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Dynamic interactions between stock markets and banks in South Africa: testing for market disciplining of banks

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DECLARATIONS

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DEDICATION

To my beautiful daughter, lily of my heart, Anopaishe Theresa Mishi

To my late sister Ekenia Mishi.

To Mishi family!

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ABSTRACT

Literature on the significance of vibrant financial system is vast and conclusive, more so on the need for strong banking system for sustainable inclusive growth. This study take cognisant of such literature and explores the possible links between stock markets and banking system, with emphasis on testing the presence of market disciplining of banks. The study analysed South African individual bank panel data for the period 1994-2014. The study makes the following contributions: testing of market discipline of banks by stock markets in a developing economy, albeit this new strand in banking sector research has been fairly a preserve for developed countries across literature; testing stock market channel of monetary policy transmission in South Africa; exploring robust estimations to mitigate downfalls with short and unbalanced panels; controlling for financial crisis as well as covering a period of Basel II & III which emphasizes market discipline as a third pillar. The role of stock market discipline in aiding regulators and supervisors in ensuring efficiency and stability of the banking system is phenomenal internationally as seen by the recognition in Basel II & III, however its effectiveness has not been empirically tested in developing countries like South Africa.

Diverse panel data estimation techniques producing robust/ corrected standard errors have been employed on the data making use of STATA 13. The study also made use on Pooled Mean Group estimates as well as dynamic fixed effects for robustness checks. The empirical results indicate that indeed stock market indicators are omitted variables in the traditional bank lending channel model and that the specified stock market channel model has no omitted variables. The presence of a stock market channel of monetary policy transmission in South Africa is established and thus vindicating the appropriate intermediate target for the central bank to be price level (inflation), with price stability being the ultimate goal. Furthermore the results point to the ability of stock markets to monitor and influence the banks (market discipline of banks) as indeed stock markets have been found to be significantly linked to banks' operations as being information aggregator and provider. The results have varied implications for policy and further research.

Key words: *Banks; market discipline; monitoring; influencing; stock markets; South Africa*

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ACRONYMS

ALSI- All Share Index

BA- Banks Act

BASA- Banking Association of South Africa

BBBEE- Broad Based Black Economic Empowerment

BCBS- Basel Committee on Banking Supervision

BCP- Basel Core Principles

BFI- Bank Financial Institutions

BIS- Bank of International Settlement

BRICS- Brazil, Russia, India, China and South Africa

BSD- Bank Supervision Department

CAMELS- Capital quality, Asset quality, Management quality, Earnings potential, Liquidity quality, Systematic risk

CAR- Capital Adequacy Ratio

CIPC- Companies and Intellectual Property Commission

CRSA- Credit Rating Services Act

CSD- Central Securities Depository

DD- Distance to Default

DTI- Department of Trade and Industry

ECB- European Central Bank

FEM- Fixed Effects Model

FGLS- Feasible Generalised Least Squares

FIC- Financial Intelligence Centre

FICA- Financial Intelligence Centre Act

FIU- Financial Intelligence Unit

FMA- Financial Markets Act

FRSC- Financial Reporting Standards Council

FSB-SA- Financial Services Board- South Africa

GDP- Gross Domestic Product

GLS- Generalised Least Squares

IMF- International Monetary Fund

IPS- Im-Pesaran-Shin

IRB- Internal Rating Based

JET- Johannesburg Equities Trading system

JSE- Johannesburg Stock Exchange

KPMG- Professional services firm

LSDV- Least Squares Dummy Variable

MBS- Mortgaged Based Securities

ML- Maximum Likelihood

NCC- National Consumer Commission

NCR- National Credit Regulator

OTC- Over-The-Counter

OTD- Originate to Distribute

PCSE- Panel Corrected Standard Errors

POLS- Pooled Ordinary Least Squares

PWC- PricewaterhouseCoopers professional services network

REM- Random Effects Model

SA- South Africa

SARB- South African Reserve Bank

SMEs- Small and Medium-sized Enterprises

SRO- Self Regulatory Organisation

SSA- Securities Services Act

STA- Standardised rating approach

STATA- Statistical software

TBTF- Too-Big-To-Fail

TRP- Takeover Review Panel

VaR- Value at Risk

WEF- World Economic Forum

WFE- World Federation of Exchanges

ZAR- South African Rand

CHAPTER ONE

Introduction and Background of the Study

"Africa doesn't need strongmen, it needs strong institutions."
– Barack Obama

1.0. Introduction

Financial markets and financial institutions interact in various ways to constitute a country's financial system. Banks and other financial intermediaries interact with financial markets, and both their strengths and their weaknesses are influenced by the fundamentals of each other and the nature of interaction. The financial system of a country summarizes those interactions in a specific arrangement (Keiding, 2016 (forthcoming). Furthermore, a country must have a strong banking sector to achieve sustainable economic growth (Onuonga-Okeri, 2014). The South African financial system is held in high regard given the high level of development, its sophistication, and the sound regulatory regime that is believed to have cloistered the banking sector from contagion of the 2008/09 global financial crisis (Mlambo & Ncube, 2011; IMF, 2015).

One such important possible link is the market discipline of banks. Market discipline is a complex phenomenon meant to solve an equally intricate situation created mainly through financial innovations. It has its roots in the fundamental problem of the corporate structure—the separation of ownership of capital (both equity and debt) and control, which lies with managers. As financial safety nets have become to be known to increase risk-shifting of banks, market discipline is agreed to be the solution to curtail this by both regulators and scholars (Cubillass, Fonseca & Gonzalez, 2010). However the study acknowledges the work of Ntim and Osei (2011) who found out that corporations with board members that meet regularly are better managed and are less vulnerable.

Financial innovation, to some extent leading to conglomeration and introduction of opaque products, has impaired the corporate structure of banks, and has been argued

to be among the drivers of financial crisis. It has become increasing difficult for the board to intricately understand the operations of financial institutions, so is the same fate faced by regulators (Keiding, 2016). Furthermore, recent crises and the repercussions have crushed the confidence of economic agents in the banking system exposing the possible weaknesses of financial systems in channelling resources to their best use (Stephanou, 2010). Due to such enhanced complexity and upped risk-taking behaviour, risk management and monitoring have equally become intricate.

The convolution motivated banking sector leaders and regulators to convene in Basel Switzerland in 1988 to come up with recommendations (now commonly known as Basel Accords) to ensure stability of the financial sector. From the maiden meeting a set of recommendations, Basel I[1], focusing on capital adequacy were made. Despite the remarkable results from implementing such recommendations (Jablecki, 2009), the 1997-98 Asian financial crisis highlighted major weaknesses in the Accord, and this led to Basel II introducing additional 'pillars' to capital adequacy to come up with three interdependent pillars: capital adequacy; supervisory control and market discipline (BIS, 2003; Gambacorta & van Rixtel, 2013; van Rixtel & Gasperini, 2013).

Subsequently, the 2008/9 global financial crisis called for further revision and improvements in the recommendations leading to Basel III introduced in 2010 (Stephanou, 2010). Over the years, vast number of countries have made significant efforts to align their regulatory structure to the Basel Accords and hence the accords have become a beacon of regulation within banking sectors. Most importantly, South African banking sector authorities have kept abreast of such developments and enthusiastically implemented the recommendations, with implementation of Basel III having already started in 2013 (KPMG, 2013; SARB, 2013). Furthermore the developments in the stock markets over time seem to be co integrated with movements in the bank specific fundamentals (SARB, 2013; Keiding, 2016).

[1] A full discussion of the Basel Accords is done in Chapter Two. The Accords are basically financial market regulation recommendations.

However, on the other hand Keiding (2016) cites various issues which may expose the extent of limitation of bank regulations in avoiding crises. Firstly, there is generally lack of enough information in the hands of regulators (SARB, 2013) due to limited access to the extent that even if action is taken it may be too late or may actually be damaging. Secondly, there are cost implications in regulating financial institutions like banks, thereby regulators may simply refrain (Haldane & Madouros, 2012; Hoenig, 2012). Lastly, Keiding pointed out that there are several parties to the regulatory framework and in some instances, it may not be clear which of these decide upon the action to be taken on the troubled bank (Haldane & Madouros; Mhango, Feb 6 2014). The latter is the argument held by critics of twin-peak regulatory framework which has been implemented in South Africa since 2013 (SARB, 2013; Gordhan, 2012; KPMG, 2013)[2]. Furthermore, it has been noted that regulatory compliance costs are prohibitively very high (Harle, et. al, 2010).

In such contexts, market discipline plays a unique role to augment the role of regulators and supervisors. Market discipline has proved to be complementary to banking regulatory supervision (Kalfaoglou & Sarris, 2006), and its promotion is meant to augment regulatory supervision acting as counterparty supervision (Greenspan, 2001; Stephanou, 2010). To be effective it, however, depends on bank disclosure policy and on ability of market participant (bank stakeholder) to monitor bank riskiness and enforce discipline (incentive to take action).

In practice, banks that do not display the appropriate risk-taking behaviour are "punished" by participants through a mechanism referred to as market discipline (Baele et. al. 2011, 2014). Such punishment is executed in three forms: depositors can withdraw their funds (quantity effect); investors demand higher returns on bank securities (the price effect); and finally, the equity market participants push down the bank's value (the valuation effect) (Inoguchi, 2008; Romero & Tabak, 2010; Hasan et al. 2013). However, the existence of any of the three forms of punishment relies heavily on market participants' incentive to do so (Flannery & Rangan, 2003; Romero & Tabak,

[2] A detailed discussion is presented in Chapter Two.

2010). Existence of the incentives and the effectiveness of the market discipline process is discussed more in chapter three when outlining the theoretical framework. On the other hand, Gueyie and Lai (2003) added that the disciplining factors of bank risk-taking include regulatory discipline, bank self-discipline (charter value), and market discipline. The focus of this study is on the latter.

Notably, the impetus for this study emerged from the third pillar of the New Capital Adequacy Framework- Basel Accord; market discipline. The framework is wholly devoted to market discipline and outlines a set of disclosure recommendations which are expected to enhance transparency and allow market participants to assess key information for banks' financial position (BIS, 2010a). In addition, enhanced disclosures on the detail of the components of regulatory capital and their reconciliation to the reported accounts, including a comprehensive explanation of how a bank calculates its regulatory capital ratios, was required as from Basel III. Basel Accord developments have provided market-related monitoring tools through early warning indicators based on high-frequency market data with little or no time lag (market wide information; information on the financial sector), (BIS, 2010; Micocci, Gregorion & Masala, 2010; Mbarek & Mezzez, 2012a; Abdel-Khalik, 2013).

Therefore, it is imperative to note here that the effectiveness of market discipline depends on availability of adequate and timely information (which, in turn, rely on bank's disclosure policy and/ or third party disclosures), the ability of the market participants to assess bank's riskiness (i.e. ability to monitor) and the ability to impose discipline (ability to influence) (Forsobaeck, 2011; Mbarek & Mezzez, 2012b; Baele, et. al. 2014). Basel Accords pillar three provides international benchmarks on banks' disclosure policy and, therefore, underpins this study. Thus, in assessing market discipline of banks in South Africa, this study is effectively testing the ability to monitor and influence banks' actions by market participants. Furthermore, the disclosure has to be efficient, and this depends upon how information translates into transparency with regards to correct assessment of the probability of counterparty risk in financial operations by participants providing market discipline (Freixas & Laux, 2011).

In general, since Basel II, there is an increase in the risk sensitivity of banking regulation and supervision and, as a consequence, there is potential for reduction in banks' risk-taking incentives and supervision costs (BIS, 2010a). Enhanced disclosure requirements allow market participants to assess the capital adequacy of an institution. According to SARB (2013), Basel II sought to enhance disclosures, thereby boosting the role of market discipline, this culminating to improved supervisory practices and techniques.

The stock market, given listed banks, is a potential source of market discipline on these institutions; however, the key questions to be asked are: is the stock market able to assess (monitor) the risk of a particular bank and influence the respective management's behaviour? Can the stock market assess bank risk and influence bank behaviour? Necessary to note is that there are several market players, notably shareholders, subordinated debtors and uninsured big depositors who can exercise the discipline (Romero & Tabak, 2010).

There are limited studies modelling this problem globally (Shimizu, 2009; Mehran & Mollineux, 2012) and in South Africa (Nel, 2001; Theobald, 2013). The study, therefore, specifically explores whether stock markets in South Africa are complete and unbiased indicators of a banks' risk-taking behaviour (bank fragility). Although, Bongini, Laevene and Majnoni (2002) noted that where information-processing is quite costly, as in most developing countries, it is important to use simultaneously a plurality of indicators to assess bank fragility. In this case, we can reliably use equity market data given substantial support form literature and the developed nature of South African stock markets (IMF, 2015). Market information is handy as it summarises information beyond what is contained in financial statements and is also available in high frequency. By increasing funding costs of the bank, market prices have the potential to discipline (Krozner, 2013; Beyhaghi, D'Souza, & Roberts, 2014; Li, 2014; Danisewic, 2015).

In this regard, it is apt to carry out a study on market discipline of banks in South Africa (SA), thereby displaying dynamic interactions between banks and stock markets. South Africa is unique as it has consistently made significant efforts to promote the role of

market forces in regulating banks and is keen on following the Basel Accords (which have started promoting market discipline since Basel II) (Masood, 2001; Van Vuuren, 2012; National Treasury, 2013; SARB, 2013). The sector is also highly concentrated, operating in a sophisticated financial system (Mlambo & Ncube, 2011).

There are, however, variations to the definition for market discipline in literature, although, in more accommodative terms, market discipline is the mechanism through which market stakeholders monitor and influence excessive risk-taking behaviour by banks. As pointed out by some analysts, market discipline has less to do with the market *per se* but more about the institutional framework (Stephanou, 2010). That relates to information, enticements, as well as control which are used to dilute the problems of moral hazard and asymmetric information prevalent in banking. This has been the cornerstone for studies testing for presents of stock market channel of monetary policy and hence this study also builds the argument form that angle at the empirical analysis stage (see Chapter Four and Five.

The background provided above highlights the significance of market discipline and how it evolves. Furthermore, there is yet no consensus on the existence of market discipline in all economies due to differences in fundamentals underpinning each financial system, namely: regulatory environments, financial sector development and innovations as well as the level of sophistication of the set of investors, among other factors.

1.1. Problem Statement

With internationalisation, increasing financial innovation and engineering supervising banks has become increasingly problematic (Birchler & Facchinetti, 2006). As a result is has become difficulty for regulatory supervisors to timeously and accurately identify individual bank's problems and/ or any system instabilities. South Africa is not immune to such challenges given the sophistication of the financial system (financial innovation) and the high concentration (as measured by Herfindahl-Hirschman Index (HHI) averaging over 0.18 with only four banks controlling over 80% of the sector assets).

Lijesen (2004) reports that a market with a HHI value between 0.10 and 0.18 shows that the market is moderately concentrated, whilst a value over 0.18 is taken to signify high concentration. Regrettably, no known study focuses on South Africa testing presence and effectiveness of market discipline (Clausen, 2012). Furthermore, there has not been any testing of stock market channel of monetary policy transmission (Fullenkamp, Chami & Cosinamo, 1999; Yoshino, Taghizadeh-Hesany, Hassanzadeh & Prasetyo, 2014).

Nel (2001) of the SARB noted that it might be a good idea for countries to test their banking systems for market discipline. Existing studies are mostly based on developed countries' data, and very little evidence exists from other countries (for example, Fannery & Rangan, 2003; Sironi, 2003; Ashcraft, 2008; Baele, et. al., 2011, 2014; Distinguin, Hasan & Tarazi, 2013). For developing countries, see Inoguchi (2008) and Romero and Tabak (2010), among the few. Furthermore, very few research papers test for the presence of market discipline using information other than yield spreads

According to Stephanou (2010), of late, market discipline has been playing an enhanced role on prudential matters as well. With the development of capital markets as well as globalization and conglomeration which limit the ability of supervisors to adequately monitor banks, market discipline has witnessed increased importance (IMF, 2015). More so, banks have seen an increase in their size, cross-border activities and complexity, making supervision a daunting task (Flannery, 2012; Bakir, 2013; Keiding, 2016). Against this backdrop, official supervisory action and market discipline will be viewed as complementary and self-reinforcing (Murinde, 2010; Andrle, Bluedorn & Eyraud et. al., 2015). In essence, bank regulation flows from the twin goals of safeguarding retail depositors and circumventing the substantial welfare costs related to the systemic effects of a bank failure. Evidently, banks might not be sufficiently disciplined, at least on an *ex ante* basis, by official supervision (Herring, 2003; Stephanou, 2010; Goldstein & Sapra, 2012).

Banks are believed to play a unique role in the financial market, which could effectively reduce the problem of information asymmetry and moral hazard (Sharpe, 1990; Cassar,

2011; Barbosa, 2012; Moro, Nuno & Tedde, 2015). Banks could access borrowers' inside information which is not available to other participants. Thus, bank loan announcements convey valuable information to the market, and market response of the stock price should be positive. On the other hand, Distinguin, Rous and Tarazi (2006) assert that until the early 90's initial warning, models of bank financial distress essentially depended on public information confined in financial statements and on macro-economic variables. However, if banks themselves are not completely monitored, over and above regulatory supervision, the consequences are adversely far reaching (Coppola, 2013; Bloomberg, 2015). It is, therefore, necessary to investigate whether stock market stakeholders are able to discipline (monitor & influence) banks in SA and whether the stock market provides additional information to enable other stakeholders like depositors to make their decisions.

Of late, recommendations have targeted the extension of the role of market forces to promote benign and sound banking systems as well as the use of market information by bank supervisors to advance the valuation of bank financial conditions (Berger, Davies & Flannery, 2000; IMF, 2015; Keiding, 2016). Such emphasis on market forces is at the centre of the regulatory framework established by the Basel Committee on Banking and Supervision (Basel II Accord) which comprises market discipline as one of its three pillars (BIS, 2010b). Through requiring grander disclosure, the intention is to increase the superiority of the information given by banks to investors; market forces are thus expected to reinforce bank capital regulation and supervision to guarantee safety. With regards to market discipline, market prices and returns imitate the precise level of individual bank risk as, distinct from insured depositors, market investors will need a risk premium which may raise banks' cost of funding and thus lessen risk-taking inducements.

A central question is therefore: do market prices convey additional information which is not already comprised in accounting data? (Curry, Elmer & Fissel, 2002; Distinguin, et. al. 2005; Bai, Philippon and Savov, 2014). Such answers are not yet available for the South African financial system and to the best of our knowledge, studies posing such questions are scant (see Romero & Tabak, 2010). This relates to the question of

presence of market discipline (monitoring and influence) of banks in South Africa. According to Baele et al (2011, 2014), if bank managers adjust the long term target value of key strategic variables and the speed of adjustment towards those targets following a risk and/or negative valuation signal, it can be interpreted as evidence of stock market influencing. In this process, regulations and supervisory practices are key in creating the necessary environment. Hence, Levene (2004) noted that regulations and supervisory practices that force accurate information disclosure and promote private sector monitoring, but do not grant regulators excessive powers, boost overall level of banking sector and stock market development.

Though market discipline is reported as necessary, Cubillass et al (2010) suggest that on average, market discipline weakens after a banking crisis. This weakening is greater in countries where bank regulation, supervision, and institutions promoted market discipline before the banking crisis. The South African banking sector was reported to have been cushioned from recent global financial crisis by the stringent regulatory measures (National Treasury, 2013; IMF, 2015); it would, therefore, be necessary to seek the effect of market discipline pre- and post-financial crisis. Based on that, the South African economy presents a unique empirical testing ground, especially among the developing economies.

1.3. Objectives

The primary objective of the study is to investigate the dynamic interactions between the stock markets and banking sector, specifically focusing at:

a. Background and trends in stock markets and bank-based characteristics.
b. Investigating the role of stock markets in the bank loan market (traditional vs. non-traditional bank lending channel).
c. Determining if stock markets have the ability to assess bank status (performance and risk).
d. Investigating presence of stock markets influence in the SA banking sector.
e. Drawing conclusions and making policy recommendations based on the study findings.

1.4. Hypotheses

The following hypotheses are tested:

1. H0: The non-traditional bank lending channel does not hold in South Africa.
   H1: The non-traditional bank lending channel does significantly hold in South Africa.

2. H0: The traditional bank lending channel does not hold in South Africa.
   H1: The traditional bank lending channel does significantly hold in South Africa.

3. H0: South African stock markets do not significantly monitor bank performance and risk.
   H1: South African stock markets do significantly monitor bank performance and risk.

4. H0: South African stock markets do not significantly influence bank behaviour.
   H1: South African stock markets do significantly influence bank behaviour.

1.5. Rationale of the Study

From the context of interaction between markets and banks, central banks and supervisory authorities are confronted with the question: should the observed market prices be taken into account for policy decisions in the area of banking and systemic stability, and, if yes, to what degree and how? The answer lies in understanding the presence and effectiveness of market discipline within an economy.

Firstly, the presence of stock market lending channel is investigated, which informs the role of stock markets in bank lending activities of each bank. Imperative to note is that literature in this regard is very scant (Krainer, 2012; 2014) and thus this study will make a contribution in this regard.

Inoguchi (2008) noted that stock markets are very useful in assessing the status of banks. In essence, the research on whether financial markets have served in terms of assessing and disciplining of banks has been done in selected advanced countries, with limited research on this question in emerging market economies like South Africa. South Africa has a highly competitive financial system globally. This is an important issue in emerging markets in terms of maintaining the domestic banking systems. According to Flannery & Rangan (2003), over and above a number of financial economists who have written numerous papers on the topic (see for example, Inoguchi, 2008; Hasan et al 2013; Baele, 2014), the Basel Committee on Bank Supervision identifies market discipline as one of the three "pillars" on which effective regulatory oversight should be based.

On the other hand, other studies have used subordinated debt to represent market information (Karacadag & Shrivastava, 2000; Baele et. al., 2014) which is not well applicable in developing economies (Inoguchi, 2008; Romero & Tabak, 2010), as markets for such debt are thinly traded and suffer from inadequate liquidity.

The stock price of individual banks can reflect a bank's risk profile, and interbank loans to domestic banks that have higher risk and bad performance may decline (Bai, et. al. 2014). If, as in Brewer et al (2003), shareholders of banks respond to the financial conditions of individual banks and the market is able to differentiate between banks in its response to the failures, then stock markets are effective in monitoring performance and helping in establishing discipline. Research into the relationship between stock prices on banks and bank performance is important as it assess the role of the stock market in measuring the status of banks. On the other hand, if bank managers can make changes to key strategic decisions, given changes in stock market based risk and performance changes, then market influencing is present (Baele, et. al. 2011; 2014).

Ghosh and Das (2005) provide three key possible benefits from improving market discipline in a country's banking sector. Firstly, moral hazard problems may be moderated by enhanced market discipline through restraint on unnecessary risk-taking by banks. Secondly, efficiency can be improved, or inefficiency entities could be forced

out of market (Berger, 1991). Third and lastly, credit standing of financial firms can be obtained from markets, which can increase the efficacy of overall regulatory supervisory, especially when combined with regulators' obtained information. The sentiments are echoed in IMF (2015).

Despite such potential role of markets to discipline banks, Stephanou (2010), reports that the global financial crisis has actually uncovered imperative weaknesses of market discipline and has cast doubts on its fundamental premise of efficient markets and on its success as a prudential mechanism. In the same vein, some commentators (for example, De Grauwe 2008) have stated their consternation with the way that market participants did not identify and adequately chastise (at least on an *ex ante* basis) those banks that accumulated unwarranted risks and later failed or had to be salvaged at great cost to taxpayers (to-big-to-fail doctrine) (Birschof, Bruggermann & Daske, 2014).

Testing of market discipline on South African banks is also essential to assess whether disclosure, as advocated by Basel Accords, and the regulatory authority in South Africa is translating to transparency or not. Disclosure translates to transparency if the disclosed information (whether by the bank itself or third party) is used effectively to monitor (assess risk-taking) and influence (effect change of behaviour) banks (Baeriswyl and Maja, 2012; Bartllett, 2012; Starita & Malafronte, 2014).

The limited research on South Africa, the uniqueness of the SA banking sector and the contradiction in literature with regards to effectiveness of market discipline encourages further analysis in this field focusing on South Africa.

1.6. Organisation of the study

The thesis is divided into 8 chapters as follows:

1. Introduction and Rationale of the study (this current chapter)
2. Overview of the South African Financial Sector
3. Literature Review
4. Research Methodology and Empirical Estimation Techniques
5. The Role of Stock Markets in Bank Loan Market

6. Do Stock Markets Monitor Bank Status in South Africa?
7. Do Stock Markets Influence Bank Activities in South Africa?
8. Summary, Conclusion, Policy recommendations and areas of further research

CHAPTER TWO

Overview of the South African Financial Sector

"Bank failures are caused by depositors who don't deposit enough money to cover losses due to mismanagement", **Dan Quayle**

2.0. Introduction

This chapter provides an overview of the South African financial system, specifically reviewing the regulations related to the sector, structure of and innovations within the banking sector and stock markets. South African National Treasury (2011), (thereafter National Treasury) notes that a nation's financial system presents a framework for conducting economic transactions as well as monetary policy.

The system is further reported as consisting of banks, insurers and pension funds as institutions; it further comprises security markets, on the other hand, and regulators among others - the central bank. Such an interlinked system is central to an economy's performance, with strength brought about by efficient interactions. Similarly, the weakness of the system can be brought about by inefficiencies of one of the role players within the system. Such inter-linkages make the system very delicate and prone to crises (Lumpkin, 2008; Bisignano, Hunter & Kaufman, 2012; Bakir, 2013).

After the introductory section follows a brief background to the financial system in general; this is then followed by the following key sections, respectively:

- South African Banking sector Regulatory environment;
- Regulation of Stock markets in South Africa;
- Trends in key banking sector variables;
- Trends in key Stock Markets variables; and
- The linkages between the two sectors.

2.1. Financial System and the Economy

A well-managed system benefits the economy immensely, while a non-functional/ unstable system has equally wider negative repercussions (Capiro, 2013; National Treasury, 2013; Onuonga-Okeri, 2014; Burton & Brown, 2014). The global financial crisis has just demonstrated the latter across different economies globally (KPMG, 2013; Keiding, 2016). For such reasons, the financial system is one of the most regulated globally, witnessing highly evolving regulations structures and mechanisms to match the innovativeness and complexity that the system is ever undergoing. From a South African point, the Financial Services Board (FSB) (2013) states that the institutional infrastructure set up for regulation of the financial sector and its supervision are relatively complex, comprising manifold government agencies; self-regulatory organisation; a number of advisory; and oversight committees (KPMG, 2013).

The primary role of the financial system is noted by Levene (1997, 2001) as the one of facilitating allocation of resources across space and time in an uncertain environment, overcoming information asymmetries and transaction costs. In the same vein, Honohan (2004) and Claessens (2006) conclude that financial system development is more likely to reduce poverty than average pro-growth initiatives. This signifies the importance of the financial system, and hence its soundness which can be ensured by effective market disciplining.

As much as the financial sector soundness determines macro-economic performance, the latter is equally underpinned by the establishment of an innovative and expanded financial sector (International Monetary Fund (IMF), 2008). It is, therefore, beneficial to the wider economy if the financial sector is innovative and continuously diversifies. However, such innovations have led to opaqueness of the products offered and increased conglomeration yielding a complex structure to

effectively monitor, at least through regulatory supervision (Forbes, 2012; Lenzner, 21 October, 2015).

In South Africa, the SARB's Bank Supervision Department (BSD) is the major government agency, created to prudentially regulate and supervise all banks in the land, including the Financial Services Board of South Africa (FSBSA) which is directed towards regulation and supervision of the majority of non-banking financial institutions and activities within the financial markets (SARB, 2012b). On the other hand, there is also the National Credit Regulator (NCR) of South Africa which is responsible for overseeing the market conduct of all credit providers in South Africa when extending credit to consumers, which reports to the Department of Trade and Industry (DTI). Imperative to also note here is that the South African financial system is ranked 28th globally and first on the continent (with South African and Morocco the only African countries in Africa in the top 50 2012 rankings) in terms of development (World Economic Forum, 2012). There are also self-regulated bodies within the financial system, with a good example in South Africa being the Johannesburg Stock Exchange (JSE) (FSB, 2013). Thakor (1996) and IMF (2015) note the trade-off between innovation and stability of the banking sector.

The South African financial system is in the hands of a few large corporations which boast a wide-ranging ownership and a variety of activities. The National Treasury (2011) reports that the sector covers assets worth over R6 trillion, having contribution towards gross domestic product of up to 10.5 per cent per annum. It further represents 3.9 per cent of the employed population, also adding to corporate income tax by at least 15 per cent. The Treasury further noted that the sector has survived the 2007-2009 global financial crisis relatively unscathed, as shown by the growth figures of 9.1 per cent per annum since 2000, in comparison to the 3.6 per cent growth attained by the wider economy over the same period. Specific to the banking sector, the post global financial crisis year-on-year growth in banking-sector assets of 9.0 per cent as at December 2011 was a marked improvement compared to the year-on-year growth of 5.3 per cent reported as at December 2010 (SARB, 2012c).

Given such significance of the financial sector to the economy, any shock is observed with interest to draw lessons for, especially among other things, regulation improvements (KPMG, 2013). According to PWC (2013), regulatory reform is regarded as the most significant development, the most pressing issue and the most significant weakness in the banking industry. The recent 2008/2009 global crisis, indeed, brought lessons to the sector's authorities. It, among many other lessons, highlighted the need for synchronization of financial regulation, macro-economic policies and systemic risks consideration (prudential regulation), (IMF, 2009; National Treasury, 2011). Such lessons went also to most successful economies which were not spared in these enervating financial woes, for example, the Euro area (Greece and Italy are remarkable examples of prolonged suffering). In most instances, real economy fundamentals accede to the effects of a poorly performing financial sector in a leading and/ or coincidental manner. This demonstrates the strong link between the financial and real economic variables. The interconnections of individual banks make contagious easier and wide spread (Kawai, 2009; Forrest & Yip, 2011).

Such developments draw the debate to the roles of financial sector in contemporary economy. Specifically, according to Butterworth & Malherbe (1999), Sutton and Jekkings (2007), Ibhrahim (2007) and BIS (2010b), the following roles are key:

- Allocating capital from the economy's resources: A weak financial system misuses these resources as what was experienced in the Asian countries where funds were directed to low return projects in the periods leading to the Asian 1997/98 financial crisis;
- Managing the financial risks in an economy: There are three types of risks to be managed by intermediaries which are: credit risk; maturity misalliances; currency mismatches. From the corporate and banking balance sheet, the extraordinary build-up of risks made Asian economies to succumb to economic volatility; and
- Generating added value for the economy: As reported in National Treasury (2011, *as discussed above*), financial organizations contribute to the gross domestic product, employ a sizeable chunk of the working population, and contribute to tax revenue as well as generate earnings from foreign exchange.

The financial system is, therefore, both highly vulnerable to financial crises and important for economy's well-being. At the origins of the recent 2008/9 global financial crisis, two key problems can be identified - that of macroeconomic disequilibria globally and derisory regulation in the financial sector in comparisons to product innovativeness witnessed (National Treasury, 2011). To provide some resistance to shocks to the sector, regulations have been put in place to curtail excessive risk-taking and even-out the playing field. Supervisory units are present in all economies, of one form or the other, with different degrees of success in such endeavour.

The financial system directly contributes significantly to the wellbeing of the economy. A snapshot of the financial services sector contribution to GDP and employment shown below bore testimony.

Table 2.1. Gross Value, Assets, Employment and Tax contribution by the financial services sector of South Africa: 2000-2014

	June 2000	June 2010	Relative size 2010
			Share of GDP
Size*	R68.6bn	R203.8bn	10.5 %
Assets	R 1 890bn	R 6040bn	252%
Of which:			
Banks	R 730bn	R 3040bn	127%
Long term insurers**	R 630bn	R 1440bn	60%
Short term insurers	R 50bn	R 90bn	4%
Pension funds (public and private)	R 470bn	R 1480bn	62%
			Share of formal employment
Employment***	286000	356 353	3.9 %
			Share of corporate taxes
Tax contribution[+]	n/a	R21 bn	15.3%

Source: South African National Treasury, 2011

** Size is gross value added in nominal rand of the financial intermediation and insurance component of the finance, real estate and business services sector. Estimate based on projected growth.*
*** The long-term insurer assets figure includes assets of pension funds managed by an insurance company*
**** Financial intermediation, insurance, pension funding and auxiliary services.*
- Estimate as detailed disaggregated data is not available. The total financial services, business services and real estate and business services sector contributes R39.6 bn or 29% of corporate tax. Excludes VAT and other taxes.

According to National Treasury (2011), as of 2010 the South African financial sector comprised of over R6 trillion in assets, contributed 10.5 per cent of the economy's GDP annually, employed 3.9 per cent of the employed people, and contributed at least 15 per cent of corporate income tax. Fort the past decade and half, that is from 2000, the South African financial sector has witnessed a significant growth of 9.1% compared to the paltry 3.6% by the rest of the economy. Furthermore, over the same period, the sector came out as one of the fastest growing employer with the number of people employed rising by 24.5 percent. On another front, the sectors' assets rose significantly, with a nominal compound growth of 12.3 per cent between over a decade (2000-2010). As a result, the sector's assets currently represent 252 per cent of the economy's gross domestic product (GDP). IMF (2015) reports that the South African banking sector assets are about 298 per cent of GDP and exceed those of other emerging economies, with commercial banks alone contributing over 112 percent.

From the overview of the regulatory structure of the South African system, it is becoming clear that challenges and innovations within the sector have made the regulations more and more complex, and involvement of multiple stakeholders in the process has been witnessed. The latter is well captured by the migration from Basel I through to Basel III where additional focus points have been added to the 1988 capital adequacy framework. From Basel II, additional two pillars were introduced to the one on capital adequacy. These are for supervisory review and market discipline.

2.2. Regulations and Supervision Governing the South African Financial Sector

According to de Lange and Petros (2009), the South African financial sector landscape has changed dramatically since 1988, with the following major changes having been witnessed:

- Deregulation of financial markets;
- Globalisation (and financialisation);
- Competitive pressures;

- Improved technology (new products and new delivery systems);
- Conglomerations (through mergers and acquisition);
- Risk management revolution; and
- Changing role of disintermediation (risk transfer).

These changes compelled a re-look of regulations (for example, migration from Basel I to Basel II and to the recent Basel III); expectantly one would argue, the link between banking sector and the stock markets changed in the process (Falkena, 2001; Barth, Caprio & Levine, 2005, 2008). Each development in the regulatory front is regarded as reinforcing, especially after a shock to the system which could illuminate some weaknesses on current regulations (Lumpkin, 2009) as can be deduced from the commentary on Basel III that it will bolster the regulatory framework for banks (National Treasury, 2011, 2013).

At the G-20 meeting held in Mexico, 2012, South Africa committed to global financial regulatory reform agenda targeted towards consolidating financial stability (National Treasury, 2013). The pledges are in fourfold:

- Strengthening the regulatory framework – this will be achieved by coming up with necessary principles to improve weak areas of the regulatory system;
- Effective and coordinated supervisory network – improving the domestic and international coordination of our regulators in effort to enhance effective governance and coordination. Proposal for twin peaks regulation flowed from this commitment;
- Resolving crisis issues and managing systemic institutions – addressed by managing the cost of any financial institution's failure to minimal levels. Should some institutions be considered too-big-to-fail (TBTF) and afforded bail-out from the fiscus, which in some parts of the world is argued prompted negligence and reluctance to effectively manage risk; and
- International assessment and peer review – checking alignment of the regulatory system to international best practices. The financial system is ever revolving, so should be the regulations. Moreover, learning form peers is

beneficial as experiencing a crisis brings about valuable lessons for future regulations.

The commitments have shaped regulatory reforms and will do so in the foreseeable future. Some of the reforms related to these pledges will be discussed in more details in following sections.

2.2.1. Summary of the current South African financial regulation system

As mentioned earlier, there are a number of agencies responsible for regulating and supervising the South African financial sector, as follows:

- SARB: Specifically the BSD (The Office for Banks of the SARB) is tasked to register and supervise banks in South Africa through legislative authority. The BSD reports directly to the Minister of Finance mainly matters to do with legislation despite it being a department under the SARB. This institutional dependence is historical (National Treasury, 2013);

- FSB-SA: The focus is on regulating and supervising financial sector operations including, for example the stock exchange, the securities firms, clearing houses, the central securities depository, financial advisors and intermediaries. As its latitude extends to financial advice and intermediaries, banks are also under its scope. It falls under the auspices of the Minister of Finance;

- JSE: This is one of the Self-Regulatory Organisation (SRO) with broad regulatory responsibilities that flows from the Finacial Services Board. It is mandated with a primary regulatory responsibility of licensing members and employees, as well as coming up with standards for listing and disclosure requirements for the listed entities. Accordingly, it is responsible for market surveillance and enjoys power to discipline its member firms and their employees, so are listed companies, and the directors;

- DTI: The department is responsible for the following: the NCR; the National Consumer Commission (NCC); the Takeover Review Panel (TRP); the Companies and Intellectual Property Commission (the CIPC); and the Financial Reporting Standards Council (FRSC). DTI is key in the financial system and its well-being because of the roles played by the agencies under its auspices;

  The DTI funds the NCR, established by the National Credit Act, which regulates consumer credit provision. On the other hand, the TRP is in charge of assessing public company mergers and acquisitions. Earlier, it was noted that one of the major changes within the financial system has been conglomarisation through megers and acquisitions. Company disclosure form the crux of market discipline, from the DTI the CIPC is responsible monitoring on-going public company disclosure duties, as well as registering all corporations, and intellectual property rights. Finally and equally important to market discipline is the FRSC, which a policy standard-setting body responsible for disclosure requirements and standadisation and benchmarking.

Other related agencies and/ or bodies include:

- Council for Medical Schemes (CMS): This is for the insurance sector and reports to the Department of Health, being responsible for regulating medical insurance schemes;

- Financial Intelligence Centre (FIC): It was created by the Financial Intelligence Act Centre of 2001, responsible for setting regulatory requirements to detect and prevent money laundering, commonly known as FICA requirements within the banking sector. Each individual supervisory body remains accountable for FICA compliance of the institutions it supervises; and
- Statutory advisory boards: In South Africa, the statutory advisory boards and standing committees give strategic and policy input to the numerous financial regulatory bodies.

The relationship and interaction of all these various agencies is summarised diagrammatically in Figure 2.1 below.

Figure 2.1: The Current Regulation System in South Africa

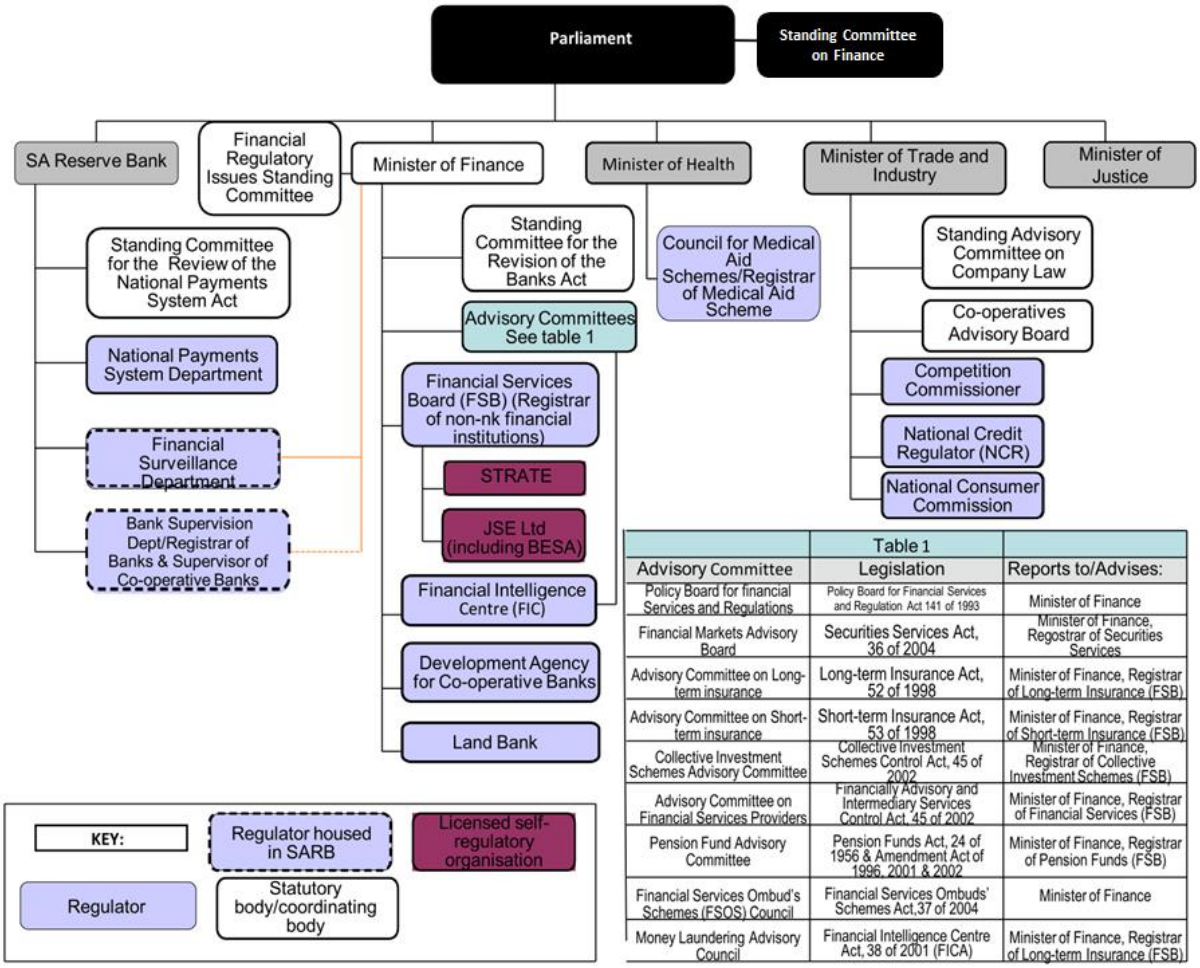


Table 1

Advisory Committee	Legislation	Reports to/Advises:
Policy Board for financial Services and Regulations	Policy Board for Financial Services and Regulation Act 141 of 1993	Minister of Finance
Financial Markets Advisory Board	Securities Services Act, 36 of 2004	Minister of Finance, Regostrar of Securities Services
Advisory Committee on Long-term insurance	Long-term Insurance Act, 52 of 1998	Minister of Finance, Registrar of Long-term Insurance (FSB)
Advisory Committee on Short-term insurance	Short-term Insurance Act, 53 of 1998	Minister of Finance, Registrar of Short-term Insurance (FSB)
Collective Investment Schemes Advisory Committee	Collective Investment Schemes Control Act, 45 of 2002	Minister of Finance, Registrar of Collective Investment Schemes (FSB)
Advisory Committee on Financial Services Providers	Financially Advisory and Intermediary Services Control Act, 45 of 2002	Minister of Finance, Registrar of Financial Services (FSB)
Pension Fund Advisory Committee	Pension Funds Act, 24 of 1956 & Amendment Act of 1996, 2001 & 2002	Minister of Finance, Registrar of Pension Funds (FSB)
Financial Services Ombud's Schemes (FSOS) Council	Financial Services Ombuds' Schemes Act,37 of 2004	Minister of Finance
Money Laundering Advisory Council	Financial Intelligence Centre Act, 38 of 2001 (FICA)	Minister of Finance, Registrar of Long-term Insurance (FSB)

Source: (National Treasury, 2011)

From this, it is easier to pick the regulations that pertain to the banking sector and those that relate to the stock markets in the South African financial system. Each catergory is discussed, in turn, in the next sections.

In line with the regulatory system depicted above, ideally, the financial system regulators involved in the South Africa are as shown in Table 2.2 below.

Table 2.2: Selected Regulators in the South African Financial Sector

	Entity	Current Function	Currently Reports to
1	Bank Supervision Department (BSD)	Banking sector (prudential) regulation	Reserve Bank
2	Financial Services Board (FSB)	Regulator of non-bank financial institutions	Minister of Finance
3	National Payments Systems Department	Payment system oversight	Reserve Bank
4	Exchange Control Department	Exchange control regulation	Reserve Bank/ Minister of Finance
5	National Credit Regulator (NCR)	Regulator of credit provision	Minister of Trade and Industry
6	Co-operative Banks Supervision	Regulation of co-operative banks (over R20million)	Reserve Bank
7	Co-operative Banks Development Agency	Regulation of co-operative banks (under R20million)	Minister of Finance
8	Financial Advisory and Intermediary Services ombud	Resolve disputes with between financial services providers and customers	FSB
9	Pension Funds Adjudicator	Resolve disputes with respects to pension fund management	FSB
10	Industry ombuds	Resolve disputes in long-term insurance, short-term insurance and banking services industry	FSB
11	Johannesburg Stock Exchange (JSE)	Licensed self-regulating securities exchange	FSB
12	Strate	Licensed self-regulating central securities depository	FSB
13	Financial Intelligence Centre (FIC)	Preventing financial crimes: Anti-money laundering and combating the financing of terrorism	Minister of Finance
14	Council of Medical Aid Schemes	Regulation of medical aid schemes	Minister of Health

Source: National Treasury, 2013

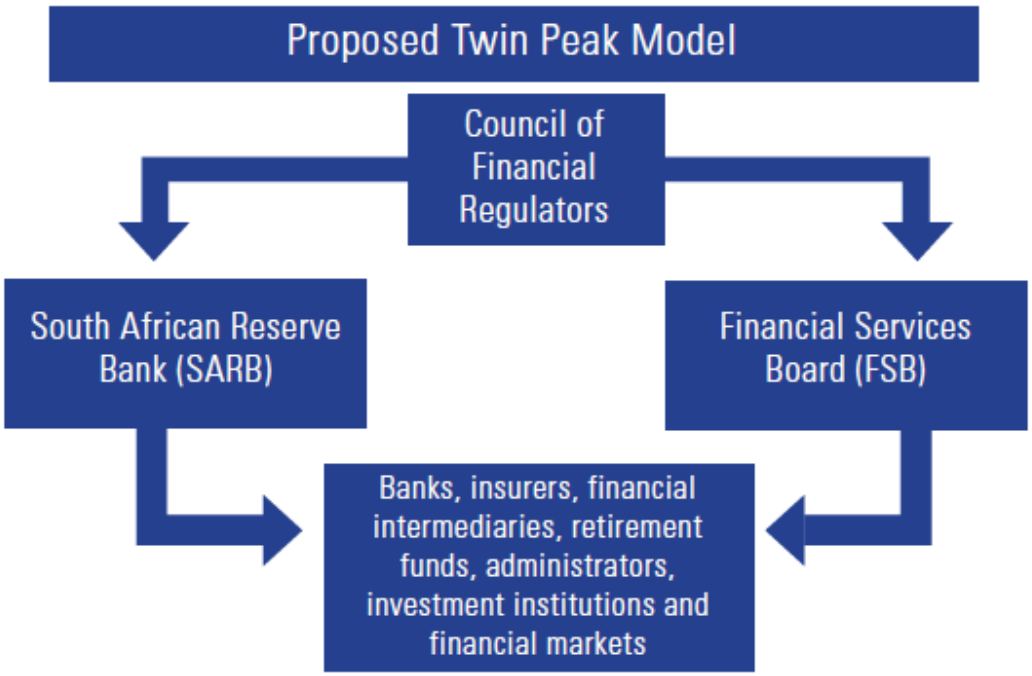
2.2.2. Twin Peaks Regulation (2013-.)

A single-regulator approach for South Africa was opted for after the 1993 Melamet Commission (National Treasury, 2011). New financial systems challenges started

to emerge, thereby pushing for a rethinking of regulatory structure, and with the occurrence of global financial crisis since 2007, a move towards a twin peak model as was in use in the UK was initiated in South Africa.

The twin peak regulation encompasses prudential regulation which aims at maintaining funds' and financial institutions' safety, soundness and solvency and market conduct, a new regulatory angle and philosophy, which is designed for the perspective of the customers. The combined effects of the two, prudential regulation and market conduct, have a bearing on market discipline. Figure 2.2. below illustrates the structure of the twin-peak regulatory model. According to this diagram, the model ideally has two centres of regulatory power, the central bank and the FSB, both under the overarching council.

Figure 2.2: The New Regulatory structure – Twin-Peak Model



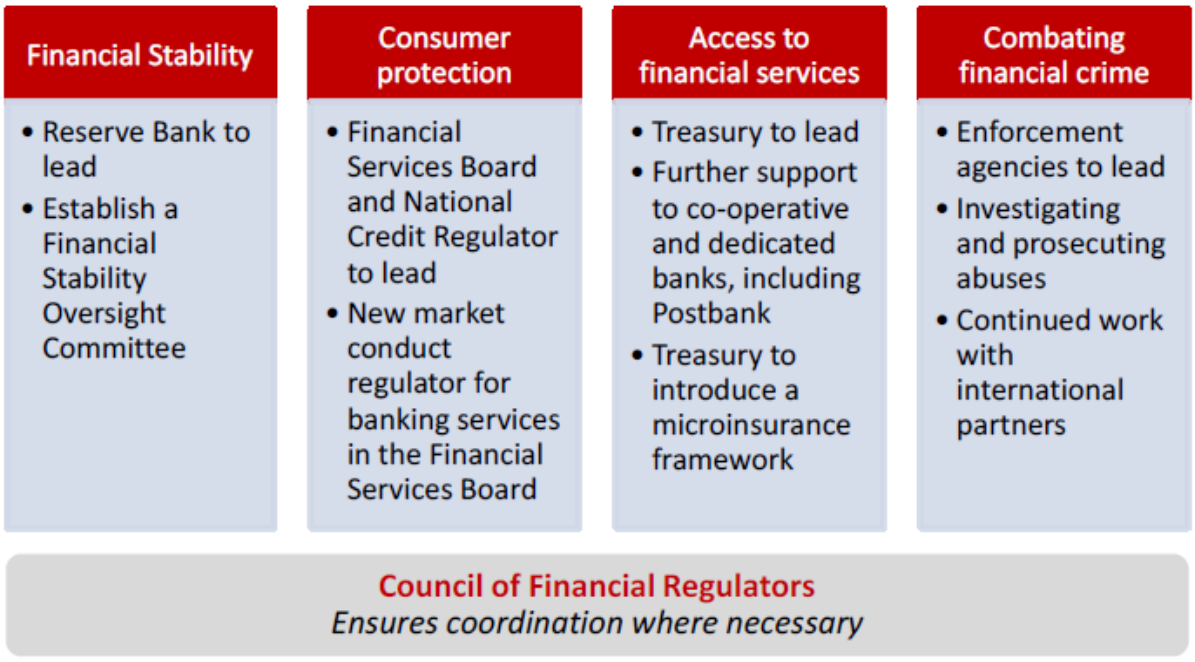
Source: KPMG, 2013

The twin-peak model has had its share of criticism (see Mhango, Feb 6 2014; Schoenmaker & Peek, 2014; Gottschalk, 2014) but touted in other circles as a clearer

framework (Weber, Arner & Baumann, 2014). Conclusive empirical results are yet to come by given its recency.

The specific regulatory functions are divided among the members of the council of regulators as displayed in Figure 2.3.

Figure 2.3: The new Financial System Regulation



Source: South African National Treasury, 2011

According to National Treasury (2013), the implementation of Twin Peaks reform is a multiyear project, with a two-phase process envisaged. Furthermore, the National Treasury (2011) noted that the process is phased in, mindful of the possible risk of wearying the capacity of any regulator over the transition era. The phases are as follows:

Phase one:

- The first component is establishment of new prudential authority within the reserve rank, tasked to oversee and ensure safety and soundness of banks, insurers and financial conglomerates; and

- The other leg is establishment of a new market conduct authority to safeguard financial system customers as well as establish an oversight on the development of ways in which business is conducted by the financial services providers. Furthermore, it is tasked with ensuring the integrity and efficiency of financial markets as well as promoting effective financial consumer education**.**

Phase two:

- The existing sectorial legislations (like the Banks Act) are gradually amended or replaced with laws that more appropriately align with the Twin Peaks framework.

In order to see this coming into action, the following controls were publicised in 2010:

- Financial Stability Oversight Committee: This comprises the SARB, FSB and National Treasury, co-chaired by the central bank Governor and the Finance Minister;

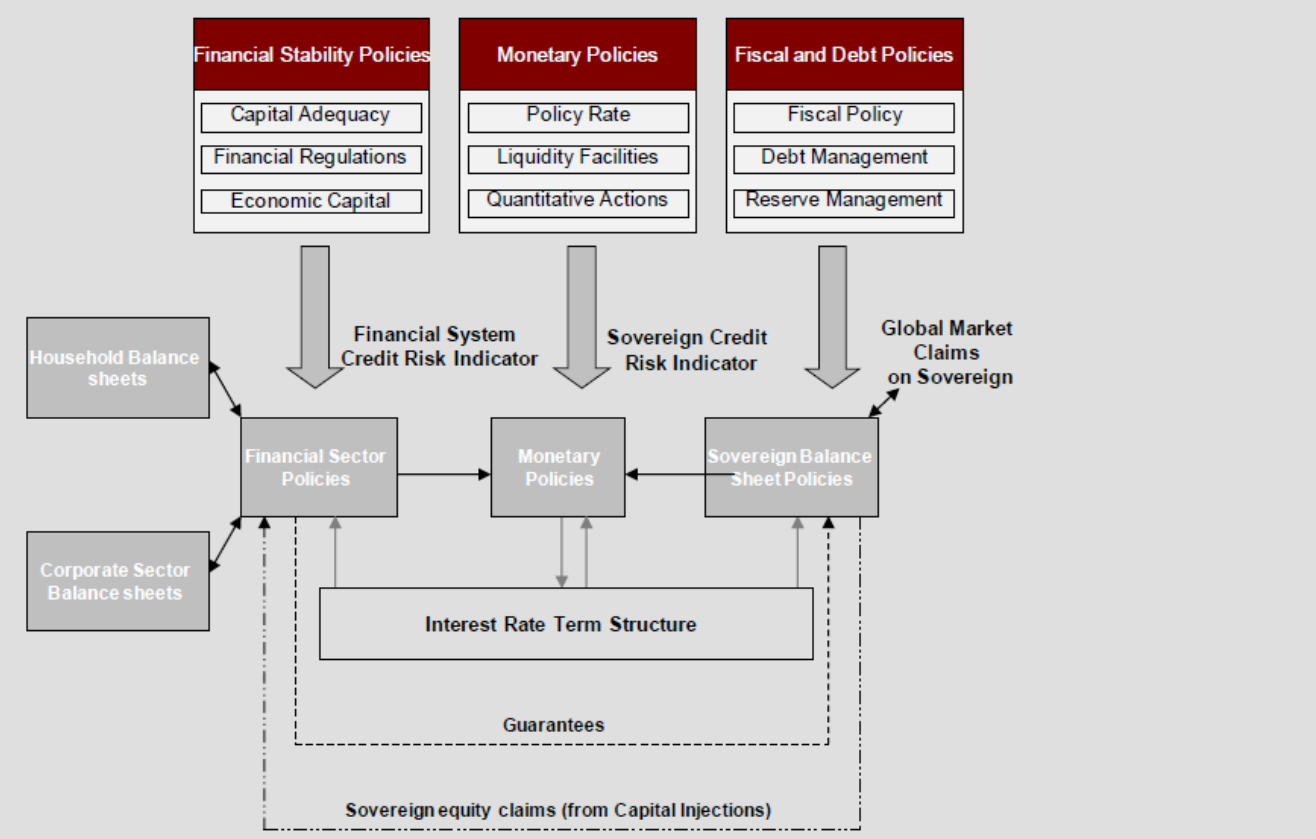
- Council of Financial Regulators: Its set-up was motivated by the need for coordination across agency and regulators for legislation, enforcement and market conduct related matters. The Independent Regulatory Board for Auditors, as a standard setter, will also be part of the council. This Council is not meant not be involved in running the business of the regulators, but will have limited meetings;

- Improved banking and financial crisis resolution frameworks: This pertains to improvement in interagency coordination that have been witnessed in the resent past will go a long way in shaping and consolidating the framework for South Africa's resolution and crisis management. The National Treasury and the central bank have considered a broad shared assessment of the crisis exigency framework; and

- International peer review: Notably, the G-20 countries, pledge to the financial sector international peer assessments. South Africa was jointly assessed and ranked as very good by the IMF and World Bank in 2010 on compliance with international regulatory best practice in its financial sector. (National Treasury, 2013).

Macro-prudential regulations efficacy is determined by how well the different policies within the financial sector interact. Figure 2.4 below graphically displays how the policies should interact for a healthy financial system, bearing in mind, however, that regulatory supervision is necessary but not sufficient to curtail risk-taking by banks (Mbarek, 2011; Bai, et. al., 2014).

Figure 2.4. : Macro-prudential Regulations: Understanding how the Financial Sector Policies Interact



Source: SA. National Treasury 2011 - Gray and Malone (2008)

The emphasis on macro-prudential is as a result of the weaknesses observed with microprudential regulatory structure. It can be deduced that the macro-prudential approach is an effort to detect and mitigate risks as a result of financial institutions' linkages. Levene (2004), National Treasury (2011) and IMF (2015) acknowledge that once one an institution 'catches a cold', the whole system, or at least a number of institutions within the system 'cough' as well. The same applies to actions taken to advance certain entities' viability of sustainability which can result in unintended outcomes or adverse effects on others. This is contrary to micro-prudential supervision which is premised on the desire to have a single entity or group attain prudential soundness without much regard to other players within the system, (Gray & Malone, 2008). The financial crisis was a great wake-up call as it illuminated the weaknesses of micro-prudential approach in that macro-economic risks, such as the increasing linkages between large financial institutions, went undetected (National Treasury, 2011, 2013).

Having looked at the regulations in the financial sector as a whole, the discussion proceeds to the specific regulatory environment of the banking sector in South Africa and that of the stock markets to gain a better undertanding of the two sectors of interest in this study.

2.3. Banking Sector regulations

The responsibility for the regulation and supervision of banks lies with the SARB, as guided by the Banks Act of 1990 (BA), with authority exercised through the Registrar of Banks and the Office for Banks, also known as the BSD (IMF, 2015). The SARB and the BSD also have the responsibility for the regulation and supervision of mutual banks as provided by the Mutual Banks Act of 1993. The National Credit Regulator (NCR), which reports to the Minister of Trade & Industry, has a certain regulatory power over lending activity for consumer protection. The Financial Intelligence Center (FIC) acts as the country's Financial Intelligence Unit (FIU) (National Treasury, 2013).

As mentioned above, banking sector regulations are under the custodian of the South African Reserve Bank, and there was a move towards twin-peak regulation (since 2013) which saw SARB regulating prudential matters and FSB being responsible for market conduct (KPMG, 2013).

The following table provides a summary of primary statutes and regulations governing the South African banking industry.

Table 2.3.: Legislature Governing the Financial System in South Africa

Legislation	Focus	Overseeing banks
Banks Act 1990	- Regulates and supervise the deposit taking from the public	-
Financial Services Board Act 1990	- Oversees compliance with financial services legislation	- Provide for the compliance supervision board enactment to check a bank's alignment financial institutions' and the provision of financial services laws
South African Reserve Bank Act 1989	- Responsible for regulating the SARB and monetary policy	- Registrar of banks is within the SARB - Role of a central bank
National Payment Systems Act 1998 (NPS Act)	- offers guidelines for the running, regulation and supervision of payment, clearing and settlement systems in South Africa	- recognized as a body focused on organizing, managing and regulating the participation of its members, that is banks, in the payment system;
Inspection of Financial Institutions Act 1998	- affords the scrutiny of the dealings of financial organizations (as banks) and of those unregistered bodies undertaking business of financial institutions	-
Currency and Exchanges Act 1933	- Regulates legal tender, currency, exchanges and banking. Exchange Control Regulations issued in terms of that Act imposes exchange control that restricts the export of capital from South Africa	-
Financial Intelligence Centre Act 2001 (FICA)	- provides for the formation of a Financial Intelligence Centre and a Money Laundering Advisory Council meant to fight money laundering actions and terrorism related business financing	- Monitors and guides banks to be accountable institutions in terms of their performance and FICA compliance
Financial Advisory and Intermediary Services Act 2002 (FAIS)	- provides for the regulation of rendering of particular financial advisory and intermediary services to clients	-
Co-operative Banks Act 2007	- ensures cooperative banks' regulation and supervision.	-
NationalCredit Act 2005 (NCA)	- Provides for consumer credit regulation, improved standards of consumer information, prohibiting unfair credit practices and credit-marketing acts. It also discourages reckless credit granting, encouraging debt reorganisation in cases of over indebtedness, regulates credit information and affords for registration of credit bureau, credit providers and debt counselling services.	- Oversees the registration of credit providers and monitoring the consumer credit market and industry to deter and /or detect prohibited and ensures prosecution where violation is identified.
Mutual Banks Act 1993	- affords mutual banks activities' regulation and supervision	-

Source: Author compilation using information from, SARB 2010-2013

2.3.1. Banks Act

This Act polices the banking sector, whilst the BSD under the central bank specifically sets regulations in terms of the Act and oversees the industry (National Treasury, 2011; SARB, 2013; BSD, 2014). The BSD has implemented the Basel Core Principles for Effective Banking Supervision which are used as benchmark when assessing the on-going effectiveness of its supervisory process. In line with the Basel Accords, the Core Principles for Effective Banking Supervision are the *de facto* minimum standard for sound prudential regulation and supervision of banks and banking systems (Basel Committee on Banking Supervision, 2011). These Core Principles were originally issued in 1997 by the Basel Committee on Banking Supervision, to be used by countries as a benchmark for assessing the quality of their supervisory systems and for identifying future work to achieve a baseline level of sound supervisory practices. South Africans have adopted all the Basel Accord guidelines and recommendations, hence follows the principles prescribed thereof. Moreover, the Core Principles are a benchmark used in the Financial Sector Assessment Programme (FSAP) to assess the effectiveness of countries' banking supervisory systems and practices by the International Monetary Fund (IMF) and the World Bank (Basel Committee on Banking Supervision, 2012).

Butterworth and Malherbe (1999), Falkena, (2004) and National Treasury (2011) bemoaned that the South African banking sector policies have significantly inhibited –to some extent even prohibited - foreign-registered firms' activities. Foreign bank branches that operate in South Africa cannot depend on their parent companies' capital; they must have their own on-shore capital, with a higher minimum value. Currently, there are no implications for a controlling entities or individuals in the event that a bank becomes insolvent. Furthermore, these branches are effectively barred from the retail banking market. In general, it is noted that a foreign shareholder may not acquire or hold more than 15 per cent of the shares of a bank or controlling company without the permission of the Minister of Finance, which is done in consultation with the Competition Commission (Getting the Deal Through, 2012).

From the prudential regulation perspective, capital requirements apply to all banks operating in South Africa, and some of such necessities are obstructions to the

functioning of the foreign branches. The said capital requirements are divided into endowment, operating capital and liquidity requirements as discussed below:

- **Endowment capital**: Every foreign branch is required to bring in endowment capital to the value of R250 million. The amount must be in Rands and held in South Africa. Getting the Deal Through (2012) reports that banks have to ensure that primary and secondary capital as well as unimpaired reserve funds are above this minimum of 250 million or an amount representing a prescribed fraction of the sum of amounts in relation to the different classes of assets and other risk exposures of the bank determined as set out in the regulations covering banks.

- **Operating capital**: Every bank registered in the land should meet the minimum capital requirements prescribed based on the Basel Accord. The banks are to uphold 8 percent capital to risk-adjusted asset ratio, which must be located in South Africa as well. Looking at the recent past in South Africa, the Banking Supervision Department, (2012) notes that the banking sector remained adequately capitalised with total banking-sector equity increasing by 12.1 per cent during 2011. Furthermore, total capital adequacy improved from 14.9 to 15.1 per cent bewtween December 2010 and 2011. The report also notes that the Tier 1 capital-adequacy ratio (CAR) of the banking sector increased from 11.8 per cent to 12.2 per cent during the same period; and

- **Liquidity requirements**: According to this requirement, from the liabilities, 2.5 per cent (of deposits, for example) have to be kept with the Reserve Bank in a non-interest bearing account. Furthermore, on some categories of liabilities as may be prescribed in the banking regulations, a bank must hold liquid assets amounting to at least such liabilities' amounts (Getting the Deal Through, 2012).

The regulations are to ensure that banks are well capitalised and in a position to meet short-term obligations as they become due (liquid), and this will entail ability to cushion any shocks.

On the other hand, the Banking Supervision Department (2007) reports that the Registrar of Banks has, under the Banks Act of 1990, titled securitisation schemes as activities that do not fall in the context of "the business of a bank", given that such schemes stick to the requirements set in the Schedule. Securitisation is one of the ways the banking sector has been increasingly woven into the financial markets developments and, therefore, has great implications on effectiveness of market discipline and, thus, to this study.

2.3.2. Basel Accords- Basel Committee on Banking Supervision

As has been noted earlier, South African Banking sector authorities have adopted the Basel Core Principles aligning the Banks Act with the Basel Committee on Banking Supervision recommendations and guidelines. This, specifically and materially, resulted into Core Principle 5 (Licensing Criteria) of Basel Accord being addressed in Section 52 of the Banks Act. This, notably, requires South African-registered banking groups to gain written approval from the Registrar prior to the establishment or acquisition of any subsidiary, cross-border branch, representative office or any undertaking that has its registered office or principal place of business outside South Africa (Banking Supervision Department, 2012). According to IMF (2015), South Africa has a high level of compliance with the Basel Core Principles for Effective Banking Supervision. The different versions of the Accords, to date, are reported below, indicating the improvements required in the banking supervisory role.

Basel I

Basel I is a framework of minimum capital standards introduced in 1988 by the Basel Committee on Banking Supervision. This set of recommendations was known as the 1988 Basel Accord and was enforced by law in the Group of Ten (G-10) countries from 1992. The framework was designed to increase the safety and soundness of the international banking system and to set a level playing field for banking regulation. Although praised for achieving its initial goals, it has been heavily criticised because

the low risk sensitiveness of its capital requirements may lead to greater risk-taking and regulatory capital arbitrage practices by banks (Basel Committee on Banking Supervision, BCBS, 1999).

Financial innovation has created opportunities for regulatory capital arbitrage and increasing evidence of distortions in modern banking necessitated the supervisors and international regulatory bodies to be innovative. One such notable achievement has been the introduction of disclosure requirements among the Basel recommendations.

The main criticisms of Basel I include:

Firstly, it is a one size fits all approach. The recommendations lacked differentiation factor as all banking institutions, be it investment versus commercial, as well as from all economies around the globe (developed, emerging and developing) were expected to comply with the minimum capital adequacy ratios. Furthermore, Heffernan (2005) noted that using equity as a measure of bank capital adequacy, as recommended by Basel I Accord, largely ignores the fact that countries have different degrees of access to capital markets. This puts into question the cross- country studies that have embarked on assessing market discipline using measures like equity as proxy for capital adequacy in capturing and comparing bank fundamentals in different economies.

On the other hand, the Basel I focus was narrow, focusing only on credit risk with disregard of market and operational risk. The distortion was that the same capital needed to be set aside despite different levels of counterparty risk (Hogan & Sharpe, 1997).

Furthermore, the Accord (Basel I), as argued by Blundell-Wignall and Atkinson, (2010), motivated disintermediation through shifting of on-balance sheet assets and securitising them with off balance sheets at lower weights. Capital was easily shifted to less regulated categories, thus allowing capital arbitrage to dominate. For example,

mortgages and corporate loans could be securitised as Mortgage Backed Securities (MBSs) or Collateralised Debt Obligations (CDOs), respectively, which would create room for changing risk weights (Lybeck, 2011).

On the other hand, there were discrepancies around the constituents of the Tier 1 & 2 capital which incentivised innovation form the side of financial institutions. This is so because there was no capital earmarked in the event that debt instruments like longer maturity bonds lose value as a result of interest rate and liquidity risk (Heffernan, 2005).

Basel II

Due to the criticisms recorded above, the Basel Committee proposed a new framework in 1999 which was set to be gradually implemented until 2006, (Heffernan, 2005; Balin, 2008). The revised framework was formally titled “A Revised Framework on International Convergence of Capital Measurement and Capital Standards” and has come to be known as Basel II. The purpose of Basel II Accord was to correct the shortcomings of Basel I, as discussed above (Lybeck, 2011). In the Accord, financial institutions have been encouraged to use Value at Risk (VaR) models to determine possible loss from each portfolio daily (BIS, 2004). Flexibility was introduced through allowing banks, mainly the large ones and those with sophisticated systems and robust risk management systems, to use internally developed models to measure risk levels (Balin, 2008).

Basel II succeeded Basel I from 2004, and to achieve the safety and soundness of the financial system, it relies on three pillars: minimum capital requirements, supervisory review, and market discipline (BIS, 2013; National Treasury, 2013). The third pillar of greater relevance to this study is promoted by developing a set of disclosure recommendations that enables market participants to evaluate vital information fragments to determine financial soundness of the institution. Generally, conditions necessary for the disclosure to be effective, that is, translate to transparency according to Basel Committee on Banking Supervision (2001) include:

materiality- implying misstatement or omission of such information could result in different opinion about the company; Proprietary information- does the information to be disclosed have the potential to undermine competition such information can include, for banks, among other things, information on customers, products or systems?; Frequency of disclosure- if proper monitoring is to take place, how frequent should the information dissemination be? Lastly, how comparable is the disclosed information across different institutions, in other words, are firms disclosing exactly the same kind, volume and quality of information as discrepancies will defeat the disclosure purpose (Bai, et. al., 2014).

From 2004, Basel II started to be implemented, and the challenges for banks on the road to Basel II's implementation were general skills shortage, the quality of data, systems constraints and new system requirements - all adding to the burden of regulation (PricewaterhouseCoopers, 2007). The challenges were faced at international scale, with variations in reactions to address them from country to country. South Africa has, however, responded to the constraint on resources by launching training programmes, secondments and making use of external experts, mainly auditors (International Monetary Fund, 2008). This has helped South Africa to be relatively ahead with implementation of the Basel requirements, as noticed in IMF assessments (IMF, 2008; 2015).

International Monetary Fund (2008) asserts that Basel II strenghtened the regulatory framework for banks and the Accord's January 1, 2008 implementation deadline has been met by the South African banks. Given that there are various approaches, the SARB approved the standardized and internal rating based (IRB) approaches. The IRB approaches to credit risk assessment has, by 2008, been implemented by banks holding a total of 80% of the overall sector assets.

South Africa is reported to have taken part in a pilot project for the implementation of Basel II in January 2008 run by IMF and World Bank (IMF, 2008). Not surprisingly, the succeeding process was smooth, and the Accord did not affect the capital standing for the four largest banks. The SARB has made a commitment to achieving global best practice in its supervisory regime (SARB, 2013). Over and above this

Basel Accord implementation, the BSD has implemented the recommendations in the FSAP report of 2000. South Africa conducted self-assessment of compliance with the October 2006 Basel Core Principles (BCP) and has identified few areas of noncompliance, which is relatively better compared to other emerging economies.

Basel II has been criticised for pro-cyclicality and securitisation (Heffernan, 2005; National Treasury, 2013; IMF, 2015). With regards to pro-cyclicality, financial institutions could adjust their desire to extend credit in accordance to the business cycles. On the other hand, with securitisation in line with risk-shifting discussed above, banks acted as conduits of risk transfer as they originated the loan and then transfer the credit risk to yield seeking institutional investors. Furthermore there were over-reliance credit-rating agencies to estimate company credit risk and give a rating that would allow banks to price lending on a risk adjusted basis. According to Cumming and Nel (2005), the disadvantage is that Small and Medium sized enterprises (SMEs) could easily be crowded out due to lack of ratings by any agency. SMEs are driving a number of economies and are used as vehicles for inclusive growth and emancipation of the previously disadvantage individuals and groups.

As a result of these weaknesses, the committee further revised the recommendations and came up with Basel III, which is the one currently being implemented.

Basel III

Basel III guidelines are a response of Basel Committee on Banking Supervision (BCBS) to the 2007-2009 financial crisis aimed at strengthening individual financial institutions as well as the overall financial system by eliminating the weaknesses that were identified with Basel II that were illuminated during the crisis (Jacobs & van Vuuren, 2013). Basel III introduces new capital, leverage, and liquidity standards to reinforce regulation, supervision, and risk management of the financial sector. It reinforces the three Basel II pillars through Rules that must become laws and regulations in each participating country by January 1, 2013 (Adamson, 2012). On 21 November 2012, the SA Minister of Finance approved the amended regulations relating to banks, which were in line with the requirements of the Basel III framework

(Banking Supervision Department, 2012). The report further notes that South Africa, along with Australia, Canada, China, Hong Kong SAR, India, Japan, Mexico, Saudi Arabia, Singapore and Switzerland are the only countries that published finalised Basel III regulations effective from 1 January 2013. Furthermore, regulations have been revised and guided by the Accords in line with current thinking with regards to banking supervision, which, among others, foster robust market discipline through sound supervisory practices in the areas of corporate governance, disclosure and transparency (Banking Supervision Department, 2012).

In terms of the new capital regulations from the Basel Accord III, South Africa is in a better position to fully comply with the modifications to the Basel framework (National Treasury, 2011) as the banks are already holding capital in excess of the newly set levels. Furthermore, even though the supervision department has no interest in capital maintenance buffers, all banks have in excess of the Basel buffer requirements. From the global liquidity standards perspective, however, local banks do not presently satisfy the requirements (National Treasury, 2013). Structural changes to the financial system are needed in order to comply with the standards, which would allow banks transform their funding maturity.

The greater part of the Basel III reform package had started to be implemented in member countries since beginning of 2012, and the requirements pertaining to liquidity are to be continuously phased until January 2019. In order to have a smooth implementation in South Africa, the central bank has already made proposals to revise the Banks Act regulations (National Treasury, 2011).

South African banks are considered to be conservatively capitalised with core Tier 1 and Tier 1 capital ratios that comfortably comply with the Basel III requirements (Fitch, 2011). Furthermore, Fitch does not expect that the enhancements to the Basel II framework and Basel III amendments will materially affect the core Tier 1 capital ratios of the major SA banks. In support of that, as with Basel II, the major banks have all indicated that the transition to the higher capital requirements of Basel III, effective since 1 January 2013, should occur without significant deterioration in regulatory capital levels (PWC, 2013). PWC further argues that such a well-capitalised status is a venerable credit to the South African Banking sector, both for

the banks' prudent business practices as well as for the strong regulatory capital regime adopted by the system's regulator over the years. Basel III sets stringent capital standards through more deterring capital definitions, higher risk-weighted assets (RWA), additional capital buffers and advanced requirements for minimum capital ratios (PWC, 2013). Capital adequacy is a cornerstone for preventing bankruptcy and is the one credited for South African sector for weathering the global financial crisis which paralysed many systems, including some in advanced economies (BIS, 2012b; Kganyago, 2012).

The regulations are linked and developments in one influence the other. For example, Getting the Deal Through (2012) notes that the Banks Act regulations have been revised in line with Basel II. In South Africa, the amendments were implemented from 1 January 2012 (National Treasury, 2013). Furthermore, the requirements contained in the Basel III framework were phased in as from 1 January 2013 (IMF, 2015).

To take this into perspective, Theobald (2013) noted that the over-regulation of the South African banking sector prior 1980 was due to the massive institutional regulations implemented. The resulting challenges made the government to appoint a commission (De Kock Commission) in 1987 to look into possible structural reforms to address the over-regulation that was inhibiting growth of the sector and its effectiveness. The De Kock commission bore the Banking Act of 1990 which is still enforced to this day (Botha & Makina, 2011). The Banking Act of 1990 introduced internationally sound standards of risk management and has made the sector resolute and steadfast in the global financial crisis wake. Shocks to the system form the financial crises, notably the Asian Financial crisis 1997/8, the South African domestic financial crisis (microloan crisis) of 2001/2 and the recent global financial crisis in 2007-2009 ignited a number of reforms in the regulatory environment. Such reforms touched on a number of aspects never integrated in regulations before like corporate governance (Erkens, Hung & Matos, 2009; Calice, 2010; Bainbridge, 2012).

2.3.3. Corporate Governance and new regulatory paradigms

Furthermore, corporate governance is one of the contestable issues in relation to crisis aftermath and new regulatory paradigms such as the FSB have drawn up improvements to compensation practice (Bainbridge, 2012). Through recent governance structures, there is an argument that financial institutions have been under lower levels of market monitoring than non-financial corporations (Mehran & Mollineux, 2012). This analysis stems from the key differences between financial and non-financial corporations, mainly: multiplicity of stakeholders in banking corporations and complexity in their operations. It follows then that control of management and board of directors in banks by the multiple stakeholders could be limited.

There are arduous responsibilities resting on bank directors, given that they are trustees ensuring that public deposits and savings are adequately secured. It is, therefore, important that persons included in the boards of directors of banks be of a wide-ranging pool of skills, capability, understanding and are available to discharge such duty of trust resting on them (Banking Supervision Department, 2007). Basel Committee has developed Principles for Enhancing Corporate Governance, in order to promote good corporate governance. The principles requires banks to have an internal audit function with sufficient authority, stature, independence, resources and access to the banks' board of directors (Banking Supervision Department, 2012). Linked to this complication is the question of executive compensation and composition of the boards. The concern is that compensation practices of banks, in the short-term, should not promote bankers to engage in unwarranted risk-taking and what could be the effect of residual compensation on risk appetite.

To sum up the banking sector regulatory platform, currently, there are no serious changes expected separate from the continued compliance with Basel Accords (current implementation of Basel III) and harmonizing local standards with international benchmarks (Getting the Deal Through, 2012; IMF, 2015). The proposed migration to a 'twin peak' regulation system, as discussed in preceding paragraphs, is one of the announced steps to be followed to improve the financial services and enhance the regulatory framework.

Accordingly, banks in South Africa are requested and required by pieces of legislation, from the ones discussed above, to submit at regular intervals specific financial and other reports which are then analysed by the regulatory authorities with a view to identifying adverse developments, such as potential default trends (Getting the Deal Through, 2012). Moreover, banks are also subjected to on-site inspections, mainly checking compliance with prudential and conduct-of-business requirements.

2.4. Stock markets Regulations

South Africa has a developed financial infrastructure, including a stock exchange, a Central Securities Depository, a national payment system, and credit bureaus (IMF, 2015). The Johannesburg Stock Exchange (JSE) is the primary exchange in South Africa, the largest in Africa, and 19th in the world (JSE, 2014; IMF, 2015). It offers primary and secondary markets for a range of financial products, including equities, bonds and derivatives and is supervised by the Financial Services Board (FSB) (JSE, 2014).

According to National Treasury (2011), the JSE was rated by the World Federation of Exchanges as the number one stock exchange in 2010, in terms of regulation by the World Federation of Exchanges (WFE). As an SRO, the JSE is required to fulfil a number of regulatory duties in compliance with the requirements of the Financial Markets Act, 2012 (FMA) (JSE, 2014). To ensure compliance, the SRO Oversight Committee was created as a committee of the JSE Board in 2011mandated to oversee the SRO activities of the JSE. It serves as an independent check on the appropriateness of the JSE's SRO activities and the manner in which conflicts of interest are managed by the JSE (JSE, 2014).

The 1985 Stock Exchange Control Act regulates the JSE, while the 1989 Financial Markets Control Act polices financial institutions (Butterworh & Malherbe, 1999). In line with the theme of delivering on Africa's promise, existing legislation and regulations are also continuously updated to ensure that loopholes are closed and

good governance practices are captured in the statutes (FSB, 2013). There are two new acts that have been signed into law, these are: the Financial Markets Act, No 19 of 2012 (FMA) and the Credit Rating Services Act, No.24 of 2012 (CRSA). The acts are targeted at addressing the fundamental issues emerged as flaws within market structures during the collapse of the sub-prime market in the USA and the contagious spread world over. The FMA that has replaced the Securities Services Act now broadly regulates the securities industry in South Africa (JSE, 2014). As a new aspect, the FMA tackles over-the-counter (OTC) trading in derivatives, which was instrumental in spreading the subprime contagion across financial markets.

Table 2.4: Legislature Governing the Capital Markets in South Africa

Legislation	Focus
Financial Markets Act, 19 of 2012	• To provide for the regulation of financial markets; to license and regulate exchanges, central securities depositories, clearing houses and trade repositories; to regulate and control securities trading, clearing and settlement, and the custody and administration of securities; to prohibit insider trading, and other market abuses; to provide for the approval of nominees; to provide for codes of conduct; to replace the Securities Services Act, 2004, as amended by the Financial Services Laws General Amendment Act, 2008, so as to align this Act with international standards; • In terms of section 9.1(e) of the Financial Markets Act (FMA), the JSE is required to have an investor protection mechanism in place to enable it to provide compensation to clients in certain circumstances
Securities Services Act No. 36 of 2004 (SSA); effective 1 Feb 2005	• Used to govern the regulation of securities services in South Africa to include securities exchanges, central securities depositories (CSDs), clearing houses, and their respective members • Consolidated the South African regulatory framework for capital markets and aligned the regulation and supervision of South African financial markets with the prevailing international developments and regulatory standards.
Financial Institutions (Protection of Funds) Act No 28 of 2001	strengthen the Registrar's regulatory and supervisory powers in respect of inspections, curatorship and other enforcement measures
The Financial Services Board Act No 97 of 1990	strengthen the Registrar's regulatory and supervisory powers in respect of inspections, curatorship and other enforcement measures
Inspection of Financial Institutions Act No 80 of 1998	strengthen the Registrar's regulatory and supervisory powers in respect of inspections, curatorship and other enforcement measures

Source: Government Gazette, 2013; JSE, 2014

On the other hand, the Credit Rating Services Act, Act No 24 of 2012 (CRSA) ensures that South Africa has legislation in place on an "at least" equivalent basis with international regulatory requirements and in line with the G20 requirement of regulated and accountable credit rating agencies at a global level (FSB, 2013).

Crediting raters are an important stakeholder in the financial sector as they aggregate information into a single figure that can easily be monitored by other unsophisticated stakeholders. Investors pay much attention to credit ratings, and therefore the conduct of the agencies should be constantly checked to ensure that there is no conflict of interest and have them hold economies at ransom.

According to IMF (2015) for securities companies, while the FSB is responsible for supervising fund managers and exchanges, the supervisory responsibility for market intermediaries is divided between the FSB and the Johannesburg Stock Exchange (JSE). The FSB does not have any role in issuer supervision, which is undertaken by the JSE for listed companies and by the Department of Trade and Industry (DTI) for unlisted companies. The FSB also regulates the JSE (including SAFCOM, its clearance and settlement subsidiary), Strate Limited, and pension funds. Overall, this regulatory arrangement ensure that stock markets functions well, being more information efficient in order to be able to aggregate any firm's fundamentals and reveal it in stock pricing (Bai, 2014). In terms of market discipline, information efficiency facilitates easy monitoring (Distinguin, et. al. 2005; Bai, et. al. 2014)

2.5. Structure and Trends in the banking sector

The banking sector is very dynamic with innovations and competition posing threats to others and opportunities for some over time. Financial disintermediation, on the other hand, (Gurley & Shaw 1960; Hester 1969) represents a movement away from using the traditional banks as intermediaries toward a system where financial transactions take place directly between savers and borrowers. With disintermediation, banks lose their importance in providing value to their customers with these customers sourcing more favourable returns and/or financial services either through NBFIs or by directly transacting in non-bank capital markets (Blundell-Wignall & Atkinson, 2010; IMF, 2015).

South Africa's banks rank second in the world for soundness, according to the World Economic Forum (WEF), 2012). The Banks Act of 1999, which sets out strict rules in terms of audit committees, directors' suitability and qualification, mandatory

disclosure to the public and the power of intervention by the Reserve Bank of South Africa has led to South African banks surviving and thriving through the economic downturn without the need for bailouts and recapitalisation. Among other things, the reasons given for the resistance have to do with the fact of limited exposure to foreign credit and shunning of toxic investments by domestic banks.

Mboweni (2008) regarded that the South African banking industry withered the global financial crisis because of its sound regulations and hence stability of the system, despite the crisis ransacking a number of developed economies' financial systems. As a result, authorities and researchers have alluded to the South African experience citing prudent regulatory system and stringent risk controls to weaken the transfer of shocks between the financial system and the real economy, as seen by lack of bank failures nor the call for government support, (Singh, 2010; IMF, 2015).

2.5.1. Structural features of the banking sector

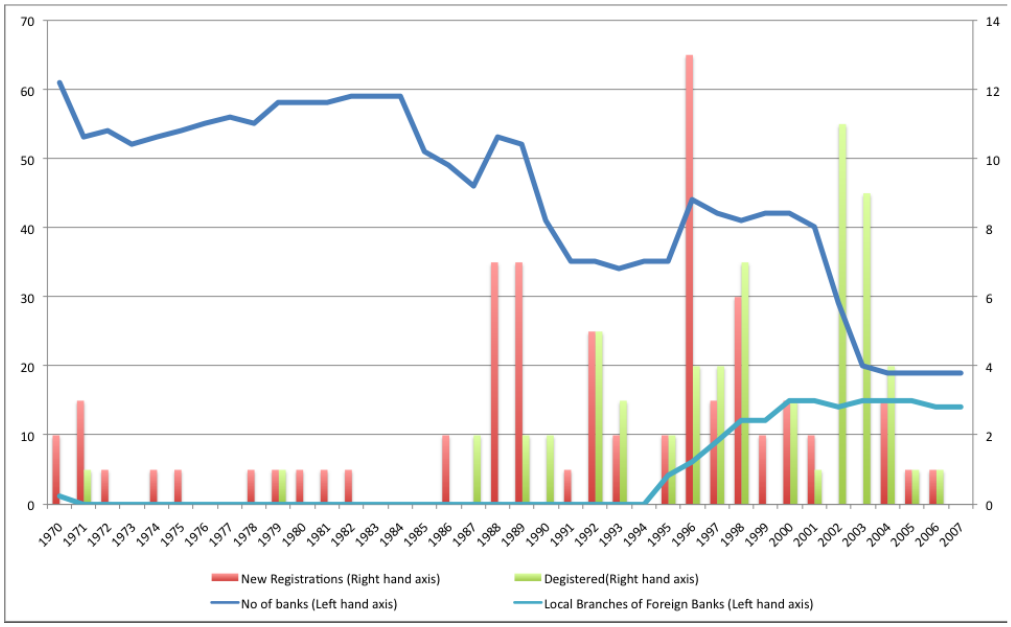
Trends in selected variables within the banking sector will aid in reviewing major trends witnessed by the sector over the period under review. The structure of the South African banking sector is distinct from those in other economies as it is less fragmented and has four entities representing around 85% of total banking industry assets (IMF, 2010). Therefore, the industry is highly concentrated.

The following variables are useful:

2.5.1.1. Banking entities registered in South Africa

Considering prior year 2000, there were 43 banks and mutual banks registered in South Africa at the end of 1998. Over the same period, several foreign firms have entered South African financial markets as the economy returned to the global community in 1994 (Butterworh & Malherbe, 1999). Such phenomenon accelerated innovation, widened product choice, and demanded enhanced regulatory standards. The graph below reveals the trend on registering and deregistering of banks since 1970.

Figure 2.5: Trends in Bank Registration and Deregistration in South Africa, 1970-2007



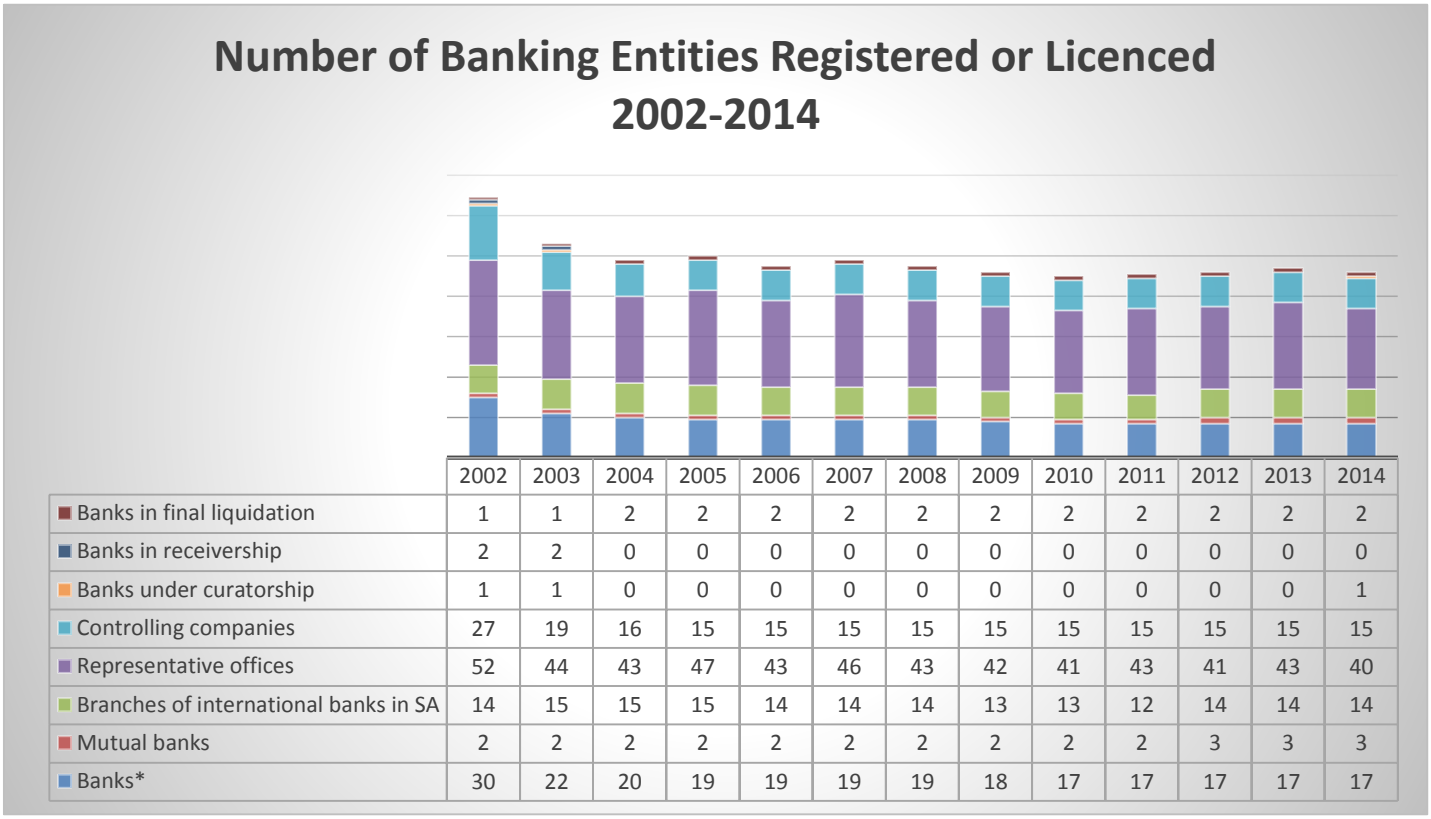
Source: Gilbert, Calitz & Du Plessis (2009)

As shown in Figure 2.5. above, there has been significant growth in new bank registrations post 1987 although the trend was more cyclical recording highest registrations of 13 new banks in 1996. This saw a significant increase in the number of registered banks since 1994, levelling off in 2001 and beyond. The number of deregistered banks was highest in 2002, where a total of 11 banks deregistered, and the following year (2003) saw 9 banks exiting. This happened in the work of the domestic loan market crisis (local financial crisis of 2001/2-2003) (Theobald, 2013).

On the other hand, Figure 2.6 below continues the display of trends in the number of banks registered in South Africa since 2002. The number had fallen from 30 banks in 2002 to only 17 as of 2014, with mutual banks remaining at two. There has also been a significant decline in the number of controlling companies over the same period. Two banks have been under final liquidation since 2004.

The number of international banks with authorised representative offices in South Africa declined from 43 in December 2013 to 40 in December 2014. As at the end of December 2014, one bank, namely African Bank, was under curatorship.

Figure 2.6: Number of Banks in South Africa, 2002-2014



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Banks in final liquidation	1	1	2	2	2	2	2	2	2	2	2	2	2
Banks in receivership	2	2	0	0	0	0	0	0	0	0	0	0	0
Banks under curatorship	1	1	0	0	0	0	0	0	0	0	0	0	1
Controlling companies	27	19	16	15	15	15	15	15	15	15	15	15	15
Representative offices	52	44	43	47	43	46	43	42	41	43	41	43	40
Branches of international banks in SA	14	15	15	15	14	14	14	13	13	12	14	14	14
Mutual banks	2	2	2	2	2	2	2	2	2	2	3	3	3
Banks*	30	22	20	19	19	19	19	18	17	17	17	17	17

Source: SARB, 2014

Branches of international banks in SA declined from 13 to 12 between 2010 and 2011 as The Royal Bank of Scotland NV cancelled its banking license with effect from 31 January 2011. On the other hand, the number of representative offices increased from 41 in December 2010 to 43 in December 2011.

2.5.2. Concentration and competition of the banking sector

It is traditionally believed that a high level of concentration shows that the banking sector is suffering from a low level of competition-the so-called structure-conduct performance paradigm. The four main banks, in terms of size and economy-wide coverage, in South African are Standard Bank, FirstRand, Nedbank and ABSA. However, IMF (2015) noted five large banks in South Africa namely: ABSA Bank, FirstRand Bank, Nedbank, Standard Bank of South Africa and Investec Bank. Four of these five large banks are providing full-scale banking services nationwide, while Investec's operation is focused on corporate and private banking businesses. The

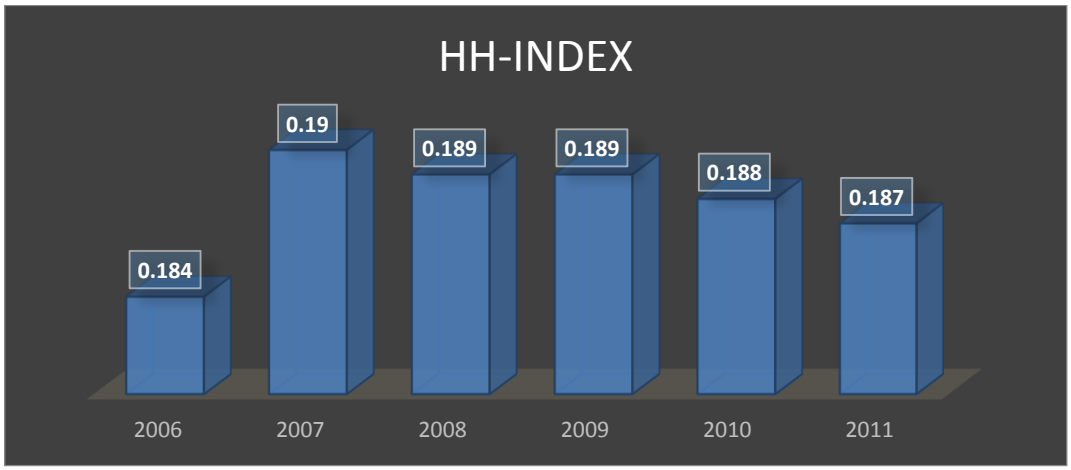
rest of the sector consists of 7 locally owned banks, 5 subsidiaries of foreign banks, and 14 branches of foreign banks (end-2013).

The Herfindahl-Hirschman Index (HH-Index) has widely been used to measure concentration within an industry and is the one employed by the South African banking sector authorities. The graph below illustrates the high levels of concentration within the South African banking sector. An HH-index of above 0.18 is generally considered very high, and this sector has experienced very high concentration levels over the period under review. Having increased sharply between 2006 and 2007, the index decreased marginally from 0.189 by December 2009 to 0.188 then 0.1887 as at December 2010 and 2011 respectively.

Such levels of concentration can be attributed to the continued dominance of banking-sector assets by the “big-four” banks, which accounted for 84,1 per cent of total banking-sector assets at the end of December 2011, a marginal drop from 84.6 percent in December 2010, (Banking Supervision Department, 2012). As of 2015, five large banks (ABSA Bank, FirstRand Bank, Nedbank, Standard Bank of South Africa, and Investec Bank) controlled over 90% of the total sector assets (IMF, 2015).

Concentration levels have great implications for market discipline, as having few big entities will pose a danger to the whole system if one fails. (Blundell-Wignall, et. al., 2008; OECD, 2008) Such systemic relevance of these few institutions may be construed in the “too-big-to-fail" (TBTF) dictum by authorities. Henceforth, as investors perceive that a TBTF bank would always be rescued by the authorities, no risk premium for lending money to that bank will be necessary. Ultimately, market discipline in such a scenario would be ineffective.

Figure 2.7: Herfindahl-Hirschman Index for the South African Banking System (2006-2011)



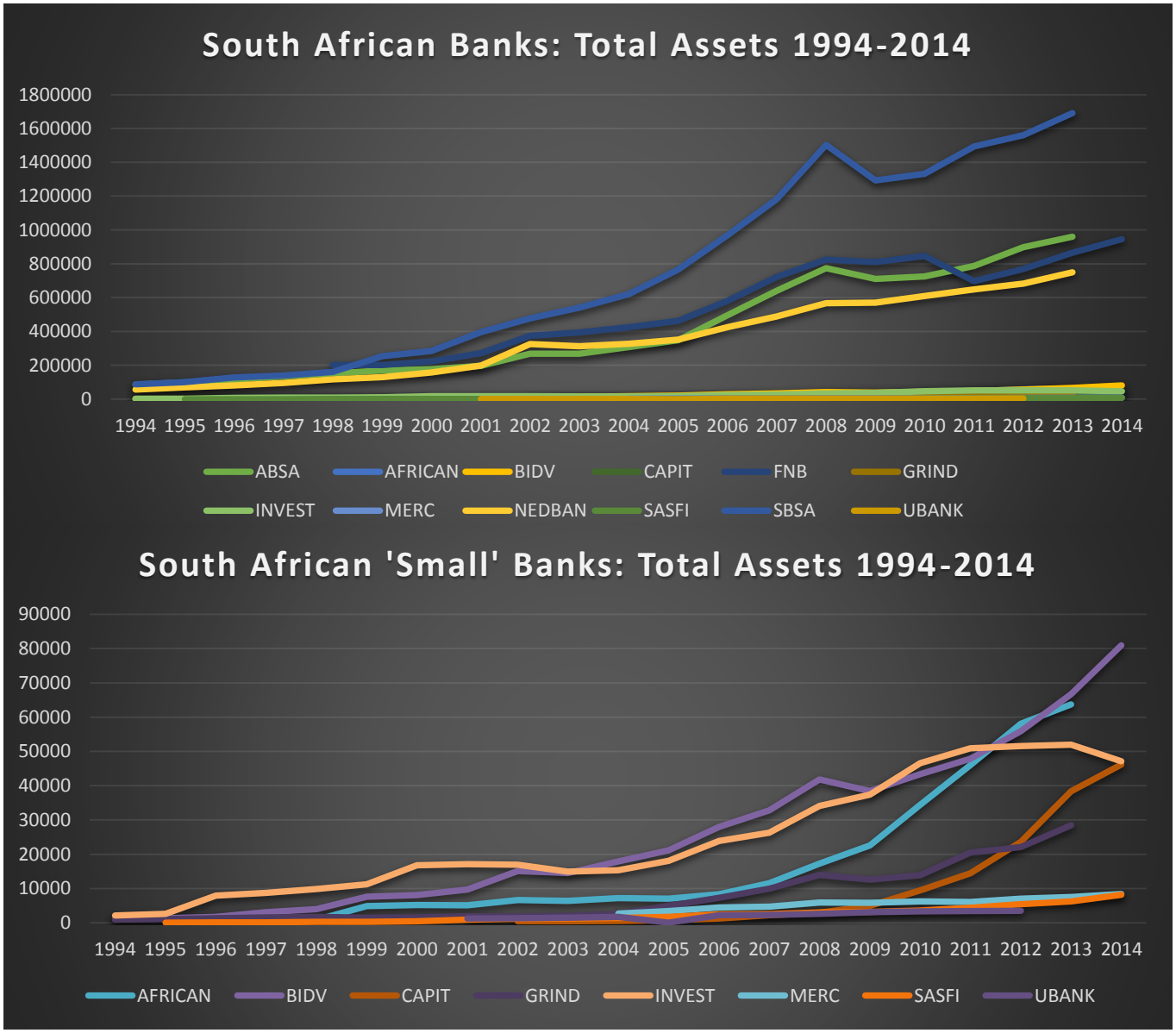
Source: Banking Supervision Department, 2012

One driver of high concentration has been conglomeration which has far-reaching implications for corporate governance and regulations alike. In some cases, corporate governance may encourage connected lending with a weak risk analysis of customers, concealed losses and any unsound financial position (Falkena, et al., 2001). This is argued to have played a significant role in a number of bank failures in Latin America and South East Asia. Among the "big-four" banks, all fall under group companies, except for Standard bank. The graph below shows comparisons of total assets of the four major players.

Also of interest to this study is bank size. Mehran et al. (2012) showed why market discipline in large banks remains a serious challenge. The nature of the South African banking sector makes the study stimulating globally as it presents a unique opportunity to test if bank size matters. In literature (see Mishi & Tsegaye, 2012; Mehran et al, 2012), bank size is measured commonly as a log of total assets.

As shown in Figure 2.8 below, very few banks (four): (Standard Bank, SBSA; First National Bank, FNB; Amalgamated Banks OF South Africa, ABSA and Nedbank) hold the greatest position of the banking sector assets over the years (upper panel of Figure 2.8). The bottom panel shows the smaller banks' total assets trend, with Capitec, Bidvest and African Bank (before its closure) driving the assets volume in this sub-group.

Figure 2.8: The major players in the South African Banking industry



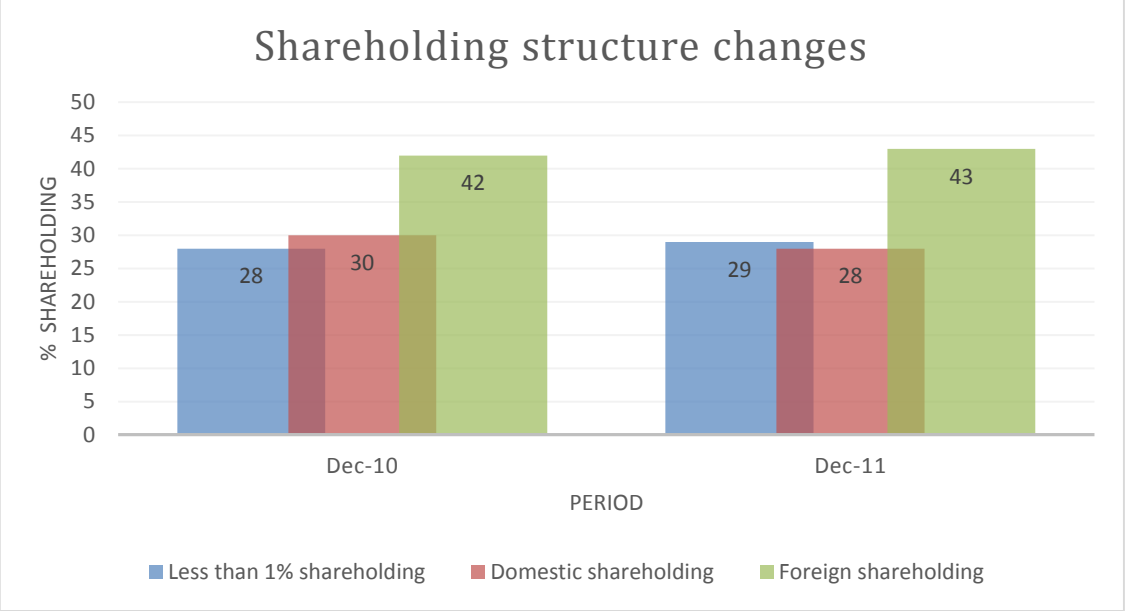
Source: Author's Drawing; data from BankScope, 2014

2.5.3. Shareholding structure

Shareholding structure relation to market discipline emanates from the theoretically grounded argument that agency problems and risk-taking behaviour are different according to the nature of the shareholder (Jensen & Meckling, 1976). From the figure below, in South Africa, foreign shareholders held 43.2 per cent of the nominal value of the South African banking sector's shares in issue at the end of December 2011 compared to 42.3 per cent in December 2010 (Banking Supervision

Department, 2012). An explanation to that can be obtained by looking at the shareholding structure of the four largest banks, for example, Absa Bank Limited has 55.5 percent foreign shareholding. This could drive significantly the high percentage of banking-sector shares held by foreign shareholders, overall.

Figure 2.9: Shareholding Structure of the SA Banking Sector (per cent), nominal value of shares



Source: Authors drawing; Data from Banking Supervision Department, (2012)

According to Forssbaeck (2011), market discipline is more strongly exerted in banks with higher leverage. Furthermore, Sullivan and Spong (2007) show that stock ownership by hired managers is positively linked to bank risk. This implies that behaviour of managers is conditional, as under certain conditions (being a shareholder of the bank), hired managers operate banks more closely in line with stockholder interest.

The South African government has no ownership interest in the banking sector (Getting the Deal Through, 2012). This can be good news given that in literature, it has been underlined that state owned banks have poorer loan quality and higher default risk than privately owned counterparts (Berger et al, 2005; Iannotta, Giacomo & Sironi, 2007).

On the other hand, mutual banks and the government owned banks are the least profitable, while foreign owned ones show high performance than other banks (differences are more pronounced in developing countries) (Bonin, Hasan & Wachtel, 2005; Micco, Ugo & Monica, 2007).

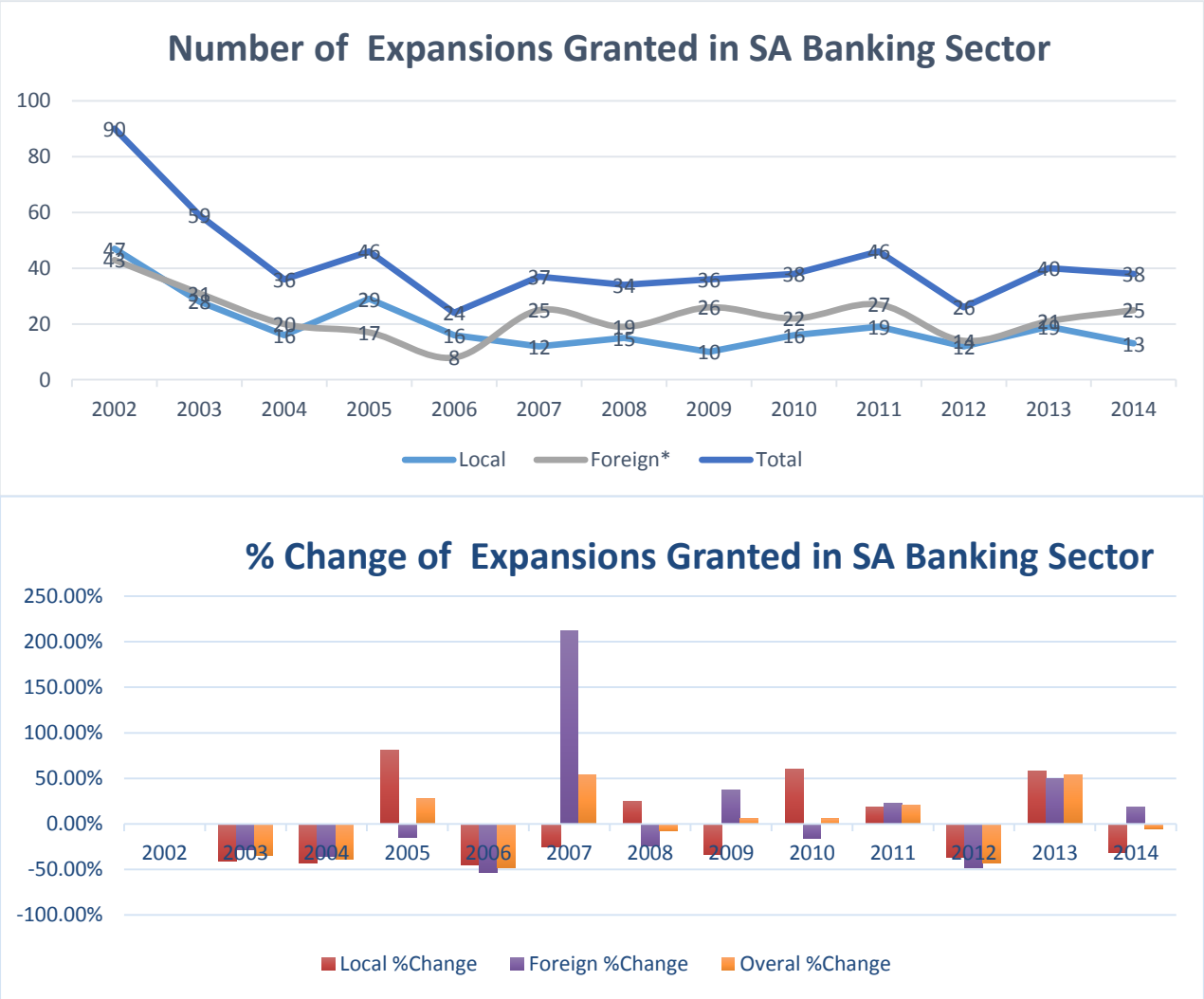
2.5.4. Conglomerations (mergers and acquisitions) and Globalisation (Global presence of SA banks)

According to Baele, et. al. (2014) noted that a conglomerate institutions is one that combines at least two of the three financial activities: banking, securities-related activities, or insurance. This is a manifestation of functional diversification of banking institutions which is often proxied by the proportion of non-interest income. As mentioned under 2.4.2. above, conglomeration has increased concentration levels. More so, it also aids in complicating bank operations, gives room to conceal risk, thus rendering supervision a daunting task (Boot, 1996; 2000; Van Hoose, 2009; Mehran & Thakor, 2011). Flowing from the Basel Committee's Core principles, as highlighted above, the Core Principle 5 commends the banking supervisors to "have the power to review major acquisitions or investments by a bank or a bank controlling company, against prescribed criteria, including the establishment of cross-border operations".

Acquisitions have implications on competition and structure of entities, which, in turn, have a bearing on supervision effectiveness. Figure 2.10 below, with two panels- the upper one showing the count and the bottom one showing percentage changes, shows the number of applications approved by the BSD in accordance to the section 52 of the Banks Act over a period of ten years to 2011.

Since 2002, there has been a significant drop in the number of expansions granted. Foreign expansions are more than the local ones as from 2006, with 2012 witnessing deregistering of both local and foreign expansions. This could be the aftermath of global financial crisis which saw banks revising their strategies and cutting down operating costs as much as possible (Standard Bank, 2010).

Figure 2.10.: Bank Expansions granted in South Africa, 2002-2014



Source: Own calculations based on data from SARB BSD, 2014

2.5.5. Selected Banks' Fundamentals

This section presents trends in a number of selected bank fundamentals over the years to gain an insight of the health and riskiness of the South African banking sector at sector level.

Table 2.5 below displays selected fundamentals and some key ratios for the years 2010-2014 to give a snap view of the current status of the South African banking sector.

Table 2.5.: Selected Banks' Fundamentals: Sector Aggregate: 2010-2014

Bank Fundamental	2010	2011	2012	2013	2014
Total assets (R billions)	3842	3961	4025	4127	4179
Total assets: year-on-year growth (per cent)	5.18	7.03	6.28	9.55	8.77
Gross loans and advances (R billions)	2967	3084	3159	3207	3234
Gross loans and advances: year-on-year growth (per cent)	7.76	8.94	9.18	10.04	9.00
Total equity (R billions)	306	304	311	313	318
Profitability					
Cost-to-income (smoothed) (per cent)	53.65	54.11	54.74	54.32	54.39
Return on equity (smoothed) (per cent)	14.73	13.83	13.76	14.13	14.47
Return on assets (smoothed) (per cent)	1.11	1.03	1.02	1.05	1.06
Capital adequacy					
Common equity tier 1 capital-adequacy ratio (per cent)	11.77	11.51	11.37	11.12	11.38
Tier 1 capital-adequacy ratio (per cent)	12.42	12.08	11.92	11.66	11.92
Capital adequacy ratio (per cent)	15.58	14.84	14.79	14.34	14.74
Credit risk					
Impaired advances (R billions)	108	108	109	107	106
Impaired advances as a percentage of total advances (per cent)	3.64	3.51	3.44	3.35	3.27
Specific credit impairments as a percentage of impaired advances (per cent)	45.84	46.30	46.15	48.95	48.99
Specific credit impairments as a percentage of gross loans and advances (per cent)	1.67	1.63	1.59	1.64	1.60

This table presents an overview of the financial and risk information, compiled by means of the aggregation of data submitted during 2013 and 2014 from individual South African-registered banks (including domestic branches of international banks but excluding offshore branches and subsidiaries of South African banks, mutual banks and cooperative banks). Information represents aggregated banks'-solo information.

Source: SARB, 2015

The sector's smoothed return-on-equity (ROE) ratio declined slightly from 14.73 per cent in December 2013 to 14.47 per cent in December 2014. However, during the year under review the ROE and return-on-assets (ROA) ratios declined to a low of 13.04 per cent and 0.97 per cent respectively before recovering in December 2014. The decline was due to a decline in 12-month cumulative profit, largely due to a R4 billion impairment of goodwill reported by African Bank in August 2013, as well as R4.3 billion of credit losses reported by African Bank in July 2014.

The smoothed cost-to-income ratio (also known as the efficiency ratio) increased marginally from 53.65 per cent in December 2013 to 54.39 per cent in December 2014. The increase was mainly due the pace of growth in operating expenses (10.52 per cent) exceeding that of operating income (9.01 per cent). A R6.9 billion increase in

staff expenses was the main contributor to increased operating expenses, with increases in computer processing, fees and insurance, and other expenses contributing more than R1 billion each to the sector's expenses growth.

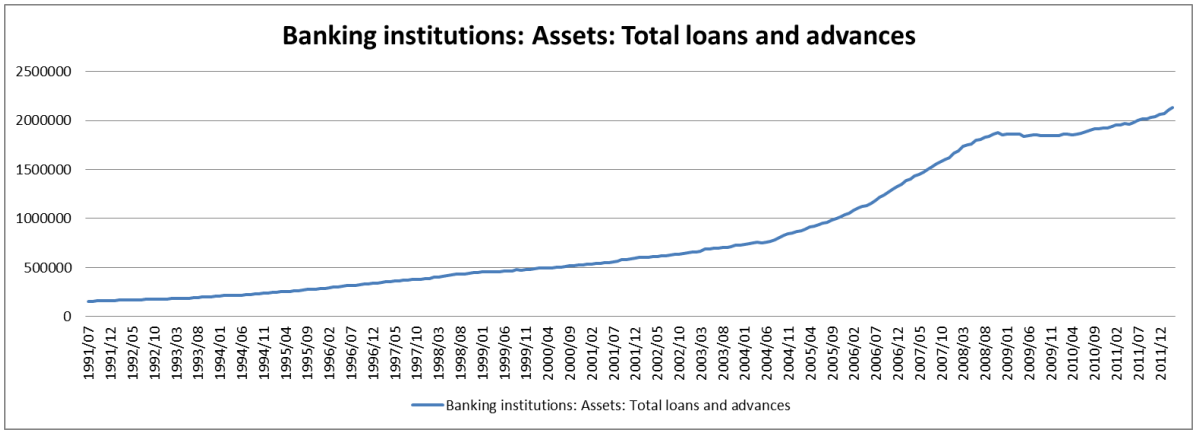
The banking sector's capital-adequacy ratio declined from 15.58 per cent in December 2013 to 14.74 per cent in December 2014. This decline was largely due to an increase in credit and operational risk-weighted exposures, as well as the phasing out of non-Basel III compliant capital instruments with effect from 1 January 2014. Accordingly, the total minimum capital required increased to 10 per cent with effect from 1 January 2014 as a result of the adopted phasing in of the Basel III capital requirements.

Impaired advances reported by the sector declined by 2.08 per cent from R108 billion to R106 billion. Most of this decline in impaired advances was due to declines reported by African Bank in June 2014 as well as declines reported on credit portfolios using the internal ratings- based (IRB) approach for calculating and measuring credit risk. The ratio of impaired advances to gross loans and advances, a key ratio for assessing credit risk in the sector, declined from 3.64 per cent in December 2013 to 3.27 per cent in December 2014.

Banking-sector assets

The majority of banking sector assets are in the form of loans and advances (Padmalatha, 2011; Golin & Delhase, 2013; Phylaktis & Kaye, 2014; PWC, 2014). When measured in relation to the gross domestic product, the sector depth is ascertained (Cihak, et. al., 2013; Drummond, Wajid & Williams, 2014; Sahay, et. al., 2015) taking into accounts the limitations as cited by Schoemanker and Werkhoven (2012).

Figure2.11: Trends in South African Bank Lending



Source: Authors drawing, data from SARB, 2013

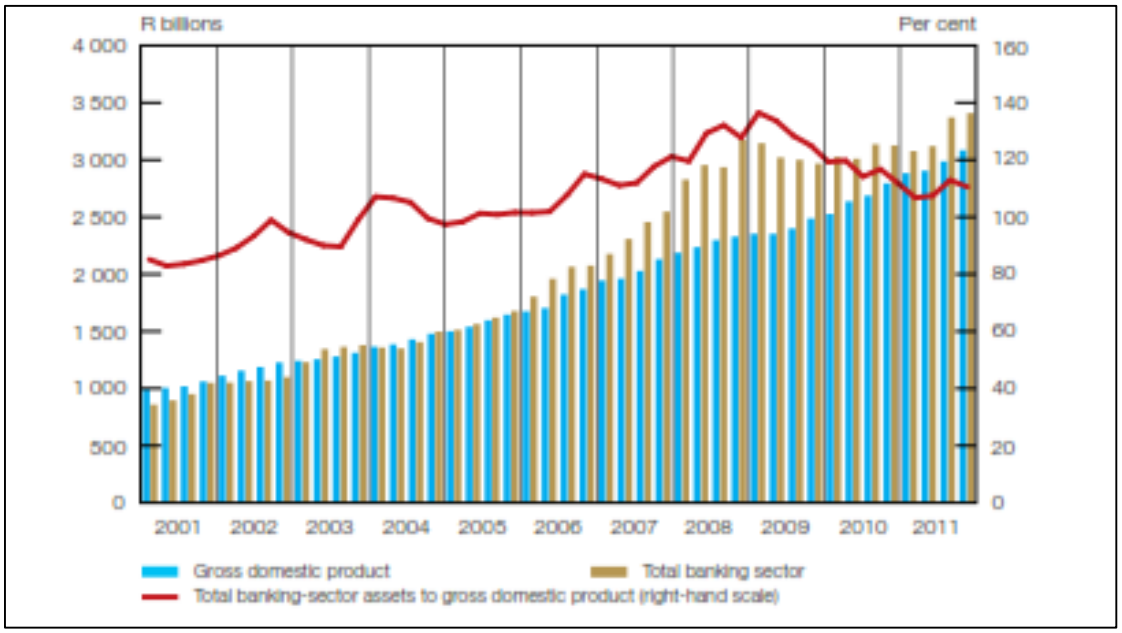
Between 1990 and 2002, on average, the loans and advances of the banking sector made up around 65% of its assets. The average growth in banks' assets (15.9%) has exceeded the economy's nominal growth rate (11.1%) over this period, and loans and advances have grown from around 57% of GDP in 1994 to 73% in 2002. In Brazil, a peer economy, where loans are a scant 25% of GDP, banks are seen as inhibiting economic growth, (Economist, 2003).

Loans and advances constituted, on average, 72.7 % of total banking-sector assets during 2011 down from 73.6 per cent in 2010 (Banking Supervision Department, 2012). BDS further reports that the banking-sector assets increased by 9.0 per cent and amounted to R3 409 billion or 110.5 per cent of nominal GDP as of December 2011 compared to R3 126 billion or 111.9 per cent of nominal GDP in December of 2010 (Banking Supervision Department, 2012). In comparison, South Africa's nominal GDP increased by 10.3 per cent year on year to December 2011.

After a sharp decline in growth in gross loans and advances during 2009 (owing to the global financial crisis), an upward and persistent trend was recorded, growing exponentially from mid-2011. The acute decline in the growth in gross loans and advances coincides with nosedive recorded in the All-share index. Most banks, as companies listed on the JSE, would have experienced a shock on their equity valuation, that is, shock on their balance sheet, which may require a revision of risky investments thus resulting in retarded growth in loans and advances. It is imperative

to note here that what declined is the rate of growth in loans and advances not the nominal values of loans and advances.

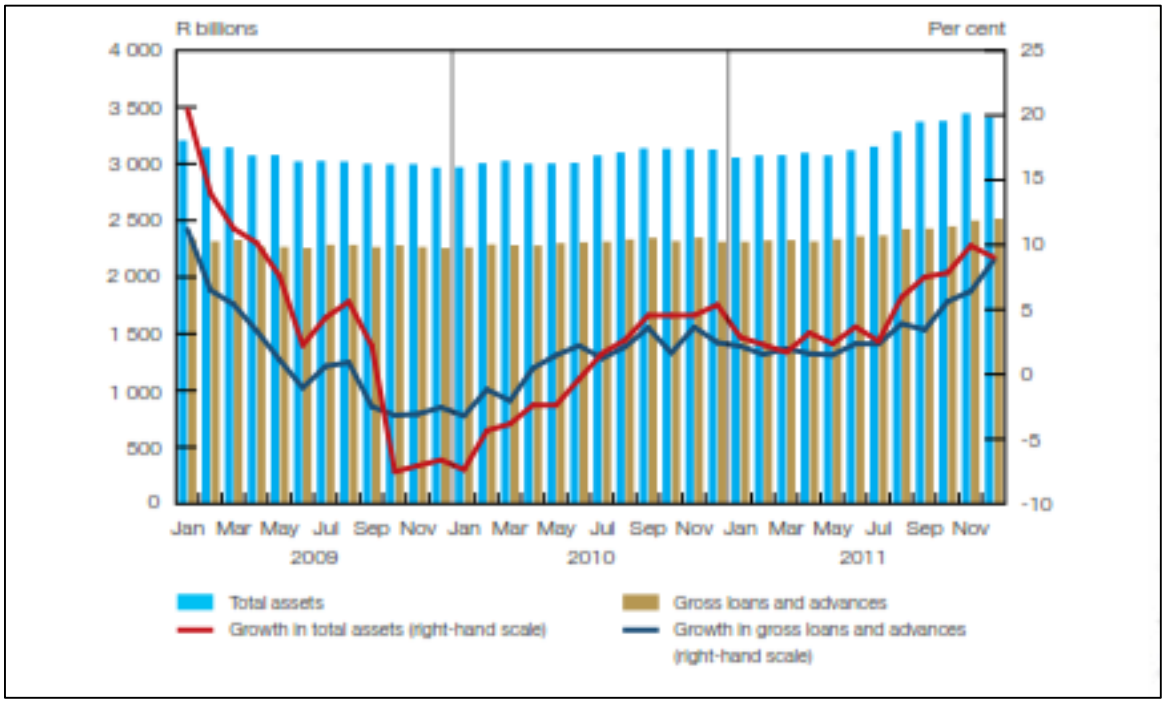
Figure 2.12: Total Banking sector Assets in relation to GDP



Source: Banking Supervision Department, 2012

On the other hand, according to the Banking Supervision Department (2012) report, the growth rate in total banking-sector assets acceleration during the third and fourth last two quarters of 2011 can be explained by a year-on-year increase in gross loans and advances which, in turn, was caused by increases in term loans and other loans. The BDS report further asserts that total banking-sector assets also increased due to increases in Treasury bills and increased investment in government securities over and above the increase in gross loans and advances reported.

Figure 2.13: Total Banking-sector Assets, Gross Loans and Advances, including growth rates



Source: Banking Supervision Department, 2012

Of additional interest could be financial derivative instruments which amounted to R279 billion at the end of December 2011 and represented, on average, 7.7 per cent of total banking-sector assets during 2011, down from 8.5 per cent as of 2010 (Banking Supervision Department, 2012). In September 2011 alone, the financial derivative instruments increased by R74 billion in line with the mark-to-market adjustments on foreign-exchange derivatives.

Furthermore, in line with the view that financial markets provide a platform for developments in the banking sector, in South Africa between 2010 and 2011, investment and trading securities (as a percentage of total banking-sector assets) increased from an average of 6.7 per cent during to 7.3 per cent. The trend can be attributed to the increase in appetite on government securities by banks.

Banking sector liabilities

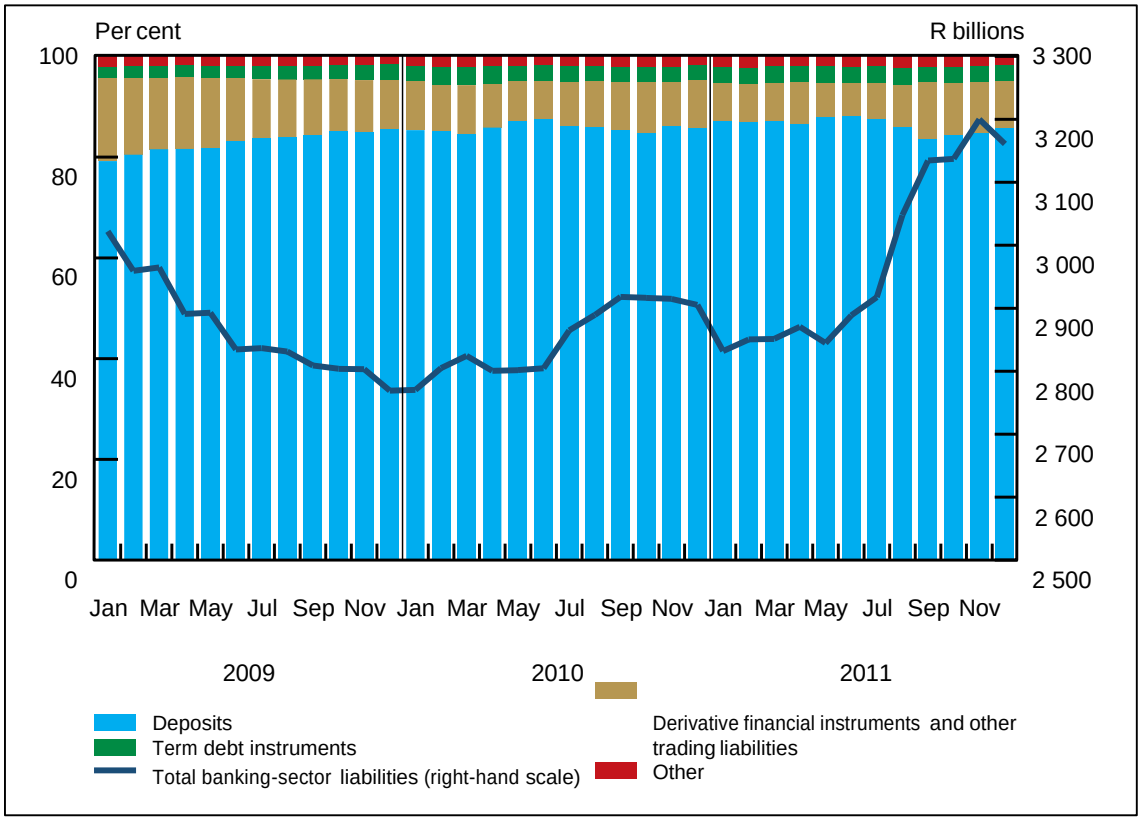
The greatest component of the South African banking sector liabilities consists of deposits, in line with other banks internationally (Padmalatha, 2011) of which, as of end December 2011 amounted, on average, to 86.2 per cent of total liabilities up from

85.8 per cent in the previous year. On the other hand, derivative financial instruments and other trading liabilities, as a percentage of liabilities, increased in September 2011 due, as with assets, to the increase in foreign-exchange derivative financial instruments (Banking Supervision Department, 2012).

Most deposits were made by corporates (42.92 per cent as at 31 December 2014), with retail customers' deposits at 24.57 per cent, and banks' deposits at 12.44 per cent constituting other significant sources of deposits for the sector as at 31 December 2014. The sector continued to grow equity, with increases in both share capital (R5.6 billion) and retained earnings (R7.4 billion), (SARB, 2015).

Deposits are, in general, not insured by the government but cooperative banks, once registered and compliant with the Co-operative Banks Act will eventually be covered by an explicit deposit insurance scheme as set out in that Act (Getting the Deal Through, 2012).

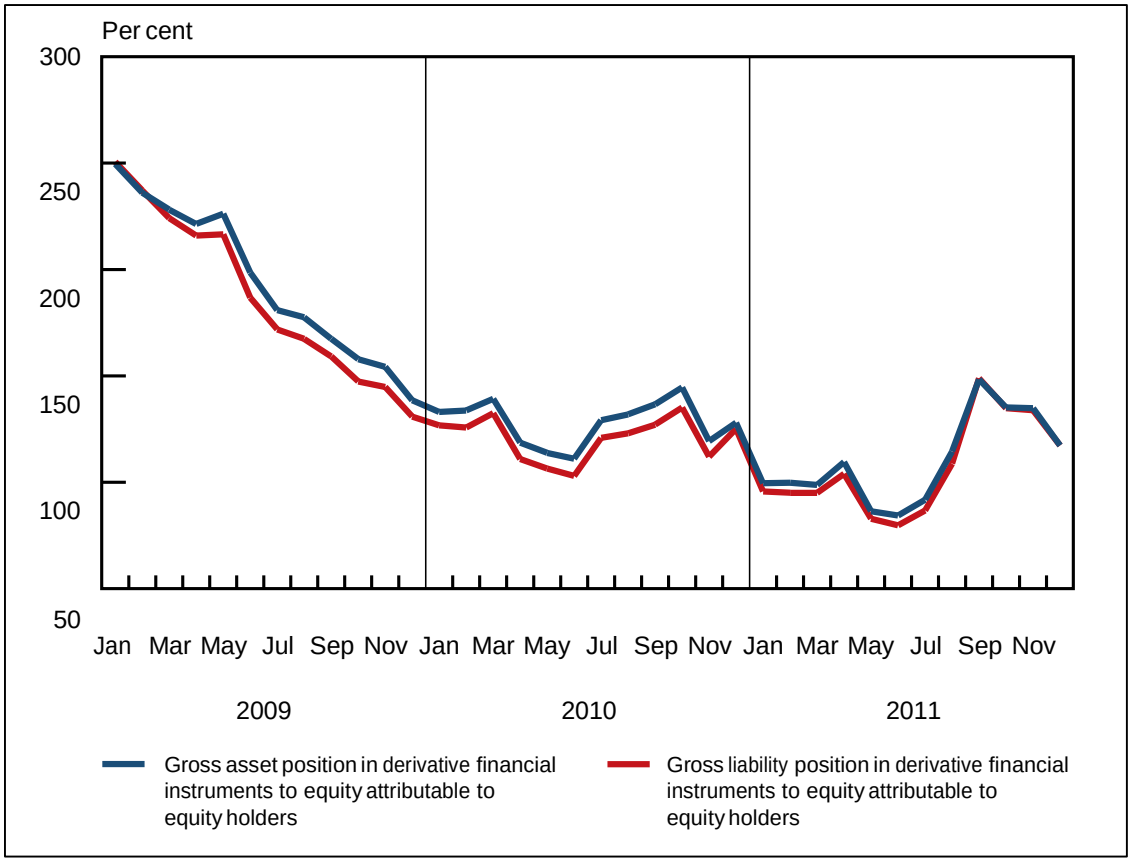
Figure 2.14: Composition of Banking-sector Liabilities



Source: Banking Supervision Department, 2012

The banking sector's gross asset and liability position in derivative financial instruments, as a percentage of equity attributable to equity holders is shown below. The graph depicts that gross asset and liability positions were fairly matched throughout 2011 and the net mismatch between the ratios decreased to an average of 3.1 per cent during 2011.

Figure 2.15: Asset and Liability position in Derivative Financial Instruments (as a % of Equity attributable to Equity holders)



Source: Banking Supervision Department, 2012

On the other hand, fixed and notice deposits represent the greater proportion of banking-sector deposits, amounting to R838 billion at the end of December 2011 up from R698 billion in the previous year (Banking Supervision Department, 2012).

Equity

For 2010 and 2011 share capital and retained earnings constituted 91.4 percent and 92.2 per cent of total equity respectively. The 2011 figure of total equity show a12.1 per cent increase from 2010 figure of R221 billion, this was driven by an increase in

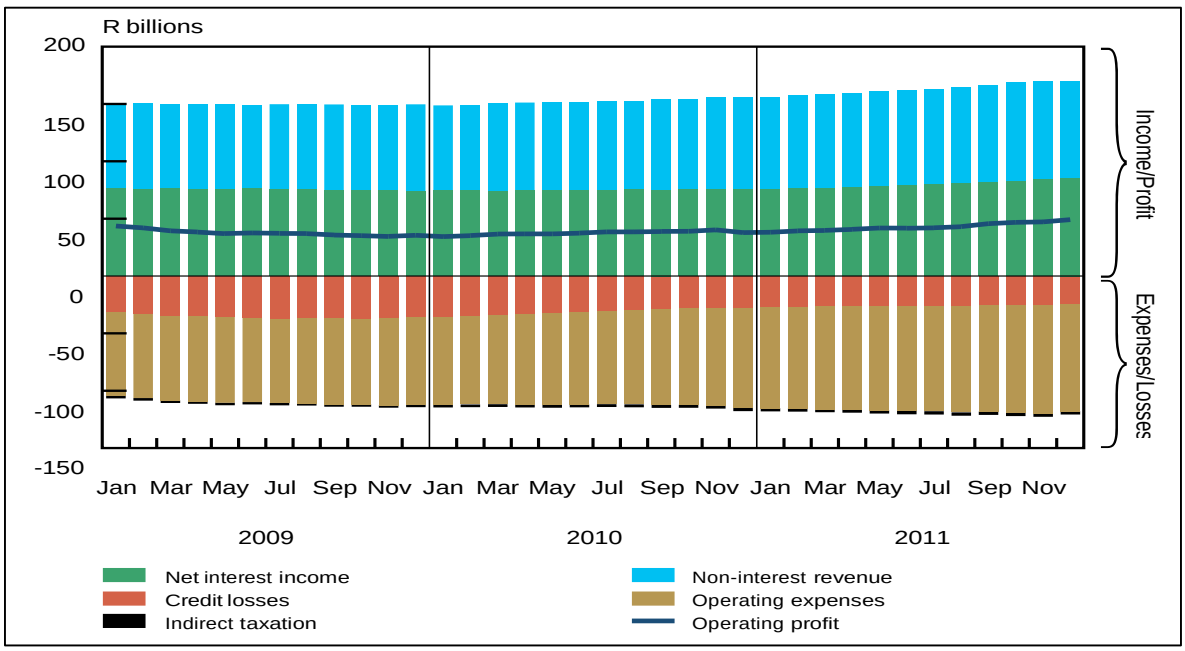
retained earnings of R17.9 billion and a R7.8 billion in share capital over the same period. The 2012 BDS report highlights that the movement in other reserves and preference shareholders' equity in September 2011 was due to a change in regulatory reporting by a large bank.

Profitability

The banking sector's operating profit is mainly driven by net interest income and it increased by 30 per cent to R49 billion for the year ending December 2011 (Banking Supervision Department, 2012). From 2010 to 2011, gross operating income, the sum of net interest income and non-interest revenue, increased by 9.2 per cent to R170 billion.

The increase in non-interest revenue was driven by a 13.0 per cent increase in net fee and commission income, while the increase in net interest income was mainly due to a year-on-year decrease in interest expense on negotiable certificates of deposit, term deposits, and other deposits and loans. The increase in the portion of non-interest revenue is material to this study as it reveals repacking of products and selling them in the financial markets through securitisation.

Figure 2.16.: Composition of Income Statement



Source: Banking Supervision Department, 2012

Capital adequacy

This is a key measure of bank stability. The ratio of capital to risk-weighted assets provides a key measure for the healthiness of a banking sector. This is so as capital is a buffer for depositors' and other creditor's funds against any losses. Widespread bank failures experienced during the Asian crisis demonstrates the effects of a poorly capitalised banking system. With respect Tier 1 CAR and total CAR, the minimum required CARs applicable to all banking operations and consolidated bank holding corporations licensed under the Banks Act are 7 % and 9.5 % respectively (Banking Supervision Department, 2012).

Moreover, the Registrar may require banks and consolidated banking groups to maintain a total CAR above the minimum required level based on assessments of systemic risk and each bank's idiosyncratic risk. This could be done as part of the supervisory review and evaluation process under Pillar 2 of the Basel II framework.

Credit risk

The South African repo rate remained unchanged and at the lowest level in more than 30 years, at 5.5 per cent throughout 2011. As such, there is great implication in improving the banking sector's credit environment. Accordingly, the sector experienced a decrease in credit losses and an increase in gross credit exposure during 2011. Retail mortgage on-balance-sheet exposure, the largest on-balance-sheet asset category reported by the IRB banks, increased by 0.3 per cent year on year to December 2011, reflective of, among other things, the sector's risk appetite and continued focus on pricing, as well as households' cautious approach to entering new long-term loans (Banking Supervision Department, 2012).

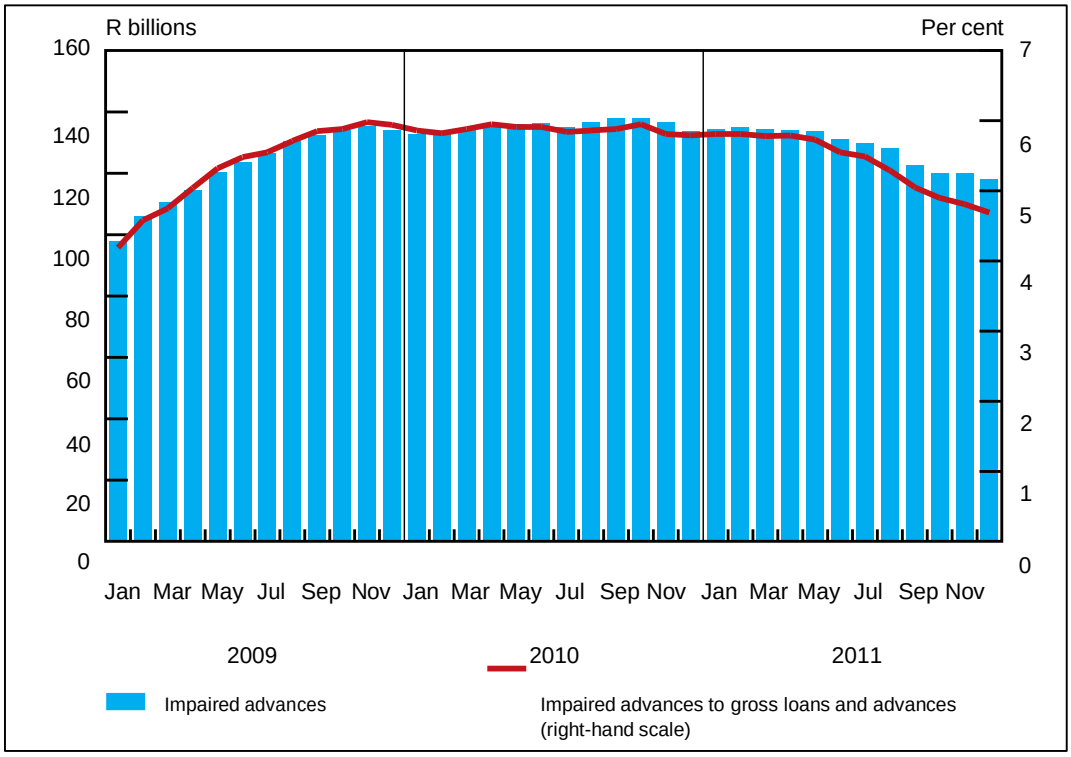
On the other hand, the five largest banks' senior debt and deposit ratings were downgraded by Moody's in February 2012 by a notch. The Banking Supervision Department (2012) suggests that the downgrades reflected "the impact of the country's increasingly constrained public finances and Moody's view that authorities would face challenging policy choices if multiple institutions were to need its financial support at the same time".

Total impaired advances

Impaired advances are part of credit that is bad, doubtful or sub-standard. Its ratio to gross loans and advances provide a key indicator of credit risk quality in the banking sector. Impaired advances decreased from a peak of R138 billion in October 2010 to R118 billion in December 2011. The decrease is attributable to a combination of increased write-offs, the impact of stricter lending criteria, and proactive credit risk management processes focusing on highly indebted consumers.

Credit risk measured as a ratio of impaired advances to gross loans and advances remained largely unchanged during 2010 at 5.8% at December 2010 and the first quarter of 2011. It has, subsequently shown, a declining trend as at December 2011, dropping to 4.7 per cent. The Banking Supervision Department (2012) attributes the decline in the ratio to an 11.8 per cent decrease in impaired advances and an 8.8 per cent increase in gross loans and advances.

Figure 2.17.: Impaired Advances to Gross Loans and Advances



Source: Banking Supervision Department, 2012

Table 2.6 below provides a summary of the key risk drivers of credit risk as primary inputs to the capital calculation reported by internally rated banks (Internal Rate Based, IRB approach). Banks who have adopted the IRB approach to measure their exposure to credit risk are expected to submit (annually) a series of completed self-assessment questionnaires to allow evaluation of their level of compliance with the minimum requirements prescribed in the Regulations (SARB, 2015).

Table 2.6: Key Credit indicators reported by IRB Banks

	Dec-09	Dec-10	Dec-11
Total exposure at default (R billions)	*2 597*	*2 611*	*2 788*
Exposure at default analysed by PD band (R billions)	*2 533*	*2 547*	*2 721*
Average probability of default (per cent)	*7.4*	*7*	*5.8*
Of which:			
Retail	*12.4*	*11.3*	*9.8*
Corporate	*3.6*	*3.9*	*3*
Average loss given default (per cent)	*28.4*	*28.7*	*29.2*
Of which:			
Retail	*24.2*	*25.7*	*25.9*
Corporate	*34.4*	*33.6*	*33.7*
Expected loss as a percentage of exposure at default (per cent)	*2*	*2*	*1.7*
Risk-weighted exposure as a percentage of exposure at default (per cent)	*35*	*37*	*36.5*
Advances in default as a percentage of exposure at default (per cent)	*4.7*	*4.7*	*3.5*

Source: Banking Supervision Department, 2012

Under the regulatory framework employed in South Africa, banks can choose from the following three methodologies to calculate their minimum required regulatory capital relating to credit risk (SARB, 2013):

1. standardised approach (STA), including the simplified standardised approach;

2. the foundation internal ratings-based approach; and

3. the advanced internal ratings-based approach.

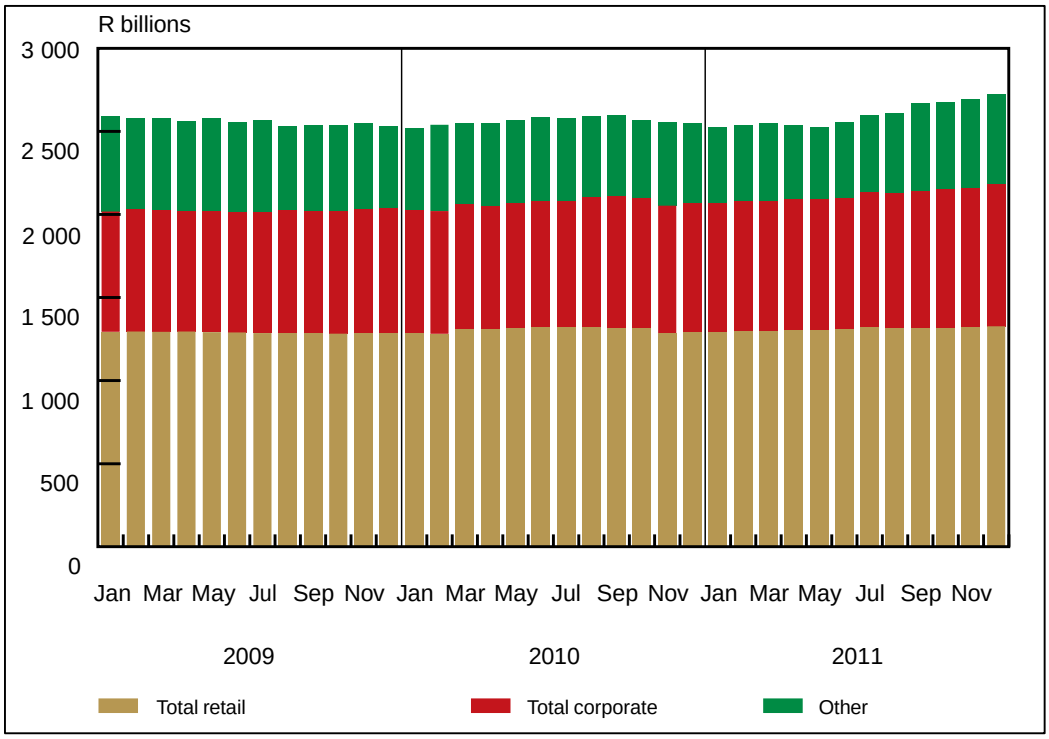
The IRB banks, in a similar fashion to STA banks, have been continually refining credit risk frameworks, chiefly rating systems' risk estimates. This resulted in a slight decrease in the average risk-weight percentage (Banking Supervision Department, 2012).

However, the IRB is not without its weaknesses. According to the SARB (2013), the 2007/8-2009 global financial crisis revealed potential inconsistency between the different banks that employ the IRB approach to measure credit risk. This was mainly with regards to the interpretation of methodologies, the level of conservatism and the various elements of the IRB framework. Nonetheless it is imperative to take note that SARB, through the BSD, neither expects banks' IRB risk parameters nor the choices of modelling these parameters to be identical across IRB banks, (Banking Supervision Department, 2012).

Exposure at default (EAD)

EAD is the total value that a bank is exposed to at the time of default; the value is recognized within the bank's internal system calculated by multiplying each credit obligation by an appropriate percentage. Each percentage used coincides with the specifics of each respective credit obligation. According to Banking Supervision Department (2012), the total EAD per standard rating bands categorized according to each major asset class (as presented in Figure 4.50), was largest for the retail category, at 48,8 per cent in 2011. Although the structure of total EAD changed slightly due to a 110 basis point increase in the 'other' category as well as a 76 basis point increase in the corporate category, the retail sector dominated both in 2010 and 2011.

Figure 2.18: Total Exposure to Default



Source: Banking Supervision Department, 2012

The total banking institution's credit risk concentration to South Africa has been decreasing since December 2009; however, the majority (86.87 percent) of that exposure was due to South African counterparties as reported in December 2011. The change in trend can be explained by increased international participation due to advanced globalisation. The banking sector has been increasing its exposure mainly to the 'other' and Asian geographic regions since December 2009.

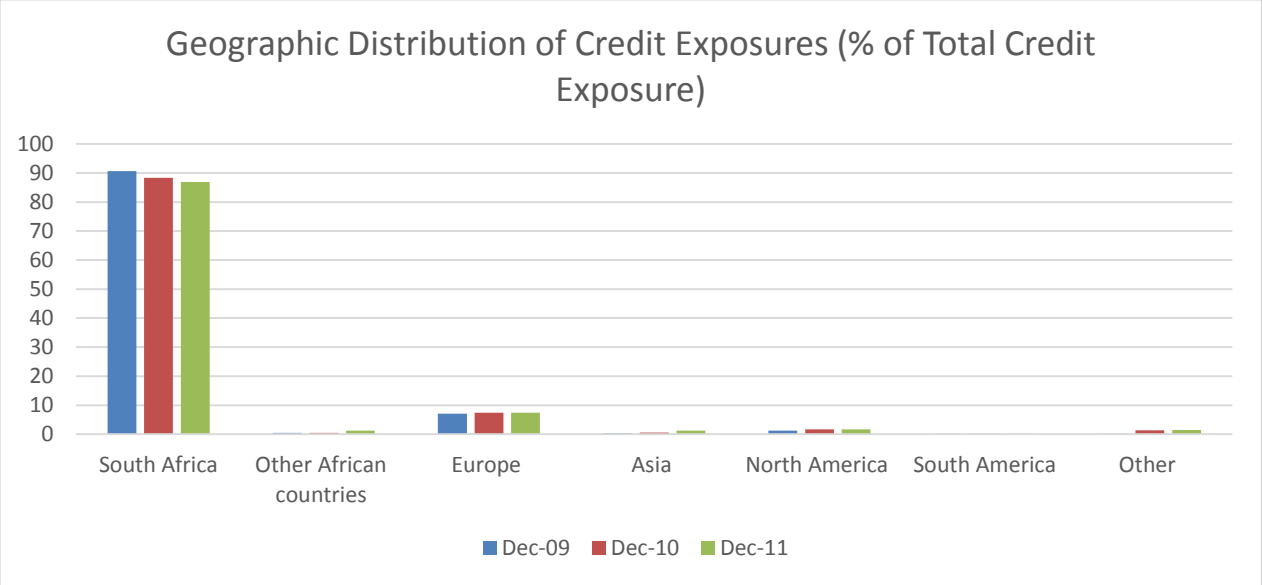
Table 2.7: Geographic distribution of Credit Exposures (as % of total Credit Exposure)*

	DEC-09	DEC-10	DEC-11
SOUTH AFRICA	90.63	88.37	86.87
OTHER AFRICAN COUNTRIES	0.5	0.51	1.21
EUROPE	7.06	7.38	7.38
ASIA	0.31	0.54	1.25
NORTH AMERICA	1.27	1.67	1.65
SOUTH AMERICA	0.11	0.19	0.16
OTHER	0.12	1.32	1.49
TOTAL	100	100	100
* PERCENTAGES MAY NOT ADD UP TO 100 DUE TO ROUNDING			

Source: SARB, 2012

The above can be presented graphically for clear visual impression as in Figure 2.19 below.

Figure 2.19.: Geographic Distribution of Credit Exposure



Source: SARB, 2012

2.5.6. The changing nature of banks

Notably, globally, banks shifted funding focus towards capital markets (Cassis, 2011; Lai, 2012). The risks associated by providing credit undiscriminatingly were compounded by the novelty of erudite financial products and inapt risk management systems. Through innovativeness, the financial intermediaries had the ability to repackage products that are mortgage-related into securities, in a process called

securitization, which they could then sell to investors, globally (National Treasury, 2011).

According to National Treasury (2011), the South African financial sector did not experience the financial upheaval seen in advanced economies and, as a result, the economy remained in a favourable situation to recover from the downturn and was in a position to emerge stronger than before. The National Treasury states that the policy components that protected the country from a financial and subsequent sovereign crisis include:

- A sound framework for financial regulation and well-regulated institutions keeping potential risks at bay. South African banking sector regulators have restricted investment in toxic assets;
- Appropriate and conservative risk management practices at domestic banks. This emanates from the minor banking crisis experienced in 2002 and also to meet the capital adequacy, liquidity and disclosure requirements of Basel II;
- Limited exposure to foreign assets. Overall foreign risk was limited by restrictions on the degree to which banks and institutions investors could be exposed to foreign assets; and
- Structure of subsidiaries and requirements for listing. In South Africa, a bank to be registered has to be a subsidiary of a local or foreign company, (Banking Supervision Department, 2012). This allows ring-fencing assets and liabilities of these banks when the parent company is in distress. The listing requirements entail expected high transparency, demanding and wide-ranging disclosure standards and quality corporate governance. These features end up compelling banks to meet shareholders' and stakeholders' interests at all times. Of interest to this study is: could this requirement be in a position to reduce complex structures and thereby foster supervisory review?

One of the key developments in the South African banking system is conglomeration, which has seen the banks diversifying into non-banking financial business as insurance (Falkena, et. al., 2001; Hentz, 2005). This has resulted, for example, in an

increase in the number of registered controlling companies from 23 in 1994 to 34 by the end of 1998 (SARB, 2013).

2.5.7. Deposit insurance and cases of Bank failures in South Africa

Existence of deposit insurance or government bailout defeats the effort of market discipline (Demirguc-Kunt, 2004; Karas, Pyle & Schoors, 2010; Romera & Tabak, 2010; Barajas, 2011). However, South Africa currently does not have an explicit deposit insurance (SARB, 2011) although the Financial Services Board (FSB) has been proposing one (National Treasury, 2013). Given the South African banking sector which is highly concentrated, with five banks controlling over 90% of the total sector assets, (IMF, 2015) it will be highly costly to bail out any one of the few big banks.

2.6. Structure and Trends in stock markets

The Johannesburg Stock Exchange (JSE) was established in November of 1887 in response to the need for capital to fund burgeoning investments in the gold mining sector of Witwatersrand. Currently, there are three major market sectors on the JSE, that is, the Resources, Financials and Industrials indices.

According to Goodspeed (2008), the JSE, similarly to other exchanges, facilitates the trading, clearing and settlement of equities and any other securities transactions of listed South African companies. JSE is licensed in terms of the Securities Services Act (SSA) of 2005 which also allows the existence of more than one stock exchange, however, there is still only one stock exchange in South Africa.

The SA stock market is worth almost twice the country's output, and is larger than the bourses of, for example, Mexico, Indonesia and Turkey – significantly larger economies (Hassan, et. al., 2013). The JSE is consistently one of the world's twenty largest stock markets, being the sixth largest among emerging economies.

From the regulatory perspective, it is commonly appreciated that too much regulation in financial markets may discourage prospective investors. However, investors are only confident with a stock exchange where a proper regulatory framework is in place

and regulatory authorities rigorously enforce it as well as make sure that market participants adhere to it. Regulation ensures safety of funds from unscrupulous trading ad misrepresentations. The South African stock market is regulated only to the extent of protecting members of the general public in buying and selling of shares without unduly infringing upon self-regulation. The legislation that governs the JSE is embodied in the Securities Services Act, Act 36 of 2004. South Africa's financial markets used to be (prior to 1990) heavily regulated with controls which were meant to stifle severe capital flight as a result of huge political risk which was associated with investing in South Africa at the time (Beelders, 2002). This, however, changed with the coming of new South Africa, after the political negotiations that started in 1990.

On the other hand, the stock market can be divided into primary (where first solicitation of capital happens, funds flows directly to the company) and secondary markets (where shares exchange hands without direct funds flowing to the company). Transactions in the primary market affect the size of the equity pool as opposed to transactions in the secondary market, which do not affect the number of shares in issue (Goodspeed, 2008). The secondary market is a market of the sale of previously owned securities, and prices are determined by demand and supply in the market. According to the Goodspeed (2008), the trading system for the secondary market in South Africa is through an electronic system called JSE Trade Elect.

The critical role that the secondary market plays is based on the major influence it has on the primary market. The primary market only functions successfully as a result of the liquidity that the secondary market provides. Investors want the guarantee that they can easily convert equity into cash at known prices; at any time since they do not want to be stuck with meaningless paper hence the invaluable role of the secondary market. Investors go where they can easily leave, with minimal costs- the quest for liquidity (Hassan & van Biljon, 2010).

The JSE stood up to the international area by deregulating the traditional stockbroking environment which was once shielded from international competition (Butterworh & Malherbe, 1999). In 1995, a 'Big Bang' was introduced bring in commissions, corporate ownership (for domestic and foreign banks), and principal

dealing to the market. As a result, the bourse witnessed an increase in turnover, highly competitive rates and services extended to investors. Not surprisingly, liquidity of the JSE, measured as a fraction of annual trade over market capitalization, in 1998 stood at 27 percent up from 5 percent in 1992, while at the end of June 1999, the market capitalization stood at R1, 360

Generally, the JSE performance has been very strong, although impulsive (International Monetary Fund, 2008). According to the IMF 2008 report, the gains in the commodity sectors drove up the All-share index, leaving JSE capitalization as the largest among emerging markets, supporting why South Africa made it to the major investable global stock market indices. However, considering stock market liquidity relative to other emerging markets, it is more limited, possibly as a result of few large listings and a tendency among domestic institutional investors to buy-and-hold index as well as single stock futures traded on the JSE.

Suffice to say then, that the major developments in the securities markets are among many others, as follows:

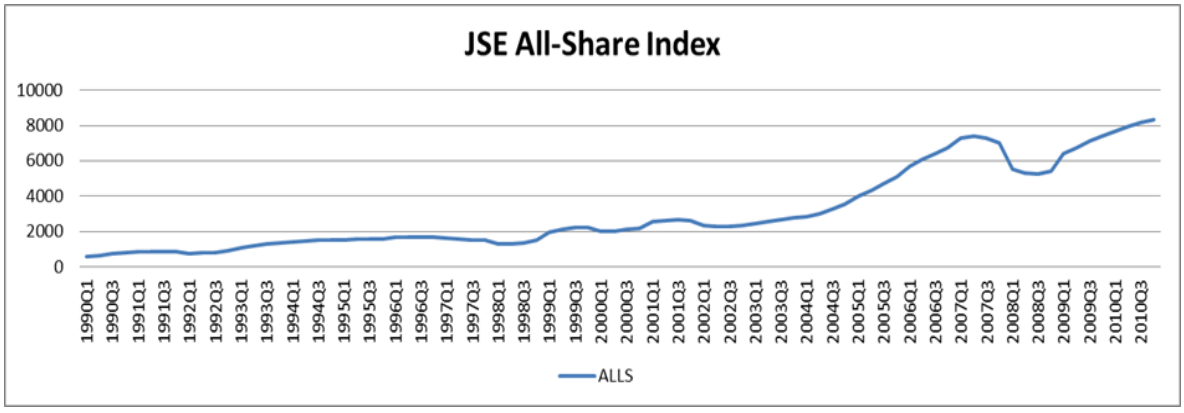
- **Innovation.** The level of sophistication in the market has increased as financial firms are able to construct complex products, given a larger balance sheet and exposure to pool of funds;
- **Merger of exchanges.** In South Africa, the three platforms: S.A. Futures Exchange, the Bond Exchange and JSE agreed to merge following international trend towards integrated or merged markets;
- **Trading companies increased competition.** Competition along the lines of price and product range has been increased in South African markets by foreign brokerages;
- **Updating clearing systems.** There has been a move to paperless system in the mid to late 1990s through the introduction of a central securities depository, STRATE; and
- **Capital raising boom.** Over a period of mere four years, between 1994 and 1998, raised new capital on the JSE increased intensely from R10 billion almost R90 billion.

The SADC committee of stock exchanges, private sector invention, was created in January 1997, and members thus far (as of 2008) are: South Africa, Namibia, Botswana, Mauritius, Swaziland, Tanzania, Zambia and Zimbabwe. Cross-border investment promotion, facilitating dual listings and introducing depository receipts are the key mandates.

Further to these developments, the Johannesburg Stock Exchange has made links with other stock exchanges: for example in February 1998, the JSE made its JET system accessible to other SADC exchanges at a cost. As of November of that year, the Namibian stock exchange (NSX) took advantage of the offer. Moreover, foreign companies have been permitted to list on the JSE, however, so far, non-South African companies active in Africa have not yet been able to raise capital on the exchange.

The JSE Securities Exchange, which is by far the largest stock exchange in Africa, has three main indices listed as follows: Resources Index, Financials Index and Industrial index (JSE, 2010). Movements in the volume and share traded are tracked as well as measured by the JSE all-share index which, in actual fact, is a barometer of performance of listed companies. South Africa's stock market is largely resource based since the biggest listed companies are mining conglomerates. Consequently movements of the main index are driven by movements in the Resources index which are a result of movements in resource prices especially gold and platinum (Beelders, 2002).

Figure 2.20.: Trends in JSE All-Share Index



Source: Authors drawing, data from World Federation of Exchanges

The JSE All Share Index has generally been on an upward trend in the entire period of analysis with a few definitive deep declines (see Figure 2.20.: Trends in JSE All-Share Index). This figure serves to show that the market index has registered remarkable growth over the years. The discussion of the trend of the stock market focused on the period between 1990 -2010. The JSE All share index performed well between 1991 and 1996, pointing to the relaxation of hostile controls and regulations making South Africa's stock market more accessible and favourable to international investors with non-residents taking a more active role in the bond and stock markets (SARB 1996; SARB, 1997).The financial markets were also more accessible to residents thus the stock markets flourished.

This steady and stable performance of the share market in the 1990's was disrupted by the South–East Asian economies financial crisis of 1997 (SARB, 1997). The JSE all-share index declined sharply in October 1997, but it immediately recovered (SARB, 1997). In 1999, South-East Asian economies were firmly on a recovery path, and this brought back stability in financial markets; there were also positive sentiments with regard to a positive world economic outlook (SARB, 1999).

At the time, the world economy recovered from the effects of the Asian financial crisis; stock markets around the world gathered momentum yet again as a result of a boom in share prices of companies who produce communications, information and computing technology equipment (SARB, 2002). The dotcom bubble, nevertheless, burst in 2000, and this resulted in an acute decline in the JSE all-share index due to linkages of world stock markets, nevertheless the index recovered immediately (Naude, 2009: 2). However, the September 11 terror attacks of 2001 in the US, which immediately followed afterwards, affected economic activity in the US and beyond (SARB, 2002). The impact of the disturbances in the US economy as a result of the attacks was more evident in the second quarter of 2002 in South African stock markets as the JSE all-share index started to decline (SARB, 2002).

Global economic activity picked up in the second quarter of 2003 and remained firm between 2003 and 2006. However, the world was to be hit by a major economic crisis in 2007 that could only be compared to the Great Depression of 1929. According to Naude (2009), as of end October 2008, US$ 25 trillion had been wiped

off the value of world stock markets. Between November 2007 and February of 2009, the all share index lost 41% of its value. Stocks markets all over the world tumbled due to the calamitous effects of the global financial crisis of 2007/08 (SARB, 2008). Figure 1 shows the biggest decline in the index in the whole period of analysis; the JSE lost almost half of its total value in the turmoil from the beginning of the crisis. Signs of recovery were visible in South Africa from mid-2009 onwards as the index picked up at around the same time as most major world economies which had been devastated by the financial crisis were also showing signs of recovery (SARB, 2009).

2.7. Link between banking sector and stock markets

Banks constantly reassess their capital uses more often as margins of some customary activities fall, mainly shifting to market intermediation (Butterworh & Malherbe, 1999; Adrian & Shin, 2010; Wehinger, 2012). This development demonstrates an increased use of financial markets by banks to augment their profitability. If the income flowing from loan extension, or other use of resources, is compared to the cost of the capital held against it to comply with the Basel capital adequacy requirements, one would be able to test the shift to market intermediation by banks (see Cetorelli, Mandel & Mollineaux, 2012).

Not surprisingly, that margin squash has resulted to a reassignment of the resources of a bank (Wehinger, 2012). Due to such shifts, funds that would have conventionally sourced from a bank would be now accessed from the bond or other securities markets. Thus, intermediation has shifted from banks to the securities markets. As a result of the move to market, there is a much smaller banks' portion of intermediated funds in the developed economies than in emerging economies. In the banking sector, the two common forms of market intermediation are the issuing of corporate bonds and securitisation, which has been promoted by regulatory arbitrage targeted at narrowing links to the Basel capital requirements (Allen, 2012). Nonetheless, securities markets proved to be best alternative for bank credit and have also come out to be cheaper in some instances. Of interest are the possible implications of that move to market intermediation by banks to banks themselves, securities markets and

regulations (Milhajek, 2010). Naturally it implies blowing of the infernos of competition in the process.

Banks may react to this competition amongst themselves and with securities markets in ways that may increase risk exposure. As a result, it is expected that the valuation of the banks could move along with the activities it is engaged in. Such hypothesis puts emphasis on stock price movements as indicators of bank value. In such circumstances, stock markets will be able to discipline banks. Falkena, Bamber, Llewellyn, & Store (2001) asserted that usually, market discipline works through share prices, the price of subordinated debt and willingness to trade with the institution. It is further noted that markets are far more successful in effecting change in directors and management (market influence) than are the authorities. As almost every bank failure is underlined mainly by poor management, it is of great importance that authorities promote market discipline. It is also necessary to understand the role players in ensuring market discipline which includes: the rating agencies, the unsecured creditors in the capital markets and financial press.

However, from the perspective of bank supervisors, markets show an ambiguous effect. From one angle, markets are the mainspring behind the increasing complexity of the banking industry. In respect of this, financial markets today carry an unusual choice of sophisticated instruments to diversify, hedge, but most worryingly to conceal risks. Despite this, markets may also help supervisors in indorsing a safe and sound financial system through market discipline (Mbarek, et. al., 2011). As discussed earlier, market discipline come in two forms: direct market discipline, when banks that are prone to assume excessive risks find it difficult or expensive to refinance those risks; indirect discipline, when the terms at which banks refinance reveal valuable information on investors' perception of bank quality to supervisors (Facchinetti, 2007).

Empirical evidence on the link between the two markets is present (see Mishkin & Eakins, 2015) despite not focusing on testing presence of market disciplining of banks. In the USA, Jalilvand and Maliaris (2012) concluded that a change in the parent banks stock price affects the foreign bank’s lending. A connection then identified through the internal capital market (Ibrahim, 2006). On the other hand, in

the case of Saudi Arabia, Almutair, (2015) noted that the health of the banking sector depends on stock market stability. For South Africa, Odhiambo (2010) found a distinct positive relationship between the two sectors, both in the short and long run. Furthermore, Nyasha and Odhiambo (2014) present the dynamics of stock market development in Kenya, linking it to banking sector.

With sound regulations, as discussed in this chapter, together with the effort to constantly keep abreast with the dynamics of the sector, the link between the two sectors will grow in importance. However, Mishkin and Eakins (2009; 2012) and Howells and Bain (2007) identified potential problems of bank supervision despite the existence of varied regulations to support it. In that regard, market discipline becomes key and effort should be made to understand its presence, its effect and ways to improve. This study contributes to this effort by testing the presence of market discipline of banks in South Africa, given its unique financial system of sound regulatory environment of international standards, sophisticated markets, highly concentrated banking sector, among other fundamentals.

Also to note is that the South African financial sector reforms led to competition between banks and other financial intermediaries (non-banking financial institutions like insurance companies) (Matemilola, Bany-Ariffin & Muhtar, 2015). This is the reason why during the late 1990s, the number of banks de-registering has been increasing. This can also be observed form high consolidation of banks in order to operate more efficiently in the face of small profit margins (Matemilola, et al., 2015). This resulted in a highly concentrated banking system (SARB, 2013). Imperative to note for the highly concentrated sector, in which few banks wield surmountable power on the overall economy and more specifically to some extent detrimentally to the customers, is that firm supervision by markets and regulators is required to maintain strength in banking (Sinkey, 2001; BIS, 2012a).

2.8. Chapter Summary

The chapter has provided an overview of the South African financial system in relation to matters influencing market discipline like trends in regulations,

innovativeness and conglomeration. Consolidation, technology and legislature have transformed the South African financial system over the years, resulting in a well-developed and sophisticated system that compares favourably well internationally (JSE, 2014; IMF, 2015; SARB, 2015). The following lessons can be drawn for market discipline environment in South Africa:

- The financial system plays a central role in overall economic performance, with problems having far reaching negative consequences;
- The regulatory structure is robust comparing favourably amongst peers and globally. The rigorous regulatory structure is argued to have shielded the domestic banking sector from the recent financial crisis which crippled even well developed economies. The key legislations responsible for overseeing the SA banking sector are: Financial Services Board Act1990; South African Reserve Bank Act 1989; Financial Intelligence Centre Act 2001 (FICA); and the National Credit Act 2005 (NCA);
- The financial system, as a whole, operates as a network and provide platform for institutions to interact and strengthen their efficiencies. However, failure of one would be threatening to the whole system;
- Numerous developments have been witnessed in the sector, including globalisation and financialisation; innovation through technology; new products development which necessitated revision in supervisory regulations and need to involve all stakeholders (including equity holders, bond holders and depositors) in monitoring and supervising;
- Market intermediation has been highlighted as one of the major links between banks and stock markets. In addition, stock markets are noted as having ambiguous effect to the banking sector: mainspring behind increasing complexity in the sector, on one hand, and assisting supervisors in indorsing a safe and sound financial system through market discipline, on the other. The South African corporate bond market is identified as shallow and less traded; and
- The key argument is that almost every bank failure is underlined mainly by poor management, hence need for market discipline

The next chapter addresses the following questions: What are the theoretical arguments for the case of linkages between stock markets and banks? Can stock markets, theoretically, be argued to be able to effectively discipline banks? What are the theoretical prescriptions for identifying market discipline? Lastly, what gaps exists given the current theoretical and empirical literature that this study can fill?

CHAPTER THREE

Literature Review

In 1974, a noted bank-stock analyst said, regarding the first billion-dollar bank failure in the U.S.A, "People who can read a balance sheet were out of there long ago."

3.0. Introduction

This chapter presents a review of literature, starting with the theoretical underpinnings then followed by some empirical works carried out to date in this area. The key objective of this chapter is to provide a theoretical framework to guide empirical inspection in the subsequent chapters (specifically chapters 5, 6 & 7), as well as point to gaps available in literature.

The theoretical section is broadly sub-divided along the objectives of the study as set out in chapter one; that is, theories pertaining to the link between stock markets and bank lending (stock market channel of monetary policy transmission) and theories of market discipline (monitoring and influencing). Similarly, the empirical section is sub-divided mainly along these objectives as this helps in positioning this study and justifies how it fits in and adds to existing literature. In reviewing the empirical studies, the context of this study is kept in perspective, as reviewed in the preceding chapter.

3.1. Theoretical literature

3.1.1. Theoretical link between financial markets and banking sector

From Chapter Two, trends have been observed that have augmented the hypothesis that there are strong links between stock markets and the banking sector. This section reviews theoretical explanations that could support that observation. Intuitively, when

banks traditionally funded their business with deposits, it was easier to shield corporate borrowers from the shocks to the financial markets, debt markets in this regard (Hale & Santos, 2010). However, the postulated hypothesis vindicates the fact that those borrowers shunning financial markets, for example, bond markets, are being exposed to the risks in such markets through their relations with the banks. The latter may have been necessitated by the transformation of both the institutional structure of and boundaries between financial institutions and financial markets over the years (Boot & Thakor, 2010).

To understand the link between the two above-stated markets, theory has evolved around the question of whether financial market information can be used to predict bank fragility or at least to add to supervisory information and enhance the analysis of these (Bongini, et. al, 2002; Distinguin, et. al., 2013).

The answer has been provided from both the debt and equity perspective with the latter being of interest to this study. Literature acknowledges that policy makers have long considered looking at financial markets' information as a way of better understanding increasingly complex banking organizations (Krainer & Lopez, 2003; Gropp, Vesala & Vulpes, 2006; Mbarek, 2011; Krainer, 2014). The argument is that the prices within financial markets aggreagate the views of investors about the financial well-being and projections of the bank, which could be a key ingredient in the assessments conducted by the supervisory units. In line with this argument, Levine (2004) asserts that regulatory practices that force accurate information disclosure and promote private sector monitoring, and do not grant excessive power / reliance on regulatory authorities, have shown to boost the overall level of banking sector and stock market development.

3.1.1.1. Modigliani and Miller (1958) indeterminacy principle

Modigliani and Miller (1958) posed a fundamental question that underpins the analysis here, especially with regards to the debate of whether equity can be used to predict bank fragility as compared to the traditional variable, debt.

> "*What is the "cost of capital" to a firm in a world in which funds are used to acquire assets whose yields are uncertain; and in which capital can be obtained by many different media, ranging from pure debt instruments, representing money-fixed claims, to pure equity issues, giving holders only the right to a pro-rata share in the uncertain venture.?"*(Modigliani & Miller, 1958).

Levonian (2001) applied this concept and showed that, assuming a hypothetical bank that has assets to the market value of *A* and that such value is random, evolving overtime as a martingale. Considering that the bank operates for *T* periods, then liquidates without cost, the bank then has, as stated in Modigliani & Miller (1958), three options to finance the assets: senior debt (or deposits) with promised payment *DT*, junior (or subordinate) debt with promised payment *BT*, and a residual equity claim receiving *AT-DT-BT* if the bank is solvent at the end of the period. Given that the asset value follows martiangale process, and both the funding items must be paid from such assets, it means the two are risky as the promised payments may not materialise.

Under this model, assuming complete markets and no information frictions (albeit highly unlikely in the real world), the two sides of an entity's balance sheet are independent. However, being more realistic, and removing these assumptions, such independence fail to hold and in that regard, the capital structure of banks will likely affect their loan policy. This has widely been supported in literature, among others Steffen and Wanhrenburg, (2008) and Santos and Winton (2008).

The hypothesis is that such banks that rely on financing from the bond market adjust their loan pricing policies, raising interest rates on corporate loans when cost to issue on the bond market goes up. On the flip side, those banks that rely exclusively on deposit funding are not exposed to the bond market conditions, and, therefore, do not have pressure to adjust their loan policy in the face of an increase in the cost of bond financing (Hale & Santos, 2010). This implies that banks still following the traditional funding approach can be expected to be least exposed to financial market volatility, and therefore risk. The volatility is in terms of variation in key banking fundamentals than pose viability risk to individual entities.

Intuitively, the funding structure of a bank has an influence on its loan supply. However, from the observed trend of moving to market financing by banks in the previous chapter, it is not far-fetched to postulate of the possible effects of stock market developments on bank loan supply. The substantial recourse to market funding instruments has made banks increasingly more reliant on financial markets, and as a result, display an increase in loan supply at any given monetary policy rate (Gambacorta & Marques-Ibanez, 2011).

Other studies further highlight that the growth in lending by banks varies based on whether the bank is part of a holding company, with affiliated banks relying on internal capital markets having lending less sensitive to monetary policy than the unaffiliated counterparts (see for example Ashcraft (2006) and Gambacorta (2005). Bank holding companies have become popular, and in the case of South Africa, there are holding companies like Nedcor, owning Nedbank and Old mutual; First Rand limited (FNB and First Rand Corporation). The intuition is straightforward- holding companies easily raise funding from external sources and are also able to generate more funding internally, aided by diversity.

Interestingly, the move to market has been skewed by bank size, a characteristic that distinguishes South African banks clearly given the high concentration. From this perspective, access to bond market is dependent on bank size, with smaller banks relying heavily, if not completely, on deposits for funding. Hale and Santos (2010) asserted that such findings show that policies which are aimed at market discipline promotion have effects that will go far beyond the monitoring of banks by investors. Furthermore the above-mentioned authors, based on this theoretical framework, highlighted a new mechanism that interlinks the financial intermediation done through banks with the intermediation done through the debt market. This inter-linkage was highlighted in the previous chapter by the increasing movement from bank intermediation to market intermediation within the financial system.

The observation in Chapter Two and the findings in Hale and Santos are, however, contrary to the common view which is rife in the financial architecture literature that banks and debt markets operate independently from each other,. Nonetheless, albeit

from differing angles, there are similar researchers whose studies uphold the inter-linkage argument, among these are Allen and Gale, (2000), Holmstrom and Tirole (1997) and Song and Thakor (2010).

Of more interest to this analysis, and in the context of South Africa, is the analysis of Song and Thakor (2010) where complementarity was tested when banks use the equity market, not the bond market, to raise equity capital needed to meet regulatory requirements. The focus is on equity over bond as it was noted that the South African corporate bond market is thin in relation to many emerging economies and that the South African sector has no deposit insurance scheme in place (PWC, 2013); both have unique implications on the role of deposits and bonds on market discipline of banks to be discussed under theories of market discipline.

3.1.1.2. Capital Budgeting model of bank lending

As can be deduced form the preceding sub-section, this study is closely related to the theoretical work examining how financial institutions should manage their portfolios when they face costs of external financing linked to capital market imperfections. A number of models have been developed to characterise the optimal risk selection strategy for financial institutions. One particularly celebrated model is based on Froot, Scharfstein and Stein's (1993) and Froot and Stein's (1998) works. One major conclusion is that the production technology of a company should not be exposed to financial risk at all if the company operates with the shareholders' interest at heart. When experiencing decreasing marginal payoffs in the level of capital invested and when trading at fair value in market, shareholders develop aversion towards market risk in the internal cash flow of the company.

Froot et al (1993) specifically showed that firms facing costly external finance, stochastic net worth, and attractive future investment opportunities behave in a risk-averse manner. On the other hand, Froot and Stein (1998) extended this to a model of financial institutions in which institutions' new investments are influenced not only by capital structure, but also by their existing asset portfolios and their ability to hedge new and existing risk. In line with this theory, related to this study, negative capital

shocks such as increases in non-performing loans (credit risk) reduce loan supply (influence management decisions).

From this angle, bank lending is taken as an investment decision, so that like all investment decisions, it has to face a cost of capital snag (Krainer, 2012; 2014). This view stresses the role of the market valuations of bank stocks reflecting the equity cost of capital for banks. According to this view, banks adjust their investments in loans in response to changes in the cash flows (or profitability) associated with the loans and their cost of capital. The cash flows or profitability generated on the asset acquisitions of loan customers is proxied by general equity share prices and reflects the investment opportunities of firms and the wealth of households. The cost of bank loan capital is proxied with bank equity share prices. The cost of deposit finance is ignored since it is practically zero (Krainer, 2014).

3.1.1.3. The New Bank Lending Channel

Financial innovation contributed to the developing of the "Originate to Distribute" (OTD) model: an intermediation approach in which banks originate, repackage and then sell their loans (or other assets such bonds or credit risk exposures) on to the financial market (van Rixtel & Gasperini, 2013; Pinna, 2014). In principle, these innovations allowed a broader range of investors to access a class of assets hitherto limited to banks (i.e. loans) thereby distributing these risks to financial markets. As a result, banks' funding became much more dependent on perceptions of financial markets (van Rixtel & Gasperini, 2013).

Capital plays a significant role in banks' activities, especially during times of financial distress where stakeholders including creditors and regulators impose stringent conditions. Although banks have different sources to raise funding (deposits and bond market for example), contractionary monetary policy would reduce lending only if the tightening of deposits cannot be offset by access to the debt market (issuing non-reservable liability). However, the debt market can have frictions that result in lemon premium demanded by investors, making the cost for debt higher for less capitalized banks as bank capital affect its external crediting rating.

Across literature, it has been acknowledged that bank capital has an effect on bank lending if the cost of not meeting minimum capital requirements is high and when the equity market is imperfect to the extent that banks cannot easily issue equity in financial distress periods (see for example Gambacorta & Mistrulli, 2004; Altunbas, Gambacorta & Marqués-Ibanez, 2009). To put it in perspective, Beltratti and Stulz, (2009) found out that equity prices of banks with more Tier 1 capital performed comparatively well (with regards to loan supply) during the crisis than low-capitalized banks.

There is a trade-off between amount of credit risk to accumulate and earnings of the bank. According to Sinkey (2001), the risk index of a bank can take the form:

$$\boldsymbol{RI = [E(ROA) + CAP]/sROA} \quad \textbf{..... 3.1}$$

Where

RI= risk index;
E(ROA) is expected return on assets;
CAP =capitalisation and
sROA is standard deviation of returns on assets

The risk index (RI) is a distance measured in terms of the number of standard deviations that a bank is away from book-value insolvency. Poor quality loans reduce a bank's expected earnings, plummets its capital, and raise the unpredictability of its earnings, banks with high loan losses will show low RIs. The challenge for the bank is to determine the optimum level of credit risk, as too much will kill a bank but not enough will retard its earnings. The bank has to monitor its probability of default which can be given by the following expression:

$$\boldsymbol{d = f[I, CF, NW, G]} \quad \textbf{.....3.2}$$

Where

d = probability of default

I = information quality, which is a function of character (honesty, ethical reputation)

CF = cash flow, level and stability

NW = real net worth (capital)

G = guarantee

The factors that explain probability of default are susceptible to changes in external environment, which on the negative side, will increase the probability of the borrower not able to meet their loan repayment commitments. In that regard, given that credit risk is the greatest component of bank risk (as discussed in detail in Chapter Two) banks often show leniency to their clients depending on their relationship (Plei, 2013). This is one source of a major difference between intermediated finance (banking) and direct finance (capital markets) where when adverse external conditions occur, bankers tend to practice forbearance, which is a function of the strength of the bank-customer relationship (IMF, 2008).

Regulatory discipline (increased regulatory interference) focuses on the quality of banks' loan portfolios: classified loans (substandard, doubtful, loss) and risk-based capital requirements (credit risk and bank capital). While market discipline (the increased costs of funds) rewards banks with lower loan losses through higher stock prices and punishes banks with higher loan losses via lower stock prices (Billett, 1998; Sinkey, 2001; Bliss, 2004; Guo & Prezas, 2014).

3.1.1.4. Corporate finance versus financial services view

According to Beck, Levine and Loayza (2000), banks and stock markets are substitutes; therefore, the competition among banks and stock markets in extending external finance to corporations will end in a negative relation between banking development and stock market turnover. Development of one is at the expense of the other. Contrary to the corporate finance view, Levine (2001) upholds the financial

services opinion, arguing that banking and stock market activities complement each other in attaining economic growth.

In line with the focus of this study, Dow and Gorton (1997) and Allen and Gale (2004) argued that the stock market can perform a direct (monitoring) as well as indirect (information signalling) role regarding corporate performance that banks use in their conjecture of economic growth and hence of future banking activity. The financial services view, as articulated by Merton and Bodie (1993) and Levine (1997), curtails the prominence of the bank-based versus market-based debate. Notably, the financial services view places the analytical spotlight on how to create better functioning banks and markets. In that vein, Boot and Thakor (2010) assert that there is a growing dependence on the financial markets by banks for both as sources of hedging funds as well as for engaging in other activities such as securitization. The outcome being double edged: possibility of risk reduction and risk elevation for the bank.

This is the belief that has resulted in promotion of market discipline through implementing the principles outlined under the Basel Accord Pillar 3 (Market Discipline), (BIS, 2012). The success of this pillar rests on the complementariness of the two sectors, and it was developed from the financial services view perspective. South African financial sector authorities seem to keenly trail the financial services view with the reported quest to implement the Basel recommendations through willingness to revise and align financial sector regulations (IMF, 2015). The increasing interactions have been expected to increase financial system fragility hence increased regulation and supervision expected to adequately curtail that adverse effect.

Therefore, finding support for the presence of market monitoring in South Africa and its effectiveness (presence of market influence), may be in support of the financial services view that banks and financial markets complement for a better financial system.

3.1.2. Theoretical Framework of Market Discipline

The formative study by Lane (1993) describes market discipline as: “financial markets giving signals that lead borrowers [in this case banks] to act in a way in line with their creditworthiness”. It follows then that market discipline can be signalled by all bank stakeholders, which includes depositors, debt-holders as well as equity-holders. In line with this, depositors can demand a higher return, leading to price effect, or withdraw their deposits resulting in quantity effect, when faced by growing costs and more uncertainty (Peria and Schmukler, 2001). Availability of such threats acts as discipline mechanism for banking management on their activities. In the same way, debt-holders can demand a higher yield on bank debt, thus raising the cost of funds for riskier entities. Moreover, from the angle of equity-holders, they can sell their stocks, thereby pulling down share prices and placing management under increased scrutiny (Berger, 1991).

Flannery and Sorescu (1996) suggest that market discipline must satisfy a two-stage process of recognition and control. While, Bliss and Flannery (2001) notes that market discipline entails two distinct components of ‘monitoring’ and ‘influence’. Intuitively, the two concepts logically follow in line with recognition and control concepts.

By recognition, it implies the stakeholders are able to realize, after processing all the available information, that the bank is not financial healthy. Availability of information is key, hence Basel committee recommendations for improved disclosure by banks. Therefore, under this recognition phase, also called monitoring phase, stakeholders monitor the risk profile of the financial institution and …

i. promptly impound any changes in the firm’s condition in prices (e.g. deposit rates demanded or stock prices), termed price effect. In an efficient market, the price of all securities reflect the fundamental features of the firm, therefore as risk profile changes, so does the price of the securities linked to that particular organization. Market price is determined by forces of demand and supply which are driven by the perception investors have about that particular firm. If the

perception is negative, more sales of the securities, for example stocks of the firm, are experienced pushing prices downwards.

A recent example of such a scenario is the one in the unsecured lending sector of the South African banking industry in 2012/2013 (Lefifi, 2013; Rose, 2014). African Bank and then Capitec reported an increase in loan loss provision, and shareholders used this information together with other pieces of information available in the market (for example the general economic outlook and household debt levels) to decide to demand a lower price for each bank's stock, resulting in the fall of the share prices sharply (Lefifi, 2014). Having processed this information, holders of the securities can act upon such information by …

ii. adjusting the amount of deposits or stockholding with the financial institution, called quantity effect. In the cases reported above, the security holders disposed of their holdings, which further pushed price downwards.

This is possible given the satisfaction of the three conditions as indicated in the diagrammatic illustration below. Firstly, the markets should be open to free trade, far from the influence of state and its institutions. Secondly, the information should be easily available, say from published statements and related reporting requirements (of late the amount of information that firms, especially banks should disclose has been increasing) (IMF, 2015).

These two combine help investors assess risk of the bank and rightly process the information. These two are necessary but not sufficient conditions, as investors after assessing the risk profile of the bank, should perceive themselves at the losing end in the event of a default. Lately, in various countries, this has been defeated by the too-big-to-fail argument which led to banks being bailed out. In such a scenario, the security holders do not have an incentive to provide signals to the bank- through the price and quantity effects as discussed above- as they do not stand to lose anything. Therefore, the third condition is that no bail-out should be expected (Flannery & Rangan, 2003).

As this should not be a once off thing, the bank regulators are fostering the availability of the right kind of information at the right time, which will be well reliable to aid investors' decision-making (BIS, 2012; IMF, 2015). A wrong reaction by investors could self-fulfil, and this can be detrimental to the whole banking sector, therefore, sufficiency and consistency of information should be ensured. Meeting the three conditions and related sub-conditions, the investors can react and as a result provide signals to the banks directly or indirectly form the market in general.

Upon the release of the signals by the market or the investors, a reaction from the borrower (in this case a bank) would be anticipated. This happens in the control phase where the market disciplinary effects feed back to the financial institution (direct influencing) and respective supervisors (indirect influencing). The banks can react by adjusting their activities to be in line with their solvency, as reflected by the market.

There are various ways the bank management could react to that information as it appears in the market- direct influencing. Capitec for example, drastically cut back on its lending also making the requirements and assessing process more stringent (Lefifi, May 2013; Barry, December 2015). On the other hand, the supervisors of banks will read the market signals and process that information in the supervisory reviews and induce management to change the bank activities to reflect their risk profiles, that is, indirect influencing.

If this happens in the South African banking sector, then it can be concluded that there is market discipline (both monitoring and influencing). Sometimes monitoring could be present, but influencing (direct mostly) is not effective, (Baele, et. al., 2012; 2014).

In general, market discipline is a market-based incentive mechanism whereby stakeholders 'punish' institutions that are not risk-taking conservative (Baele, et. al., 2014). The nature of 'punishment' could either be: price effect, where investors require higher returns on bank securities; the quantity effect, where depositors withdraw their funds; and/ or the valuation effect, whereby stock market participants drive down the bank value (Romero & Tabak, 2010; Hadad, et. al., 2011).

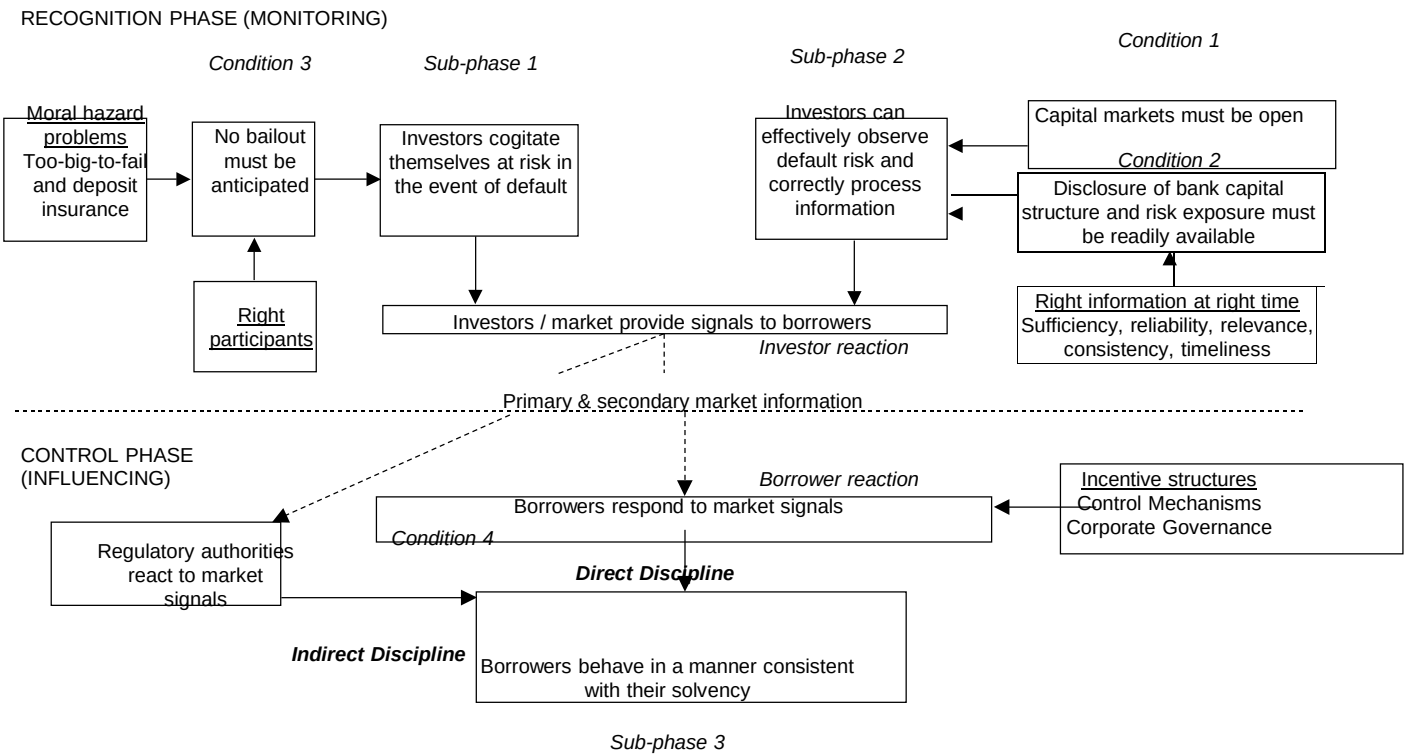
It is imperative to note that for the punishment to occur and be effective, it depends on the stakeholders' incentive to exercise it, the power in their actions on the viability of

the business and also the level of awareness (information) they have about the institution. The incentive to act usually manifest as a possibility to lose some investment funds, which encourages stakeholders to gather information about performance and risk behaviour of the institution of interest. The power could be by the value of the investment of the ability to crowd in other stakeholders in the action against the institution. The effectiveness of market discipline depends mainly on the bank's disclosure policy (which Basel accords have been promoting since Basel II), accuracy of the stakeholders' interpretation of the information and the capacity to act (see McCunn, 2015; IMF, 2015).

The discussion here highlights how market discipline is postulated to evolve. The next sub-section details how and why the identified stakeholder would act upon the information they receive about the bank.

Market Discipline Theoretical Framework

The phases, sub-phases and conditions for effective market discipline



Source: Hamalainen et al (2005) and information from Flannery and Sorescu (1996)

3.1.2.1. Merton's structural approach

The quantitative modelling of credit risk initiated by Merton (1974) shows how the probability of company default can be inferred from the market valuation of companies. Merton (1974) showed how equity and debt can be modelled as contingent claims on bank assets. Since its conception, Merton's structural approach has been widely used in analysing market discipline and bond prices (see, for example, Campbell and Taksler, 2003; Gropp, et. al., 2006).

The basic insight of the Merton model is that the pay-offs to the shareholders of a firm are very similar to the pay-offs had they purchased a call option on the value of the firm with a strike price given by the amount of debt outstanding. Shareholders have the last claim on the assets of a firm and have limited liability. As initially proposed by Merton (1977), equity can be controlled as call option on a firm, in this instance a bank, with a strike price equal to the total book value of the debt. Thus, option-pricing theory can be used to derive the market value and volatility of assets from the observable equity value and total debt liabilities. Alternatively, we can consider the negative of the distance-to-default (-DD), which can be derived from the Black-Scholes model. Consequently, -DD is a complete and unbiased indicator of bank fragility hence the best stock market indicator derived from stock prices.

Why stock prices are complete and unbiased indicators of bank solvency

The payoff of equity can be taken as a call option on the bank, with obligation towards depositors given the strike price (Merton, 1974, 1977). In the case of depositors having full information about the bank's investment strategies, a deposit rate commensurate with the inherent risk will be demanded. This results in maximization of a bank's value along share value maximization and hence no exploitation of depositors by shareholders through their controlling position. The outcome of a value maximizing portfolio selection implies that regulations will not be necessary as socially optimal risk levels are assumed by the bank.

Equity value and the probability of default

Assuming that the value of the firm's equity is denoted by E and that of its assets by A; $E_0$and A_0be the current values of E and A respectively while the values at time T will be

denoted by E_T and A_T. In line with the Merton framework, the payment to the shareholders at time T is given by

$$\boldsymbol{E_T = max\,[A_T - D, 0]} \quad \text{……..3.3}$$

Implying equity is a call option on the assets of the firm with strike price equal to the promised debt payment. The current equity price is therefore:

$$\boldsymbol{E_0 = A_0 N(d_1) - De^{-rT} N(d_2)} \quad \text{……..3.4}$$

$$\text{With} \boldsymbol{d_1 = \frac{\ln(\frac{A_0 e^{rT}}{D})}{\sigma_A \sqrt{T}} + 0.5\sigma_A\sqrt{T}\ ;\ d_2 = d_1 - \sigma_A\sqrt{T}}$$

σA is the volatility of the asset value, and r is the risk-free rate of interest, both of which are assumed to be constant. Define $D^* = De^{-rT}$ as the present value of the promised debt payment, and let $L = D^*/A_0$ be a measure of leverage. Using these definitions, the equity value is:

$$\boldsymbol{E_0 = A_0[N(d_1) - LN(d_2)]} \quad \text{……..3.5}$$

Where

$$\boldsymbol{d_1 = \frac{-\ln(L)}{\sigma_A\sqrt{T}} + 0.5\sigma_A\sqrt{T}\ ;\ d_2 = d_1 - \sigma_A\sqrt{T}} \quad \text{……..3.6}$$

As shown by Jones, Mason and Rosenfeld (1984), because the equity value is a function of the asset value, we can use its lemma to determine the instantaneous volatility of the equity from the asset volatility:

$$\boldsymbol{E_0\sigma_E = \frac{\partial E}{\partial A} A_0\sigma_A} \quad \text{……..3.7}$$

Where σ_E is the instantaneous volatility of the company's equity at time zero. From Equation (5), this leads to

$$\boldsymbol{\sigma_E = \frac{\sigma_A N(d_1)}{N(d_1) - LN(d_2)}} \quad \text{……..3.8}$$

Equations (5) and (8) allow A_0 and σ_A to be obtained from E_0, σ_E, L and T. The risk-neutral probability, P, that the company will default by the time T is the probability that shareholders

will not exercise their call option to buy the assets of the company for *D* at time *T*. It is given by

$$\boldsymbol{P = N(-d_2)} \quad \text{…… (3. 9)}$$

This depends only on the leverage, *L*, the asset volatility, σ_A, and the time to repayment, *T*.

Debt value and the implied credit spread of risky debt

Merton's model can be used to explain risky debt yields. Define B_0 as the market price of the debt at time zero. The value of the assets at any time equals the total value of the two sources of financing, so that

$$\boldsymbol{B_0 = A_0 - E_0} \quad \text{…… (3.10)}$$

Using Equation (5), this becomes

$$\boldsymbol{B_0 = A_0[N(-d_1) + LN(d_2)]} \quad \text{…… (3.11)}$$

The yield to maturity on the debt is defined implicitly by

$$\boldsymbol{B_0 = De^{-yT} = D * e^{(r-y)T}} \quad \text{…… (3.12)}$$

Substituting this into Equation (11) and using A_0 = D*⁄L gives the yield to maturity as

$$\boldsymbol{y = r - ln\frac{N(d_2)+N(-d_1)/L}{T}} \quad \text{……(3.13)}$$

The credit spread implied by the Merton model is therefore

$$\boldsymbol{s = y - r - ln\frac{[N(d_2)+N(-d_1)/L]}{T}} \quad \text{……(3.14)}$$

Like the expression for the risk-neutral probability of default in Equation (9), the implied credit spread depends only on the leverage, L, the asset volatility, σ_A, and the time to repayment, T.

As in Crosbie and Bohn (2003), a distance to default can be calculated to measure the performance of the banks based on this theoretical option pricing model of Merton (1974) as discussed above. Vassalou and Xing (2004) highlighted the merits of distance to default emphasising that it combines information about stock returns with leverage and volatility

information and is, therefore, a more efficient indicator of default risk than simple equity price based indicators. However, also worth noting is that market-based risk measures have been found to be more consistent than other measures relying on financial statements (see for example Hillegeist, Keating, Cram & Lundstedt 2004; Demirovic & Thomas 2007). Their power extends to predicting supervisory ratings, bond spreads, and rating agencies' downgrades the economies level of development divide better than "reduced form" statistical models of default intensities (Arora, Bohn & Zhu 2005).

3.1.2.2. The Agency Costs of Outside Equity of Jensen and Meckling 1976

From this theory, every owner will make decision to maximize his/her utility derived from pecuniary returns as well as various non-pecuniary features of the entrepreneurial accomplishments. The owner will bear the entire wealth effects of these expected costs so long as the equity market anticipates these effects.

Elizalde (2007) asserts that any effective market discipline mechanism has to satisfy three requirements. First, it has to ensure stakeholders (depositors or shareholders) receive timely information about the financial situation of the bank, which can be provided by rating agencies and published financial statements. Second, it has to ensure that the stakeholders have incentives to use that information. Finally, the market discipline mechanism has to affect the behaviour of banks.

Imperative to note that public disclosure is in line with Regulation 43 of the regulations relating to banks in South Africa based on Basel II. According to Elizalde (2007), all three Pillars of the Basel Accords reduce banks' risk-taking incentives. Theoretically, markets can discipline the banks, with two distinct components of monitoring and influencing, (Bliss & Flannery, 2001; 2002). In support of the possible link, Kim and Moreno (1994) noted that as far as bank loans are collaterised by assets as shares, this will mean falling stock prices can expose banks to default risk which, with a possibility of affecting a banks' loan supply behaviour (Krainer, 2014). Moreover, conglomeration within the financial sector and securitization of bank loans aids the interaction.

Having identified the key theories underpinning this study, the next section turns to reviewing studies that have been done in this and related fields. Worth noting is the limited

extent of empirical works in this field, especially in developing economies (Romero & Tabak, 2010).

3.2. Empirical Literature

Theoretical literature review pointed to the possible link between the markets mainly in the loan market (based on the funding structure of banks and that the stock market in general is a predictor of economic prospects therefore lending by banks), also through the information gathering and processing by stakeholders in the financial markets which is compounded in security prices demanded by the respective stakeholders. For the latter, various instruments like debt and/or equity could be used to predict bankruptcy of banks. Here, a glance is taken at various works within the field guided by the distinctions identified in theory.

Ghosh and Das (2005) pointed out that authorities should find ways to encourage prudent behaviour by banks at all times and especially to avoid banking crisis. According to Mishkin (2000) and IMF (2015), this could be through tightening prudential supervision. It follows then that there is need for measures that can complement prudential supervision, alternatively banking on the concern of other stakeholders on the desire for efficacy of bank operations.

3.2.1. Literature on Stock markets and bank lending

Kim and Moreno (1994) investigated the relationship between stock prices and bank lending. The study employed a five-variable VAR model based on Japanese monthly time series data from 1970 to 1993. There was evidence that in the period prior to the mid-1980s, the relationship between stock prices and bank lending was weak, but strengthened afterwards. The conclusion reached was that the stock prices made significant contributions to variations in bank lending in Japan. More specifically, the Japanese Stock market was found to affect both the supply and demand side of bank loans.

For South Africa, it has long been postulated that the banking sector does not lend much due to low household savings, and the analysis for such behaviour is scant (Ivashina & Scharfstein, 2010). This study will contribute to this strand of literature specifically for the

South Africa case and emerging economies as stock markets' effect of bank loans works through both the demand and supply side. The latter is of more interest to this study as it depends on the individual bank's financial market price and its balance sheet considering its capital position, a component that has seen regulations being upped preserve creditability of the sector.

Sichei (2006) as well as Mishi and Tsegaye (2012) argue for the case of South Africa investigated the bank lending channel, taking into account one of the unique features of the banking sector- concentration. Literature on the traditional bank lending channel is vast, globally (see for example Bernanke & Gertler, 1995; Kishan & Opiela, 2000; Angeloni, Kashyap & Mojon, 2003; Ehrmann, & Worms, 2004; Gambacorta, 2005; Ashcraft, 2006; Peek & Rosengren, 2010; Gambacorta & Marques-Ibanez, 2011;Simpasa, Nandwa & Nabassaga, 2014). However, recent strands of literature emerging have pointed to the possibility of stock market channel of the monetary policy transmission mechanism; notable contributors are Cosimano, Fullenkamp & Chami (1999) Sondermann, Bohl, & Siklos (2009); Krainer (2011, 2012, 2014) for the case of US, UK and Japan, as well as Burdekin and Tao (2011).

Ibrahim (2006) also estimated the interactions between bank loans and stock prices in Malaysia using a VAR model. The findings from the VAR model and Impulse response functions were that the Malaysian banking sector significantly depends on stock market stability. A further interesting finding is that bank loans react positively to the increase in stock prices, but the reverse influence could not be ascertained. Ultimately, the study concluded that bank loans play no significant role in transmitting stock market shocks to the real sector; however, the strength of the sector rests on stock market stability.

In addition to that, Ibrahim (2006) asserts that as a result of the focus placed on stock markets in the reverberation of the crisis and their possible effects on banks, the dynamic associations between stock prices and bank lending behaviour merit empirical enquiry. Empirically, though the role of banks in the economy has attracted mammoth attention particularly in evaluating monetary transmission mechanisms, their relations to the healthiness of financial markets have scant attention. Few studies have incorporated both

stock prices and bank loans in their empirical modelling, for example Dale and Haldane (1995).

In Africa, Mbutor (2010) examined whether banks curtail lending because of the fluctuation in exchange rate and the stock indices in the context of the Nigerian financial system. The outcomes of the study showed that exchange rate volatility and equity fluctuations do have a significant effect on bank lending in the Nigerian banks. The exchange rate volatility affects the share price in the stock market and then affects the bank lending.

Additionally, Burdekin and Tao (2011) examined the bank lending channel and stock prices relationship in China from year 2004 to 2010. The study employed the Chinese ALL share index, inflation and a single bank's survey data drawn from roughly 20 000 questionnaires administered in 50 different sized Chinese cities. Estimation was based on the Granger-causality test which uncovered uni-directional causality running from the stock market index to the Banking Business Index and also from Bankers' Confidence to the stock market index. A positive relationship was found to exist where a rise in Chinese stock prices fuels the rise of bank loans. Conclusions from the study are consistent with those of antecedents in the subject matter such as Ibrahim (2006).

Focusing on France, Germany and the Euro Area, Krainer (2011) investigated the role of a stock market in the bank loan market. Based on non-nested hypothesis checks and omitted variables tests, the study contrasts a traditional demand oriented model to a non-traditional capital budgeting model of bank lending. Results from the European model confirmed that the bank lending in Europe is affected by stock market innovations, which is consistent with findings in earlier studies. Similar results were obtained for the Euro area and France, although Europe has a more economy. The traditional demand-oriented model of bank lending was rejected for both France and the Euro area, but they failed to reject the capital budgeting model of bank lending which emphasizes the role of equity in influencing loan market. The study, indeed, provides useful empirical work.

For China, Burdekin and Tao (2011), found out that stockmarket strength is followed by rising, bank lending activity using the 2004-2010 People's Bank survey data concluding that stock markets, therefore, could add information for decision making to the monetary

policy regulators. In this way, the development of the stock market is seen as a complement to that of the banking sector (Garcia & Liu, 1999). However, it is still not clear if stock market can best predict bank lending in South Africa due to limited works in this area.

Similarly, Tan and Floros (2012) evaluated the determinants of bank performance in China, particularly examining the effects of stock market volatility, competition and ownership on bank performance. The findings show that increased volatility of stock markets can result in greater bank performance measured by return on equity and its excess.

Raunig, Scharler and Sindermann (2014), in a panel data set-up, found out that that growth rate in bank loans declines sharply in periods of uncentainty as proxied by stock prices volatility, and the effect varies according to individual specific bank characteristics like size and liquidity. In sharp contrast to the above, Karim et al. (2012) concluded that the stock markets and banking sector are independent after employing Granger non-causality test in bivariate and multivariate models on both month and quartely time series data on Malaysia.

From this discussion, it is clear that there is a possible link between stock markets and banks' activity, albeit not without disagreements on the actual relationship and how it ensues. It would be necessary to consider the possibility of stock prices as predictors of bank fragility, that is, to look at the possibility of stock markets to monitor bank activities and penalise them accordingly. This will be a case of market discipling of banks that is discussed in the next sub-section and discuss its empirics.

3.2.2. Literature on market discipline

Several studies have modelled financial markets and bank performance and risk, however, predominantly focusing on developed economies. According to Malherbe and Segal (2001), one clear lesson is that capital markets discipline can, at least in some cases, enforce sound corporate governance, adding that the most important force for corporate governance reform in South Africa has been the market. Market discipline imposed through falling equity prices has led to radical changes in corporate structure and conduct. On the other hand, a study by Gunther et al (2001) estimated statistical models directly established

from downgrades to allow a clear analysis of the contribution of equity based indicators to the identification of default.

Contrastingly, Allen and Gale (2004) although concluding by encouraging more research on this topic, found out that Europe should develop a financial system based on both financial intermediaries and markets, arguing that in this way, it can, to some extent, get the best of both worlds. Specifically, in terms of efficiency properties, it will get the benefits of cross-sectional risk sharing, albeit giving up the benefits of inter-temporal smoothing. Allen and Gale (2004) added that competition between banks and markets will help to ensure that there are few rents to be protected so that change will not be held back by consigned interests.

Private market information is poised to contribute to bank supervision process, with its incorporation in the process gaining momentum over the years (Furlong & Williams, 2006). The study found that financial market indicators (both equity and debt based) best estimate individual bank risk. Similarly, Distinguin et al (2006) weigh in by concluding that the accuracy of how stock market information can predict financial distress of banks is dependent upon the market tradability of the bank's liability, that is, the more the bank liabilities are market traded, the greater the predictive power.

Inoguchi (2008) looked at the role of stock markets and interbank markets in measuring bank performance in Malaysia, arguing that research on whether financial markets have served in terms of assessment and discipline of banks have been confined in developed economies only. In addition, the author asserts that the functioning of the stock market is particularly important from the view of maintaining and strengthening banking systems. Panel regression techniques were employed. In the same vein, Debasish and Das (2009) investigated the existence of market discipline in the Indian commercial banks over the period 2001-2008. Market discipline was found to exist in the Indian banking sector with variation in the type of variables that dominate between foreign and domestic banks.

Furthermore, Baele et al (2011, 2014) looked at whether stock markets discipline US bank holding companies, specifically investigating if they just monitor or influencing is also present. Evidence of market monitoring from a stochastic frontier framework was found, so

was the presence of market influence. Banks that receive a risk signal react by increasing their capital buffer, lowering the dividend pay-out ratio, lowering the liquidity risk, increasing their desired level of retail funding and lowering their reliance on potentially volatile sources of non-interest income. This confirms the two components of market discipline, monitoring and influencing, are present and that markets are, in such cases, able to effectively discipline banks.

Forssbæck (2011) considered the effect of market discipline by creditors on bank risk-taking controlling for ownership structure. Using panel data for several banks across the world, the study concluded that there is a negative individual risk effect of creditor discipline, which increases when interacted with shareholder control significantly. The literature supports the view that bank supervisors across the globe are advocating for: promoting market discipline to reduce risk-taking by banks. The Basel Accords stand for this view, with market discipline pillar from Basel II advocating for more and more disclosure to enhance onitoring of the entities activities by all interested statekeholders that may include shareholders. The role of ownwership structure on the effectiveness of market discipline was echoed by Barry, Lepetit, and Tarazi (2009) asserting that asset risk is lower in banks where a higher proportion of total stocks is held by families and individuals and that the probability of default of banks is higher when non-financial companies and institutional investors hold a higher proportion of total equity. The ownership structure of South African banks is varied, and it will be interesting to see how market discipline, if it exists, varies depending on that.

Similarly, Distinguin, Hasan, and Tarazi (2012) ran a horse race for accounting and stock market data considering their estimation power on both downgrades and updagrades controlling for major activities of the bank. Both indicators were found to be significant leading indicators but more effective in forecasting upgrades that downgrades and greatly significant for banks that focus on tradition banking.

Imperative to note here is that the majority of studies (for example, Ashcraft, 2008; Flannery & Sorescu, 1996; Sironi, 2003; or Krishnan, Ritchken, & Thomson, 2005) on market discipline infer evidence on market monitoring and influencing from subordinated debt. However, contrary to such, this study infers from stock prices rather than from subordinated

debt, measure suitable for developing economies characterised by banks with limited use of subordinated debt (Gunther, Levoniana & Moore, 2001). Chen, Funke, and Mannasoo (2006) used equity prices to calculate distance-to-default of Estonian banks and concluded that market indicators are moderately useful for anticipating future financial distress and rating changes in transition economies. Equity-based risk scores were observed to be dependent upon expected future payoffs to investors and are thus innately forward looking.

Therefore, can stock prices accurately and completely predict bank fragility? Of late, empirical studies point out that stock market prices can be helpful in predicting bank vulnerabilities. Earlier, Berger et al. (2000) reported that supervisors' assessments of bank soundness are less predictive of future changes than equity and bond market signals. Further, Hal, King, Meyer, and Vaughan (2001) observed that the stock market emphasizes risk-return trade-offs, whereas regulators care more about probability of failure. If the stock can predict bank vulnerability accurately, then it is possible for the stock market to discipline banks over and above the supervision done by the regulators. This is the crux of inquiry of this study.

In literature, debt has been touted as the best predictor of bank fragility as the interests of bondholders are more aligned to those of bank supervisors. For example, the concern of bondholders, so as for the supervisors, is on downside risks. However, Furlong and Williams (2006) argued that equity-based indicators could be better as interpreting debt spreads can be problematic, interest rates spread on debt are affected by various other factors than just default risk and more importantly, in terms of depth and breath of the market, they argued that the equity market is much richer. Although not without other limitations, the effect of government safety net on dumpening signals from changes in stock prices is not significant in the case of South Africa, given the limited extent of such a safety net.

Across literature, analyses have focused on banks' subordinated bond spreads as predictors of bank fragility (Gropp, Vesala, & Vulpes, 2002). The study concluded that both equity based indicator (the negative of distance to default) and bond spread are complete and unbiased indicators of bank fragility in the European region. However, the ability to estimate bank fragility is slightly different, with the spread's prediction power stronger for

periods closer (3-6 months) to default and is non-linear. The findings corroborate with those of Chen, Funke, and Mannasoo (2006) who, based on Estonian banks' data, concluded that market indicators are abstemiously beneficial for predicting financial distress and rating changes in transition economies. The study also used equity prices to calculate distance-to-default measures of banks´ distress probabilities.

In a case of developing economies, Mbarek and Mezzez (2012b) used different stock market based indicators to test the ability of stock market investors in disciplining banks. The focus was on stock market only as they argued that bond markets are not developed in the Maghreb region and are dominated by government securities. Considering the period 2003-2009, the panel data analysis checked the significance of market beta, idiosyncratic risk component, total volatility of bank stock returns and distance to default in estimating bank financial distress. The latter variable is well supported in literature because even though equities are forward-looking and highly liquid, an ambiguous signal on bank soundness can be released in a case where there is limited liability of shareholders and safety net.

The consensus of investors, with respect to an individual entity, is reflected in market prices and their movements (Gunther, Levonian, & Moore, 2011). Since prices depend on future pay-offs, they are naturally forward-looking, investors are incentivised to collect and process information about the organisation. This, coupled with the high frequency nature of equity prices data, the quality of the price signals can be argued to be reasonably high.

Across literature (see for example, Romera & Tabak, 2010; Hadad et. al. 2011; Hasan et al 2013), testing for market discipline of banks is touted to be feasible using depositors' information, mostly for developing and emerging economies like South Africa. This is contrary to other studies that argue that it is best to use subordinated debt or stock prices (as in Flannery & Sorescu, 1996; Sironi, 2003; Krishnan, Ritchken, & Thomson, 2005; Distinguin et. al., 2006; Ashcraft 2008; Debasish et. al., 2009; Baele et. al., 2011).

3.2.2.1. Conglomeration and complexity of supervision

Khanna and Palepu (1997) assert that the benefits of conglomeration depend on the economy in which the conglomerate is operating, with more benefits found in developing

countries that developed. However, others suggests there is more to this as conglomerates can improve internal market discipline and may even vary in the developing countries depending on the funding structure. Conglomeration is argued to be beneficial through benefits of diversification- cost sharing and revenue enhancements. However, the effect is not straight forward. If the desire is to take advantage of deposit insurance subsidies a conglomerate can be induced to maximize risk by choosing positively correlated, highly risky projects- minimising diversification. On the other hand, the conglomerate's desire could be to maximize diversification benefits by choosing negatively correlated projects with low risk.

Furthermore, the benefits that accrue depend on the effectiveness of market discipline, with more effective market discipline on stand-alone eroding such benefits, (Boot & Schmeits, 2000). Though beneficial in the event of ineffective market discipline, conglomeration can further undermine the effectiveness of market discipline. Dealing with conglomerates brings supervisory nightmares as well as diluting monetary policy transmission. For example, the nature of global banks allows cross-border transmission of shocks and thus requires effective coordination and cooperation between national supervisory authorities to prevent the international spill-over of financial shocks (De Has & Van Lelyveld, 2014). On the other hand, such multinational banks respond differently to local conditions as compared to domestically owned ones as for examples (De Has et al., 2014) identified that they did not reduce their lending when a host country was hit by a banking crisis (while unaffiliated domestic banks had to do so).

3.2.2.2. Board members effect

Ntim, Opong, and Danbolt (2015) investigated the association between board size and firm valuation using a South African sample of 169 firms from 2002 to 2011. Their results suggest that board size has a positive association with firm valuation, consistent with larger boards providing better access to resources. SA corporate boards were found to perform a weaker agency (advisory, monitoring and disciplining) role than Western European and US boards, but a stronger resource dependence role, by providing access to resources, such as business contacts and contracts.

This is so because the corporate sector under the empowerment laws which decipher in appointment of board members with narrow or limited skills base, weak enforcement of corporate regulations and concentration of ownership (among the black bourgeoisie). In that regard, any positive impact of board size on firm valuation is likely to depend on the effective execution of the resource dependence role than the agency role. Furthermore Ntim (2013) brings out the significant role played by good cooperate governance on a firm's performance. In addition, Bliss (2004) acknowledges the ability of board members to monitor and influence a bank's behaviour.

However, in the case of Tunisia, Gassouma and Rajhi (2013) observed that market discipline is only affected by the concentration of institutional outsider ownership, the nationalization of ownership and by depositors but remains unpractised by both the Board of directors and the creditors. This further vindicates carrying out this study as the argument is that beyond regulatory supervision, internal and external, there is need for other stakeholders to monitor and influence banks' behaviour. In other words, regulatory supervision is necessary but not sufficient to ensure health operations of banks.

3.3. Assessment of Literature

Literature on banking in South Africa investigating the dynamic interaction of stock markets and banks is scant. This study will fill the gap by exploring the interaction between stock market and the bank balance sheet variables. Specifically, the study investigated the relationship between bank lending and stock market developments (stock price changes) as well as whether stock prices can accurately predict bank fragility and influence management decision making. The South African case study is interesting given the structure of the banking sector and the sophistication of the financial system, biased towards the development of financial markets.

The first contribution of the study is that the bank lending channel is revisited with a specification that includes, among other controls, stock market prices. Secondly, an investigation whether stock market prices provide quantitative guidelines for the bank loan portfolios management was done. It is intuitive that stock market liquidity, for example, absorbs a wide variety of information, including macro announcements. As a direct consequence, prior knowledge about stock market illiquidity may provide an alternative

solution to limit catastrophic implications of financial crises. Most importantly, the study focuses on an emerging market economy, with world class financial systems marked with heightened effort to enhance market discipline in a highly concentrated banking sector.

CHAPTER FOUR

Methodology and Empirical Estimation Techniques

*"It is well enough that people of the nation **should** not understand our banking and monetary system, for if they did, I believe there would be a revolution before tomorrow morning". **- Henry Ford***

4.0. Introduction

This chapter is set to specify the models to be estimated to address the empirical objectives set in Chapter One. The specification is informed by the preceding chapter on literature review and the desire to meet the said objectives. Theories underpinning this study have been discussed, so are the key empirical works in this field that will guide model specification. To adequately cater for all the objectives, this chapter is broadly divided into five sections: three sections as themes in line with the three objectives, the fourth one details the robustness checks and lastly, a section presenting chapter summary.

Under each theme, there are three sub-sections to present model specification, variable definition and data sources, and estimation techniques, respectively.

4.1. Testing for the stock market monetary policy transmission channel

4.1.1. Model 1 Specification

To determine the impact of stock markets on bank lending in South Africa, the specification of bank lending of monetary policy transmission stresses the capital budgeting aspects of bank investments in private loans as in Krainer (2012; 2014). The reduced-form linear specification of the stock market oriented view of bank lending is given by:

$$\Delta BL_{it} = \alpha_0 + \beta_0 ASI_t + \beta_1 (SP, bk_{it}) + \mu_{it} \quad \text{..... 4.1}$$

H1:β_0>1 and β_1>0

Where

BL = bank lending by each bank (i) in time t.

ASI= All Share index, stock market index in time t.

SP, bk = share price of the specific bank (i) at time (t)

The traditional demand oriented model, on the other hand, follows the following specification:

$$\Delta BL_{it} = \alpha_1 + \beta_2 GDP_t + \beta_3 R_t + \varepsilon \text{ ..... } \mathbf{4.2}$$

H2: β_2>0 and β_3<0

Where, GDP= South Africa's gross domestic product at time t.

R= monetary rate at time t.

The results of the above specifications are two non-nested hypotheses on this linear bank loan market model.

4.1.2. Variable definition, *a priori* expectations and data sources

BL: Bank lending, the dependent variable, is measured as individual bank loans and advances to the private sector. The data is obtainable from individual bank financial statements obtained from the Bankscope database.

ASI: This All Share Index proxies the profitability generated on the asset acquisitions of loan customers, which will also reflect the investment opportunities of firms, so is the wealth of households. In line with Ibrahim (2006) and Brinkmeyer (2014), a positive and significant relationship between ASI and changes in BL is expected. This variable is obtained from Quantec easydata database.

SP, BK: Share prices for individual banks are used to capture the cost of capital for banks as informed by literature (Krainer, 2014). The data was obtained from Bankscope individual bank's financial statements. *A priori*, a positive relationship with bank loans to the private sector is expected, as in Brinkmeyer (2014).

GDP: In theory, the sign of $\boldsymbol{\beta_2}$ is ambiguous. In this study, the supply side perspective concurs with a positive $\boldsymbol{\beta_2}$ from the traditional argument that higher income of firms and households imply a greater ability to service debt (Ong, et. al., 2013); therefore, , banks are willing to lend more as the default risk is revised down (see Paile, 2014; Jourdan and Ellyne, 2015 for the case of South Africa).

R: Is the money market rate representing the monetary policy stance by the South African Reserve Bank. As the interest rate increase, the demand for loans is expected to decline, hence a negative relationship *a priori* (Kakes & Sturm, 2002; Liu, 2011; Mishi & Tsegaye, 2012)

4.1.3. Estimation Procedure

a. We run the two regressions separately and the results compared in terms of goodness of fit and stability. The model that better fits the data, which better explains bank lending, identifies the best monetary policy transmission channel in South Africa, the traditional bank lending channel or the existence of the new stock market channel. The latter vindicates the assertion that stock markets have a significant influence on the banks, that is, there is a link between the stock markets and the banks.

b. Non-nested hypothesis tests (J-type tests), as proposed by Davidson and MacKinnon, (1981; 1993) are done. First run the regression in 4.1 and collect fitted values of BL; the fitted values are included as explanatory in the regression of equation 4.2. If the estimated coefficient on the fitted values from equation 4.1 is statistically significant, then reject H2, if not, then fail to reject H2. Repeat the procedure for equation 4.2. The hypotheses being tested are stated in equations 4.1 and 4.2 above.

Comparing the non-nested hypotheses implies four outcomes: reject H1 and fail to reject H2; reject H2 and fail to reject H1; reject both or fail to reject both H1 and H2. If both are rejected, then neither model is very useful in explaining bank lending. On the other hand, if it is not possible to reject both, then the data is not opulent enough to differentiate between the two competing models of bank loaning.

4.1.4. Estimation techniques

The models specified above, 4.1 and 4.2, are panel in nature, and the key estimation technique is the regression analysis. The study employed panel data models, as opposed

to time series models, because of two important reasons. Onuonga-Okeri (2014) while investigating the Kenyan banking sector provided an elaborate account of the advantages of panel data, as well as the different estimation techniques.

First, panel data models and in particular, the fixed effects model takes into account bank-specific heterogeneity. It is important to recall that one of the attractiveness of panel data analysis is that it enables one to analyse variables that vary over time but are constant across cross sections (banks). In this study macroeconomic variables are, for example, market concentration, inflation, and interest rate.

Second, according to Gujarati (2004), by employing a combination of time series and cross-sections, panel data provide more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency. In addition, Brooks (2014) asserts that through pooling cross-sections and time-series data, one can increase the degrees of freedom, thereby improving the power of the test. Panel data models were employed to address the main objective, namely, to test the presence of market discipline, both monitoring and influencing components, in the South African banking sector.

The dataset utilised in this study followed a given sample of banks over time, thus providing multiple observations on each entity in the sample, and therefore, following under the category of panel data (Hsiao, 2003). There are two kinds of information in cross-sectional time-series data: the cross-sectional information reflected in the differences between subjects (in this study, banks), and the time-series or within-subject information reflected in the changes within subjects over time (Huang & Lee, 2007). This study benefited from such data structure and related techniques. The fundamental advantage of a panel data set over other formats is the great flexibility in modelling differences in behaviour across entities/ units.

4.1.4.1. Regression Analysis

Regression analysis allowed the researcher to determine the impact of stock market through estimating the coefficient of stock market indicators on the dependent variable.

i. Panel data estimation methods

According to Greene (2008) and Baltagi (2015), the basic framework for panel data regression model takes the form:

$$y_{it} = \beta X'_{it} + \alpha z'_{it} + \varepsilon_{it} \quad \text{..... 4.3}$$

There are *K* regressors in X'_{it} not including a constant term. The heterogeneity, or individual effect is z'_{it} where $z_i$contains a constant term, and a set of group-specific variables, which may be observed as such risk-taking behaviour and capital structure, which can be considered to be constant over time *t.* There are several models for panel data. These are discussed in detail below.

There are three primary panel data estimation methods in literature namely, Pooled OLS (POLS), Random Effects Model (REM) and Fixed effects Model (FEM) (Brooks, 2014; Baltagi, 2015). The hypotheses to be tested with panel data for individual banks can be summarised as:

- Stock markets are relevant in providing useful information to banks for lending decision-making purposes (stock market channel of monetary policy transmission);
- Stock markets are relevant in providing useful information to bank stakeholders, thus allowing them to take action within their means (market monitoring); and
- bank managers observe the behaviours of their stakeholders in the market and act upon such (market influencing).

There are different approaches to employing equation 4.3 above to the data of this study in order to estimate the specified models. These are discussed below.

ii. Pooled Regression Model

According to Baltagi (2013; 2015), the pooled regression model stresses the combined estimation of coefficients using the ordinary least squares (OLS) thereby increasing degrees of freedom and decreasing standard errors of the coefficients. Its major weakness is, however, that it pools all cross-sections and time series data and estimates a common regression disregarding possible individual bank-specific differences. To decide between a pooled regression model (restricted) and a fixed effects model (unrestricted), the F-test is performed.

The F-test is constructed as follows:

$H_0 : \mu_1 = \mu_2 = ... = \mu_{N-1} = 0$

H_A : Not all equal to 0

$$F\ statistic = \frac{(RSS - URSS)/(n-1)}{URSS/(nt-n-k)} \sim F_{(n-1),(nt-n-k)}$$

Where**:**

RSS- Residual sum of squares from the pooled model (restricted model)

URSS -Residual sum of squares from the (unrestricted model)

n- Number of cross sections (banks)

t- Number of time periods

k- Number of explanatory variables

The F-test basically encompasses a comparison of the residual sum of squares (RSS) of both models. This method is justified on the basis that OLS entails minimising the residual sum of squares. The rationale of the F-test is that if after imposing restrictions, a much greater RSS is obtained then the restricted model is not supported by the data. Similarly, if the RSS decreases significantly following the restrictions, then it is concluded that the restricted model is supported by the data. The null hypothesis of cross-section homogeneity is rejected if F-statistic > F-critical value at 0.05 level of significance.

Greene (2010) claims that OLS can produce dependable and efficient approximations of the common α, and the slope vector β if Z_i in equation 4.3 above contains an intercept only. Given that the data is in panel format, the OLS will be pooled with an extra intercept or 'dummy' added for each entity (bank). The approach is suitable in at least nearly homogenous groups (Metriscient, 2014). Although this cannot be purely said for the banks that are under investigation in this study, there are a lot of features that tie the institutions together to form 'near' homogenous group. To augment the latter argument and to ensure that the estimates are consistent, the study will check if the model does not give large standard errors (small T-stats). This outcome is highlighted that the banks are not homogenous and, therefore, more advanced approaches like Random Effects Model may be more appropriate.

iii. Random Effects Model

In the random effects model (REM) or the error component model (ECM), the individual effects are treated as random draws from a larger population. If the cross-section or

individual-specific error component is zero, there will be no difference between the pooled and the random effects model in which case, one would simply run a pooled regression (Gujarati, 2004).

The differences in the variances of the error term are used to model the groups together, thus imposing a constant intercept and common slope. Greene (2010) states that if the unobserved individual heterogeneity can be considered uncorrelated with the controlled variables, the model is specified as:

$$\boldsymbol{y_{it} = \beta X'_{it} + \alpha + \mu_i + \varepsilon_{it}} \quad \textbf{4.4}$$

This is a linear regression model with a compound disturbance that may be consistently, albeit inefficiently, estimated by least squares. This random effects approach specifies that $\mu_i$is a group-specific random element, similar to ε_{it}except that for each group, there is but a single draw that enters the regression identically in each period. According to Greene (2010), the crucial distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model, not whether these effects are stochastic or not.

However, Baltagi (2008) states that the random effects model is appropriate if draws are made randomly from a large population where *N* is generally large (>30). In this study, *N* = 13, which is not sufficiently large to warrant the use of the random effects model. As a result, the REM versus FEM test is not performed and as such, random effects results are considered inferior in this study.

iv. Random Parameters

Greene (2010) asserts that the random effects model is a regression model with a random constant term. With a sufficiently rich data set, this idea is extended to a model in which the other coefficients vary randomly across individuals as well. Greene (2010) then provided an extension of the model might as:

$$\boldsymbol{y_{it} = X'_{it}(\beta + h_i) + (\alpha + \mu_i) + \varepsilon_{it}} \quad \textbf{4.5}$$

where $h_i$is a random vector that induces the variation of the parameters across individuals.

Despite having been proposed early in literature, this random parameters model has only gained attention fairly recently. The approach allows researchers to increase the amount of heterogeneity across individuals while retaining some commonalities. According to Tores-Reyna (2010), this has been recently extended to allow the mean value of the parameter distribution to become a cross-section identifier. Unlike the random effects discussed above, this approach allows slopes and constants to change by cross-sections or groups.

On the other hand, there are still other techniques that allow more flexibility, for example allowing dynamics to the model. Such techniques include the General Method of Moments (GMM).

v. Generalized Method of Moments (GMM)

This method was developed by Hansen (1982) as a generalization of the method of moments of Peterson (1984). The GMM becomes handy in instances where parameters of interest are finite-dimensional and when the full shape of the distribution function of the data may not be known, consequently maximum likelihood may not be applicable (Bond *et al.,* 2001).

The prominence of the GMM estimator is growing owing to many advantages over and above its dynamic nature. It has the advantage of generalising and combing a couple of techniques such as least squares (LS), instrumental variables (IV) or maximum likelihood (ML), and, therefore, enjoys the benefit of most unlikely to be mis-specified. Furthermore, Bond *et al.* (2001) noted that even in the presence of some. Therefore, above all, the GMM estimator is strong in being asymptotically normal and efficient compared to other estimators that do not use extra information aside from that contained in the moment conditions (Mishi & Tsegaye, 2012). In the context of market discipline, GMM has been applied for example in Hadad et al (2011), among others.

The limited sample size, *n*, in this study can benefit from the robustness properties of GMM, especially dealing with mis-specification as a result of small sample issues.

vi. Fixed Effects Model (FEM)

A fixed effects model is a linear regression model in which the intercept terms vary over the individual units (banks). Gujarati and Porter (2009) state that these intercepts capture

the different special features of each entity such as managerial style or the type of market each firm is serving. Griffiths et al (2008) had observed that these fixed effects can be analysed to study the extent of firm heterogeneity and to examine any particular firms of interest. However, in the event that these individual effects are identical, one can then use a pooled least squares regression model.

Fixed effects is used when there is a need to analyse the impact of variables that vary over time. “Fixed Effects Models measure differences in intercepts for each groups (calculated using a separate dummy variable for each group. This is basically an OLS model with dummy variables to control for group differences, assuming constant slopes (coefficients) for independent variables and constant variance across groups” (Umar, 2010).

Fixed effects works through investigating the relationship between predictor and outcome variables within a unit of analysis (e.g. bank in this study). The assumption is that each entity has its unique characteristics that may or may not exert effect on the predictor variables (e.g., the business practices of a company may influence its stock price).

In the event that $Z_i$is unobserved, but correlated with x_{it}, the discussed OLS estimates on β are biased and inconsistent due to an omitted variable effect. As a result, Greene (2010) proposes that the model take the form:

$$\boldsymbol{y_{it}} = \boldsymbol{X'_{it}}\,\boldsymbol{\beta} + \boldsymbol{\alpha_i} + \boldsymbol{\varepsilon_{it}} \quad \textbf{4.6}$$

where $\alpha_i = Z'_i \alpha$, embodies all the observable effects and specifies an estimable conditionalmean.

It is imperative to note that the term *fixed* implies the correlation of α_i and X_{it}not that α_i is non-stochastic. The approach takes α_i to be a group-specific intercept in the regression model. The assumption should be that there is a factor within the unit of analysis that may bias or influence the predictor or outcome variable and therefore should be controlled for, hence assuming the correlation between entity’s error term and predictor variables. Such are time in-variant characteristics as they are fixed over time and allow assessment of the net effect of the predictors on the outcome variable. Furthermore, Umar (2010) argued that such time-invariant characteristics must be unique to specific individual entities and should not be correlated with those of other entities.

When the entity's error term is not constant and is correlated with that of others, fixed effects fails to produce consistent and dependable estimates and random effects should be opted for instead. To know which technique to apply, Tores-Reyna (2010) and Greene (2015) suggest the use of Hausman test. In this study, a number of techniques are being applied including those that produce corrected (robust) standard errors, therefore, the consistency of fixed effects will be tested in terms of the coefficients it produces compared to the stringent techniques.

The fixed effects model can be estimated by employing the "within" estimation technique or the least square dummy variable (LSDV) technique. Both fixed effects modelling techniques namely, LSDV and "within" estimation methods basically produce the same results. For making inferences, the LSDV is reported as it estimates as opposed to calculating the intercept coefficients and as such, produces standard errors, *t*-statistic and *p*-values. The latter argument makes LSDV appealing to this study and hence, it has been employed.

The deviations corrected by heteroskedasticity are calculated in the estimations (White correction). Also to be included are the tests of joint significance of bank fundamentals in order to determine if macro-economic effects and shocks are important, and a test for the joint significance of fixed effects. There are procedures to test the best model over and above general assumptions based on the nature of the firms under study. One such technique is the Hausman test. In case the test indicates a hypothesis of random effects, these results are indicated- in such a case a generalised least squares (GLS) method will be used.

The estimation techniques discussed above apply to all models in this study, unless explicitly stated, with the only variation being the specifications and/or variables in each model. As a result, for brevity, the discussion is not repeated for each specification, but only reference is made to the regression techniques discussed here.

4.1.4.2. Unit Root testing

Even though Maddala and Wu (1999) showed that testing unit roots for panel data is not much value adding, this study considered the suggestions of Im–Pesaran–Shin (2003) and Baltagi (2015) and tested for unit root in the variables used the all models. In literature,

there are a number of panel data unit root tests available (Baltagi, 2013). The notable ones are: The Levin Lin–Chu (2002), Harris–Tzavalis (1999), Breitung (2000; Breitung and Das 2005), Im–Pesaran–Shin (2003), and Fisher-type (Choi 2001) which all have a null hypothesis that all the panels contain a unit root. In addition, there is the Hadri (2000) Lagrange multiplier (LM) test has with a null hypothesis that all the panels are (trend) stationary (see for example, Hlouskova & Wagner, 2006; Baltagi, 2013).

However, among all these tests, the Im-Persaran-Shin (IPS) unit root test is the one that accommodates unbalanced panels as the one in this study (Baltagi, 2013). Therefore, this study followed this unit root testing technique. Moreover, all the other tests also assume that all panels share a common autoregressive parameter, which becomes an unrealistic assumption in the face of cultural, institutional, and other factors that are pertinent to bank level study. In this regard, IPS (2003) came handy with test that allowed relaxing this assumption.

$$\Delta \boldsymbol{y_{it}} = \emptyset_{\boldsymbol{i}} \boldsymbol{y_{i,t-1}} + \boldsymbol{z'_{it}} \boldsymbol{\gamma_i} + \boldsymbol{\varepsilon_{it}} \quad \text{.....4.7}$$

As described by Maddala and Wu (1999), the power of IPS is that each panel unit root test model is fitted to each panel separately and average the resulting t statistics.

The null hypothesis is that all panels contain a unit root, in that case $\emptyset_{\boldsymbol{i}}$= 0 for all i. On the other hand, the alternative hypothesis states that the proportion of panels that follow stationary processes is different from zero; that is, as N tends to infinity, the fraction N1/N converges to a nonzero value, where N1 is the number of panels that are stationary (Baltagi, 2013).

Furthermore, IPS allows an option to demean the series. Demean option, requests that the analysis first subtract the cross-sectional averages from the series. When specified, for each time period, the estimation produces the mean of the series across panels and subtracts this mean from the series (IPS, 2003). Levin, Lin, and Chu (2002) strongly recommend suggest this option to alleviate the effect of cross-sectional dependence.

The techniques discussed here apply to model 1 specified and also to models 2 and 3 specified below.

4.2. Testing market discipline- monitoring

Market monitoring is the first step in market disciplining, the second and final being influencing, as depicted in the theoretical framework presented in the preceding chapter. Under this section, modelling of monitoring by stockholders as well as monitoring by depositors through quantity and price is explained. The estimation of depositor disciplining of banks is tested for robustness checks.

4.2.1. Model 2 Specification

This is motivated by the works of Baele, et. al. (2011; 2014), with the testing for monitoring by stockholders done using the rule equation as follows:

$$\boldsymbol{\delta_{it} = \alpha_1 + \beta_3 X_{i,t-1} + \vartheta_{it}} \quad \text{..... 4.8}$$

As much as shareholders are interested in the return, so is in risk. This means that when assessing a bank's strategy to determine its effect on return and risk, the bank's stock prices will be revised accordingly. Shareholders feel they stand to lose in the face of liquidation of the bank in line with Merton's (1974) reasoning of considering equity as contingent claims. The market monitoring hypothesis can thus be tested by controlling bank's risk exposure on bank specific characteristics.

On the other hand, testing monitoring by depositors is done with the following estimations:

$$\boldsymbol{\Delta Dep_{i,t} = \mu_i + \tau_t + \beta_1 FUND_{i,t-1} + \epsilon_{i,t}} \quad \text{..... 4.9}$$

The model postulates that a bank's volume of deposits (total and time deposits) can be explained by its risk, the bank fundamentals, as well as macro-economic and systemic conditions (Hadad et. al., 2011; Romero & Tabak, 2010). On the other hand, the price effect model takes the form:

$$\boldsymbol{P_{i,t} = \mu_i + \tau_t + \beta_2 FUND_{i,t-1} + \omega_{i,t}} \quad \text{..... 4.10}$$

Model 2 specification depicted in equations 4.8-4.10 is in line with the Merton's structural approach as well as the agency costs of outside equity model by Jensen and Meckling (1976) discussed in Chapter 3.

4.2.2. Equity holders' monitoring- model 4.8

The specification in equation 4.8 links individual banks' stock market-based risk measureδ to a number of bank-specific features contained in X. The explanatory variables (X) and their possible proxies are: bank strategy (log of total assets, total capital ratio; return on equity, return on assets; cost-to-income ratio); funding structure (deposit to total assets ratio; loan to deposit ratio); asset mix (consumer loan share; loans to total assets); and revenue streams (non-interest income share; revenue diversification index).

If a significant relationship is found between the individual bank characteristics and risk measure, that would be a confirmation of market monitoring, a first step in market discipline. If so, a conclusion that equity holders track the different risks associated with the balance sheet and income statement characteristics will be reached. To better capture risk, total volatility, as in Calomiris and Nissim (2007), are considered.

4.2.3. Depositor Monitoring

a. The quantity effect (equation 4.19)

The change in volume of total deposits and that of time deposits is represented by ΔDep represent. The dependent variable takes two forms, total and time deposit, specifically. The modelling of time deposits is motivated by the understanding that they have greater probability of effecting market discipline since they have known maturity, and are for a specialised group of customers.

On the other hand, FUND captures the banks' economic and financial fundamentals as captured by the CAMELS methodology (see table 4.1 below). Although now commonly referred to as CAMELS, it originated on November 13 1979 as Uniform Financial Institution Rating system in the United States. It was later adopted by the National Credit Union Administration in October 1987. In general, CAMELS is an internationally recognised bank rating system using a group of indicators that summarize an institution's financial condition. The system is based on the six categories in which financial indicators are used to evaluate Capital adequacy, Asset quality, Management quality(efficiency), Earning ability (profitability), liquidity risk and Sensitivity to market risk (systematic risk).The variables reflect a banks' risk profile, among other things. This vector is one lagged to control for the time difference between the publication of the information and the absorption by the market. It should be noted, however, that the actual rating score based on CAMELS has,

ever since, never been disclosed to the general public; it only remains information for bank supervisors/ regulators and senior bank management, (Hirtle & Lopez, 1999).

The $\mu_i$term represents the effects of fixed nature of each bank. They affect each studied unit in a different way. For example, banks that are more experienced may attract more deposits regardless of the institution's risk.

The $\tau_t$represents time effects for variables that do not vary between the banks. As banks are under study, there are some variables that are common to all entities and only vary over time, such as macro-economic factors. Such factors are captured in this term. Such factors captured here can influence the level of deposits and the price for such deposits (interest paid) but are not part of the variables considered by depositors in choosing the bank to do business with. Lastly, the error vector is denoted by $\epsilon_{i,t}$.

b. Price effect (equation 4.10)

In this case, P represents the interest rate paid to depositors by banks. It would be best to use interest paid on uninsured deposits however, such disaggregated form is not available. Furthermore, specific data on the interest expense paid by banks on uninsured deposits is not easy to obtain however, following the works of Martinez-Peria, Soledad and Schmukler (2001), Demirgüç-Kunt and Huizinga (2004) and Hadad et al (2011), implicit interest rates can be used instead. The implicit interest rate is determined by dividing total interest expense by total deposits.

Two stakeholders, depositors and equity holders (covered in the next sub-section) are used for robustness check. It has been argued in literature that depositor discipline is straightforward and is commonly inherent in most markets unlike stock holder discipline (see for example Gonzalez-Rivera & Nickerson 2003; Romera & Tabak, 2010). Stock market discipline depends on the extent to which the economy's stock market is developed and how many banks have their equity negotiated on such platform.

Discrepancies between the outcomes from each model do not, however, entail the extent of tradability of bank equity. Romera and Tabak (2010) further argued that the importance of using equity to promote and confirm market discipline is controversial in most of the studies and requires a lot of data, which is not possible for most emerging economies. This argument necessitates the use of both equity and deposits in this study for robustness

check. It is imperative, however, that a significant number (12 out of 13) of the entities in the sample have tradable stock of the Johannesburg Stock Exchange, a globally competitive exchange.

Depositors are stakeholders interested in the well-being of financial institutions with the ability to sanction an institution that deviate from their desired/ expected performance path. Depositors can do this through withholding (withdrawal of) their deposits, known as quantity-based restriction, or through the price effect- where depositors demand a higher interest reward from a struggling institution (Hasan et al. 2013; Hadad et al 2011; Romero & Tabak, 2010). These two effects can be tested empirically, controlling for banks' fundamentals informed by the CAMELS ratings. Examples are in Romero and Tabak (2010) in the case of an emerging country like South Africa and Brazil. Brazil and South Africa are both members of an emerging economies bloc called BRICS, coined by taking the first letter from each of the five member countries (others being Russia, India and China). In their study, they proved that, indeed, depositors do discriminate between well and poorly managed banks through both channels. Variations where also observed within and outside financial crisis periods, for which, in this study, financial crisis was be controlled, so is the general macro-economic environment.

Despite the key focus being to use stock market data to test market discipline of banks in South Africa, there are limitations to the banks with equity negotiated on the stock exchange. Furthermore, availability of data is a serious constraint. To that effect, the study first tests the presence of market discipline using data that is relatively better in terms of availability and frequency- balance sheet accounts of individual banks. Market discipline analysis demands substantial data, which is often a limitation when considering financial institutions, as in this case, (Romero & Tabak, 2010). Amid such limitations, the majority of the data can be accessed and proxies, in some instances, can easily be employed.

To determine the presence or absence of market discipline, this study employed panel data estimation technique to determine the reaction bank deposits and interest rates paid for deposits to individual bank risk characteristics. In this instance, two can be revealed: quantity and price. If market discipline is exerted via quantity, then depositors reallocate their deposits from riskier to safer banks. On the other hand, market discipline via prices suggests that riskier banks would pay higher interest rates on their deposits than safer banks.

Table 4.1 Variables Description

Dimension	Examples of proxies	*a priori* expectation
C- capital adequacy,	• Capital-to-assets ratio (CAR) • Equity capital to total assets	Improved working capital indexes, and capital/ assets ratio, attracts more deposits and increases stock valuation. On the contrary, the effect over price of deposits will be the opposite.
A-asset quality	• NPLs to total loans • NPLs to total equity • Allowance for loan loss ratio • Provision for loan loss ratio	Higher ratio reduces deposits, while it increases interest rates paid on the deposits. Higher ratio leads to lower value of the bank's stocks due to the increasing possibility of default risk
M-management quality	• Operational cost • Loan growth rate • Ownership	The relationship is ambiguous as high administrative and personnel expenses in relation to assets reflects inefficiencies thus less deposits can be attracted. On the other hand the high ratio may imply investing in quality service therefore more deposits attracted. The same ambiguous effect is the case with stock valuation.
E-earnings/ profitability	• Net interest income • Margin (NIM) • Cost to income ratio • Return on asset • (ROA) • Return on equity • (ROE)	Higher profitability attracts more deposits and reduces the costs of deposits (interest paid). On the other hand that increased earing ability increases stock prices.
L-liquidity risk	• Customer deposits to total assets • Total loan to customer deposits (LTD) • inter-banking dependence	Customers desire more liquidity, therefore more liquid entities will attract more deposits and can be able to pay lower interest rate on the deposits. Stock markets also price liquidity positively.
Systematic risk sensitivity	Too-big-to-fail- bank size (SIZE)- log of assets	The bigger the bank, the more deposits and less interest rate can be expected. Bigger banks are considered safer and likely to be bailed out in the event of failure. Bigger institutions can be considered too-big-to-fail and assuming diversity and strength in their operations thus stock prices are expected to be high for big banks.

Source: Constructed based on the works of: Baele et. al., (2011, 2014); Romero and Tabak (2010); Curry, et. al., (2008); Kalfaoglou and Sarris (2006); Bognini et. al., (2002)

To control for general macro-economic conditions, there are two possibilities: one is the approach favoured by Flannery and Sorescu (1996) and Park and Peristiani (1998) of using year dummy variables. On the other hand, the work of Martinez-Peria and Schmukler (2001) suggests time-specific effects to control for macro-economic and

banking sector development variables. In the present study, for robustness the two possibilities were implemented separately, as well as the third suggested approach of using Gross Domestic Product growth rate, the inflation rate, and the annual average of Rand/USD exchange rate, to control for general macro-economic conditions. The study period ranging almost twenty years has witnessed a great swing in economic conditions, thereby making identification of expected specific signs difficult.

It is also important, given the structure of the South African banking sector, as discussed in Chapter Two and the sophistication of the financial markets, to control for variables such as: (1) a market structure variable (concentration ratio, measured by the HH-Index), (2) a market capitalization over GDP variable to control for the impact of capital market competition, (3) ownership variables foreign banks versus domestic banks and (4) regulatory variables. To examine the impact of each of the latter two variables on the extent of market discipline, the model interacted each of them with the bank risk variables (credit risk, liquidity risk, and insolvency risk). Market discipline is present when the dummy interaction with credit risk shows a positive sign, or when the dummy interaction variables with liquidity and insolvency risks show a negative sign.

In all equations, 4.8-4.11 above to allow exclusion of the scale effects and test the "too big to fail" hypothesis, a logarithmic variable of each bank's assets (capturing bank size) is controlled for, with the intention of testing if large banks are considered more safe and, consequently, attract more deposits. It has also included a dummy to test if ownership and regulatory changes matter. So, if the parameter on ownership-bank risk interaction is significant, it is possible to conclude that foreign owned banks have the capacity to interfere in market discipline and attract deposits.

4.3. Testing market discipline- influencing

4.3.1. Model 3 specification

To test market discipline the study was guided by Baele et al (2011), and the model is specified as:

$$\Delta\boldsymbol{\varphi_{it}} = \boldsymbol{\gamma}\left(\boldsymbol{\varphi} * -\boldsymbol{\varphi_{i,t-\tau}}\right) + \boldsymbol{\epsilon_{it}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textbf{4.11}$$

Where φ is strategic business indicator, $\varphi *$ is the target level of y and the speed of convergence to this target level. In order to identify the presence of market influencing, the study determined if the assumed target level differs for banks that receive a market signal; if banks with such signal converge quickly to the target, in the process setting different targets and speed of adjustment levels for banks of different strength (based on a particular banks position in the business model characteristic distribution). Furthermore, it is possible to allow $\boldsymbol{\varphi} *$ to be a function of the other indicators as well.

i. Stock market influencing

To test the stock market influencing hypothesis, a test on whether or not bank managers make strategic business model reallocations following a negative risk signal is done. The same model as in equation 4.11 above was considered, however in the context of equity market risk.

Market influencing is either direct (market players taking action of say, selling off stocks of the bank engaging in risky activities) or indirect (compelling regulatory authorities to act). In this study, interest was on the former, and to investigate that, the first step was to identify stock market-based bank-specific risk signals. The main focus was on obtaining information on to the extent bank managers make adjustments of key strategic variables following a shock on risk and/or valuation. Baele et al (2014) noted that equity holders are concerned with both return and risk, implying that their judgment of a bank's strategy and possible effect on risk and return will, consequently, be included in specific bank's stock prices. This provides an opportunity to test the presence of market discipline in SA's financial markets. A notable bank strategy is that of income diversification, premised on bank innovations (Roy-Trivedi, 2015).

In this study, income diversification was measured by the ratio of non-interest income to net operating income, in line with arguments in literature (see, Stiroh, 2004; De Young & Rice, 2003; Sanya & Wolfe, 2011; Kiweu, 2012; Calmes & Theoret, 2013;

Chen, et. al., 2013; Mishi & Khumalo, 2014). In this case, a high ratio represent more diversification (expansion to non-traditional intermediation activities) of income sources and therefore, a positive relationship is expected between diversified banks and deposits. This is a different approach from the one in Mercieca, Schaeck and Wolfe (2007) as well as Amidu and Wolfe (2013) with a measure for revenue diversification in the form of HH- index as follows:

$$HHI_{rev} = \left(\frac{NON}{NETOP}\right)^2 + \left(\frac{NET}{NETOP}\right)^2$$

Markowitz theory on diversification is very much plausible linking higher diversification to greater yields, hence attractive to investors and resonates with the chosen measurement of diversification in this study. The above formula uses net revenue instead of gross. Gross revenue has the advantage of ensuring that the diversification measure is not distorted by the profitability of the bank's interest business (Elsas, Hackethal & Holzhäuser, 2010).

ii. Depositors' influencing

Here, the estimation entails determining the effect of change in total and time deposits, the quantity and price on key individual bank strategy. If banks make strategic business model reallocations, following a shock on the quantity or price of depositors, that may interpreted as market influence of banks by depositors. However, since strategic business model shifts are in different forms, a couple of strategic bank business model indicators were considered for this study, which included among others: capital ratio, quality of assets, efficiency on costs, profitability, liquidity, and the proportion of retail deposits in total deposit funding.

4.4. Sampling and Study period

Data was drawn from thirteen (13) SA banks for the period 1994-2014. The data is from financial statements of individual banks obtained from Bankscope data base and stock prices obtained from Johannesburg stock exchange. The researcher believes

that the sample is representative as presently, there are 17 domestically owned banks that are registered with SARB, 14 branches of foreign banks and 3 mutual banks. However, the banking market is dominated by the four largest banks known as the “Big Four” which together contributed 84.1 percent to the balance-sheet size of the total banking sector at the end of December 2011 (SARB, 2011). Additionally, this sample is relatively large to the ones dominant in South African literature (see for example, Mishi & Tsegaye, 2012; Maredza & Ikhide, 2013b; Erasmus & Makina, 2014). The sample has been determined by availability of data over the study period which is covering the democratic period of South Africa. Pre- 1994 South Africa was under international economic sanctions which made it impossible to trade competitively and openenly. Furthermore majority of the banks currently operating in South Africa have been registered, regrouped or at least registered on the stock exchange post 1994.

4.5. Robustness and diagnostic checks

4.5.1. Heteroskedasticity

For models 4.1 and 4.2 where the POLS is the key estimation technique, Stock and Watson (2008) and Greene (2008) advised that it is necessary to test for heteroskedasticity. This can be done in two ways, informally (graphical) and formally (Breusch-Pagan test).

4.5.1.1. Informal tests- Graphical display

Heteroskedasticity can be tested graphically by plotting residuals vs. predicted values. To conclude that there is no Heteroskedasticity, there should not be any pattern observed.

4.5.1.2. Breusch-Pagan test

A non-graphical way to detect heteroskedasticity is the Breusch-Pagan test. The null hypothesis is that residuals are homoskedastic.

4.5.2. Corrected Standard Errors

For robustness and inspired by the work of Alu, Amidu, Osei and Kuipo (2014), the study supplemented the conventional panel data analysis techniques presented in sub-section 4.1.5 above with Panel Corrected Standard Errors (PCSE) model of Ordinary Least Squares (OLS) which is robust to heteroscedasticity and first order serial correlation (Reed & Webb, 2010; Reed & Ye, 2011). In this study, it is evident that the banks exhibit variation in scale and thus PCSE was considered ideal (Reed & Ye, 2011). The standard errors reveal the precision of the estimates and if corrected of heteroscedasticity, then they are reliable and generalisation to the population is stable and more precise. The standard error of the PCSE is, therefore, more robust.

In addition to PCSE, Feasible Generalized Least Squares (FGLS) were also be estimated because of its ability to fit linear cross-sectional time-series models when the disturbances are not assumed to be independent and identically distributed, that is, they are not i.i.d., (Maddala & Lahiri, 2006). Instead, the disturbances are assumed to be either heteroskedastic across panels or heteroskedastic and contemporaneously correlated across panels. The errors may also be assumed to be auto-correlated within panel, and the auto-correlation parameter may become constant across panels or different for each panel. In this study it was compelling to estimate these two models, not intending to run a horse race of them, but chiefly for robustness and to benefit from the advantages of both.

It is imperative to note here that the PCSE and FGLS follow estimation patterns that are different, as PCSE produces OLS estimates of the parameters when no autocorrelation is specified. In the case where auto-correlation is specified, the estimates of the parameters are restricted by the estimates of the autocorrelation parameters (Greene & McKenzie, 2012). In literature, Parks (1967), followed by Kmenta (1997), showed that the estimate of the variance–covariance matrix of the parameters is asymptotically efficient under the assumed covariance structure of the errors and applies the FGLS estimation of the error covariance matrix.

Furthermore, although the study period is 1994-2014 (20 years), the panel is unbalanced, with some variables having observations (T) spanning less than 13 years (N). This poses a challenge to FGLS, which according to Beck and Katz (1995) and Hoechle (2007), become infeasible. This is, however, not a unique and isolated issue related to unbalanced panels as the authors assert that it is common with majority of micro-economic panels. In this regard, Driscoll and Kraay (1998) developed a methodology that applies a Newey-West type correction to the sequence of cross-sectional averages of the moment conditions that guarantees that the covariance matrix estimator is consistent, independently of the cross-sectional dimension N.

This study, therefore, included Robust Standard Errors estimates for Panel Regressions with Cross-Sectional Dependence to cater for the possible deficiencies with FGLS and PCSE. In STATA, a command *'scc'* is used to obtain the estimates Panel Regressions with Cross-Sectional Dependence with the required robust standard errors.

On the other hand, as discussed above, not all variables can fit unit root testing conditions, and there is a great possibility of having some series within the panel not stationary. This is so because the alternative hypothesis for the unit root tests states that at least one of the panels follow a stationary process, which implies that it is not strict to have all exhibiting absence of unit root. To take care of that, this study considered the work of Blackburne and Frank (2007) for estimating non-stationary heterogeneous panels.

4.5.3. Pooled Mean Group (PMG) Estimator

PMG is premised on the understanding that assumption of homogeneity of the slope parameters can be misleading (see for example IPS, 2003). This is to separate large panel estimations form small panels that heavily rely and better estimated on fixed-random effects models or a combination fixed and instrumental variable techniques which produces GMM. The issue with non-stationarity of panels is also of great concern, therefore, Pesaran, Shin and Smith (1997, 1999) offer alternative techniques to estimate non-stationary panels with heterogeneous parameters across groups.

In essence, PMG pools and averages parameters within the model. This is thus an intermediate estimator allowing the short-term parameters to vary between groups while equality of the long-term coefficients between entities (banks) is imposed (Bangake & Eggoh, 2012). These are some of the motivations to apply it in this study, besides the advantage that it is its first application in this field for the case of South Africa and the need to capture the dynamic nature of the interaction of stock markets and banks.

The estimator assumes an autoregressive distributive lag (ARDL) ($p, q_1, \dots, q_k$ dynamic panel specification as follows:

$$\boldsymbol{y_{it} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q} \delta`_{ij} X_{i,t-j} + \mu_i + \epsilon_{it}} \quad \textbf{..... 4.12}$$

where i= 1, 2, …, N (13) representing the number of banks; the number of time periods t= 1, 2, …, T (20); $X_{i,t}$ is a vector of explanatory variables; $\delta`_{ij}$ represent the coefienct vectors; scalars are λ_{ij} and μ_i is the group-specific effect.

Equation 4.12 can be re-parameterised into an error correction model if the variables are cointegrated, that is if all variables are I(1) and cointegrated the error term will be I(0) for all banks. Imperative to note that there exists two extremes to this moderate PMG, namely: mean group (MG) estimator and dynamic fixed effect (DFE) estimator (Blackburne & Frank, 2007). The MG estimator depends on averaging the coefficients of N- time-series estimations without pooling, while the DFE pools the time-series data for each group with only constants allowed to vary. Given the unbalanced nature of the panel, the study took these options into consideration during estimation as the PMG requires the panel to be large a condition that may be restricted by missing observations in the panel, although overall, T and N are large enough (Tany, 2006; Bangake & Eggoh, 2012) .

4.6. Calibration of the estimation techniques

This chapter specified three main models meant to meet the specified objectives of the study, testing the hypotheses. The models were estimated in the panel techniques domain. However, to allow smooth flow of information and the discussion, this chapter

kept the discussion of estimation techniques to general form, with the specific techniques employed left for the relevant chapter that will be estimating each of these models. This is so because the models to be estimated are coming from different approaches and in some instances, use different levels of data (for example, macro vs. micro variables). The succeeding three chapters are each dedicated to one of the specified models and thus easy to discuss the specific estimation techniques in each chapter. This section calibrates the model specification and techniques in summary for clarity and pointing to the discussion to come in each of the coming three estimation chapters.

In short, the three main specified models, the possible variations and proposed estimation techniques are as follows:

- **Model 1: Testing for stock market channel**

As this specification is set to compare two assumptions, namely, the non-traditional (NT) (stock market) bank lending channel, on one hand (equation 4.1), and the traditional (T) bank lending channel, on the other (equation 4.2). Under each of the assumptions, two sub-models are estimated, the baseline model and the revised model controlling for some individual bank fundamentals. For both sub-models, four different estimation techniques are to be employed from the ones suggested above, and these are: pooled ordinary least squares, random effects, fixed effects as well as the least squares dummy variable.

As a result, the baseline model has eight variations, that is, two assumptions (traditional vs non-traditional bank lending channel) by four estimation techniques. The same can be said for the revised model. The results are presented and discussed in Chapter Five.

- **Model 2: Testing market discipline- monitoring component**

This model's estimates are found in Chapter Six. Broadly, two sub-specifications exist, that is, one depositor monitoring (with deposit side indictors as dependent variables) and stock market monitoring (with stock market based indicators as dependent variables). As highlighted earlier, from the deposit side, quantity (total deposits, term

deposits, current deposits, savings deposits, demand deposits) and price (deposit price and change in deposit price) of deposits were considered to determine the quantity effect and price effect respectively. On the other hand, the equity based indicator used is stock prices.

As a result in each sub-specification, that is, variation of dependent variables, seven techniques where used to estimate the model variants. The techniques are the four applied in model 1 above as well as the robust estimates techniques (panel corrected standard errors- PCSE; feasible generalised least squares-FGLS; cross-sectional dependent robust standard errors- SCC) based on literature given that this model only has bank level data (Parks, 1967; Kmenta, 1997; Reed & Ye, 2011; Alu, Amidu, Osei & Kuipo, 2014).

- **Model 3: Testing market discipline- influencing component**

Finally, in testing market, influencing two key banking activities were identified and are specified as dependent variables, thereby producing to sub-models. The first is having revenue diversification as dependent followed by one with funding structure. The estimation techniques applied and their justifications are as in model 2 above.

4.7. Summary of the chapter

The chapter set to specify the models estimated to assist in meeting the objectives set out in the first chapter as informed by literature. The model estimation techniques that are going to be carried in the following chapters were discussed and presented in line with panel data estimation framework benefiting from the numerous advantages of panel data like the flexibility in modelling and observing individual bank differences.

A total of about three main models are specified and were estimated in STATA 13 with data on individual banks sourced from Bankscope over a period of twenty years with some samples within the period considered in order to determine the influence of major macro-economic factors like the global financial crisis. For robustness check, the differences among the created mini-samples are tested. The chapter ended with providing a calibration of the estimation techniques applied to each model based on

the general techniques presented. The presentation and analysis of empirical findings is conducted in the coming chapters, specifically chapter 5-testing for the stock market channel; chapter 6- market monitoring of banks by stock markets and finally market influencing of banks by stock markets is done in Chapter 7.

CHAPTER FIVE

The Role of Stock Markets in Bank Loan Market

"[Don't be]… hostile towards those theorists bearing free parameters …" ***Lucas****, 1980 pp709*

5.0. Introduction

This chapter applies model 1 specified in Chapter Four (section 4.1.1) to the South African bank level data obtained from Bank Scope for 12 banks, covering the period 1994-2014. This is an important period in the history of modern South Africa covering two-decades of the democratically elected government. Compared to other studies of the banking sector in South Africa (see for example Mishi & Tsegaye, 2012; Maredza & Ikhide, 2013a, 2013b), this study makes a contribution to the number of entities studied breaking the data barrier reported in related literature.

This chapter serves as a precursor to econometric testing of market discipline, monitoring and influencing components, as it is justifiable to have an overall consideration of the effect of stock markets on the banking sector from the angle popularised in literature- bank lending (see literature review, works of Sichei, 2005; Mishi & Tsegaye, 2012 on the case of South Africa and Ashcraft, 2006; Peek & Rosengren, 2010; Gambacorta & Marques-Ibanez, 2011;Simpasa, Nandwa & Nabassaga, 2014) among others, globally. This channel is tested in the capital budgeting model framework as discussed in Chapter Three. The novelty of this model and the new knowledge-generation potential, especially with regards to better understanding the conduct of monetary policy for sustainable inclusive growth, vindicates the focus of this chapter.

The main argument, as discussed in the preceding chapters, is that the traditional bank lending channel model, being a demand-oriented model, fails to control for stock market influence on bank lending. This shortcoming can be addressed by incorporating

the capital budget model to bank lending in contrast to the traditional bank lending model. This idea is heavily and explicitly popularised by Krainer (2012, 2014; Deyoung, Gron, Torna & Winton, 2015). This chapter applies this line of thinking to the South African dataset in an effort to observe the link between stock markets and the banking sector, that is, “whether the stock market with its many eyes can see more clearly the underlying factors for loan supply and demand to the private sector”, (Krainer, 2014:285) to the extent of disciplining banks.

This helps in understanding the conduct of monetary policy, particularly the kind of asset and markets to be targeted with monetary policy stances aimed at stabilising bank lending and contributing to overall economic development. Bank lending challenges solution may lie in the manner of monetary policy focus and implementation (Krainer, 2014).

5.1. Descriptive Statistics

It is imperative to note here that the South African banking sector, albeit highly sophisticated and well-connected internationally, is highly concentrated (Mishi, Sibanda & Tsegaye, 2016 forthcoming) as measured by the Herfindahl-Hirschman Index (Mlambo & Ncube, 2011; SARB, 2013, 2014; BASA 2011, 2014). This phenomenon makes comparisons across groups (accounting for heterogeneity) categorised by size laudable when modelling issues within this sector. Bank size has been proxied by assets in line with banking sector literature (see among others Bernanke & Gertler, 1995; Kashyap& Stein 1995, 2000; Kishan & Opiela, 2000; Gunji & Yuan 2010; Mishi & Tsegaye 2012; and Onuonga-Okeri, 2014).

Carrera (2011) notes that different identification strategies have been proposed, including the use of bank-level data to account for heterogeneity in the response of banks to changes in monetary policy. This is underpinned by the belief that banks are price-takers in that the demand for loans is infinitely elastic, and reacts differently to monetary policy depending on the substitutability among alternative sources of non-deposit finance. Based on this, four banks have qualified to be in the ‘big banks’ categories (natural log (ln) of total assets value is 10 and above), while eight fall into

the small banks categories (ln total assets is below 10). Furthermore, the categorisation reflected and upheld the general market assertion that there are big four banks in South Africa, and they have been rightly identified as ABSA, FNB, Nedbank and Standard Bank alphabetically (Mlambo & Ncube 2011; Maredza & Ikhide, 2013a)

Table 5.1 below presents descriptive statistics of the key bank-based variables used in this chapter.

Table 5.1. Descriptive Statistics on Selected Bank Fundamentals by Bank Size (1994-2014) for 13 Selected South African Banks

	Big (4) Banks [ln_totalassets>10]					**Small (8) Banks[ln_totalassets<10]**				
VARIABLES	N	mean	sd	min	max	**N**	**mean**	**Sd**	**min**	**max**
Shareprice*	60	8,058	5,503	574.6	22,648	**88**	**5,098**	**6,046**	**31**	**28,339**
totalincome	76	52,337	32,592	5,961	145,080	**137**	**13,011**	**31,729**	**4.810**	**183,645**
interestincome	77	36,734	22,250	4,209	101,425	**120**	**1,110**	**2,026**	**4.810**	**12,205**
totalassets	77	517,814	396,044	56,836	1.691e+06	**137**	**13,087**	**16,982**	**19.30**	**80,975**
customerloans	74	309,378	212,738	43,610	763,882	**92**	**6,683**	**11,428**	**10.90**	**60,476**
totalequity	77	38,512	32,503	3,121	152,648	**137**	**3,184**	**5,211**	**-31.20**	**33,011**
triskcap**	74	12.11	2.516	5	17.50	**89**	**28.84**	**22.49**	**0**	**114.8**
totalloan	51	338,603	160,415	93,673	601,968	**92**	**17,937**	**34,353**	**10.90**	**143,901**
Nplreserves	71	6,493	4,684	0	19,166	**101**	**730.6**	**1,745**	**0**	**10,566**
totalfund	48	548,442	772,945	33,479	5.538e+06	**92**	**27,178**	**56,175**	**0**	**264,733**

**values are in cents | ** the values are in ratio form | the rest of the values, except N, are in R millions*

Source: Author's computation

Based on Table 5.1 above, there are marked differences between the two groups (big vs. small banks) with regards to the summary statistics provided. Looking at share prices for individual banks, among the big four, the minimum price of stock over the period was 574.6 cents (ZAR5.75) and a maximum of 22 648 cents (ZAR226.48), compared to the smaller banks' 31 cents (ZAR 0.31) and 28 339 cents (ZAR283.39) respectively. There is a wide range among smaller banks than in bigger banks, as well as great variation (sd. 6 046 cents for smaller banks vs 5 503 cents for bigger banks), with the minimum stock price among smaller banks reflecting the final share price of

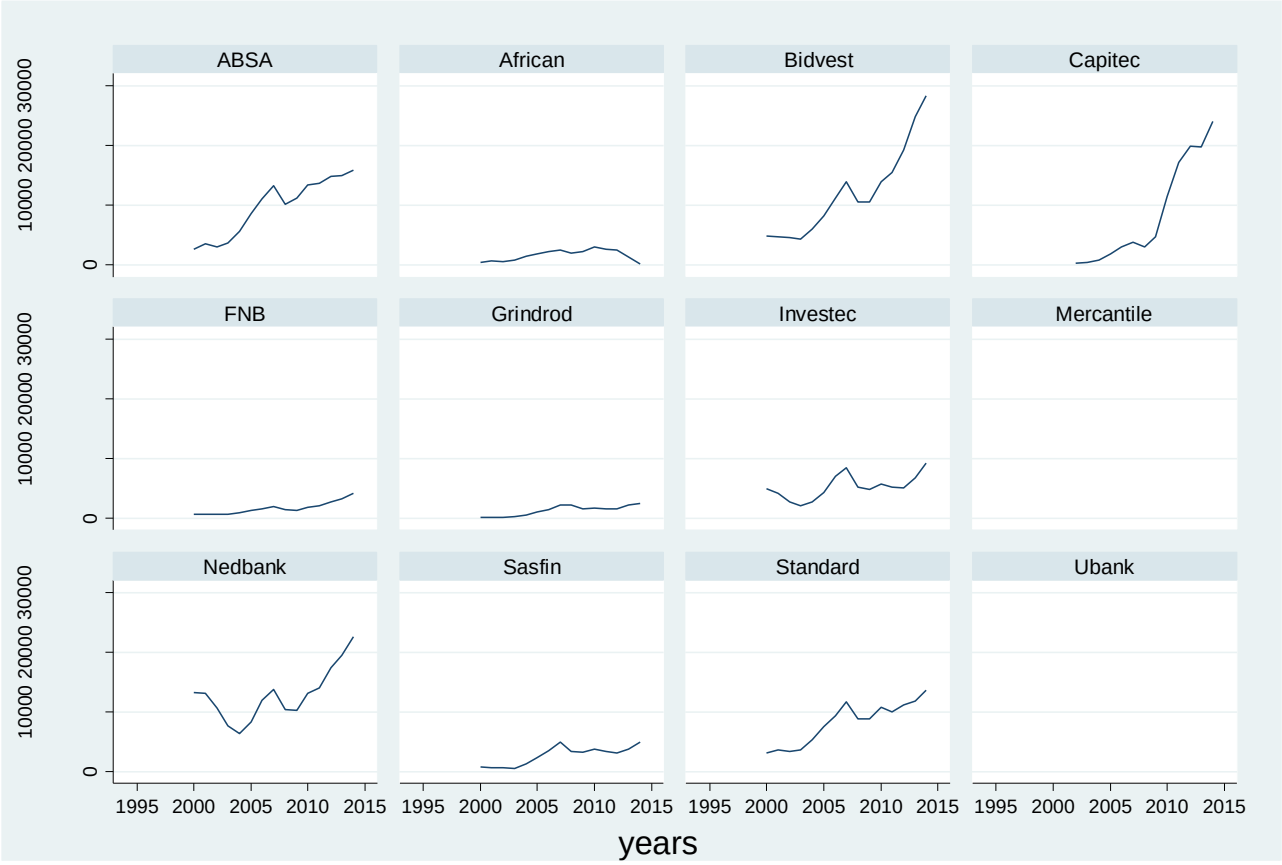
African Bank limited before being placed under curatorship in 2014 (SARB, 2015). The state of African Bank in these past years is also revealed in the total equity value which is in the red. Among the smaller banks, there are banks like Capitec and Investec with high performing stocks over the period, thereby providing a maximum value above one among the big four banks.

On average, big banks' shares are more valued than of those in the small banks group. On the other hand, the small banks group is containing investment banks with well-performing stocks like Investec and Grindrod that drive the maximum value. This feature is also reflected in the total income variable, where the smaller banks group has a higher maximum value compared to the big banks group. However, with all the remaining variables, the big banks stand out.

Figure 5.1 below shows the trend in stock prices for the individual banks (Ubank, a mutual bank is not listed on the stock exchange, therefore, no stock prices were available). Bidvest, an investment bank and Capitec, a young and competitive bank (entered the market around 2005) focusing mainly on the unbanked populace and competing fiercely in the unsecured lending market with African bank has stocks with the highest price, despite some noticeable few troughs. The key question however is, how sustainable would be such a trend on a bank heavily reliant on unsecured lending and limited diversification?

On the other hand, interest income is earned from credit (loans) extended and there are some banks from the small banks category that do not operate fully in the traditional banking fashion of depositing taking and loan supply. Notable examples are the investment banks named above as well as mutual banks like Ubank. The average income from interest charged on such loans among big banks is over 30 times more compared to that of smaller banks. Also of interest is to note the presence of pre-dominantly unsecured lenders among the smaller banks, African Bank, Capital bank. The argument is vindicated by the volume of customer loans, which is over ten times more among bigger banks. The big four banks, indeed, drive the South African banking sector. It suffice therefore to control for this variation in size on the various model variations to be estimated in this chapter.

Figure 5.1. Trends in Stock Market Prices for the individual banks in the Sample[3]



Source: Own compilation with data from Bankscope

Having looked at the descriptive statistics of the key variables, unit root tests were done before turning to the empirical estimation of the specified model to test the role of stock market prices on bank lending in South Africa.

5.2. Unit Root tests

As discussed earlier, unit root test was carried out to see the nature of the series making up the panel. Even though stationarity test has been reported not to be necessary in smaller panels, especially if some series have less than 10 observations (Maddalla & Wu, 1999; Baltagi, 2015) this study checked for robustness. In this study,

[3] Mercantile and Ubank did not have any stock price data over this period hence no trend observed. This is how the panel is unbalanced as mentioned in Chapter Four.

with the unbalanced panel, series with less than 10 observations are common as some banks started operating recently, and data for some variables was only available in a limited time span. The IPS panel unit root tests' outcome, where it was applicable (with series that have at least 10 observations), revealed that some panels are stationary for each of the variables, except log total equity. The variables were in log form to remove underlying trends (Brooks, 2014).

As mentioned in Chapter Four, the hypotheses for the IPS unit root tests are:

H0: All panels contain unit roots

Ha: Some panels are stationary

The null hypothesis was tested on the variables applicable, and the results are summarised in Table 5.2 below. The full results, as estimated, are available in appendix- *Im-Pesaran-Shin Unit Root Tests Results*. Of interest in the table below is the standardised Z_t-bar which is derived from an estimator of the Dickey–Fuller regression error variance. It is named Z-t-tilde-bar in the table and has an asymptotic standard normal distribution.

Table 5.2: Im-Pesaran-Shin (IPS) Unit Root test Results

Variable	No. of panels	Avg. No. of periods	Z_t_tilde_bar statistic	p-value	Conclusion
lsharep	9	14.78	-1.3528	0.0881*	Reject Null
ltotalincome	12	17.75	-2.6890	0.0036***	Reject Null
lintincome	12	16.42	-2.3201	0.0102**	Reject Null
ltassets	12	17.83	-1.8624	0.0313**	Reject Null
ltequity	12	17.75	-1.2435	0.1068	Fail to reject Null
ltotalD	11	16.73	-2.5441	0.0055***	Reject Null
diversification	12	16.25	-2.1139	0.0173**	Reject Null
HHIRev	12	16.25	-2.9951	0.0014***	Reject Null
depo_price	11	16.64	-2.4635	0.0069***	Reject Null

Where all variables are in logs and lsharep are share prices; ltotalincome is total income, lintincome is total interest income, ltassets s total assets; ltequity is total equity; ltotalD is total deposits; diversification is share of non-interest income to total income; HHIRev is HHI index for revenue diversification; depo_price is the deposit price

*** statistically significant at 1%; ** at 5% and * at 10%

Source: Own computation in STATA 13

As can be seen in the table, based on p-values that are less than 0.1 (10%), the null hypothesis that all series contain a unit root is rejected and it can be concluded that some panels are stationary (a nonzero fraction of panels with no unit roots exists).

5.3. Empirical estimations

5.3.1. Baseline Models

Based on the discussion in section 4.6 of Chapter Four, Table 5.3 below presents the baseline regression results. The variants of the estimation techniques represent pooled ordinary least squares (POLS), 1 and 2; Generalised Least Squares fixed effects techniques (3 &4) and random effects' assumed assumption (5 & 6) and least square dummy variable estimation (7 & 8). Based on estimations 1, 3, 5 and 7, the non-traditional bank lending channel is evident in South Africa. The stock markets, at both levels (individual banks and from the side of profitability of the investments, All Share index) significantly explains bank lending. In a similar vein, Ibrahim (2006) concluded that bank loans react positively to the increase in stock prices however, there is no evidence of influence from bank loans to stock prices. The results are also in line with the findings in Krainer (2014).

In the case of Nigeria, Oludare, Olagunju and Adelodun (2013) found a positive relationship between returns and NPL, and they interpreted it as: an increase in the amount of NPL ratio will bring about an increase in stock market volatility. Albeit having notable conclusions, the authors did not test causality clearly. However, it can be learnt that there is a link between stock markets and banks fundamentals, especially the loan market variables. Karim B.A., Lih and Karim Z.A. (2012) did test causality between stock market and bank loans, and in the case of Malaysia, the authors found strong evidence of no causality running between stock prices and bank loans' different models and samples. Their explanation for this was the inefficiency of the Malaysia stock market, which is contrary to the South African one (see the literature on South

African stock market efficiency (Watson & Rossouw, 2012; Noakes & Rajaratnam, 2014)

The results imply that bank management consider the information presented by stock markets in their investment (extending credit) decisions. In this case, if a bank is performing contrary to its investors' expectations, their reaction which would affect stock prices will further make bank managers to respond accordingly. In this regard, the stockholders have the ability to impact the investment decision-making by banks. In addition, banks consider the stock market very informative as the All share index, reflecting the potential profitability of newly funded ventures, significantly positively explains bank lending. Bank managers are wary of the information asymmetry problems, and the stock markets aggregate and present such information in the form of stock performance which managers can easily discern. Furthermore, Burdekin and Tao (2011) suggest that the stock market could serve as a useful indicator variable for monetary policy due to the significant positive link between stock market strength and bank lending in China.

Similarly, the traditional model is binding as well. However, the coefficient of growth in GDP is negative, contrary to theory and some evidence in literature. To further investigate this, the volume of turnover on the primary stock market was controlled for; the model improved significantly and the coefficient for primary market turnover was positive. There is a strong negative correlation between primary market turnover volume and GDP growth. On the other hand, money market rates indeed have a negative effect on bank loan demand. This is in line with theory and empirical works in this field. From this analysis it can be argued that in good times (higher economic growth episodes) companies rely on retained earnings than borrowings, hence the negative relationship between bank loan and growth in GDP. On the other hand, stock market development act as a intermediating factors as its inclusion in the model improves the model fit. This further explains the negative coefficient on GDP growth rate.

The fixed or random effects assumption does not make any difference to the results, only that ALSI and GDP are more statistically significant compared to in POLS. On the

other hand, the LSDV models confirm that there is a great difference between the banks, as shown by statistically significant intercepts of the individual bank financial institutions (BFI). The comparator firm is BFI (1), which is ABSA. The BFIs that are not having an intercept statistically different from that of ABSA, are the remaining three of the “big four”, FNB, Nedbank and Standard bank, respectively. The behaviour of the big four banks is statistically similar, and all other smaller banks have intercepts that are statistically lower than these, implying the dominance of the big four banks in the South African banking sector. This dominance is also reflected in the widely used measure of concentration, namely, HH-Index which is very high since late 1990s.

The first set of estimations in Table 5.3 below failed to distinguish the model that holds for the South African banking sector lending channel. Unlike in Krainer (2014) and ignoring Lucas’ (1980) warning, this study controlled for other variables which would help the models fit the data better. The results from the revised models, demonstrating the value of controlling other necessary variables, are presented in the next sub-section.

Table 5.3 Bank Lending- Traditional (T) vs. Non Traditional (NT) Channel

VARIABLES	(1) POLS(NT)	(2) POLS(T)	(3) FE(NT)	(4) FE(T)	(5) RE(NT)	(6) RE(T)	(7) LSDV(NT)	(8) LSDV(T)
jse_alsi	923.2*		1,097***		1,094***		1,097***	
	(524.2)		(290.3)		(287.1)		(290.3)	
shareprice	11.36***		9.781***		9.847***		9.781***	
	(4.026)		(2.942)		(2.886)		(2.942)	
2.BFI							-289,961***	-285,978***
							(48,566)	(37,766)
3.BFI							-386,041***	-336,560***
							(44,057)	(42,273)
4.BFI							-380,434***	-342,737***
							(44,275)	(43,452)
5.BFI							67,896	-5,031
							(50,321)	(42,126)
7.BFI							-349,289***	-283,155***
							(47,603)	(39,551)
9.BFI							-65,651	-36,915
							(44,017)	(37,279)
10.BFI							-279,196***	-297,665***
							(59,563)	(51,880)
11.BFI							80,216*	41,949
							(43,394)	(37,279)
gdp		-16,861*		-11,716**		-12,157**		-11,716**
		(8,971)		(5,427)		(5,578)		(5,427)
mmarketr		-17,392***		-25,132***		-24,546***		-25,132***
		(4,712)		(2,943)		(3,018)		(2,943)
8.BFI								-361,654***
								(46,322)
12.BFI								-339,464***
								(43,344)
Constant	14,824	355,098***	6,262	409,468***	-4,625	377,578***	173,129***	583,484***
	(59,149)	(57,870)	(31,555)	(35,571)	(79,981)	(50,856)	(43,880)	(44,353)

Observations	111	162	111	162	111	162	111	162
R-squared	0.131	0.088	0.310	0.331			0.783	0.692
Number of BFI			9	11	9	11		

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

Source: Own Computation in STATA 13

5.3.2. Revised Models

For the non-traditional (NT) model (stock market channel), the following bank fundamentals obtained in literature were considered:

- Bank size (size)- the log of bank *i*'s total assets;
- Income (lincome)- the total income as a proxy for profitability of each bank;
- Equity (lequity)- measuring bank capitalization;
- Total risk capital (lrisk)- capturing the effect of risk capital; and
- Non-performing loan reserves (lnplres) - proxy for credit risk, from the eyes of the bank managers. This is forward-looking as compared to non-performing loans.

Furthermore; the global financial crisis dummy variable was created. Additionally the 1997/98 Asian financial crisis, the 2001/02 minor domestic financial crisis as well as the transition to inflation targeting (IT) monetary policy dummy variables were considered but turned out to be immaterial. The motivation for inclusion of all these variables is evidently widespread in literature (see for example Gambacorta, 2005; Simpasa et al., 2014; Onuonga-Okeri, 2014). Literature argues that these are key bank fundamentals which, thus, may be considered by individual institutions before extending loans, or still influence the amount of funds available for lending through influencing the ability to raise funds.

On the other hand, for the traditional (T) loan demand model, general price levels, proxied by inflation is controlled for. This variable captures the macro-economic uncertainties that, in their presence, would hamper demand for loans. Controlling for the above produces the results in Table 5.4, with size, and non-performing loan reserves positively related to loan supply, while income is negatively linked to loan supply. The latter may be premised on that loan supply is an investment for the bank and increases when other sources of income are limited or low.

Table 5.4 Revised Models: Testing for stock market Channel

VARIABLES	(1) POLS(T)	(2) FE(NT)	(3) FE(T)	(4) RE(NT)	(5) RE(T)	(6) LSDV(NT)	(7) LSDV (T)	(8) POLS(NT)
size		0.558**		0.428***		0.442***		0.750***
		(0.237)		(0.155)		(0.160)		(0.0907)
alsi		0.193		0.119		0.106		0.225*
		(0.197)		(0.0744)		(0.0818)		(0.129)
d.shareprice		-9.88e-07		3.28e-05***		3.46e-05***		5.89e-05***
		(3.33e-05)		(1.18e-05)		(1.26e-05)		(2.20e-05)
lincome		-0.692**		0.309*		0.280		-0.652***
		(0.278)		(0.179)		(0.193)		(0.128)
lequity		0.739		0.365***		0.373***		0.470**
		(0.436)		(0.107)		(0.109)		(0.178)
lrisk		-0.439		-0.570***		-0.563***		-0.350***
		(0.270)		(0.0655)		(0.0678)		(0.100)
lnplres		0.498***		0.0679		0.0712		0.498***
		(0.0817)		(0.0600)		(0.0609)		(0.0403)
g_fc	31,122				83,866***	0.0256	83,866***	0.221**
	(48,149)				(27,419)	(0.0617)	(27,419)	(0.108)
2.BFI						0.562**	-285,481***	
						(0.223)	(35,099)	
3.BFI						-4.617***	-347,164***	
						(0.606)	(39,370)	
4.BFI						0.209	-366,324***	
						(0.214)	(41,748)	
5.BFI						-0.130	-12,713	
						(0.0900)	(39,170)	
7.BFI						0.159	-286,742***	
						(0.237)	(36,757)	
9.BFI						-0.0805	-36,915	
						(0.0824)	(34,638)	
10.BFI						0.442*	-282,081***	
						(0.257)	(48,302)	
11.BFI						-0.413***	41,949	

						(0.0890)	(34,638)	
gdpc	-12,925		-3,891		-6,191		-6,191	
	(9,113)		(15,879)		(5,157)		(5,157)	
mmarketr	-22,320***				-29,521***		-29,521***	
	(5,750)				(3,320)		(3,320)	
infl	13,969		6,115		9,721*		9,721*	
	(9,635)		(23,344)		(5,427)		(5,427)	
8.BFI							379,609***	
							(43,273)	
12.BFI							-352,277***	
							(40,388)	
Constant	295,830***	0.865	158,511	-0.256	356,495***	0.274	534,242***	0.149
	(64,261)	(1.620)	(200,177)	(0.490)	(36,695)	(0.538)	(44,192)	(0.795)
Observations	161	23	30	88	161	88	161	88
R-squared	0.116	0.993	0.004	0.961	0.434	0.997	0.739	0.986
Number of BFI				9	11			

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

Source: Own computation using STATA 13

ALSI and individual bank stock are still positive and significantly related to bank loan supply, while equity and risk capital are negative and significant in the POLS model. In the same model, the global financial crisis significantly increased bank loan supply- there could have been trade off. The banks facing viability challenges due to non-performing loans, may have considered extending more credit to remain profitable. However, this they did considering the potential profitability of funded investments, as observed form the positive coefficient on ALSI.

The only exceptions remain the performance of T models wherein the GDP turned out insignificant when macro-economic uncertainty (inflation) is controlled for. Inflation itself is only significant and positively related to loan supply in the random effects and LSDV sub-models. Borrowing tends to increase in most uncertain times in line with adverse selection theory.

According to Kaya and Meyer (2014), lending is, for the most part a consequence of an adverse economic outlook and fears that a greater share of clients will be unable to service loans in the future (as depicted by low stock market prices or over stock market index). As a response, banks limit loan supply to the best clients by tightening credit requirements.

The above results show improvement in the goodness of fit of the model, with adjusted R-squared values, where applicable, significantly improving. The R-squared values may seem low however, they are in line with studies in related literature and model specifications (see for example Kapan & Minoiu, 2013). However the additional control variables could not help to identify the best bank lending channel at play in South Africa. As a result, up to this point, it is not clear which model best describes bank lending in South Africa between the two, namely: traditional bank lending channel (demand side) or the non-traditional stock market channel. To check further, a non-nested hypothesis test is discussed in the coming sub-section.

5.3.3. Non-nested hypothesis testing

As proposed by Davidson and MacKinnon (1981), to compare non-nested hypotheses, there is the J test as the best alternative, especially with linear models

as in this case. To understand the approach, assume two non-nested hypotheses that are offered as alternative explanations for L:

$$\boldsymbol{H_0: L = X\beta + \epsilon_1 \ldots\ldots\ldots\ldots\ldots\ldots} \textbf{ 5.1}$$

$$\boldsymbol{H_1: L = Z\gamma + \epsilon_2 \ldots\ldots\ldots\ldots\ldots\ldots} \textbf{5.2}$$

Also consider that the two disturbances are in line with the classical normal model assumptions, where X has k1 and Z has k2 independent non-stochastic regressors (Brooks, 2014).

It follows then the "artificial" compound model will take the form:

$$\boldsymbol{L = (1 - \alpha)X\beta + \alpha Z\gamma + \epsilon \ldots\ldots\ldots\ldots\ldots\ldots} \textbf{ 5.3}$$

By estimating this model, the non-nested model was tested by one parameter, that is, if $\alpha = 0$, the composite model breaks to equation (5.1) and when $\alpha = 1$, the compound model collapses to equation (5.2).

Theoretically, model 5.3 above is appealing and straight forward; however, its empirical application is constrained as the parameters are not identifiable. In literature, and since Davidson and MacKinnon's (1981, 1993, 2004) proposition, the composite model can easily be replaced by one "in which the unknown parameters of the model *not* being tested are replaced by estimates of those parameters that would be consistent if the DGP [data generating process] actually belonged to the model they are defined" (Davidson & MacKinnon, 1993:382), without loss of information or validity.

Thus, to test equation (5.1), γin 5.3 is replaced by its estimate $\grave{\gamma}$ obtained by regressing L on Z. If we write$\boldsymbol{\grave{L}_z = Z\grave{\gamma}}$the equation to be estimated to test whether $\alpha = 0$ is

$$\boldsymbol{L = (1 - \alpha)X\beta + \alpha\grave{L}_z + \epsilon \ldots\ldots\ldots\ldots\ldots\ldots} \textbf{ 5.3`}$$

Similarly, to test equation (5.2), the study estimate $\hat{\beta}$ by fitting equation (5.1) to the data and replaced $X\beta$ in (5.3) by $\hat{\beta}$, or$\grave{L}_X$. The equation estimated to test (5.2) as a result then became:

$$\boldsymbol{L = (1 - \alpha)\grave{L}_X + \alpha Z\gamma + \epsilon} \text{ ..... 5.3``}$$

The Davidson and MacKinnon *J*-test applies the *t*-test for the estimated coefficients on $\boldsymbol{\grave{L}_z}$ in equation (5.3`) and $\boldsymbol{\grave{L}_X}$in equation (5.3``). A statistically significant *t*-statistic on the coefficient of $\boldsymbol{\grave{L}_z}$rejects H_0 as the appropriate model and a significant t-statistic onthe $\boldsymbol{\grave{L}_X}$coefficient results in the rejection of H_1. Davidson and MacKinnon (1993:384-5) show "why the *J* and *P* tests (which in [linear models] are identical) are asymptotically valid."

Comparing the non-nested hypotheses implies four outcomes: reject H_0 and fail to reject H_1; reject H_1 and fail to reject H_0; reject both or fail to reject both H_0 and H_1. If both are rejected, then neither model is very useful in explaining bank lending, on the other hand, if it is not possible to reject both, then the data is not opulent enough to differentiate between the two competing models of bank lending.

It is also prudent to take note of some of the weaknesses of the *J* test that have already been stated in literature. For example, Godfrey and Pesaran (1983) asserts that there are some conditions where the *J* test is likely to over-reject the true hypothesis, for example, in smaller samples. Moreover, Davidson and MacKinnon (2004) agree that the *J* test will over-reject, "often quite severely" in finite samples when the sample size is small. In relation to this study, the sample is fairly large enough to worry about this limitation, that is, there are 12 banks over a twenty year period. Based on this, the study continued with the J test on the South African banking sector data.

Table 5.5. Non-nested Variables test (J Type test)

VARIABLES	Baseline (NT)	Baseline (T)	Revised (NT)	Revised (T)	Baseline J-test (NT)	Baseline J-test (T)	Revised J-test (NT)	Revised J-test (T)
size			0.750***				0.706***	
			(0.0907)				(0.0940)	
alsi			0.225*				0.218	
			(0.129)				(0.132)	
D.shareprice			5.89e-05***				6.24e-05***	
			(2.20e-05)				(2.22e-05)	
lincome			-0.652***				-0.653***	
			(0.128)				(0.129)	
lequity			0.470**				0.524***	
			(0.178)				(0.183)	
lrisk			-0.350***				-0.357***	
			(0.100)				(0.100)	
lnplres			0.498***				0.511***	
			(0.0403)				(0.0413)	
g_fc			0.221**	31,122			0.289**	81,690*
			(0.108)	(48,149)			(0.115)	(48,139)
jse_alsi	923.2*				1,149**			
	(524.2)				(519.6)			
shareprice	11.36***				10.24**			
	(4.026)				(4.346)			
gdpc		-16,861*		-12,925		-25,658**		5,787
		(8,971)		(9,113)		(11,229)		(8,628)
mmarketr		-17,392***		-22,320***		-10,385		-21,790**
		(4,712)		(5,750)		(9,824)		(10,693)
infl				13,969				5,311
				(9,635)				(10,608)
demand1					1.061**			
					(0.443)			
supply1						1.106***		
						(0.261)		

demand2							-1.41e-06*	
							(8.34e-07)	
supply2								71,255***
								(5,991)
Constant	14,824	355,098***	0.149	295,830***	-168,826*	151,858	0.352	-441,926***
	(59,149)	(57,870)	(0.795)	(64,261)	(91,694)	(111,000)	(0.820)	(95,175)
Observations	111	162	88	161	108	108	86	86
R-squared	0.131	0.088	0.986	0.116	0.214	0.220	0.987	0.679

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

Source: Own computation using STATA 13

The results in Table 5.5 above displaying statistically significant coefficients on added residual variables from each of the other model (demand1, supply1, demand2 and supply2) prove that the two models still hold; however, the performance of other variables in the traditional model is weakened, making the model less robust. Depending on whether other control variables are included or not, either the market rate or GDP growth becomes significant, respectively. The results are, again, inconclusive. Due to this, the omitted variable test in STATA is utilised to check which model exhibits omitted variable problem.

5.3.5. Omitted variables test

In addition to Krainer's (2014) test for omitted variables, this study made use of the diagnostic test available in STATA as a *post hoc* analysis, ovtest (omitted variable test). The results from both approaches are presented below in Tables 5.6. (Regression output) and 5.7 (post hoc ovtest- standing for omitted variable test).

Table 5.6. Omitted Variables Test on Model 1

VARIABLES	TRADITIONAL CHANNEL	STOCK MARKET CHANNEL
GDPC	-16,861*	
	(8,971)	
MMARKETR	-17,392***	
	(4,712)	
SHAREPRICE		11.36***
		(4.026)
JSE_ALSI		923.2*
		(524.2)
CONSTANT	355,098***	14,824
	(57,870)	(59,149)
OBSERVATIONS	162	111
R-SQUARED	0.088	0.131
STANDARD ERRORS IN PARENTHESES		
***** P<0.01, ** P<0.05, * P<0.1**		

Source: Own Computation in STATA 13

The results presented in Table 5.6 show that there is a negative relationship between GDP growth, market interest rate and bank lending. On the other hand stock market based variables, individual bank stock prices and overall stock market performance (JSE-ALSI) positively affect bank lending. The stock market channel model better

explains bank lending than the traditional channel as R –squared is relatively higher 0.131> 0.088. This difference is tested statistically using the post hoc options.

The post hoc analyses are presented in Table 5.7 below.

Table 5.7: Ramsey Omitted Variables Test: Non-Traditional (stock market) Channel vs Traditional Bank lending channel

	Stock Market Channel	**Traditional Channel**
Ho:	model has no omitted variables	model has no omitted variables
F(_, _)	(3, 105) 0.51	(3,156) 3.29
Prob > F	0.6753	0.0222
Decision	*The p-value 0.68 > 0.05, we fail to reject null hypothesis and concluded that the non-traditional (stock market) channel has no omitted variables*	*The p-value 0.02< 0.05, we reject null hypothesis and concluded that the traditional bank lending channel has some omitted variables*

Ramsey RESET test using powers of the fitted values of customer loans. Stock and Watson, 2003

Source: Own computation using STATA 13

It can be concluded that the stock market channel is superior to the traditional bank lending channel in South Africa, just as in the case of Sondermann, Bohl and Siklos, (2009) and Krainer (2014). Indeed, stock markets do matter for bank loan supply as bank managers derive information about the economy and its prospects form the stock market index as well as considering the strength of their balance sheet through stock prices. This implies that there is great possibility of the existence of stock market discipline of banks in South Africa, a phenomenon tested in the next chapter.

5.4. Robustness checks

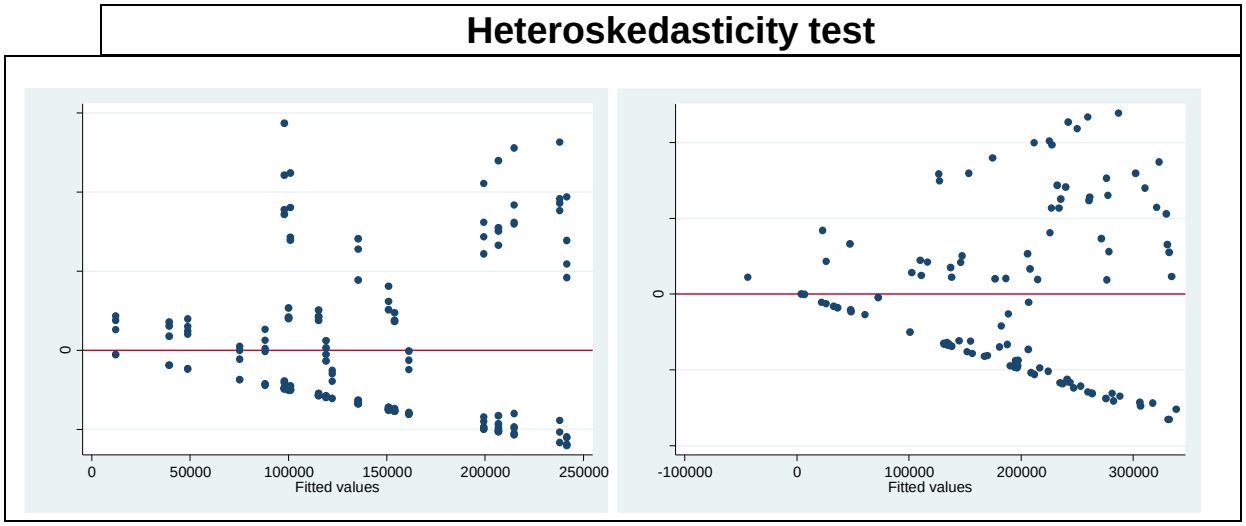
a. Heteroskedasticity

- **Informal tests- Graphical display**

Heteroskedasticity can be tested graphically by plotting residuals vs. predicted values. To conclude that there is no Heteroskedasticity, there should not be any pattern

observed. The *rvfplot* command in STATA, soon after each regression analysis, automatically draws a scatterplot between residuals and predicted values as below.

Figure 5.2: Graphical Heteroskedasticity test



Source: Own computation using STATA 13

There is some pattern observed in the data, implying the presence of heteroscedacity problem. Furthermore, the study applied the more formal Breusch-Pagan, and the results and discussion appear below.

- **Breusch-Pagan test**

A non-graphical way to detect heteroskedasticity is the Breusch-Pagan test. The null hypothesis is that residuals are homoscedastic.

Table 5.8: Breusch-Pagan test Results

	Stock Market Channel	**Traditional Channel**
chi2(1)	19.25	29.95
Prob > chi2	.0000	.0000
	Ho: Constant variance	
Decision	*Reject Ho and conclude that variance is not constant (homoscedasticity is present)*	*Reject Ho and conclude that variance is not constant (homoscedasticity is present)*

Source: Own computation in STATA 13

The Prob>chi2 is less than 0.05 in both models presented in Table 5.8 therefore the null hypothesis has been rejected in favour of the alternative. In this study, much care is given to heteroskedasticity issues as (pooled) OLS makes the assumption that $V(\varepsilon_j) = \delta^2$ for all j. This implies that variance of the error term is constant, that is, there is homoskedasticity. If the error terms do not have constant variance, they are said to be heteroskedastic, which is a problem.

The two tests, the informal checks (the graphical) and the formal test (Breusch-Pagan) both indicate the possibility of the presence of heteroskedasticity the two models estimated. It is worrisome as the estimates of the standard errors reported for the coefficients may be wrong and, thus, their t-values. It is imperative to note that the heteroskedasticity problem can also occur if there are sub-population differences or other interaction effects, for example, the effect of interest rate on customer loan demand differs for smaller banks and big banks. This becomes a problem because there is violation of the assumption that no such differences exist or if they do, the model has already taken care of them.

The other reason for the possibility of heteroskedasticity problems has already been addressed as that of omitted variables. The omitted variables test has indicated that the stock market channel model is correctly specified compared to the traditional bank lending channel specification (see Tables 5.6 and 5.7). It is worth noting that fortunately, some form of heteroskedasticity will not affect the significance tests, meaning POLS estimation can be interpreted without concern of serious distortion.

Nonetheless, the study have to deal with this problem to obtain unbiased estimates. The empirical analysis in this study places great weight on the specifications of the models; therefore, serious consideration for addressing these problems has been done. Literature widely reports two ways to deal with the heteroskedasticity problem, firstly, one can make use of heteroskedasticity-robust standard errors (this is an LSDV specification with robust option), and alternatively, weighted least squares model

(WLS) can be estimated (Stock & Watson, 2003, 2008). The two models work fairly similarly, with the WLS purported to be superior; however, its empirical application is limited as it requires the conditional variance on which the weights are based to be known, which is, however, rare. In practice, the use of heteroskedasticity-robust standard error has, therefore, become the norm in addressing heteroskedasticity.

Given that the challenge with heteroskedasticity is biased standard errors, of which [P] OLS assumes that errors are both independent and identically distributed, the robust option ease either or both of those assumptions, making robust standard errors more trustworthy in the face of homoskedasticity. Fortunately, the use of robust standard errors does not alter estimated coefficients; however, due to the change in standard errors, the test statistics provides reasonably accurate p-values (Stock & Watson, 2008). In practice, by default, STATA assumes homoskedastic standard errors, so the study needed to adjust the model to account for heteroskedasticity. According to Stock and Watson (2003), the rule-of-thumb is to always assume heteroskedasticity. To do this, the option robust in the regress command was used.

Furthermore in literature, see for example recently whereby Onuonga-Okeri (2014) suggested the use of Generalized Least Squares (GLS) method so as to reduce auto-correlation and heteroscedasticity of the data. This study also made use of the GLS and assumed both fixed and random effects separately. As can be seen from the results from table 5.3 and 5.4, the estimates are, overall, in line with the POLS results.

Overall, the results indicate that stock markets influence bank lending and thus, there exists a stock market lending channel for the monetary policy transmission in South Africa. These results are in line with Chatterjee's (2015) findings, where the interaction between stock market liquidity and bank loans was determined as prevalent to the extent that it poses challenges to the existing banking literature on monetary transmission mechanism in several ways. Such findings have implications for the monetary policy transmission conduct as they close a gap in literature on the weakness of monetary policy effect on bank lending (see Kashyap & Stein, 2000).

Table 5.9: Robust Standard Error Estimates

Variables	Traditional Channel	Stock Market Channel	Traditional Channel Robust	Stock Market Channel Robust
GDPC	-16,861*		-16,861	
	(8,971)		(10,387)	
MMARKETR	-17,392***		-17,392***	
	(4,712)		(4,627)	
SHAREPRICE		11.36***		11.36**
		(4.026)		(4.894)
JSE_ALSI		923.2*		923.2*
		(524.2)		(518.4)
CONSTANT	355,098***	14,824	355,098***	14,824
	(57,870)	(59,149)	(74,099)	(45,083)
OBSERVATIONS	162	111	162	111
R-SQUARED	0.088	0.131	0.088	0.131
STANDARD ERRORS IN PARENTHESES				
***** P<0.01, ** P<0.05, * P<0.1**				

Source: Own computation using STATA 13

The capital budgeting model proposed by Krainer (2012, 2014) and tested in this study is in line with a bank equity model postulated by Bolton and Freixas (2006). Their model shows that monetary policies do not affect bank lending. However, monetary policies affect bank equity capital and corporate financing through changes in loans to corporate bond spreads. Due to this link, the expected relationship is positive, as bank equity decreases, loans become scarce. In this study (see Table 5.4), a positive relationship was, indeed, found. Moreover, Kapan and Minoiu (2013), for the case of Japan, concluded that banks with strong balance sheets were better able to maintain

lending during the crisis, as higher and better quality capital was key in mitigating the crisis effect on bank lending.

To support the link between stock market and bank lending, Johnson (2006) argued that agents consider underlying economic uncertainties before trading. This creates a causal link between state of the economy and stock market fundamentals and, in turn, bank balance sheet management. Ibrahim (2006) upholds a similar line of thinking, arguing that the health of the banking sector depends crucially on stock market stability. On the other hand, Chatterjee (2015) argued that stock market liquidity not only determines implied cost of capital for borrowers but also governs the supply side via terms for external funds, such as deposits and bank borrowings. Unlike Ibrahim (2006), this study uses individual bank stock prices as well as the stock market index.

Finally, the study tested the correlation among stock market indicators and the loan market variables. The results are presented in Table 5.10 below. It can be observed that, all stock market variables, except volume of secondary market trading revenue are significant and positively correlated with customer loans (the dependent variable used in this study). The Pearson correlation coefficients are all significant at 5%.

The negative relationship between secondary market trading revenue and bank loans to customers can be attributable to the substutability between stock market and the bank market (bank based vs. market based literature). The result reflected that banks and stock markets in South Africa act as substitutes than complements, and thus, the development of one is at the expense of the other. However, it is important to note that the banking sector derives crucial information from the stock market and, thus, they also complement one another (Ghiasi, Mohseni & Shirazi, 2014).

There is need to ascertain the optimal levels of development in each market so as to gain from the benefits of the complementarity that exists in terms of addressing information asymmetry challenges. This is so because Levine (2002) and Allen and Carletti (2008) argue that both markets produce crucial information for each other, albeit differently.

Table 5.10 Pairwise Correlation Matrix- Loan market variables vs. Stock market indicators

	customerloans	totalloan	bankloan	jse_alsi	jse_psc	jse_ssc	sharep~e
customerlons	1.0000						
totalloan	0.9842*	1.0000					
	0.0000						
bankloan	0.7196*	0.6847*	1.0000				
	0.0000	0.0000					
jse_alsi	0.2729*	0.1872*	0.0739	1.0000			
	0.0004	0.0251	0.3875				
jse_psc	0.2477*	0.1787*	0.0927	0.7562*	1.0000		
	0.0013	0.0327	0.2777	0.0000			
jse_ssc	-0.1868*	-0.1601	-0.0527	-0.2003*	-0.0712	1.0000	
	0.0159	0.0561	0.5377	0.0028	0.2921		
shareprice	0.3262*	0.3128*	0.3943*	0.3350*	0.3918*	0.0326	1.0000
	0.0005	0.0010	0.0000	0.0000	0.0000	0.6943	

Source: Own computation using STATA 13

5.5. Summary of the Chapter

This chapter set to estimate the model 1 of stock market lending channel to test the role of stock markets on bank lending. Taking into account various possible estimations, the results point to a significant role played by stock market in determining the lending pattern of banks. The results indicate the presence of stock market channel of monetary policy transmission in South Africa, thus vindicating the appropriate intermediate target for the central bank to be price level, with price stability being the ultimate goal (as the current Inflation Targeting framework). Furthermore, the results point to the possibility of stock market discipline of banks as, indeed, stock markets have been found to be significantly linked to banks operations as being an information

aggregator and provider. The next chapter present the results from testing the monitoring ability of stock markets on bank activities, a first stage of market discipline.

CHAPTER SIX

Do Stock Markets Monitor Banks in South Africa?

"Rather than justice for all, we are evolving into a system of justice for those who can afford it [afford to monitor banks]. We have banks that are not only too big to fail, but too big to be held accountable." **Joseph E. Stiglitz**

6.0. Introduction

Having established the role of stock markets in bank lending, the stock market channel of monetary policy transmission, in South Africa in the preceding chapter; this chapter presents the empirical examination of bank monitoring ability of stock markets. There a number of stakeholders that have a keen interest in the operations of banks, especially risk-taking behaviour and overall performance (Flannery & Sorescu, 1996; Hamalainen et. al., 2005; Mlambo & Ncube, 2011; Stephanou, 2010). The stakeholders, as also highlighted in Chapter Two, include regulators, depositors, debt-holders and shareholders, among others (Mehran, et al., 2012).

Firstly, the chapter presents descriptive statistics of the variables used. It then presents the estimation of model 2 dealing with monitoring of banks by stock markets. Different dependent variables have been used for robustness checks, to fully capture the diverse measurement issues as well as to take into account the different profiles of the stakeholders existing in each sub-market.

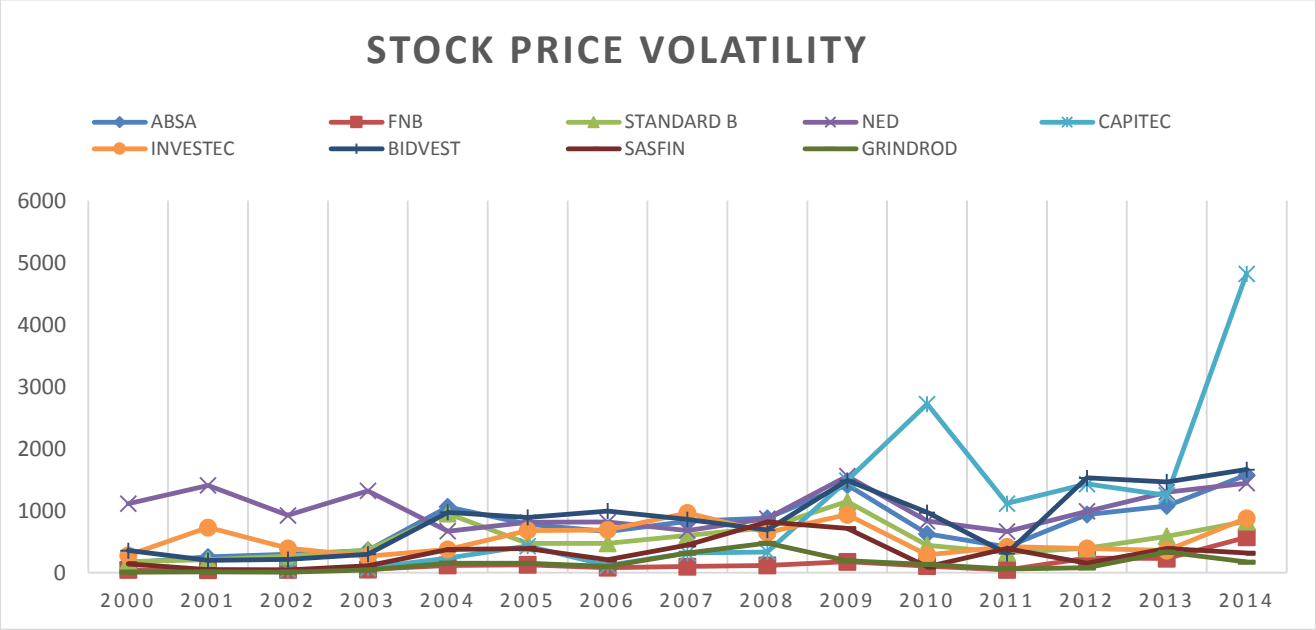
It is imperative to note that stock prices are controlled for, in the deposit monitoring model. Of guidance was the work of Shimizu (2009) in the case of Japan investigating the usefulness of stock market information to depositors. This study was much interested to see the value of stock markets in the disciplining of banks, directly or indirectly (via depositors market). Although Shimizu mainly looked at the cooperative banks, this study controlled for stock prices in all the deposit monitoring model specification and their variants for the whole sample of thirteen banks in South Africa.

A significant coefficient on the stock market price variable implies that depositors make an efficient decision to obtain information from the stock markets, aggregated already by their sophisticated counterparts (Shimizu, 2009). Such findings reveal the linkages and information-sharing ability of stakeholders and imply better monitoring of banks in support of the statutory supervisors.

6.1. Descriptive Statistics

The descriptive statistics of the bank-specific variables making up the sample are presented in Figure 6.1 below. The main variables to be modelled are: stock prices, deposits- quantity and price, and CAMELS.

Figure 6.1: South African Individual Bank Stock Market Prices volatility, 2000-2014



Source: Own compilation suing data from JSE

Capitec bank stock prices have been outperforming all banks since 2009, with Nedbank having been in such a position prior 2004. The global financial crisis of 2008/9 left a dent on stock performance of the banks with a boom witnessed from mid-2011.

As can be seen from Figure 6.1, Nedbank stock has been very volatile compared to other banks pre-2004. This is mainly due to the South African 2001/2002 domestic

banking financial crisis (microloan crisis) which hit hardly on Saambou, Unifer and African Bank, with contagion effects rumbling to banks that were not even exposed to the micro-loan crisis (Theobald, 2013). No doubt, stakeholders were jittery in all banks, even the larger ones. For example, Nedbank had shown a sharp appetite to acquire some other banks; it had attempted and failed to buy Standard bank, but later successful bought BoE. Reactions to Nedbank's activities by investors could be summarised by the volatility in stock prices depicted in Figure 6.1. above.

Hard lessons have been learnt, considering mainly how the crisis has started, as a result of the unintended consequences of policy response to a weakening Rand in the later 1990s, and the post 2000 monetary policy framework. The sharp increase in interest rates to attract capital into the country resulted in surged defaults across the banking system. This was further propagated by the fact that the new government had started financial liberalisation to allow more competition (Niyimbanira, et. al. 2015), thus resulting in licensing of a dozen new banks. Since early 2000, the monetary authorities have left the exchange rate determination to the market under the Inflation Targeting Monetary policy framework (SARB, 2010; Mishi & Tsegaye, 2012).

The storm withered only until the global financial crisis of 2008/09- 2010, which brought memories of the micro-loan crisis of 2001/2002 leading to frazzled unsecured lenders' shareholders (see Capitec bank in Figure 6.1 above). The same phenomenon, albeit more pronounced, was again witnessed in 2014 after the liquidation of African Bank. Surmountable pressure was on fellow unsecured lenders, Capitec (Ndweni, 5 September 2014; Goko, 24 March 2015). The developments further vindicate the argument on the fragility of the banking sector and its susceptibility to contagion effects.

In line with this study, such developments save to confirm how delicate the banking sector is, and how information processing and dissemination by different stakeholders would be incorporated in individual banks' fundamentals. The present study considered the role of stock markets in collecting and summarising information to the extent that it is discernible to shareholders as well as other stakeholders in the form of share prices. In this regard, the underlying belief is that South African stock markets

are informational efficient. Studies that confirm that the stock markets are indeed efficient, have been carried out (see Mlambo & Biekpe, 2007; Van Heerden e. al. 2013). The ability of stock markets to monitor banks needed to be tested empirically whether it existed or not.

All other variables in the models are summarised in Table 6.1 below. There were some banks in the sample that were not collecting deposits from the public, hence minimum values of 0. According to the South African Banks Act of 1990, not all banks can receive deposits from the public (SARB, 2013).

Table 6.1 presents the variables in three categories: the deposit market indicators, individual bank fundamentals as well as the stock market indicator, respectively. The variables in each category are total customer deposits (total_cdpsts), customer deposits- current (cd_current), savings customer deposits (cd_savings), term customer deposits (cd_term), the log of tem, current, savings and demand deposits (lterm, lcurrent, lsavings, ldemandd), deposit price (depo_price), log total deposits (ltotalDep) from the deposit market. From the bank fundamentals based on CAMELS, there is equity to total assets (c_eta), loan loss reserve to gross loans (a_llrgl), loan loss reserve to impaired loans (a_llril) cost to income ratio (m_ctir), net interest margin (e_nim), return on average assets (e_roaa), return on average equity (e_roae), interbank ratio (l_ir), liquid assets to deposit and borrowing (l_latd_b), bank size (s_banksize), wage to income ratio (m_wage_incom~o) and diversification. Lastly, share price (lsharep) is the stock market indicator used.

For each variable, information on the mean, its standard deviation as well as minimum and maximum values is provided.

Table 6.1. Descriptive statistics of selected variables

Variable	Obs*	Mean	Std. Dev.	Min	Max
Deposit market indicators					
Total deposits	186	129941.1	205169.2	0	853088
current deposits	117	59113.95	99947.38	0	697005
Savings deposits	88	10337.89	16398.8	0	75532
term deposits	120	76640.59	117146.7	24.7	431055
Long term deposits	120	8.941789	2.860903	3.206803	12.97399
Log current deposits	115	8.668433	3.00546	.0953102	13.45455
Log savings deposits	86	7.610267	2.502741	-.356675	11.23231
Log demand deposits	107	9.497875	2.589004	.1310282	13.13576
Deposits price	183	.448306	1.513201	.01	14.78
Log total Deposit	184	9.316129	2.975829	2.590017	13.65662
Bank Fundamentals based on CAMELS					
c_eta	139	19.84871	17.9337	-4.6	91.03
a_llrgl	136	5.908897	6.999959	.01	31.38
a_llril	92	70.92217	42.25789	18.56	186.95
m_ctir	138	63.04297	32.17658	25.5	350
e_nim	138	15.21543	33.7514	.24	197.3
e_roaa	139	3.596403	4.379065	-7.78	23.3
e_roae	139	20.34216	19.47555	-48.31	168.98
l_ir	73	160.9655	154.9308	4.63	699.35
l_latd_b	120	42.577	64.09122	4.68	421.83
s_banksize	214	10.08874	2.470708	2.960105	14.34079
m_wage_incom~o	170	.2582433	.2645641	0	1.221362
diversification	195	.3177591	.3918035	-1.76738	.9996535
Stock market indicator					
lsharep	148	8.156114	1.304586	3.433987	10.25201

***the number of observations vary as the panel is unbalanced*
c_ denotes capital quality variables
a_ denotes asset quality variables
m_ denotes management quality variables
e_ denotes earnings quality variables
l_ denotes liquidity quality variable
s_ denotes sensitivity variable

Source: Own compilation using Bankscope Data

6.2. Econometric Analysis

This section presents the results after running the regressions applying the techniques discussed in Chapter Four, namely, pooled OLS (POLS), least squares dummy variable (LSDV), generalised least squares (fixed effects- FE and random effects- RE) as well as robustness check specifications (PSCE, Cross-sectional Dependence, FGLS, and PMG techniques).

By applying the discussed techniques, results in Table 6.2, and 6.4-6.6 below were obtained. In the context set out in section 4.6 of Chapter Four and the preceding discussion, seven techniques have results displayed in the table.

6.2.1. Depositors' discipline (monitoring)

The study starts by testing market discipline form the depositors' side, a well-established route, to use it as 'control' and in checking the balance of the stock market based model (which is the key specification for this study). For depositors, the monitoring mechanism is tested via both the quantity and price effect (see Barajas & Steiner & Salazar, 2000 in Colombia; Ferguson & Stevenson, 2007; Hadad et al. 2011 for Indonesia; Hasan et al. 2013 in transition countries).

i. The quantity effect

The specified model revealed that the quantity effect of depositors' monitoring exists in South Africa as in Romero and Tabak (2010) and Hasan et. al. (2013), who ascertained depositors, discipline through the effect of bank's performance and risk profile (as measured by CAMELS' ratio in this study) on the quantity of deposits. It was going to be ideal to use uninsured deposits, however, such disaggregated data was not available, which is a challenge inherent with the opaqueness of the banking systems (see for example Hadad et al., 2011).

Nonetheless, the total volume of deposits was used, as well as different components separately as term, current and savings deposits (the latter two also aggregated as demand deposits). The dependent variables are considered at both level and change, for brevity, however, the most robust results (at levels) are presented.

Starting from Table 6.2., the results suggest the presence of market monitoring of banks (first component of market discipline) in South Africa, as shown by positive and significant earning ability measure (return on average equity- roae), as well as the negative and significant measure for management quality (wage expense to total income). The other variables either have counter-intuitive signs or their coefficients are individually not statistically different from zero.

As Moussu and Petit-Romec (2013) reported, return on [average] equity is a key measure of the earning ability of a company. Depositors would not want to keep their funds with a failing bank and one that has low earnings' potential, thus a positive relationship has been postulated between return on average equity and total deposits.

The results obtained are in line with theory and *a priori* expectations. Literature is also dotted with arguments against the use of return on equity as earning ability of a bank. For example, Jenkins (2011) asserted "still today, most banks around the world use return on equity as their main metric of profitability. Despite the carnage of the crisis and the lessons of excessive risk-taking it conveyed, some banks are even targeting higher returns on equity than they achieved in the boom years." This line of thinking is not supported by South African depositors as they view a higher return on average equity as an indicator for healthier than risk bank.

The dependent variable for results in Table 6.2 was the total of all deposits for each bank, and the coefficient of interest to conclude whether stock markets have the ability to monitor banks in South Africa is the one on lsharep. If that coefficient is significant, as in this case (techniques 5 & 6 in Table 6.2 below), the ability of stock markets monitoring banks is confirmed.

The question that arises then is: which technique is the best in order to draw conclusions on the results from techniques that are providing slightly different results? Of interest, however, was that both estimators (in column 5 and 6) are consistent, as long as the conditional mean is correctly specified (Beck & Katz, 1995).

Even though when the assumed covariance structure is correct, thus leading to FGLS estimates being more efficient, Beck and Katz (1995) have demonstrated

that the full FGLS variance–covariance estimates are typically unacceptably optimistic (anticonservative) when used with the type of data analysed by most social scientists—10–20 panels with 10–40 periods per panel. This was in line with the panel at hand, with 13 panels and 20 periods each. Therefore, their argument that [P] OLS estimates with PCSEs have coverage probabilities that are closer to nominal vindicated the study's position. As a result, in order to alleviate the problems of Parks-Kmenta method, Beck and Katz (1995) suggested reliance on POLS estimates with PCSE, (Hoechle, 2007). As can be seen from results in column 6 of Table 6.2., the PCSE technique also produced a statistically significant coefficient that supports the FGLS and thus the study's finding is robust.

As the covariance matrix elements are estimated from panels i and j, using observations that have common time periods, estimators for this model achieve their asymptotic behaviour as the Ts approach infinity. In contrast, the random- and fixed-effects estimators (GLS models) assume a different model and are asymptotic in the number of panels, m. On the other hand, although the estimation part of PCSE allows other disturbance covariance structures, the literature narrative of it refers specifically to models that are both heteroskedastic and contemporaneously correlated across panels, with or without autocorrelation.

The arguments above demonstrate the void in literature that there is no sole model that provides superior estimates as different techniques have own merits and demerits (see Beck & Katz, 1995; Maddala & Lahiri, 2006, Greene & McKenzie, 2012). This is the reason why this study used both innovations as robustness checks for the general techniques as specified in Chapter Four.

Table 6.2: Total Deposit as dependent variable

VARIABLES	(1) POLS	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE	(7) SCC
c_eta	-0.0430*	-0.0416***	-0.0430*	-0.0416***	-0.0430**	-0.0430*	-0.0430**
	(0.0226)	(0.00955)	(0.0226)	(0.00955)	(0.0192)	(0.0235)	(0.0159)
a_llrgl	**0.163***	**0.0889**	**0.163***	**0.0889**	**0.163****	**0.163****	**0.163****
	(0.0877)	**(0.0534)**	**(0.0877)**	**(0.0534)**	**(0.0747)**	**(0.0730)**	**(0.0611)**
a_llril	0.000498	0.00132*	0.000498	0.00132*	0.000498	0.000498	0.000498
	(0.00158)	(0.000771)	(0.00158)	(0.000771)	(0.00135)	(0.00135)	(0.00176)
m_ctir	**0.0220****	**0.0192*****	**0.0220****	**0.0192*****	**0.0220****	**0.0220***	**0.0220**
	(0.0108)	**(0.00484)**	**(0.0108)**	**(0.00484)**	**(0.00919)**	**(0.0113)**	**(0.0174)**
e_nim	0.0484	0.168*	0.0484	0.168*	0.0484	0.0484	0.0484*
	(0.0646)	(0.0894)	(0.0646)	(0.0894)	(0.0550)	(0.0459)	(0.0238)
e_roaa	-0.325*	0.0945	-0.325*	0.0945	-0.325**	-0.325*	-0.325**
	(0.186)	(0.118)	(0.186)	(0.118)	(0.158)	(0.191)	(0.116)
e_roae	**0.0309****	**0.00764**	**0.0309****	**0.00764**	**0.0309*****	**0.0309****	**0.0309****
	(0.0136)	**(0.0103)**	**(0.0136)**	**(0.0103)**	**(0.0116)**	**(0.0125)**	**(0.0102)**
l_ir	**-0.00212*****	**0.000483**	**-0.00212*****	**0.000483**	**-0.00212*****	**-0.00212*****	**-0.00212****
	(0.000574)	**(0.000309)**	**(0.000574)**	**(0.000309)**	**(0.000489)**	**(0.000566)**	**(0.000852)**
l_latd_b	**-0.0133****	**-0.00517***	**-0.0133****	**-0.00517***	**-0.0133*****	**-0.0133*****	**-0.0133****
	(0.00577)	**(0.00298)**	**(0.00577)**	**(0.00298)**	**(0.00491)**	**(0.00445)**	**(0.00437)**
banksize	**0.728*****	**1.312*****	**0.728*****	**1.312*****	**0.728*****	**0.728*****	**0.728*****
	(0.0536)	**(0.125)**	**(0.0536)**	**(0.125)**	**(0.0457)**	**(0.0599)**	**(0.0503)**
wage_incomeratio	**-0.790***	**-0.108**	**-0.790****	**-0.108**	**-0.790****	**-0.790****	**-0.790***
	(0.393)	**(0.206)**	**(0.393)**	**(0.206)**	**(0.335)**	**(0.365)**	**(0.435)**
diversification	-0.447	**0.379***	-0.447	**0.379***	-0.447	-0.447	-0.447
	(0.387)	**(0.218)**	(0.387)	**(0.218)**	(0.329)	(0.316)	(0.322)
lsharep	0.0974	-0.120	0.0974	-0.120	**0.0974***	**0.0974***	0.0974
	(0.0594)	(0.113)	(0.0594)	(0.113)	**(0.0506)**	**(0.0556)**	(0.0862)
2.BFI				-3.179			
				(2.320)			
3.BFI				-3.652***			
				(1.174)			
5.BFI				-0.172			

				(0.296)			
7.BFI				1.098***			
				(0.331)			
9.BFI				0.383***			
				(0.0724)			
10.BFI				0.0609			
				(1.276)			
11.BFI				-0.300*			
				(0.173)			
Constant	1.268	-5.545***	1.268	-5.541***	1.268	1.268	1.268
	(0.961)	(1.331)	(0.961)	(1.501)	(0.819)	(0.932)	(1.233)
Observations	51	51	51	51	51	51	51
R-squared	0.991	0.943		0.999		0.991	0.991
Number of BFI		8	8		8	8	
Number of groups							8

Standard errors in parentheses

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

Source: Own computation in STATA 13

The behaviour of depositors in the South African banking system, as found in this study, is in line with the thinking of Kim and Santomero (1988) and Rajan (2005). Their argument is that in the face of perfect regulation or efficient risk management strategies, equity levels should be correctly revised upward to any incremental risk taken by the banks. In that case, also considering binding capital constraint, Kim and Santomero (1988) show that return on [average] equity should not increase as a result of a riskier portfolio of assets. Thus, a higher ratio signals more value creation, and should not be associated statistically with higher risk as Rajan (2005) argues evaluating the true nature of bank performance requires extricating the component of performance flowing from a genuine value creation from components emanating from higher risks.

Imperative to note here is that even though higher returns can be obtained by taking more risks, and if risks are hidden or underestimated, risk-taking may seem value-enhancing as long as risks have not materialised. In the wake of the global financial crisis, the effect of real risks taken by banks was felt as huge losses borne shareholders (Moussu and Petit-Romec, 2013).

On the other hand, Purohit and Mazumdar (2003) also found that the capacity of the management of a bank can be measured by using certain ratios of off-site evaluation of a bank. In the present study, management efficiency of the banks is determined by wage expense to income ratio as well as total cost to income ratio. In general, the ratioreflect the capacity of the bank to cover up the operating expenses from the income it earned. Lower ratio is better for the bank and vice versa (Athanasoglou et al. 2006). From the results presented in Table 6.2 above, of interest was the negative relationship between wage-income ratio and total deposits. This ratio measured management cost efficiencies, with a higher ratio signifying low management efficiencies.

The results demonstrated that low efficient banks receive lesser deposits than the most efficient ones. This observation was witnessed in the market by a sharp decline of employment in the banking sector as banks shed excessive labour, to

some extent, backed by innovation; however, cost considerations cannot be ruled out (Lefifi, May 2013).

The South African banking sector is believed to have shed over 82 000 jobs over a five year period, 2008 to 2013. The greatest casualties were in the IT departments. Literature cites some reasons for poor efficiency ratio, mainly bank expanding facilities like opening a new branch, which immediately adds to overhead costs, including staffing; however, loan demand and fee income may be still low. The global financial crisis had a significant impact on South African firms' revenues and households' disposable income, thereby deteriorating their balance sheets and reducing banks' income receipts (PWC, 2012).

The selected measure of management quality is ideal as efficiency ratios are subject to controls of overhead expenses, as implemented by senior management and the board of directors. This is in line with economic theory assumption that managers are rational and act to reduce overhead expenses in an attempt to maximize profits (Standard Bank, 2010). This is despite views to the contrary, for example, the expense preference theory by Edwards (1977), popularised in banking literature by Hannan (1980), argued that bank management may choose to maximize utility rather than profitability. Earlier, Williamson (1963) had noted that in some instances, management may increase "staff expenditures, managerial emoluments and discretionary profits" rather than focus strictly on maximizing profits.

To justify this study's findings, PWC (2012) reports that salaries continue to represent about 50 percent of the total expense bill, growing at a rate of 12.6% in in the first half of 2012 compared to the same period in the previous year. According to PWC (2012), the increase was as a result of annual salary increases as well as the increased short- and long-term incentive awards associated with the improved operating performance of the banks. In the event that management prefer larger staffs or more locations, this is normally reflected, in the short-term, in higher efficiency ratios. It is imperative to note that such decisions may or may not contribute to long-run profitability. The South African situation is highly imperious,

with the smaller banks fighting for market share in a highly concentrated sector. Notably, Capitec has been offensively expanding to new locations and on a high recruitment drive while other banks where retrenching.

Looking closely at the two ratios, the smaller banks are displaying higher inefficiencies than the bigger ones, see Table 6.3 below. Lefifi (2013) quoted one of the big banks (the largest by total assets), Standard bank as saying “After careful consideration of all options available to remedy inefficiencies, the difficult decision has been made to reduce the number of employees …”. This is despite that over the same period, smaller banks, notably Bidvest and Capitec, have seen an increase in the number of employees. Capitec actually doubled the numbers between 2010 and 2013, from about 4 000 to over 8 300. Retrenchments were based on the argument that staff costs were 50 percent of operating expenses (Standard bank, 2010; PWC, 2012).

Table 6.3. Management Quality Ratios: Bigger Banks vs. Smaller Banks

Group	Variable	Obs.	Mean	Std. Dev.	Min.	Max.
All banks	CTIR	138	63.04297	32.17658	25.5	350
	Wage-income	170	.2582433	.2645641	0	1.221362
Smaller banks	CTIR	71	71.83408	42.25799	26.17	350
	Wage-income	91	.3333747	.316482	0	1.221362
Bigger banks	CTIR	67	53.72701	9.15936	25.5	67.31
	Wage-income	79	.1716995	.1480287	.0059841	.6846526

Source: Own computation using Bankscope data

On the other hand, PWC (2012) noted the significant inroads made by banks into reducing optional expenditure. Evidence prevails in the changing mix of expenditure, with the relative contribution of staff costs to the total expense bill increasing and other expenses decreasing in terms of relative contribution. However, other banks like Standard bank reported cutting down on conference attendances, end of year functions, among other options (Standard bank, 2010).

Highly capitalised banks are expected to attract more deposits; however, in this specification, a negative relationship was found between equity to total assets and bank deposits. According to Kosmidou (2009), capital adequacy is taken as the sufficiency of the amount of equity to absorb any unexpected shocks that the bank may face. The higher the ratio, the higher the value shareholders will receive in the event of the bank winding up; this, however, may not be of much interest to depositors than stockholders. The attitude of big banks to clients, due to high concentration in the market, could possibly explain this - in some instances, bigger banks feel they are too big to be accountable rather than just to fail. The South African banking system is considered highly regulated and stable, a belief confirmed by the resistance to the 2008/09 global financial crisis shocks (National Treasury, 2011).

Basel III required capital requirements: A South African perspective

South Africa undertook national implementation of Basel III capital rules commencing on 1 January 2013. From this date onwards, South African banks are to meet the following base minimum capital requirements expressed in risk-weighted assets:

- 4.5% core (common equity) Tier I capital
- 6% total Tier I capital; and
- 9.5% total capital.

During the transitional period from 1 January 2013 until the end of 2019, these ratios will gradually be stepped up to 9.0% core Tier I capital and 10.5% total Tier I capital (including 2.5% capital conservation buffer in both instances).

In addition, the following capital buffers will be phased in over the Basel III implementation period in South Africa.

The quantum of these buffers and what form of capital will be required to cover these buffers are yet to be confirmed by the SARB:

- A countercyclical capital buffer – which will require additional capital of up to 2.5% – during periods of high credit growth; and
- An additional capital charge in relation to domestic systemically important banks (D-SIB).

It is important to note that these capital buffers are dependent on a number of variables that will impact the 'end state' Basel III mandatory capital requirements. In particular, bank-specific factors as well as the macroeconomic context – such as the level of credit extension within the domestic economy – may influence the extent to which these capital buffers will be implemented for specific banks over the Basel III implementation period.

Source: Adopted from PWC, (2012)

The South African authorities keenly subscribed to the international benchmarks, notably the Basel Accords. The text box above summarises the structure of the implementation of Basel III recommendations.

On the other hand, depositors prefer higher liquidity as Rudolf (2009) reported that liquidity ratios reveal the extent to which a bank is capable of fulfilling its individual obligations. Like any investor, depositors prefer where they can get in and leave any time at minimal cost. Bank runs have been witnessed and become contagious all because of the concern for liquidity by depositors (Theobald, 2013). The bank failures during 1997-2002 also contributed to this high sensitivity. The inter-bank ratio (ir) is the ratio of money lent to other banks divided by money borrowed from other banks. Banks are required to hold an adequate amount of liquid assets, such as cash, to manage any potential withdrawals from clients (SARB, 2013).

If a bank cannot meet these liquidity requirements, it will need to borrow money in the interbank market to cover the shortfall. Some banks, on the other hand, have excess liquid assets above and beyond the liquidity requirements. These banks will lend money to the interbank market, receiving interest on the assets. Depositors also have their own preference for liquidity besides monitoring the liquidity for banks. If depositors feel that the liquidity situation of their banks will affect their own liquidity, they act by either withholding cash in the face of constrained bank liquidity, or depositing cash with the banks, in the face of liquidity banks. For the South African case, PWC (2012) noted that the decline in total deposits growth over 2011 and 2012 was due to reduced appetite for liquidity (cash preservation) among South African corporates in the face of an unrelenting low interest-rate environment.

Higher ratio implies high liquidity as the bank can be considered a net placer in the interbank market. On the other hand, lower ratio (below 1) implies a net borrower in the interbank market and heavily reliant on interbank deposits to fund its assets. In this study, a higher interbank ratio was expected to be associated with higher

deposits volume, a positive relationship. However, this was not the case since a negative and significant relationship was found.

The South African banking sector is highly concentrated with four big banks that have dominated the market for a very long time, to the extent that they become too complacent, only to be nudged by the coming of Capitec since 2002 (Theobald, 2013) targeting the previously unbanked low income populace. The bigger banks, which are more liquid, offered little incentive to the depositor (taking note the dependent variable here is total deposit), otherwise actually reduced any available incentive (the interest rate spread is very wide in South Africa) (Niyimbanira, et. al. 2015). In this regard, the actions of liquid banks repelled depositors. The same can be said for the other liquidity measure, that is, liquid assets to total deposits and borrowing, which was found also to be negatively related with total deposits. The price of deposits may, however, be more and accurately responsive to interbank ratio than the volume of deposits.

Considering loan loss reserves, the money that banks set aside to offset future losses on outstanding loans (Bernanke, 2009), the results show that as loan loss reserve increases, the volume of deposits increase. This is counter-intuitive as this implies an increase in risk profile of the bank encourages depositors to bring more funds. However, the reality could be that as bank managers increase loan loss reserves, the deposits may see them as being prudent, are good forecasters and thus act proactively to the extent of being trusted with more funds. Romera and Tabak (2010), for the case of Brazil, observed that depositors' monitoring varies within and outside the financial crisis periods, which might be the case here, hence worth investigating further (NB: The results presented in Table 6.2, as discussed, are for the full period, including the financial crisis).

Even though prudence can be pushed as an argument that it is being more cautious, building up reserves prior to future losses (Balla, Rose & Romero, 2012), Baral (2005) and Rajendra (2009) noted that this credit risk is one of the crucial factors that have an impact on the financial health of a bank and with the possibility of

adversely affecting the performance of banks and credit risk. Hence, the *a priori* expectation was that high ratio reduces the volume of deposits.

On the other hand, bank size really matters for the volume of deposits received, with a strong and statistically significant positive relationship. South Africa has a highly concentrated banking sector, with the big four' banks controlling about 90% of the industry asset and dominating geographically (Simbanegavi et. al. 2012; BASA, 2013). There is, generally, high regard for the big four banks than their smaller counterparts, as Bowdery (2015) found out that consumers incorporate branch density in identifying a bank of choice. This is quite understandable given the shock that happened in the banking sector over the 1997 (Asian Financial Crisis) to 2002 (South African banking crisis) period which still vivid in the memory of many (BASA, 2011; Theobald, 2013).

Currently, the nature of the relationship between bank size and bank risk is still ambiguous; however, larger banks are assumed to have a greater ability to diversify (a concept controlled for separately in the model) their risk and thus should have more stable earnings, thereby reducing their insolvency risk (PWC, 2012). However, in the presence of a too-big-to-fail (TBTF) policy, larger banks might have incentives to take higher risk, as indicated by Galloway, Lee and Roden (1997); Beck and Laeven (2006). In South Africa, however, there is no explicit guarantee for ban bail out by the authorities and the too-big-too-fail argument begs further exploration (Theobald, 2013). The major banks also continue to be at the forefront of innovation as they seek to meet the requirements of changing client behaviour, achieved through the launch of innovative products such as mobile and electronic banking applications (PWC, 2012). In that regard, there are other factors that add to the size of the bank in attracting more deposits.

Unless heteroscedasticity has been controlled, that is, under the FGLS and PCSE, share prices have no effect on the bank deposit volume. In that case, as share prices increase, the volume of deposits increases, implying that over and above assessing the performance and risk profile for each bank, the deposits also assess

the stock market performance of these entities. As in Shimizu (2009), depositors tend to deposit more if the stock prices are going up and withdraw funds when observing a fall in the stock prices of that bank. This study's observation is more direct that the one obtained in Shimizu where deposit of non-stock market registered cooperative banks were observed against the stock prices of registered banks.

In that regard, this study overcame the weakness in generalisation as the decline in deposits of cooperatives banks after a fall in stock market prices of registered banks may be due to an extraneous macroeconomic condition at play. The extraneous variable may affect stock prices of registered banks as well as deposits to any other bank without the cooperative banks' depositors actually reading the stock markets. In this study's case, however, the two variables: deposits and stock prices, are observed form the same entity and hence consider the findings more robust, albeit also supported by literature like Shimizu's (2009).

Therefore, stock markets provide additional information to depositor monitoring of banks, thus stock markets are information-efficient, and we reject the null hypothesis that stock markets do not have the ability to monitor banks' performance and risk-taking behaviour. Concluding that, indeed, there is a strong link between stock markets and the bank sector, with stock markets able to gather and aggregate information about banks presenting it to shareholders and other stakeholders in digestible bits.

There are reports of shifting of bank business funding models moving more to the market (Wehinger, 2012; Laeven, Ratnovski, & Tong, 2014), especially bigger banks. The traditional bank business model is reported to be less profitable hence the need to diversify (Butterworh & Malherbe, 1999; Wehinger, 2012). In this study, diversification was measured by the ratio of non-interest income to net operating income, as indicated in Chapter Four. A higher ratio indicates more diversification of income sources and therefore, a positive relationship is expected between diversified banks and deposits.

Under the fixed effects assumption, diversified banks attract more deposits. Traditionally, diversification is known to reduce risk (Markowitz, 1952); therefore, these banks are regarded by depositors as safer hence more funds entrusted. Berger, Hasan and Zhou (2010) concluded to the contrary in the case of Russia in the wake of the global financial crisis. Suffice to note that the impact of diversification on bank insolvency risk has been mixed, with studies like Stiroh (2004a), Hirtle and Stiroh (2007) and Mercieca et al. (2007) finding no merits for diversification. However, it is important to take note of studies like those of Landskroner, Ruthenberg and Zaken (2005), Baele et al. (2007) and Sanya and Wolfe (2011) who found that bank stability does increase due to diversification. The latter justifies the positive relationship between diversification and deposits observed in this current study.

On the other hand, the dependent variable was varied across the different categories of deposits. The expectation is that different deposit classes have different levels of interest in the risk profile of a particular bank. In general, uninsured deposits are expected to be more insecure; however, this classification was not available. Instead, a consideration of term deposits, current deposits, savings deposits and the latter two combined as demand deposits was done.

The approach followed in estimating the model is in line with Hasan et al.'s (2013) argument that the absence of categorisation of insured versus uninsured deposits is immaterial in emerging economies as the depositors tend not to realise it. However, the authors highlighted the possible bias of not disaggregating deposits by whether they are insured or not, that is there is a tendency to finding that market discipline exists. The bias is not a major factor in this study as price effect is also tested (Hadad et al. 2011), and most importantly, the use of stock market based risk variable, which is an advancement to what Hasan et al. (2013) covered.

The stock market, positively and significantly, influences term depositors. This implies that term depositors observe the stock market trends before committing their funds. Term deposits are not available on demand, and the depositor grants the bank use of the funds for a specified period, often at least three months in return for

an interest rate (Romero & Tabak, 2010). As accessing the funds before maturity attracts a penalty, term depositors need to consider all bank fundamentals before committing their funds, and in this study, it has been observed that they, indeed, value the information from the stock markets.

The results show that for current deposits, as the quality of assets deteriorate (high values of llr/gl and llr/il), increases the volume of current deposits decline. If managers are increasing loan loss reserves, it is considered that they are anticipating more loan defaults than in the past period(s) and hence a considered risky situation by depositors. Dugan (2009) and Floro (2010) argued that the level of loan loss provisioning should, in principle, be able to reflect bank management's belief on the quality of the loan portfolio that they have. On the other hand, Anandarajan, Hasan and McCarthy (2006) observed that Australian banks use loan loss reserves to manage capital and earnings but not as any signalling tool. In the eyes of the current depositors, it appears their funds may not be available when they need them when borrowers default. The reward for parting with liquidity becomes immaterial in the face of possible loss, as Ng and Roychowdury (2011) assert that larger loan loss reserves are associated with higher risk.

On the other hand, earnings ability of a bank, as measured by the net interest margin (nim), positively influence current depositors. As earnings ability increases, statistically significant in the models with robust standard errors, more current deposits a received. With term deposits, a higher NIM for the bank means lower interest rate receipts, and thus the negative relationship depicted in column 6 of Table 6.4.

In the same vein, as liquidity increases, current deposits increase. This implies that the depositors monitor the ability of a bank to return the funds when needed before depositing funds with a bank. Depositors, therefore, feel that they face loss in the event of a non-performing bank or a risk accumulating one. This is in line with findings in Romero and Tabak (2010) arguing that this has been supported by past financial crisis, where liquidity concerns hit hard on customers. As discussed earlier, the South African banking system had had its own financial crisis challenges which

had shaken the sector, thus making customers more watchful on certain bank fundamentals.

As with total deposits, indeed, size matters. Bigger banks attract more current deposits. It is imperative to also note that the South African banking sector is highly concentrated with few banks having broad geographic coverage to the extent of having the capacity to access more depositors. The big four banks are the ones that dominate every corner of the country and therefore, depositors considered this accessibility over and above the “too-big-too-fail” assumption (PWC, 2012). The 2002 South African banking crisis served as a good reference point to many depositors; smaller banks suffered while bigger ones remained resilient and actually showed much growth (Theobald, 2013).

Furthermore, banks that generate more income from other sources than lending, that is, diversifying income sources, attract more deposits. These banks are considered less likely to fail in line with diversification theory (Markowitz, 1952). Well-diversified banks (higher diversification ratio) are, therefore, considered safer, less risky and more depositors entrust their funds with such banks. As discussed above under asset quality, the depositors consider the possibility of them losing their funds before they can supply the funds. The bigger banks have more room to diversify compared to the smaller ones that are more niche driven (Brinkmeyer, 2014; Laeven, Ratnovski, & Tong, 2014).

Table 6.4: Term Deposits as dependent variable

VARIABLES	Total Dep	FE	RE	LSDV	FGLS	SCC
c_eta	-0.0786**	-0.0810***	-0.0786**	-0.0810***	-0.0786**	-0.0786***
	(0.0381)	(0.0271)	(0.0381)	(0.0271)	(0.0319)	(0.0140)
a_llrgl	0.0574	0.405**	0.0574	0.405**	0.0574	0.0574
	(0.149)	(0.152)	(0.149)	(0.152)	(0.125)	(0.0845)
a_llril	-0.00184	-0.00183	-0.00184	-0.00183	-0.00184	-0.00184
	(0.00283)	(0.00239)	(0.00283)	(0.00239)	(0.00237)	(0.00182)
m_ctir	-0.0166	-0.000248	-0.0166	-0.000248	-0.0166	-0.0166
	(0.0182)	(0.0139)	(0.0182)	(0.0139)	(0.0152)	(0.00945)
e_nim	-0.0993	-0.0186	-0.0993	-0.0186	-0.0993	-0.0993**
	(0.109)	(0.269)	(0.109)	(0.269)	(0.0912)	(0.0357)
e_roaa	0.187	0.487	0.187	0.487	0.187	0.187
	(0.316)	(0.324)	(0.316)	(0.324)	(0.265)	(0.175)
e_roae	-0.0581**	-0.0412	-0.0581**	-0.0412	-0.0581***	-0.0581***
	(0.0236)	(0.0287)	(0.0236)	(0.0287)	(0.0197)	(0.0141)
l_ir	-0.000458	-0.000305	-0.000458	-0.000305	-0.000458	-0.000458
	(0.000975)	(0.000849)	(0.000975)	(0.000849)	(0.000817)	(0.000543)
l_latd_b	-0.0182*	-0.0153*	-0.0182*	-0.0153*	-0.0182**	-0.0182
	(0.00976)	(0.00838)	(0.00976)	(0.00838)	(0.00818)	(0.0118)
banksize	**0.788*** **	**0.486**	**0.788*** **	**0.486**	**0.788*** **	**0.788*** **
	(0.0911)	**(0.409)**	**(0.0911)**	**(0.409)**	**(0.0763)**	**(0.0372)**
wage_incomeratio	2.384***	0.813	2.384***	0.813	2.384***	2.384***
	(0.674)	(0.566)	(0.674)	(0.566)	(0.565)	(0.383)
diversification	0.00813	-0.00656	0.00813	-0.00656	0.00813	0.00813
	(0.663)	(0.638)	(0.663)	(0.638)	(0.556)	(0.530)
lsharep	0.0601	0.638*	0.0601	**0.638***	0.0601	0.0601
	(0.103)	(0.349)	(0.103)	**(0.349)**	(0.0861)	(0.0928)
2.BFI				-4.809		
				(6.880)		
3.BFI				-3.425		
				(3.368)		
5.BFI				1.792*		
				(0.874)		
7.BFI				1.340		
				(1.146)		
9.BFI				0.752***		
				(0.204)		
10.BFI				-3.796		
				(3.793)		
11.BFI				0.394		
				(0.505)		
Constant	3.838**	-0.122	3.838**	-0.277	3.838***	3.838***
	(1.633)	(4.296)	(1.633)	(4.809)	(1.369)	(0.843)
Observations	47	47	47	47	47	47
R-squared	0.970	0.751		0.990		0.970
Number of BFI		8	8		8	
Number of groups						8

Standard errors in parentheses

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

Unlike with total deposits, current deposits are not affected by stock market variables. Similar results are observed with demand deposits, with capitalisation and return on average assets positive and significantly influencing volume of deposits.

Table 6.5: Current deposits as dependent variable

VARIABLES	(1) Total Dep	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE	(7) SCC
c_eta	-0.0992	-0.0867	-0.0992	-0.0867	-0.0992	-0.0992**	-0.0992***
	(0.0730)	(0.0960)	(0.0730)	(0.0960)	(0.0606)	(0.0400)	(0.0238)
a_llrgl	**-0.531*** **	**-0.388***	**-0.531*** **	**-0.388***	**-0.531*** **	**-0.531*** **	**-0.531*** **
	(0.186)	**(0.197)**	**(0.186)**	**(0.197)**	**(0.155)**	**(0.131)**	**(0.154)**
a_llril	**-0.00675** **	**-0.00393**	**-0.00675** **	**-0.00393**	**-0.00675** **	**-0.00675*** **	**-0.00675**
	(0.00325)	**(0.00322)**	**(0.00325)**	**(0.00322)**	**(0.00270)**	**(0.00254)**	**(0.00473)**
m_ctir	0.00844	0.0125	0.00844	0.0125	0.00844	0.00844	0.00844**
	(0.0211)	(0.0177)	(0.0211)	(0.0177)	(0.0175)	(0.00821)	(0.00350)
e_nim	0.223	0.284	0.223	0.284	**0.223** **	**0.223*** **	**0.223** **
	(0.136)	(0.328)	(0.136)	(0.328)	**(0.113)**	**(0.0689)**	**(0.0959)**
e_roaa	-0.335	-0.301	-0.335	-0.301	-0.335	-0.335	-0.335
	(0.503)	(0.485)	(0.503)	(0.485)	(0.417)	(0.216)	(0.252)
e_roae	0.0313	0.0386	0.0313	0.0386	0.0313	0.0313	0.0313
	(0.0344)	(0.0381)	(0.0344)	(0.0381)	(0.0285)	(0.0227)	(0.0245)
l_ir	0.00190	0.00154	0.00190	0.00154	**0.00190***	**0.00190*** **	**0.00190** **
	(0.00126)	(0.00121)	(0.00126)	(0.00121)	**(0.00104)**	**(0.000693)**	**(0.000748)**
l_latd_b	**0.0253***	**0.0196**	**0.0253** **	**0.0196**	**0.0253** **	**0.0253*** **	**0.0253** **
	(0.0129)	**(0.0128)**	**(0.0129)**	**(0.0128)**	**(0.0107)**	**(0.00922)**	**(0.0111)**
banksize	**0.606*** **	**1.391** **	**0.606*** **	**1.391** **	**0.606*** **	**0.606*** **	**0.606*** **
	(0.175)	(0.525)	(0.175)	(0.525)	(0.146)	(0.117)	(0.110)
wage_incomeratio	-0.0501	0.128	-0.0501	0.128	-0.0501	-0.0501	-0.0501
	(0.931)	(0.815)	(0.931)	(0.815)	(0.773)	(0.704)	(0.636)
diversification	**1.853** **	**1.416***	**1.853** **	**1.416***	**1.853*** **	**1.853*** **	**1.853*** **
	(0.768)	**(0.803)**	**(0.768)**	**(0.803)**	**(0.637)**	**(0.541)**	**(0.298)**
lsharep	0.0641	-0.442	0.0641	-0.442	0.0641	0.0641	0.0641
	(0.112)	(0.426)	(0.112)	(0.426)	(0.0928)	(0.0692)	(0.0965)
2.BFI				-0.638			
				(8.664)			
5.BFI				-1.540			
				(1.064)			
7.BFI				1.901			
				(1.499)			
9.BFI				-0.832**			
				(0.362)			
10.BFI				2.635			
				(5.181)			
11.BFI				-1.012			
				(0.646)			
Constant	2.501	-3.486	2.501	-3.629	2.501	2.501	2.501

	(2.392)	(5.458)	(2.392)	(6.053)	(1.985)	(1.736)	(1.640)
Observations	45	45	45	45	45	45	45
R-squared	0.937	0.753		0.971		0.937	0.937
Number of BFI		7	7		7	7	
Number of groups							7

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

Source: Own computation in STATA 13

When the dependant variable was savings deposits, a remarkable observation was the positive and significant effect of stock market variable. This indeed shows that stock markets are linked to the banking sector through the depositors as depositors use information collected and processed by their sophisticated counterparts in making their decisions.

Table 6.6: Savings Deposits as dependent variable

VARIABLES	(1) Total Dep	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE	(7) SCC
c_eta	-0.0720	-0.104	-0.0720	-0.104	-0.0720	-0.0720	-0.0720
	(0.396)	(0.0939)	(0.396)	(0.0939)	(0.297)	(0.279)	(0.312)
a_llrgl	-0.404	0.257**	-0.404	0.257**	-0.404	**-0.404***	-0.404
	(0.329)	(0.110)	(0.329)	(0.110)	(0.247)	**(0.214)**	(0.353)
a_llril	-0.0145	-0.00506	-0.0145	-0.00506	-0.0145	-0.0145	-0.0145
	(0.0147)	(0.00376)	(0.0147)	(0.00376)	(0.0110)	(0.0128)	(0.0154)
m_ctir	0.0288	-0.0169	0.0288	-0.0169	0.0288	0.0288	0.0288
	(0.0392)	(0.0101)	(0.0392)	(0.0101)	(0.0294)	(0.0242)	(0.0287)
e_nim	0.735	-0.243	0.735	-0.243	**0.735****	**0.735***	0.735
	(0.468)	(0.193)	(0.468)	(0.193)	**(0.351)**	**(0.385)**	(0.587)
e_roaa	-2.137	1.099	-2.137	1.099	-2.137	-2.137*	-2.137
	(1.774)	(0.649)	(1.774)	(0.649)	(1.330)	(1.263)	(1.987)
e_roae	0.0650	-0.0458	0.0650	-0.0458	0.0650	0.0650	0.0650
	(0.141)	(0.0422)	(0.141)	(0.0422)	(0.106)	(0.103)	(0.131)
l_ir	0.00256	6.20e-05	0.00256	6.20e-05	**0.00256***	**0.00256****	0.00256
	(0.00176)	(0.000422)	(0.00176)	(0.000422)	**(0.00132)**	**(0.00129)**	(0.00224)
l_latd_b	-0.0317	-0.00306	-0.0317	-0.00306	-0.0317**	-0.0317*	-0.0317
	(0.0210)	(0.00718)	(0.0210)	(0.00718)	(0.0158)	(0.0175)	(0.0180)
banksize	-0.0296	0.0320	-0.0296	0.0320	-0.0296	-0.0296	-0.0296
	(0.592)	(0.267)	(0.592)	(0.267)	(0.444)	(0.433)	(0.554)
wage_incomeratio	2.043	1.962	2.043	1.962	2.043	2.043	2.043
	(8.552)	(2.309)	(8.552)	(2.309)	(6.414)	(4.651)	(3.540)
diversification	1.744	-0.467	1.744	-0.467	1.744*	1.744	1.744
	(1.311)	(0.440)	(1.311)	(0.440)	(0.984)	(1.063)	(1.424)
lsharep	**0.517***	**0.357**	**0.517***	0.357	**0.517****	**0.517****	0.517
	(0.288)	**(0.212)**	**(0.288)**	(0.212)	**(0.216)**	**(0.223)**	(0.346)
2.BFI				-10.49*			

				(5.888)			
5.BFI				-2.235***			
				(0.509)			
9.BFI				-1.457***			
				(0.108)			
11.BFI				-1.162***			
				(0.294)			
Constant	4.762	7.351**	4.762	8.822**	4.762	4.762	4.762
	(6.896)	(3.137)	(6.896)	(3.130)	(5.172)	(4.810)	(4.934)
Observations	32	32	32	32	32	32	32
R-squared	0.920	0.848		0.997		0.920	0.920
Number of BFI		5	5		5	5	
Number of groups							5

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

Source: Own computation in STATA 13

On the other hand, demand deposits are heavily influenced by diversification, bank size, liquidity, earning ability of the bank as well as capitalisation. All these variables have correct coefficient sign according to theory and are statistically significant. This is also evidence that depositors have the ability to discipline banks in South Africa. On this specification, however, stock markets do not supply additional information relevant for decision-making by demand depositors.

Table 6.7. Demand deposits as dependent variable

VARIABLES	(1) Total Dep	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE	(7) SCC
c_eta	0.0533	**0.0794***	0.0533	**0.0794***	0.0533	0.0533	0.0533
	(0.0604)	**(0.0396)**	(0.0604)	**(0.0396)**	(0.0458)	(0.0385)	(0.0678)
a_llrgl	0.195	-0.0159	0.195	-0.0159	0.195	0.195	0.195
	(0.158)	(0.0828)	(0.158)	(0.0828)	(0.120)	(0.120)	(0.149)
a_llril	0.00360	0.000749	0.00360	0.000749	0.00360	0.00360	0.00360
	(0.00438)	(0.00212)	(0.00438)	(0.00212)	(0.00332)	(0.00314)	(0.00513)
m_ctir	-0.00640	-0.00532	-0.00640	-0.00532	-0.00640	-0.00640	-0.00640
	(0.0146)	(0.0106)	(0.0146)	(0.0106)	(0.0111)	(0.0100)	(0.0120)
e_nim	0.200	0.0621	0.200	0.0621	0.200	0.200	**0.200***
	(0.179)	(0.151)	(0.179)	(0.151)	(0.136)	(0.143)	**(0.106)**
e_roaa	-0.110	-0.222	-0.110	-0.222	-0.110	-0.110	-0.110
	(0.264)	(0.153)	(0.264)	(0.153)	(0.200)	(0.120)	(0.189)
e_roae	**0.0578****	**0.0204**	**0.0578****	**0.0204**	**0.0578*****	**0.0578*****	**0.0578****
	(0.0255)	**(0.0162)**	**(0.0255)**	**(0.0162)**	**(0.0193)**	**(0.0154)**	**(0.0229)**
l_ir	**0.00185*****	**0.000275**	**0.00185*****	**0.000275**	**0.00185*****	**0.00185*****	**0.00185**
	(0.000642)	**(0.000357)**	**(0.000642)**	**(0.000357)**	**(0.000487)**	**(0.000477)**	**(0.00125)**
l_latd_b	0.00798	**0.0127****	0.00798	0.0127**	0.00798	0.00798	0.00798
	(0.00742)	**(0.00547)**	(0.00742)	(0.00547)	(0.00563)	(0.00609)	(0.0104)
banksize	**1.479*****	**0.813*****	**1.479*****	**0.813*****	**1.479*****	**1.479*****	**1.479*****
	(0.233)	**(0.250)**	**(0.233)**	**(0.250)**	**(0.177)**	**(0.165)**	**(0.336)**
wage_incomeratio	1.629	1.130	1.629	1.130	1.629*	1.629*	1.629
	(1.190)	(1.287)	(1.190)	(1.287)	(0.903)	(0.909)	(1.681)
diversification	**1.849****	**0.443**	**1.849*****	**0.443**	**1.849*****	**1.849*****	**1.849***
	(0.708)	**(0.344)**	**(0.708)**	**(0.344)**	**(0.537)**	**(0.538)**	**(0.921)**
lsharep	-0.0229	0.165	-0.0229	0.165	-0.0229	-0.0229	-0.0229
	(0.0975)	(0.164)	(0.0975)	(0.164)	(0.0740)	(0.0639)	(0.0721)
5.BFI				0.220			
				(0.403)			
7.BFI				-2.423			
				(1.666)			
9.BFI				-0.665***			
				(0.0934)			
10.BFI				-2.012			
				(2.433)			
11.BFI				0.610**			
				(0.269)			
Constant	-11.41***	-2.274	-11.41***	-1.957	-11.41***	-11.41***	-11.41*
	(3.453)	(3.023)	(3.453)	(3.188)	(2.620)	(2.544)	(5.473)
Observations	33	33	33	33	33	33	33
R-squared	0.992	0.958		0.999		0.992	0.992
Number of BFI		6	6		6	6	
Number of groups							6

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

Source: Own computation in STATA 13

ii. Price effect

Depositors demand less price on banks with higher earnings ability (measured by return on average assets), liquid banks, as measured by interbank ratio (the banks that other banks mostly borrow from), bigger banks as well as the diversified ones.

As in Hadad et. al. (2011), for the case of Indonesia, liquidity has a positive and significant effect on deposit price, thus confirming presence of market discipline. In this specification with results presented in Table 6.8, both liquidity measures have coefficients statistically above zero. The effect of bank size is not stable, however, considering the last three estimations that corrected for standard errors, the effect is positive, bigger banks paying more interest rates depositors. This inconsistent and unstable result was also observed in Hadad et al (2011).

Of interest, more in line with the main objectives of this study, is the effect of stock market variable on deposit price. There was a negative and significant effect of share prices on deposit price, meaning that better performing stocks will attract a low interest rate demand by depositors. If the banks stocks are not performing well, depositors tend to demand a higher return. This, indeed, also confirms the link between stock markets and the banking sector in South Africa, mainly how stock markets enables bank disciplining.

On the other hand, the earning ability, as measured by return on average assets, is the correct sign and significant coefficient. This implies that banks with better earning ability end up paying less to their depositors, and the reason is that depositors do not demand higher returns as they consider their investment safe, anticipating stable returns in the future.

Table 6.8 Deposit Price as dependent variable

VARIABLES	(1) POLS	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE	(7) SCC
c_eta	0.0798***	0.0846***	0.0798***	0.0846***	0.0798***	0.0798***	0.0798***
	(0.0207)	(0.00924)	(0.0207)	(0.00924)	(0.0177)	(0.0266)	(0.0171)
a_llrgl	-0.168**	-0.0818	-0.168**	-0.0818	-0.168**	-0.168**	-0.168**
	(0.0807)	(0.0517)	(0.0807)	(0.0517)	(0.0687)	(0.0684)	(0.0642)
a_llril	0.000694	-0.000992	0.000694	-0.000992	0.000694	0.000694	0.000694
	(0.00145)	(0.000746)	(0.00145)	(0.000746)	(0.00124)	(0.00121)	(0.00120)
m_ctir	-0.0110	-0.00718	-0.0110	-0.00718	-0.0110	-0.0110	-0.0110
	(0.00992)	(0.00468)	(0.00992)	(0.00468)	(0.00845)	(0.00996)	(0.0147)
e_nim	0.0406	-0.106	0.0406	-0.106	0.0406	0.0406	0.0406
	(0.0594)	(0.0865)	(0.0594)	(0.0865)	(0.0506)	(0.0547)	(0.0350)
e_roaa	-0.0730	**-0.318*** **	-0.0730	**-0.318*** **	-0.0730	-0.0730	-0.0730
	(0.171)	**(0.114)**	(0.171)	**(0.114)**	(0.145)	(0.216)	(0.162)
e_roae	-0.0128	0.00941	-0.0128	0.00941	-0.0128	-0.0128	-0.0128
	(0.0125)	(0.00996)	(0.0125)	(0.00996)	(0.0107)	(0.0134)	(0.0109)
l_ir	**0.00123****	**-0.00074****	**0.00123****	**-0.00074****	**0.00123*****	**0.00123****	**0.00123***
	(0.000528)	**(0.000299)**	**(0.000528)**	**(0.000299)**	**(0.000450)**	**(0.000518)**	**(0.000606)**
l_latd_b	**-0.0118****	**0.00992*****	**-0.0118****	**0.00992*****	**-0.0118*****	**-0.0118****	**-0.0118***
	(0.00531)	**(0.00288)**	**(0.00531)**	**(0.00288)**	**(0.00452)**	**(0.00542)**	**(0.00655)**
banksize	**0.210*****	**-0.382*****	**0.210*****	**-0.382*****	**0.210*****	**0.210*****	**0.210****
	(0.0493)	**(0.121)**	**(0.0493)**	**(0.121)**	**(0.0420)**	**(0.0681)**	**(0.0720)**
wage_incomeratio	0.343	-0.522**	0.343	-0.522**	0.343	0.343	0.343
	(0.361)	(0.199)	(0.361)	(0.199)	(0.308)	(0.415)	(0.504)
diversification	0.0696	-0.357	0.0696	-0.357	0.0696	0.0696	0.0696
	(0.356)	(0.211)	(0.356)	(0.211)	(0.303)	(0.337)	(0.345)
lsharep	-0.0756	0.116	-0.0756	0.116	-0.0756	**-0.0756***	-0.0756
	(0.0547)	(0.109)	(0.0547)	(0.109)	(0.0466)	**(0.0451)**	(0.0567)
2.BFI				2.100			
				(2.245)			
3.BFI				1.392			
				(1.136)			
5.BFI				0.0775			
				(0.286)			
7.BFI				-1.229***			
				(0.320)			
9.BFI				-0.196***			
				(0.0700)			
10.BFI				-1.461			
				(1.235)			
11.BFI				0.231			
				(0.167)			
Constant	-1.869**	4.552***	-1.869**	4.811***	-1.869**	-1.869**	-1.869
	(0.884)	(1.288)	(0.884)	(1.452)	(0.753)	(0.935)	(1.376)
Observations	51	51	51	51	51	51	51
R-squared	0.922	0.841		0.989		0.922	0.922
Number of BFI		8	8		8	8	
Number of groups							8

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

Source: Own computation in STATA 13

Table 6.9 presents results with change in deposit price as the dependant variable. The results are not very much different from those in Table 6.8 above wherein the dependent variable was deposit price at level. It is important to highlight that asset quality, as measured by loan loss reserves to gross loan ratio, have a significant and positive effect of deposit price. This finding is also in line with that reported in Hadad et. al (2011) and Romero and Tabak (2010).

Table 6.9: Change in deposit price

VARIABLES	(1) POLS	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE
c_eta	0.0661***	0.0669***	0.0661***	0.0669***	0.0661***	0.0661***
	(0.00778)	(0.00542)	(0.00778)	(0.00542)	(0.00662)	(0.0104)
a_llrgl	**0.0621****	**-0.0562***	**0.0621****	**-0.0562***	**0.0621****	**0.0621****
	(0.0303)	**(0.0303)**	**(0.0303)**	**(0.0303)**	**(0.0258)**	**(0.0288)**
a_llril	0.000847	0.000103	0.000847	0.000103	0.000847*	0.000847**
	(0.000545)	(0.000437)	(0.000545)	(0.000437)	(0.000464)	(0.000430)
m_ctir	-0.00447	-0.00169	-0.00447	-0.00169	-0.00447	-0.00447
	(0.00372)	(0.00274)	(0.00372)	(0.00274)	(0.00317)	(0.00316)
e_nim	0.0493**	-0.00985	0.0493**	-0.00985	0.0493***	0.0493*
	(0.0223)	(0.0507)	(0.0223)	(0.0507)	(0.0190)	(0.0263)
e_roaa	**-0.446*****	**-0.180****	**-0.446*****	**-0.180****	**-0.446*****	**-0.446*****
	(0.0640)	**(0.0671)**	**(0.0640)**	**(0.0671)**	**(0.0545)**	**(0.0835)**
e_roae	0.0285***	0.00701	0.0285***	0.00701	0.0285***	0.0285***
	(0.00470)	(0.00584)	(0.00470)	(0.00584)	(0.00401)	(0.00461)
l_ir	**-0.000589*****	**-0.000286**	**-0.000589*****	**-0.000286**	**-0.000589*****	**-0.000589****
	(0.000198)	**(0.000175)**	**(0.000198)**	**(0.000175)**	**(0.000169)**	**(0.000233)**
l_latd_b	0.00110	0.00320*	0.00110	**0.00320***	0.00110	0.00110
	(0.00199)	(0.00169)	(0.00199)	**(0.00169)**	(0.00169)	(0.00221)
banksize	**-0.106*****	**-0.141***	**-0.106*****	**-0.141***	**-0.106*****	**-0.106*****
	(0.0185)	**(0.0709)**	**(0.0185)**	**(0.0709)**	**(0.0158)**	**(0.0252)**
wage_incomeratio	-0.256*	-0.165	-0.256*	-0.165	-0.256**	-0.256*
	(0.136)	(0.117)	(0.136)	(0.117)	(0.115)	(0.139)
diversification	**-0.274****	**-0.0988**	**-0.274****	**-0.0988**	**-0.274****	**-0.274****
	(0.133)	**(0.124)**	**(0.133)**	**(0.124)**	**(0.114)**	**(0.133)**
lsharep	0.00555	0.0152	0.00555	0.0152	0.00555	0.00555
	(0.0205)	(0.0642)	(0.0205)	(0.0642)	(0.0175)	(0.0146)
2.BFI				-0.342		
				(1.316)		
3.BFI				-2.360***		
				(0.666)		
5.BFI				-0.00722		
				(0.168)		
7.BFI				-0.422**		
				(0.188)		
9.BFI				-0.0733*		
				(0.0410)		

10.BFI				-1.234*		
				(0.723)		
11.BFI				0.149		
				(0.0981)		
Constant	0.990***	1.314*	0.990***	1.629*	0.990***	0.990***
	(0.331)	(0.755)	(0.331)	(0.851)	(0.282)	(0.339)
Observations	51	51	51	51	51	51
R-squared	0.854	0.897		0.950		0.854
Number of BFI		8	8		8	8

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

Source: Own computation in STATA 13

6.2.2. Equity holders' discipline (monitoring)

The results for the sub-model with stock market variable as dependent are presented in Table 6.10 below. The results do confirm that stock markets have the ability to monitor bank performance and risk in South Africa. The results corroborate those found using depositor information above. From the results, capital quality, asset quality, management quality, liquidity quality as well as control variables size and diversification all provide important information to shareholders, in other words, shareholders respond to the changes in these key bank fundamentals. As in Baele et. al. (2011) a statistically significant coefficient with correct sign on any of the bank fundamentals prove the presence of market disciplining by stock markets.

As shareholders observe bank fundamentals, which are now readily available thanks to Basel Accords, on more disclosure, they revise their holdings. As indicated earlier in the chapter, there are notable examples to this in South Africa. One close example is how share prices of African Bank fell as its fundamentals deteriorated, especially in 2013 and 2014 (Lefifi, 2013).

Table 6.10: Response of Log of stock prices on bank characteristics

VARIABLES	(1) POLS	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE	(7) SCC
c_eta	0.0702	**0.0297****	0.0702	**0.0297****	0.0702	**0.0702***	0.0702
	(0.0605)	**(0.0142)**	(0.0605)	**(0.0142)**	(0.0522)	**(0.0368)**	(0.0464)
a_llrgl	-0.268	-0.0800	-0.268	-0.0800	-0.268	-0.268	-0.268
	(0.236)	(0.0836)	(0.236)	(0.0836)	(0.203)	(0.207)	(0.246)
a_llril	**-0.0104****	**-7.82e-05**	**-0.0104*****	**-7.82e-05**	**-0.0104*****	**-0.0104*****	**-0.0104*****
	(0.00397)	**(0.00122)**	**(0.00397)**	**(0.00122)**	**(0.00342)**	**(0.00387)**	**(0.00260)**
m_ctir	**0.0540***	-0.00278	0.0540*	-0.00278	**0.0540****	0.0540	**0.0540*****
	(0.0281)	(0.00767)	(0.0281)	(0.00767)	**(0.0243)**	(0.0355)	**(0.0143)**
e_nim	0.0240	0.204	0.0240	0.204	0.0240	0.0240	0.0240
	(0.176)	(0.137)	(0.176)	(0.137)	(0.152)	(0.161)	(0.189)
e_roaa	-0.213	-0.228	-0.213	-0.228	-0.213	-0.213	-0.213
	(0.505)	(0.183)	(0.505)	(0.183)	(0.436)	(0.425)	(0.552)
e_roae	-0.0278	0.0259	-0.0278	0.0259	-0.0278	-0.0278	-0.0278
	(0.0369)	(0.0157)	(0.0369)	(0.0157)	(0.0319)	(0.0294)	(0.0193)
l_ir	**0.00273***	**0.000684**	**0.00273***	**0.000684**	**0.00273****	**0.00273****	**0.00273****
	(0.00150)	**(0.000474)**	**(0.00150)**	**(0.000474)**	**(0.00130)**	**(0.00128)**	**(0.00116)**
l_latd_b	3.63e-05	**0.00969****	3.63e-05	**0.00969****	3.63e-05	3.63e-05	3.63e-05
	(0.0157)	**(0.00440)**	(0.0157)	**(0.00440)**	(0.0136)	(0.0178)	(0.0229)
banksize	0.202	**0.538*****	0.202	**0.538*****	0.202	**0.202***	0.202
	(0.143)	**(0.173)**	(0.143)	**(0.173)**	(0.123)	**(0.120)**	(0.126)
wage_incomeratio	-0.196	0.442	-0.196	0.442	-0.196	-0.196	-0.196
	(1.072)	(0.317)	(1.072)	(0.317)	(0.926)	(1.052)	(1.032)
diversification	-0.155	**0.953*****	-0.155	**0.953*****	-0.155	-0.155	-0.155
	(1.055)	**(0.301)**	(1.055)	**(0.301)**	(0.911)	(1.008)	(0.621)
2.BFI				-2.334			
				(3.659)			
3.BFI				-0.344			
				(1.862)			
5.BFI				-2.456***			
				(0.160)			
7.BFI				0.540			
				(0.516)			
9.BFI				0.256**			
				(0.105)			
10.BFI				0.617			
				(2.022)			
11.BFI				-0.537**			
				(0.257)			
Constant	4.394*	0.589	4.394*	0.862	4.394**	4.394*	4.394**
	(2.525)	(2.110)	(2.525)	(2.377)	(2.179)	(2.280)	(1.517)
Observations	51	51	51	51	51	51	51
R-squared	0.498	0.773		0.978		0.498	0.498
Number of BFI		8	8		8	8	

Number of groups	8

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

Source: Own computation in STATA 13

6.3. Robustness Checks

For robustness checks, a closer look at the stock market variable was done. Table 6.11 shows that there are some banks with stock prices that are not correlated to those of other banks, for example, Investec shares are not, in any way, correlated to those of other banks. The business model of Investec is indeed unique hence the behaviour of the shareholders being also unique. Bigger banks are highly correlated (ABSA, FNB, Standard Bank- SBSA as well as with Bidvest).

Table 6.11: Stock prices correlations

Variables	ABSA	FNB	SBSA	NED	CPI	INVE	BIDVE	SASFN	GRND
ABSA	**1**	**0.8000**	**0.8791**	0.2594	**0.5947**	0.5102	**0.9030**	**0.5896**	**0.5564**
FNB	**0.8000**	**1**	0.4859	0.4154	**0.8448**	0.3552	**0.7789**	0.1793	0.2630
SBSA	**0.8791**	0.4859	**1**	0.1745	0.2633	0.4939	**0.6669**	**0.7304**	**0.5690**
NED	0.2594	0.4154	0.1745	**1**	0.4608	0.2049	0.2467	-0.0313	-0.1064
CPI	**0.5947**	**0.8448**	0.2633	0.4608	**1**	0.2068	**0.6076**	-0.0602	-0.0003
INVE	0.5102	0.3552	0.4939	0.2049	0.2068	**1**	0.3317	0.4993	0.3711
BIDVE	**0.9030**	**0.7789**	**0.6669**	0.2467	**0.6076**	0.3317	**1**	0.3514	0.4194
SASFN	**0.5896**	0.1793	**0.7304**	-0.0313	-0.0602	0.4993	0.3514	**1**	**0.8033**
GRND	**0.5564**	0.2630	**0.5690**	-0.1064	-0.0003	0.3711	0.4194	**0.8033**	**1**

Values in bold are different from 0 with a significance level alpha=0.05

Source: Own computation in STATA 13

Furthermore, at tests to determine whether the share prices on average are statistically different from each other over the three key periods, pre-crisis, during the 2008/9 global financial crisis and post financial crisis. For that, the Kruskal-Wallis test was done, and the results are presented below. The results show that indeed the stock prices across the three periods were, on average, the same.

Table 6.12.: Kruskal-Wallis Test Results

Kruskal-Wallis test:

K (Observed value)	4.5185
K (Critical value)	5.9915
DF	2
p-value (Two-tailed)	0.1044
alpha	0.05

An approximation has been used to compute the p-value.

Test interpretation:

H0: The samples come from the same population.

Ha: The samples do not come from the same population.

As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.

The risk to reject the null hypothesis H0 while it is true is 10.44%.

Source: Own computation in STATA 13

The global financial crisis, therefore, did not have a significant effect on the stock valuation of the banks in South Africa, based on the results in Table 6.12 above.

Furthermore, the panel mean group estimator was considered as discussed in Chapter Four. The estimator was applied to the specification in Equation 4.9, and the results reported in Table 6.13 below were obtained.

As can be seen from results in Table 6.13, the error correction term (ec) for all estimators is negative and statistically significant implying that any deviations from the long run are corrected (Bangake & Eggoh, 2012). For the PMG, there are two long run coefficients that are statistically significant with correct positive symbols, and these are return on average assets (roaa) and equity (ltequity) which proxy for bank strategy. As bank strategy improves, the stock valuation increases (Baele, et. al, 2014).

On the other hand, dynamic FE (DFE) which is similar to PMG in that it restricts the coefficients to be the same across panels, however adding further restrictions on

error correction term and short-run slopes to be the same was estimated. Two variations are employed for the DFE, that is, DFE in general and allowance for intragroup correlation in calculating standard errors (DFE_cluster, cluster on the individual bank). For both the long-run and short-run, results are obtained, see the last four columns to Table 6.13.

Table 6.13.: Pooled Mean Group Estimator including the Dynamic Fixed Effect

VARIABLES	Long-run PMG	Short-run PMG	Long-run DFE	Short-run DFE	Long-run DFE_cluster	Short-run DFE_cluster
ec		-0.649***		-0.412***		-0.412***
		(0.203)		(0.0834)		(0.113)
D.e_roaa		0.0394				
		(0.127)				
D.ltequity		-0.170				
		(0.492)				
D.e_nim		0.0642				
		(0.160)				
e_roaa	0.158***					
	(0.0177)					
ltequity	0.922***					
	(0.0587)					
e_nim	-0.00187					
	(0.00958)					
ltassets			2,661***		2,661	
			(850.4)		(1,619)	
tcr			-0.544**		-0.544***	
			(0.243)		(0.145)	
dep_TA			-14,196**		-14,196**	
			(6,324)		(7,054)	
con_loanshare			26,264**		26,264***	
			(12,419)		(9,634)	
D.totalassets				-0.00374		-0.00374*
				(0.00315)		(0.00206)
D.tcr				-0.194*		-0.194***
				(0.107)		(0.0268)
D.dep_TA				-1,675		-1,675
				(2,632)		(2,148)
D.con_loanshare				6,070		6,070
				(4,752)		(4,158)
Constant		0.522		18,097***		18,097***
		(0.392)		(5,699)		(6,963)
Observations	92	92	.	.	.	.

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

Source: Ow computation in STATA 13

The results show that total capital ratio (trc), proxy for bank strategy, has both short run and long run negative relationship with stock valuation, while funding structure proxied by deposit to total asset ratio (dep_ta) (negative) and asset mix as measured by consumer loan share (con_loanshare) (positive) are statistically significant in the long run. This implies that as the bank relies more on deposits for funding (less diversification), the stock markets react negatively (low stock prices are observed); however, when majority of the loans are extended to consumers, the stock markets observe such as a positive move, and there is an upward evaluation of bank stocks. These results are in line with the argument in Baele et al (2007) where stock markets were found to value bank diversification.

Overall, the results corroborate the tests above and therefore, it can be concluded that the findings in this study are robust, and inferences can be drawn.

6.4. Summary of the Chapter

The chapter set to estimate whether stock markets have the ability to monitor banks through assessing the banks' status in terms of performance and risk. This was done in two steps, first, the role of stock markets in aiding depositors to discipline banks was tested. The results are positive, with depositors considering stock market provided information in their decision making about whether to entrust banks with their funds or not. The effect was observed in both the quantity effect and the price effect. Secondly, the ability of stock markets to monitor banks was tested with stock market based risk measure as the dependent variable, observing how it reacts to bank specific fundamentals. It was observed that there are a number of bank specific fundamentals that have coefficient statistically different from zero, resulting in rejection of null hypothesis of not able to monitor, and it can be concluded that indeed stock markets had the ability to monitor banks in South Africa between 1994 and 2014.

CHAPTER SEVEN

Do Stock Markets Influence Banks in South Africa?

> "I [NOW] believe that banking institutions are more dangerous to our liberties than standing armies." Thomas Jefferson

7.0. Introduction

The preceding two chapters, Chapter Five and Chapter Six, have observed the link between stock markets and the banking sector, mainly the presence of stock market channel of monetary policy transmission as well as the ability of stock markets to monitor banks, directly or through enabling depositors clearer monitoring, respectively. These observations confirm the first component of market discipline, which is market monitoring. This chapter focuses on the second and last component of market discipline, market influencing, investigating whether stock markets do influence banks' decision-making process in South Africa.

The chapter presents two main empirical analyses, each addressing a unique model specification. Firstly, the effect of stock market on the decision by management to diversify revenue sources was tested. As justified in the preceding chapter, management have firm control of the diversification decision which they are assumed to make in response to specific bank performance and risk indicators. In this study, the key specific bank variable is stock market prices.

On the other hand, bank managers also have control over funding structures of the respective banks, varying the structure in response to changing macro-economic and sector environment as well as the individual bank risk and performance indicators. The second empirical model investigates the role of stock markets in such decision-making.

7.1. Stock market influencing on revenue diversification

This section presents the results on the model, checking how stock markets influence bank income diversification.

7.1.1. Descriptive Statistics: Revenue diversification and stock markets

Following the work of Mercieca et al (2007) and Amidu and Wolfe (2013), a Herfindahl-Hirschman Index for revenue diversification has been calculated, and the descriptive statistics are reflected in Table 7.1 below. Berger et al (2010) noted the saturation by studies that focus on banks in developed markets in this area of bank diversification, while leaving the banking industry in emerging and transitional economies (like South Africa) largely unexamined. However, it is worth noting here that Berger et al (2010) used a focus index, which is based on the sum of squares of shares in different bank products (loans, deposits, assets, and liabilities).

Table 7.1: Descriptive Statistics for Revenue Diversification

Revenue Concentration	Obs.	Mean	Std. Dev.	Min.	Max.
All banks	195	.871869	1.044164	.5000004	10.78202
Big banks	104	.6927685	.191876	.5005531	1.185771
Smaller banks	91	1.076555	1.492848	.5000004	10.78202

Source: Own computation using data form Bankscope

A higher value represents an increase in revenue concentration, meaning low diversification (Amidu, & Wolfe, 2013). On average, bigger banks exhibit high levels of revenue concentration than smaller banks, contrary to Saunders, Strock and Travlos (1990). To some extent, the high levels of concentration in the banking sector made the bigger banks to dominate specific revenue-generating activities (Stiroh, 2006), while smaller banks, in effort to remain viable in such a skewed environment, engage in diverse activities (different from Afzal & Mirz, 2012 but corroborates with Stiroh, 2004b; Gmara & Plihon, 2011). On the other hand, the benefits of diversification are also found to be size-dependent (Bebczuk & Galindo, 2008; Turkmen & Yigit, 2012)

7.1.2. Econometric Analysis: Revenue Diversification Model

The model variant with diversification, as a dependent variable, has been estimated in STATA taking into account the seven possible estimation techniques as identified before. The results are reported in Table 7.2.

From the results, the coefficient of interest on stock market variable, share prices, is positive and statistically significant across all the estimation variants. This implies that as share prices increase, banks diversify less and there is higher revenue concentration (see DeLong 2001; Baele, et. al., 2007). In this regard, stock markets, therefore, are able to influence banks in South Africa. Stock prices aggregate important information provided by the actions of investors and when the variable is performing well (higher stock prices), management feel that it is an opportunity to focus on such activities and create value for their shareholders and thus limit their income-generating activities (see among others, Mbarek, 2011; Turkmen & Yigit, 2012). Amidu and Wolfe (2013) noted the fear of some banks to enter into new markets, thereby engaging in other activities. On the other hand, it has been observed that when financial conglomerates diversify, it resulted in lower market value than when split (Laeven & Levine, 2007)

On the other hand, Berger et al (2010) observed that banks move from complete diversification to specific focus tended to increase the bank's profits and reduce its risk. This could be the argument for the South African banks when better performing banks (performance measured by share prices) decide to focus on specific activities than diversify. Indeed, literature (see for example Jensen 1986, Berger and Ofek 1996, Servaes 1996, Denis, Denis & Sarin, 1997; Turkmen & Yigit, 2012) argues that the costs of diversification might outweigh the benefits.

Table 7.2: Stock Market Influencing of Banks' Income Diversification in South Africa, 1994-2014

VARIABLES	(1) POLS	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE	(7) SCC
a_llril	-8.43e-05	0.000299	-8.43e-05	0.000299	-8.43e-05	-8.43e-05	-8.43e-05
	(0.000469)	(0.000672)	(0.000469)	(0.000672)	(0.000425)	(0.000416)	(0.000346)
banksize	**0.0438*** **	**0.113**	**0.0438*** **	**0.113**	**0.0438*** **	**0.0438*** **	**0.0438***
	(0.0123)	**(0.102)**	**(0.0123)**	**(0.102)**	**(0.0111)**	**(0.0130)**	**(0.0204)**
e_roaa	**0.0648*** **	**0.0563**	**0.0648*** **	**0.0563**	**0.0648*** **	**0.0648*** **	**0.0648*** **
	(0.00886)	**(0.0496)**	**(0.00886)**	**(0.0496)**	**(0.00803)**	**(0.00885)**	**(0.0103)**
l_ir	**0.000842*** **	**0.000954*** **	**0.000842*** **	**0.000954*** **	**0.000842*** **	**0.000842*** **	**0.000842*** **
	(0.000161)	**(0.000236)**	**(0.000161)**	**(0.000236)**	**(0.000146)**	**(0.000223)**	**(0.000213)**
lsharep	**0.0427***	**0.0141**	**0.0427***	**0.0141**	**0.0427***	**0.0427** **	**0.0427** **
	(0.0251)	**(0.0825)**	**(0.0251)**	**(0.0825)**	**(0.0228)**	**(0.0198)**	**(0.0189)**
hhi	**-2.845***	**-1.633**	**-2.845***	**-1.633**	**-2.845** **	**-2.845*** **	**-2.845*** **
	(1.460)	**(2.023)**	**(1.460)**	**(2.023)**	**(1.324)**	**(1.065)**	**(0.782)**
tcr	**-0.000217** **	**-0.000123**	**-0.000217** **	**-0.000123**	**-0.000217** **	**-0.000217** **	**-0.000217** **
	(9.73e-05)	**(0.000191)**	**(9.73e-05)**	**(0.000191)**	**(8.82e-05)**	**(8.49e-05)**	**(7.17e-05)**
2.BFI				0.484			
				(0.543)			
3.BFI				0.307			
				(0.389)			
4.BFI				0.128			
				(0.577)			
5.BFI				0.0132			
				(0.241)			
7.BFI				0.238			
				(0.301)			
9.BFI				0.0921			
				(0.0607)			
10.BFI				0.372			
				(0.546)			
11.BFI				-0.0119			
				(0.0988)			

Constant	0.0801	-0.751	0.0801	-0.882	0.0801	0.0801	0.0801
	(0.244)	(1.063)	(0.244)	(1.183)	(0.221)	(0.230)	(0.296)
Observations	45	45	45	45	45	45	45
R-squared	0.707	0.444		0.785		0.707	0.707
Number of BFI		9	9		9	9	
Number of groups							9

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

Source: Own computation in STATA 13

In same vein, Berger et al (2010) argued that it is prudent enough then for a bank to focus on a single line of business so as to take the maximum advantage of management's expertise and reduce agency problems, leaving investors to diversify on their own. This corroborated well in literature, for example DeYoung and Roland (2001) find that US banks replacing traditional lending activities with fee-based activities are associated with higher revenue volatility, implying higher risk. Similarly, Stiroh (2004b) documents that non-interest diversification is negatively related with performance.

Nonetheless, why such behaviour is beyond the scope of this study is that the important thing to note is bank management do indeed use stock market information in their decision-making, and therefore, stock markets influence banks in South Africa. This implies that there is a strong link between stock markets and bank diversification strategy (Sawada, 2011). However, it should also be noted that the same study (Berger et al, 2010) further reported that such effect is not long-lasting; as banks become more and more focused, the trend on risk reduction and higher profits is reversed.

Another angle of considering this relation is in terms of the operating environment. Berger et al (2010) found that the diversification strategy tends to have a stronger impact on banks' performance when they operate at higher risk levels. The South African banking sector is, however, considered stable and of low risk, owing mainly to the high levels of concentration and intact regulatory environment (South African National Treasury, 2011; Simbanegavi et al. 2012; Maredza & Ikhide, 2013a). For the case of Russia, which is an emerging market economy like South Africa (both are part of BRICS), it was noted that some less diversified local banks became more vulnerable to a decline in housing prices (Fungacova & Solanko, (2008).

Considering the level of concentration, the industry's HHI index has been used in this study, with a negative and statistically significant effect on revenue diversification being observed. This implies that as the industry got more concentrated, individual banks became more diversified. This is in line with the argument above, under descriptive statistics discussion, that smaller banks diversify more in order to remain viable in this highly skewed sector.

These findings are also supported by the positive and statistically significant coefficient of bank size. The result imply that bigger banks are more concentrated in terms of their revenue sources (see Saunders et al., 1990), and smaller banks diversify their activities to be sustainable and be able to withstand the competition from the big and established banks (Gamra & Plihon, 2011). This result is in contrast to the findings in Carey and Stulz (2007) and the assumptions in Mendizábal (2014).

On the other hand, high earning banks (ROAA) and high liquid banks (IR) are less diversified given the positive and statistically significant coefficients on these variables. This is in line with the conclusions drawn in literature for example in Stiroh (2004b). On the other hand, Berger et al (2010) found out that that banks' performance tends to be non-monotonically related to their diversification strategy.

However, highly capitalised banks feel more secure and are highly diversified as depicted by negative and statistically significant coefficient on total capital ratio. The latter result corroborate with the argument of fear of risk inherent with diversification which outweighs the intended benefits (DeYoung & Roland 2001; Berger et al., 2010)

Results in Table 7.2 indeed confirm the ability of stock markets to influence bank revenue diversification strategy. For robustness check, this study also considered the effect of stock markets on bank funding structure in the next sub-section.

7.2. Stock market influencing funding structure

This section estimates the sub-model of model 3 with funding structure as the dependent variable. This is in line with Berg, Ostry and Zettelmeyer (2012) who noted that funding structure is key to a financial institution's stability, asserting that bank supervisors often advise banks that they should fund more of their loan book with customer deposits in order to become more robust to liquidity squeezes. This comes at the backdrop of banks in many economies are becoming increasingly dependent on market funding. Berg et. al. (2012) highlighted some empirical works, for example, Demirgüc-Kunt and Huizinga (2010) and Norden and Weber (2010), who observed a link (albeit most likely non causal) between more reliance on market funding and higher risk exposure on the asset side of the balance sheet.

7.2.1. Descriptive Statistics: Bank Funding Structure

A lower loan-to-deposit ratio represents a healthy bank with more funding sources than just relying on customer deposits (IMF, 2013). Table 7.3 below shows that bigger banks in South Africa have, on average, lower loan to deposit ratio (2.01 compared to 2.15), albeit great variation. The majority of the South African smaller banks (for example, the unsecured lenders like Capitec, African Bank, Sasfin) do not have a broad enough deposit-taking market compared to the big four (PWC, 2012). This makes their loan-to-deposit ratio higher, on average, especially driven by the unsecured lenders. On the other hand, other smaller banks, although having lower deposits base, also have a low volume for loans. A higher loan-to-deposit ratio indicates lower liquidity (Olson Research, 2000; Jacobs, Styger & van Vuuren, 2012).

Table 7.3: Descriptive Statistics for Loan-to-Deposit Ratio

Loan-to-Deposit Ratio	Obs.	Mean	Std. Dev.	Min.	Max.
All banks	164	2.067398	4.203378	.1208791	36.95394
Big banks	97	2.008697	4.944717	.4887404	36.95394
Smaller banks	67	2.152384	2.838875	.1208791	13.17327

Source: Own computation using data form Bankscope

Such reliance, according to Beltratti and Stulz (2012) and IMF, (2013) has made the banks' liquidity positions more vulnerable to external shocks, a phenomenon that was unequivocally pronounced during the 2009/09 global financial crisis. According to van Rixtel and Gasperini (2013), the global financial crisis acted as a catalyst for major adjustment in banks' business and funding models. This is so because wholesale funds are largely obtained on short-term rollover bases, with instruments such as brokered deposits, repurchase agreements, large denomination certificate of deposits, amongst others (PwC, 2012).

According to IMF (2013), healthy banks have more diversified funding structures with lower loan-to-deposit ratios, thereby relying on equity more than on debt. Regulations are bent towards ensuring the banking system is healthy and stable; however, they have limitations which can be addressed by market discipline, hence

emphasis in Basel Accords on more disclosure. In terms of regulation, the Basel III liquidity provisions have an effect of reducing banks' over-reliance on short-term wholesale funding, which has proven detrimental to financial stability (Duffie, 2010; Gorton & Metrick, 2010; Chan-Lau, Liu, & Schmittmann, 2012). This action can be seen in lower funding gaps (loan-to-deposit ratios), which are desirable features for a more resilient bank.

Across literature, it has become evident that bank wholesale funding is increasingly proving to be an inherent feature of the modern financial system (IMF, 2013). The main explanation for this development is that it is banks management's response to financial innovation and a build-up of excess savings in some countries' corporate sectors as well as by increase in official reserves of many emerging market economies. However, empirical evidence points to increased vulnerability due to heavy reliance on wholesale funding, especially during crisis periods. Notable examples of studies coming to this conclusion are Huang and Ratnovski, (2009), Shin, (2009), Demirgüç-Kunt and Huizinga, (2010), Goldsmith-Pinkham and Yorulmazer, (2010), Bologna, (2011) and Vazquez and Federico, (2012).

Of interest to this study, on the other hand, is the argument that wholesale funding is associated with a lack of sufficient market discipline and instability in crises (IMF, 2013). This section provides empirical results for an investigation into whether stock markets discipline of (influencing component) banks with regards to their funding structure. A statistically significant coefficient of stock market variable found on the model with a measure of funding structure confirmed bank influencing by stock markets.

According to Chan-Lau et al. (2012), the loans-to-deposit ratio indicates how much a bank relies on wholesale funding. Loan-to-deposit ratio roughly corresponds to the wholesale funding ratio because it measures the deposit funding gap to be filled by debt (or equity) (Berg, et. al., 2012). However, the latter considered the aggregated banking sector whilst the present study considered panel analysis on individual banks.

According to IMF (2015), generally, banks are dependent on wholesale deposits with high loan-to-deposit ratios. IMF further notes the shortened maturity of average funding maturity in recent years, with short-term deposits (6 months in maturity)

rising to 63.3 percent of total deposits from 60.3 percent in 2008, for the South African banking sector. In addition, the liquid asset to short-term liabilities ratio is around 16 percent. While deposits make up the largest source of bank funding (87.5 percent), a large part (60 percent) of it is wholesale funding from non-bank financial institutions and corporations with maturities of six months or less, reflecting the structural situation in South Africa where households are investing in non-deposit products such as pensions, insurance products and unit trust, which are, in turn, deposited in banks by providers of those products.

7.2.2. Econometric Analysis: Funding Structure Model

The loan-to-deposit ratio is taken as dependent and regressed on a variety of bank specific fundamentals, as guided by CAMELS as well as some macro-economic variables (Berg et. al., 2012; IMF, 2013). This study develops and furthers the nature of estimations in IMF (2013) ordinary-least-squares panel regressions, with and without cross-section and time-fixed effects, using robust standard errors.

This study's coefficient of interest on stock market variables, individual bank stock prices as well as the overall stock market performance (secondary market trading volume), is statistically different from zero. Higher individual bank stock prices reduce the loan-to-deposit ratio. This may be explained by findings in the previous chapter that indeed, depositors consider stock market information, mainly reading the share prices of each financial institution before entrusting their funds. In that regard, more deposits are received and thus more loans are financed through deposits. The desire for additional (mostly risky) funding sources is thwarted, thus narrowing the bank's funding gap (Berg, et. al., 2012; IMF, 2013). This implies that stock markets are able to influence banks' decision-making hence the existence of complete stock market monitoring of banks in South Africa over the period 1994-2014.

Table 7.4 below presents the results from estimating the model variant. As before, seven different estimation techniques have been employed for robustness, and the results are displayed in each column.

Table 7.4. Stock Market Influencing of Banks' Funding Structure in South Africa, 199-2014

VARIABLES	(1) POLS	(2) FE	(3) RE	(4) LSDV	(5) FGLS	(6) PCSE	(7) SCC
Hhi	**11.30*** **	3.536	**11.30*** **	3.536	**11.30*** **	**11.30*** **	**11.30*** **
	(3.428)	(5.874)	**(3.428)**	(5.874)	**(2.830)**	**(1.755)**	**(2.256)**
Infl	**0.0939*** **	0.0353	**0.0939*** **	0.0353	**0.0939*** **	**0.0939*** **	**0.0939*** **
	(0.0327)	(0.0548)	**(0.0327)**	(0.0548)	**(0.0270)**	**(0.0202)**	**(0.0261)**
lsharep	**-0.284*** **	0.0936	**-0.284*** **	0.0936	**-0.284*** **	**-0.284*** **	**-0.284*** **
	(0.0792)	(0.214)	**(0.0792)**	(0.214)	**(0.0654)**	**(0.0573)**	**(0.0515)**
Nim	**-0.0237*** **	**-0.116***	**-0.0237*** **	**-0.116***	**-0.0237*** **	**-0.0237*** **	**-0.0237*** **
	(0.00414)	**(0.0619)**	**(0.00414)**	**(0.0619)**	**(0.00342)**	**(0.00240)**	**(0.00313)**
jse_ssc	0.00410	0.000374	**0.00410***	0.000374	**0.00410** **	**0.00410*** **	**0.00410** **
	(0.00246)	(0.00290)	**(0.00246)**	(0.00290)	**(0.00203)**	**(0.00153)**	**(0.00145)**
mmarketr	**-0.0947** **	**-0.0260**	**-0.0947** **	**-0.0260**	**-0.0947*** **	**-0.0947*** **	**-0.0947*** **
	(0.0425)	**(0.0713)**	**(0.0425)**	**(0.0713)**	**(0.0351)**	**(0.0290)**	**(0.0274)**
a_llrgl	**0.0999** **	**-0.0201**	**0.0999** **	**-0.0201**	**0.0999*** **	**0.0999*** **	**0.0999*** **
	(0.0422)	**(0.1000)**	**(0.0422)**	**(0.1000)**	**(0.0348)**	**(0.0383)**	**(0.0282)**
c_tier1r	-2.25e-05	-0.00642	-2.25e-05	-0.00642	-2.25e-05	-2.25e-05	-2.25e-05
	(0.00262)	(0.00510)	(0.00262)	(0.00510)	(0.00216)	(0.00318)	(0.00160)
e_roaa	**0.0701** **	**-0.0619**	**0.0701** **	**-0.0619**	**0.0701*** **	**0.0701** **	**0.0701** **
	(0.0309)	**(0.0896)**	**(0.0309)**	**(0.0896)**	**(0.0255)**	**(0.0284)**	**(0.0247)**
l_ir	-0.000331	-0.000879	-0.000331	-0.000879	-0.000331	-0.000331	-0.000331
	(0.000497)	(0.000530)	(0.000497)	(0.000530)	(0.000410)	(0.000390)	(0.000466)
l_nlta	**0.0230*** **	**0.0234*** **	**0.0230*** **	**0.0234*** **	**0.0230*** **	**0.0230*** **	**0.0230*** **
	(0.00313)	**(0.00801)**	**(0.00313)**	**(0.00801)**	**(0.00259)**	**(0.00292)**	**(0.00341)**
banksize	**-0.182*** **	**-0.0803**	**-0.182*** **	**-0.0803**	**-0.182*** **	**-0.182*** **	**-0.182*** **
	(0.0380)	**(0.335)**	**(0.0380)**	**(0.335)**	**(0.0314)**	**(0.0306)**	**(0.0248)**
HHIrev	**0.691** **	**1.608** **	**0.691** **	**1.608** **	**0.691*** **	**0.691*** **	**0.691***
	(0.322)	**(0.726)**	**(0.322)**	**(0.726)**	**(0.266)**	**(0.224)**	**(0.315)**
2.BFI				4.241**			
				(1.859)			
3.BFI				1.247			
				(1.224)			
4.BFI				13.18*			
				(7.125)			
5.BFI				0.656			
				(0.560)			

7.BFI				0.364			
				(1.062)			
9.BFI				-0.244			
				(0.146)			
11.BFI				0.130			
				(0.279)			
Constant	1.983***	-0.616	1.983***	-1.268	1.983***	1.983***	1.983***
	(0.662)	(3.418)	(0.662)	(3.647)	(0.546)	(0.508)	(0.585)
Observations	44	44	44	44	44	44	44
R-squared	0.864	0.695		0.921		0.864	0.864
Number of BFI		8	8		8	8	
Number of groups							8

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

Source: Own computation in STATA 13

On the other hand, the overall stock market performance increases the diversifying funding sources to the market. Berg et. al. (2012) reported such findings and assert that this is a growing trend, of late. This variable presents the activities on the local stock exchange and therefore shows how liquid the stock market is and thus allows financial institutions to easily access funding from other sources.

Sector and macroeconomic variables are also statistically significant in the model. The high rate of concentration within the banking sector significantly encourages banks to look for different sources of funding and therefore have diversified funding structure. This is in line with the competition felt by smaller banks in the deposit taking market and hence majority of them diversify (Businesstech, 2015).

On the other hand, economic uncertainty, as measured by inflation, also increases the number of funding sources beyond just deposits. Macro-economic uncertainty and erosion of household purchasing power due to inflation imply that deposits are limited and for individual banks to continue in business granting loans (banks' core income earning activity is lending), they have to secure the funds from different sources in addition to the deposits. De Haas and van Horen (2013) suggested that due to financial crises, many banks have reduced their lending as a way of avoiding exposure to default risk.

The South African monetary authorities use interest rates as the policy tool since the adoption of inflation targeting framework in early 2000. The market rate is, therefore, a key variable to the financial institutions. In the estimated model, the coefficient on market rate is negative and statistically significant, implying that higher rates make banks to focus on deposits as the funding source. This can also be attributed to the large volume of deposits during high interest rates, and a corresponding low volume of loan demand during the same period.

Turning to bank-specific fundamentals, the earning ability (nim and return on average assets) are both having coefficients statistically significant from zero. However, nim reduces reliance on borrowed funding given the negative and statistically significant coefficient. Net interest margin is a performance measure that examines how successful a firm's investment decisions are compared to its debt situation (European Central Bank

(ECB), 2010; Entrop et. al., 2012). Higher NIM make a bank confident in their earnings potential through the income generated from loans financed by deposits and hence reduces appetite for borrowed funds (IMF, 2013). On the other hand, return on average assets encourages banks to borrow more funds as they consider that earning ability as a cushion guaranteeing liquidity to cover any unforeseen fund requirements. The same findings and conclusions can be said for the bank liquidity measure variable (net loan to total assets).

On the other hand, higher asset quality also increases the appetite for borrowed funds. The bank will be confident of the ability to repay and therefore utilise the opportunity to borrow more, envisaging more lending and hence higher income (DeLong, 2001; Baele, et. al., 2007). The results are corroborated by the coefficient on revenue diversification variable in the model. Banks with higher diversification ratio, that is, a higher revenue concentration strategy (less diversification of revenue sources) have less loan-to-deposit ratio (rely more on deposit funding). This implies that banks that are highly concentrated in terms of revenue sources are also concentrated with respect to funding sources. Such banks prefer focus, thus stability, than diversification (considered risky) at both sides of their balance sheets.

On average, the bigger the bank, the more reliant it is on deposits as funding. The big four banks in South Africa overshadow all other banks in terms of market share, controlling over 84% of the market's assets (Theobald, 2013). Furthermore, their geographical spread is very wide and enjoys the trust in the 'too-big-to-fail' thinking (Businesstech, 2015). In other words, bigger banks are considered less risky, given this limited exposure to different funding sources (Saunders et al., 1990).

The results are robust with statistically significant coefficients under robust standard errors specifications. The results confirm the ability of stock markets' influence in South Africa and demonstrate that banks and stock markets are linked in multiple ways.

7.3. Chapter Summary

The chapter builds from Chapter Six which concluded that there is stock market monitoring in South Africa to test whether the monitoring results in stock market

influencing bank management's decision-making process. The results presented here confirm that, indeed, stock markets are able to influence the decision-making of banks, tested on revenue diversification and funding structure strategies. The results corroborate with literature regarding the role of stock markets in the efficiency and effectiveness of the banking sector. Furthermore, the results are in line with the financial services' view that banks and stock markets are complements and interact with each other for the better of the financial system.

The implications of these results to the individual banks, policy and academia are highlighted in the coming chapter.

CHAPTER EIGHT

Summary, Conclusion, Policy Implications and Recommendations

"... confidence had been shaken by the 'complex and opaque' way banks applied capital to the various risk assets held on their balance sheets, potentially overstating their financial strength ..." Sir Mervyn King,

8.0. Introduction

This is the final chapter set to provide a summary of the study, draw conclusions based on the empirical investigation undertaken, and based on such conclusions, indicate and discuss policy implications. Recommendations are made based on the policy implications and areas of further studies as well as study delimitations are highlighted.

The primary objective of the study has been to investigate the dynamic interactions between the stock markets and banking sector. Specifically, the study set to provide a background and present trends in stock markets and bank-based characteristics: investigate the role of stock markets in the bank loan market, comparing the traditional vs. non-traditional (stock market) bank lending channel of monetary policy transmission, determining if stock markets have the ability to assess bank status (performance and risk), and last but not least, investigating presence of stock markets influence in SA banking sector.

Literature review identified key theories in this field as well as the gap in empirical works. There is generally limited research in this area, more so for the developing countries like South Africa.

Panel data econometric techniques were applied, considering a sample of 13 banks, over a two decade period (1994-2014), an improvement to earlier studies (see for example, Sichei, 2005; Mishi & Tsegaye, 2012; Maredza & Ikhide, 2012; Maredza, Kapingura &

Mishi 2013; Erasmus & Makina, 2014). Bank level data was sourced from Bankscope and Bloomberg databases, while sector-specific and macro-economic variables were obtained from the South African Reserve Bank (see Appendix for the key data series). The techniques employed controlled for a number of ills that were identified in literature as common with relatively smaller samples as this one and the ones inherently associated with economic data. Notably, these are heteroskedasticity and multicollinearity. Standard errors which present the precision of the estimates were corrected to be robust thus allowing valid inferences to be drawn from the results. A number of diagnostic checks were carried out, in line with the estimated specification to check goodness of fit, identify any misspecifications, and ensure validity of the findings, among other things.

8.1. Key Findings

The key findings from the study are presented hereunder and are grouped according to the empirical estimations carried out.

a. The role of stock markets in the bank loan market

The study found strong evidence of the presence of stock market lending channel in South Africa. Indeed, stock markets proved to be an informative sector to the supply of bank loans. Banks observe their financial soundness by checking their how their share prices are performing as well as how the stock markets, in general, are performing (measured by All share index) before deciding on how much to lend. This finding points to the possibility of stock market disciplining of banks in South Africa, as stockholders have the ability to impact the investment decision-making by banks. The traditional lending channel was found to be less robust than the new bank lending channel in the J-type test used to compare the goodness of fit of the models.

Stock market variables were identified as statistically significant missing variables in the traditional bank lending model. Using the Ramsey omitted variable test, the traditional

bank lending channel produced a p-value of 0.02 which is less than 0.05 and therefore, we rejected the null hypothesis (model has no omitted variables) in favour of the null that the channel has some omitted variables. On the other hand, a p-value of 0.68 on the stock market channel led to failure to reject the null that the model has no omitted variables, and thus concluding that the model is well specified, and there are no missing variables.

The capital budgeting model is confirmed for the case of South Africa by these results. Quality capital increases lending and in line with Ibrahim (2006), the health of the banking sector depends on stock market stability. Stock markets and the banking sector are found to be complementary to each other in line with the financial services' view.

b. Determining if stock markets have the ability to assess bank status

Following the identification of the stock market lending channel, this study carried on an investigation to determine if stock markets have the ability to assess bank status, in terms of performance and risk. Risk and performance of the bank has been proxied by the CAMELS variables in line with literature. This is testing the ability of stock markets to monitor bank activities, a first comment of market discipline, with the other being market influencing.

First, the ability of stock markets to provide additional useful information to depositors was tested, both in terms of quantity and price of deposits. Positive and statistically significant earnings ability measure and a negative and statistically significant management quality measure attest to the presence of depositors' monitoring in South Africa. Of interest to this study is the coefficient of stock market indicator, which is positive and statistically significantly related to the quantity of deposits. This implies that depositors obtain additional information for their decision-making from their sophisticated counterparts, the shareholders. The results are robust, with heteroskedasticity controlled.

Furthermore, when deposit prices were used as the dependent variable, the ability of depositors' monitoring bank fundamentals, as proxied by CAMELS, was attested. Similarly, as negative and statistically significant coefficient of the stock market indicator was observed, in line with *a priori* expectations. When depositors see the shares of a

particular bank performing well, they regard overall performance as good and risk of default to be low, hence a low price on loans being demanded.

The two pieces of evidence above prove that stock markets aid depositors' monitoring of banks. The study then proceeded to investigating if stock holders themselves directly monitor banks.

Lastly, for this hypothesis, stock market risk measure was considered as the dependent variable. A number of CAMELS indicators were found to have coefficients statistically different form zero and in line with *a priori* expectation. Specifically, capital quality, asset quality, management quality, liquidity quality as well as bank size and income diversification controls all statistically influence stock prices. This means that stock holders are able to monitor these bank fundamentals and making shareholding decisions accordingly. In literature, this ability has been argued to be different in crisis and outside crisis period. The study tested for this using the Kruskal-Wallis test and failed to reject the null of no differences in and outside financial crisis periods.

Having established that stock markets, indeed, have the ability to monitor banks directly and also providing additional information to depositors to be able to monitor banks in South Africa, the study carried further analysis to determine if the monitoring culminates into influencing. This was tested in Chapter Seven of the study, and the next sub-section provides a conclusion.

c. Investigating presence of stock markets influence in SA banking sector

In order to determine this, literature assisted in identifying key banking activities that are directly under the control of management. The identified activities were diversification of revenue streams and funding structure composition. These two were used as dependent variables in models that controlled for stock market indicators.

Share prices were found to be positive and statistically significant in explaining diversification. This was interpreted to mean that higher share prices lead to less diversification, thus higher revenue concentration with South African banks. Fear of banks to explore new markets (Amidu & Wolfe, 2013) and the findings that diversification

of most conglomerates resulted in lower market value (Laeven and Levine, 2007) can best explain this relationship. In South Africa, banks tend to prefer being focused on specific activities, especially if they are performing well, generally (as measured by stock markets indicators), than to explore and diversify (something left for small banks still fighting for relevance and gaining market share). The high concentration levels of the South African banking sector also help in explaining the observed relationship, as the big banks have already established their market share and feel less competition from the smaller ones. Literature has also indicated that the gains of diversification can easily be reversed or are easily offset. The coefficient on bank size, which was positive and statistically significant helps to understand this relationship- bigger banks prefer to be focused and create more value for their shareholders than diversify (a phenomenon found to increase revenue volatility in USA).

On the other hand, with regards to funding structure, the stock market indicators were found to have coefficients statistically different form zero. Thus, again, stock markets have the ability to influence banks' funding structure decision-making.

8.2. Conclusions

The study was able to test all the hypotheses and concluded that although both the traditional bank lending channel and the non-traditional bank lending channel do significantly hold in South Africa, the latter is robust and stable. On the other hand, South African stock markets do significantly monitor bank performance and risk. Lastly, South African stock markets do significantly influence bank behaviour. Therefore, there is stock market disciplining of banks in South Africa through which reveal the dynamic interactions between stock markets and banks.

The results are in line with the capital budgeting theory, financial services view, Merton's structural approach assertions as well as agency cost of outside equity proposition by Jensen and Meckling. Stock markets and the banking sector are complements rather than substitutes, with shareholders feeling (hence motive to discipline) they have some value to lose in the event to bank failure and use their ability to discipline banks (both monitoring and influencing).

Indeed, the study concludes that participants in the South African financial system are able to punish banks from all three angles highlighted in literature: *the price effect*, investors demanding higher yields on bank securities; *the quantity effect*, where depositors withdraw their funds and *the valuation effect*, where stock market participants drive down the bank value. The former two have been proved to be exacerbated by the information obtained for stock markets and hence the stock market become a key ingredient in overall market discipline of banks. Furthermore, the study concludes that the market participants indeed had the incentive to punish.

8.3. Policy Implications and Recommendations

As conceptualised under the theoretical framework, the first condition for effective market monitoring is that markets must be open. South Africa had made strides towards this as the markets are highly developed, sophisticated and efficient, ranking favourably high globally. The authorities should continue to keep abreast with international regulations and standards, for example implementation of the Basel Accords as this assist in stabilizing the financial system as well as allowing for coordination among various actors in the system (these includes banks and stock markets). There is also need for policy stance clarity, for example with regards to Basel III capital adequacy rules which required banks to start phasing out preference shares as a component of core capital. Banks in South Africa have not started the process save for Capitec owing to lack of clarity (see Maake, January 2016). Further guidance from the responsible authorities is needed and this calls for clear communications and guidance with regards to policy changes and key deadlines to be observed.

On the other hand, disclosure of capital structure and risk exposure should be timely and readily available. The Basel Accords recommendations, of which South Africa keenly implements, support more disclosure of information by banks to allow market participants to monitor the institutions' fundamentals. This condition has not yet been fully met, with gradual increase of the amount and breadth of information to be disclosed seen in revised policy documents. Besides the quantity of the information disclosed, which is rightly increasing, other important aspects yet to be fully recognized are its standardization for

easy comparability as well as quality. With the introduction of twin peak regulatory framework, this may improve as each regulatory arm within the framework specialises on specific issues across the financial system rather than specialising on specific entities as before.

The results also call for identification of any institutional constraints affecting market participants' incentives as well as information accuracy, which may have the potential to narrow the scope for market discipline. The too-big-to-fail belief is one of the threats to effective market discipline. As shown in the market discipline theoretical framework in Chapter Two, condition 3 is that no bail-out must be anticipated. However, the National Treasury of South Africa has hinted on the possibility to bail out troubled financial institutions (although it has not been fully practiced, their efforts during the African Bank placement under curatorship left many stakeholders wondering about the exact policy stance). Again this calls for clarity in policy stance just as in the case of redemption of preference shares pointed above.

For full market discipline to be realised, effective and responsive corporate governance structures are needed to enable the "borrowers" (banks) to respond to market signals made by shareholders and depositors, as discussed in this study. This is the component of influencing of bank activities. In South Africa, this study found out that influencing is present and hence some indication of good cooperate governance. However, there is still room to improve this by ensuring rightly experienced and qualified board members. As spotted in literature, governance should not only be a resource provider (resource dependence role) but should also play an effective agency role. The BBBEE empowerment policy is ideal; however, a closer look at its implications should be done to avoid unintended consequences due to inexperienced board members' appointments.

Furthermore, it is important to note that the macro-economic policy environment should remain sound and well-coordinated to reduce systemic risks which haven ability to overshadow the role of bank fundamentals in driving market responses. Lessons from Argentine's systematic risk hike episodes are useful, especially in realising that in some instances, bank fundamentals may only be useful indicators of bank health in tranquil times.

On the other hand, authorities should start to consider how banks' fundamentals can be made public as much as possible and limit the commercialisation of such information which limits the number of market participants accessing such information. Current the sector is mainly a black-box to majority of participants which has the potential to inhibit market discipline. This should be coupled with awareness and financial literacy training.

8.4. Delimitations and suggestions for future research

As South African markets for other securities issued by banks, such as bonds or subordinated bonds, are sparsely traded, they commonly writhe from inadequate liquidity. Thus, the study restricted analysis to equity holders' incentives. Nonetheless, equity holders have been supported in literature as good discipliners since equity prices are unbiased, for example, in separate analyses, Bongini et al (2002) and Gropp et al (2002) present evidence in favour of using market price based measures as early and strong indicators of bank fragility. Moreover, Mishi and Tsegaye (2014) found that stock prices are unbiased indicators of bank fragility n South Africa. The variables, in some cases, were not in the format needed for estimation; calculations and use of proxies may have resulted in loss of some information contained in the original data.

For future studies, it may be important to consider distinguishing between market responses to idiosyncratic factors versus responses to systemic factors. In addition, making using of expected default indicators would bring in more evidence on the presence of market discipline of banks in South Africa.

Furthermore future studies can also benefit from long time span datasets, more balanced panel going beyond the 20-year period covered in this study. Also cross country comparisons, mainly among emerging market economies maybe be ideal, this study focused only on South Africa.

8.5. Ethical considerations

The study uses secondary and publicly available data and there is no limitation in disclosing the data source, and the names of banks in the sample. The data was used

with integrity, where works of others has been used they were appropriately acknowledged.

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APPENDICES

APPENDIX 1: Bank Level Data

Year	Bank	Share.p	SP.vol	Total Inc	Inte. Inco	Wage exp	#of Empl	Int Expense
1994	ABSA			12924.3	11094.5		37510	7389.5
1995	ABSA			14286	12290		37774	8211
1996	ABSA			18975	16533		38041	11856
1997	ABSA			23445	20644		37844	15291
1998	ABSA			26986	23211		36491	16992
1999	ABSA			32746	28199		33729	21336
2000	ABSA	2580	159.9479	27975	22827		34313	15843
2001	ABSA	3517.5	254.9877	28926	22666		36520	14708
2002	ABSA	2990.58	299.3597	32211	24517	4872	35283	16133
2003	ABSA	3554.42	359.9161	39426	30299	5338	32356	21467
2004	ABSA	5549.92	1063.62	39654	28901	5708		19183
2005	ABSA	8610.42	783.0275	39046	27132	5230	32515	16568
2006	ABSA	11081.58	666.8063	54447	40284	7850	34348	23427
2007	ABSA	13184.33	829.0063	73124	55702	9096	36893	36233
2008	ABSA	10071.75	879.1092	98802	76260	10268	37828	54154
2009	ABSA	11108	1416.304	87491	65247	9252	36150	43393
2010	ABSA	13309.08	628.0766	75778	54241	10836	36770	30901
2011	ABSA	13665.42	417.1448	74723	51406	11722	39659	26762
2012	ABSA	14796.5	938.7885	85684	57297	11109	33717	27995
2013	ABSA	14876.75	1078.041	90081	60232	12266	42356	27881
2014	ABSA	15866.33	1576.123					
1995	African			37.1	99.7	0		62.6
1996	African			37.4	103.5	0		70.7
1997	African			89.5	155	0		75.6
1998	African			77.8	136.5	0		67.2
1999	African			788.4	838.9	67		271.8
2000	African	399.31		1516.3	1520.8	188.6		446.9

2001	African	649.35		1226.7	1336	262.5	3435	340
2002	African	421.7		1370.8	1515	212.9		450.4
2003	African	704.58		1811.6	1889.5	274.3		472.1
2004	African	1365.87		2375	2364	375		471
2005	African	1828.62		2592	2782	675		483
2006	African	2134.64		2837	2950	548		487
2007	African	2463.04		3270	3098	506		652
2008	African	1918.19		3637	3561	619		1175
2009	African	2224.2		4316	4556	625		1848
2010	African	2892.21		5274	5593	699		2276
2011	African	2560.07		7351	7504	893		2853
2012	African	2403.33		9544	10125	1184		3787
2013	African	1205		11243	12205	1527		4528
2014	African	31						
1994	Bidvest			2560.71		197.38	14117	26.41
1995	Bidvest			3432.16		326.46	14970	31.33
1996	Bidvest			4166.68		435.46	21506	40.49
1997	Bidvest			5069.95		568.9	30001	39.32
1998	Bidvest			7432.92		989.43	31420	14.72
1999	Bidvest			14646.14		1753.98	50132	44.26
2000	Bidvest	4761.38	358.7917	26427.62		3064.83	50941	57.24
2001	Bidvest	4671.74	197.4601	29415.01		3411.28	54251	84.02
2002	Bidvest	4495.6	215.1245	41950.39	133.83	4995.34	66879	260.05
2003	Bidvest	4324.58	299.5385	47073.38	145.76	6091.13	70754	260.05
2004	Bidvest	5979.62	974.3138	51262.21	108.05	6056.22		276.95
2005	Bidvest	8150.99	892.8278	62811.78	42.29	6731.54	89737	327.4
2006	Bidvest	11200.97	994.6212	77276.49	66.29	7641.41	93325	408.69
2007	Bidvest	13836.48	859.9883	95655.51	79.52	621.86	104184	645.7
2008	Bidvest	10577.16	688.5624	110477.6	88.39	661.11	106225	1019.43
2009	Bidvest	10499.74	1487.325	112427.8	40.98	12671.32	103449	1070.22

2010	Bidvest	13870.75	972.7329	109789.2	64.41	12680.12	105752	822.89
2011	Bidvest	15405.33	311.3723	118482.7	69.91	13252.66	105057	671.99
2012	Bidvest	19240.83	1528.804	133533.6	46.26	14881.98	105103	770.44
2013	Bidvest	24774.42	1464.565	153404.5	76.66	15499.99	106371	768.85
2014	Bidvest	28339.33	1663.243	183645.2	90.23			1138.53
2000	Capitec							
2001	Capitec							
2002	Capitec	162.28	46.10644	277.87	275.87	69.5	1304	6
2003	Capitec	337.8	74.67458	326.45	326.4	97.7	1180	3.4
2004	Capitec	725.98	236.1149	404.18	398.73	117.6	1402	3.52
2005	Capitec	1735.69	429.7097	556.93	544.06	162.4	1708	16.89
2006	Capitec	2894	115.8015	838.79	784.92	205.6	1901	40.08
2007	Capitec	3740.01	317.4851	1149.24	969	258.9		69.84
2008	Capitec	2947.76	336.0986	1509.55	755.46	354.6	2800	101.45
2009	Capitec	4665.5	1489.029	2411.54	1214	508.4	3414	269.62
2010	Capitec	11406.39	2722.96	3519.48	1764.49	715	4154	490.64
2011	Capitec	17187.47	1116.207	5185.28	2809.11	992.8	5331	751.36
2012	Capitec	19844.21	1431.661	7583.58	4348.43	1346.9	7194	1022.37
2013	Capitec	19817.33	1249.054	10929.93	7084.76	1559.1	8308	1662.51
2014	Capitec	24051.17	4821.592	13526.09	9432.8		9070	2132.72
1997	FNB							
1998	FNB			5960.5	4208.8			3147.3
1999	FNB			26075.2	20659.6			15478.9
2000	FNB	609.05	46.62327	21139.6	15057.9		35200	9701.3
2001	FNB	643.41	43.91318	22977.4	15621.8	4017.3	33308	9769.7
2002	FNB	574.62	46.18183	28326	19353	4412	31035	12304
2003	FNB	614.03	54.59596	34830	26690	5350	35344	17189
2004	FNB	870.71	119.7191	31382	22412	5758	32732	13505
2005	FNB	1207.14	128.7874	66718	27505	6408	39385	14321
2006	FNB	1523.27	82.75606	77147	30395	10653	42758	15383

2007	FNB	1887.54	99.96068	98114	70582	11917	42882	25821
2008	FNB	1376.74	117.442	82857	59170	12594	42370	31830
2009	FNB	1300.64	178.715	72074	51735	11216	42783	34446
2010	FNB	1721.01	109.0523	65578	38817	13097	42548	22467
2011	FNB	1998.42	45.66446	67752	38187	14425	34612	20818
2012	FNB	2661.42	238.4301	70829	41335	16208	36398	19453
2013	FNB	3198.67	230.2695	74518	43784		37231	19015
2014	FNB	4146.83	571.8891	86562	50412		38542	20534
1994	Grindrod			713.07		713.07	3178	26.96
1995	Grindrod			832.85		832.85	3232	41.38
1996	Grindrod			981.86		981.86	3289	49.28
1997	Grindrod			1030.32		1030.32	3122	63.14
1998	Grindrod			1032.44		1032.44	2225	124.86
1999	Grindrod			958.8		958.8	1860	87.16
2000	Grindrod	40.63	9.830169	1449.46		1449.46	1113	86.71
2001	Grindrod	74.32	12.54365	1731.9		1731.9	822	71.13
2002	Grindrod	120.67	11.15298	2139.27		2139.27		60.85
2003	Grindrod	160.02	42.69508	1926.66	49.76	1926.66	1139	116.83
2004	Grindrod	496.45	154.979	2974.32	38.13	2974.32	1516	100.33
2005	Grindrod	1007.92	150.8992	7449.15	53.86	504.57	2322	140.64
2006	Grindrod	1350.83	100.1952	12507.24	66.38	646.86	5143	137.24
2007	Grindrod	2197.33	318.5133	17946.73	109.32	826.56	5330	239.85
2008	Grindrod	2113.42	478.523	33736.91	138.71	1054.03	4650	314.07
2009	Grindrod	1537.08	194.1239	27692.04	161.33	1017.8	4477	252.7
2010	Grindrod	1604.08	134.9558	29390.58	128.04	1125.93	5631	179.04
2011	Grindrod	1473.42	63.06671	35885.26	169.71	1230.13	6879	218.65
2012	Grindrod	1471.67	81.04765	27262.22	206.94	1263.76	7295	227.4
2013	Grindrod	2196.33	333.1975	15662.03	129.96	1287.42	7675	222.89
2014	Grindrod	2479.17	173.626		120.62			187.18
1994	Investec			175.06	151.6		1067	110.69

1995	Investec			295.72	253.53		1345	200.8
1996	Investec			520.11	460.62		1659	386.52
1997	Investec			746.04	673.41		2238	568.91
1998	Investec			922.6	813.64		2706	698.33
1999	Investec			1217.99	1004.66		3721	871.5
2000	Investec	4838.67	280.5011	1232.82	900.24	1443	4441	791.22
2001	Investec	4087.33	731.0537	1457.39	1108.77	1780	4836	970.95
2002	Investec	2749.08	393.5809	3318.71	874.28	590	5529	708.37
2003	Investec	1976.52	266.7774	1370.68	853.28	701	4874	738.98
2004	Investec	2694.95	375.4655	1245.85	683.48	665	4458	574.82
2005	Investec	4197.52	682.1658	1342.7	734.77	850	4163	587.95
2006	Investec	7014.08	691.9298	1674.69	934.39	1130	4453	675.24
2007	Investec	8427.92	964.1695	2112.02	1233.23	1446	4453	889.31
2008	Investec	5199.25	647.2278	3034.57	2083.38	1917	6333	1499.96
2009	Investec	4763.58	935.9231	3471.5	2596.91	2116	5951	1902.88
2010	Investec	5732.33	287.2152	3152.75	2041.15	1928	6123	1428.07
2011	Investec	5130.83	419.9146	3620.94	2238.78	2070	7237	1557.31
2012	Investec	4973.83	391.0814	3662.03	2299.93	2181	7781	1600.88
2013	Investec	6742	358.7583	3572.16	2132.72		8151	1429.11
2014	Investec	9173.33	880.858	3342.15	1905.38		8258	1253.7
2004	Mercantile			189.9	197.9	98.3	434	107.1
2005	Mercantile			249.8	254.2	102.5	413	113.2
2006	Mercantile			316.7	361.2	116.7	413	189.1
2007	Mercantile			420.4	473.9	117.1	419	250.1
2008	Mercantile			525	669.2	133.4	442	337.9
2009	Mercantile			478.7	535.5	125	435	261.4
2010	Mercantile			433.1	455.9	130	439	194.6
2011	Mercantile			547.7	446	130.7	404	181.6
2012	Mercantile			551.5	511.1	165.5	403	205.8
2013	Mercantile			542.5	567.9	180.2	389	235.5

2014	Mercantile			567	605.7	186.4	411	265.2
1994	Nedbank			24273	7071		15521	4973
1995	Nedbank			21103	9116		16420	6646
1996	Nedbank			22188	11463		16826	8443
1997	Nedbank			24034	13675		17415	10182
1998	Nedbank				20241		18722	15305
1999	Nedbank			16461	16324	2202	17311	11901
2000	Nedbank	13251.67	1115.622	16058	15332	2527	18664	10504
2001	Nedbank	13142.34	1409.188	27525	17300	2928	19178	11918
2002	Nedbank	10607.33	925.2281	28494	23780	3853	25240	17652
2003	Nedbank	7597.88	1320.938	28748	28141	4949	24273	21333
2004	Nedbank	6300.53	671.165	29513	22840	5350	21103	15644
2005	Nedbank	8260.83	811.3486	31843	23374	5312	22188	14705
2006	Nedbank	11867.17	816.6317	37985	28694	6082	24034	17558
2007	Nedbank	13773.83	681.8394	52578	42132	7079		27855
2008	Nedbank	10361.67	875.3668	68715	57986	7353	16461	41816
2009	Nedbank	10190.33	1557.807	62443	50537	7898	16058	34231
2010	Nedbank	13149.08	833.487	57592	44377	8794	27525	27769
2011	Nedbank	14063.58	666.0829	58292	42880	10243	28494	24846
2012	Nedbank	17370.5	991.249	62054	44730	11390	28748	25050
2013	Nedbank	19460.75	1300.512	65448	46087	12629	29513	24867
2014	Nedbank	22647.75	1444.501					
1995	Sasfin			4.81	4.81			
1996	Sasfin			7.23	7.23			1.06
1997	Sasfin			8.09	8.09			1.39
1998	Sasfin			16.15	16.15			2.7
1999	Sasfin			114.91	46.87		268	21.91
2000	Sasfin	692.08	143.9401	150.35	42.91		472	19.67
2001	Sasfin	654.67	51.8127	248.66	110.46		504	61.77
2002	Sasfin	611.67	43.24221	330.37	139.71		499	85.02

2003	Sasfin	499.67	112.4584	329.39	192.43		467	127.67
2004	Sasfin	1292	374.4905	174.71			451	96.32
2005	Sasfin	2290.67	391.3103	407.72	197.61	7.3	435	84.96
2006	Sasfin	3442.83	208.8799	571.44	206.29	8.4	487	92.55
2007	Sasfin	4940.42	448.6575	860.2	261.76	121.6	496	126.68
2008	Sasfin	3272.42	817.3989	950.43	336.05	144.7	542	180.91
2009	Sasfin	3183.17	713.5796	1059.1	371.07	168.2	573	211.51
2010	Sasfin	3737.25	95.99403	798.19	352.05	185.4	563	172.45
2011	Sasfin	3352.92	389.4037	779.47	359.26	199.3	583	168.68
2012	Sasfin	3111.58	152.6551	882.23	434	245.8	664	231.91
2013	Sasfin	3770.83	388.8435	1007.25	473.69	299.2	701	253.48
2014	Sasfin	4916	317.5395	1252.93	616.56		727	364.41
1994	Standard			11506	9335		32750	5883
1995	Standard			14817	12111		33938	8220
1996	Standard			18847	15605		32725	11308
1997	Standard			22864	18616	2364.8	32114	13521
1998	Standard			27185	21888	2660.1	31768	15916
1999	Standard			30251	21255	3085.4	32637	14524
2000	Standard	3032.78	181.4264	29649	20654	3133	30315	13465
2001	Standard	3584.96	209.464	36228	24368	3560	33086	16191
2002	Standard	3389.4	265.6352	43495	31055	4174	34613	20535
2003	Standard	3640.27	365.8087	49965	36796	4859	35034	25359
2004	Standard	5322.4	953.9014	57793	54077	5850	35820	23755
2005	Standard	7527.94	474.2143	66128	70865	7060	36682	25610
2006	Standard	9259.29	475.1345	82015	88423	7386	42265	34201
2007	Standard	11709.98	601.4591	102996	88517	9049	44301	40992
2008	Standard	8815.91	724.3965	145080	101425	9365	45315	69507
2009	Standard	8801.08	1149.074	126058	82291	9674	45937	50975
2010	Standard	10795.83	443.251	105806	60225	11113	48125	33382
2011	Standard	9997.17	324.1684	107845	59909	11360	51656	31082

2012	Standard	11084.58	395.1832	122528	68232	13289	49017	34266
2013	Standard	11745.58	588.5161	131655	71869		48808	32774
2014	Standard	13629.25	828.2068					
2000	Ubank							
2001	Ubank			155.3	67.5			17.5
2002	Ubank			187.8	117.2	58.2		29.9
2003	Ubank			211.2	149.4	67.9		30.9
2004	Ubank			261.7	152.8	91		33.6
2005	Ubank			266.1	134.7	115.1		27.7
2006	Ubank			287.2	160.1	120.1	760	20.1
2007	Ubank			396.3	246.7	129.1	854	24.7
2008	Ubank			476.4	321.2	168.9	899	33.1
2009	Ubank			533.1	348.6	224.8	938	53.1
2010	Ubank			544.2	247.2	231.4	919	56.1
2011	Ubank			481.3	264.1	209.5	983	45.2
2012	Ubank			561.9	331.9	222.2	793	35.6
2013	Ubank							
2014	Ubank							

Year	Bank	FA	TA	NIE	TC Loan	TC Deposits
1994	ABSA	1912.6	85964.2	3750.7	71312.7	60277.3
1995	ABSA	2182	99515	4326	84692	70116
1996	ABSA	2698	115125	5017	98441	82397
1997	ABSA	2161	134470	5710	110707	88792
1998	ABSA	2328	152821	6546	128354	107253
1999	ABSA	2560	168737	7223	140515	108563
2000	ABSA	2615	177234	7672	143343	132627
2001	ABSA	2562	196514	8900	158862	151223
2002	ABSA	2613	269064	9673	207394	198227

2003	ABSA	2613	269064	13432	199297	222056
2004	ABSA	2597	306848	12467	230098	234380
2005	ABSA	2683	348686	13678	274639	278582
2006	ABSA	3750	495112	18143	390926	368449
2007	ABSA	4610	640909	19773	461624	310512
2008	ABSA	6127	774157	22853	541002	382281
2009	ABSA	6606	710796	24326	519321	356365
2010	ABSA	7493	725957	26241	522682	387598
2011	ABSA	7996	786719	27585	517056	440960
2012	ABSA	9624	898371	33174	582039	543101
2013	ABSA	10679	959599	36247	621386	588011
2014	ABSA					
1995	African	10.5	595.1	83.2	568.6	612.9
1996	African	9.9	452.6	32.7	414.3	291.5
1997	African	9.5	626.9	78.1	522.4	421.6
1998	African	8.6	839.2	62.3	756.4	634.8
1999	African	33.3	4872.8	206.3	3624.5	614
2000	African	36.3	5164	485.7	4290.1	596.9
2001	African	102.5	5117.5	629.7	4285.1	1250.3
2002	African	84.1	6640.5	637.9	6632.1	706.2
2003	African	123	6407	855.4	6126.7	901.7
2004	African	85	7200	1056	6197	492
2005	African	60	7066	1155	6353	668
2006	African	67	8362	1118	7499	1293
2007	African	194	11542	1118	10644	808
2008	African	231	17248	1253	15762	3000
2009	African	316	22625	1329	20994	1700
2010	African	353	34435	1594	30487	825
2011	African	546	46025	2164	41690	1396
2012	African	527	58064	2558	54625	4295
2013	African	488	63705	2867	60476	7634
2014	African					
1994	Bidvest	180.55	1077.9			
1995	Bidvest	220.48	1294.89			
1996	Bidvest	321.24	1706.19			
1997	Bidvest	821.95	3101.09			
1998	Bidvest	1133.44	3990.17			
1999	Bidvest	2825.32	7642.43			
2000	Bidvest	3456.09	8109.43	2.8	18.8	24
2001	Bidvest	3930.98	9741.97	54.2	10.9	31.7
2002	Bidvest	6713.31	15117.1	121.2	16.5	17.6
2003	Bidvest	6623.35	14571.38	126	25.2	25.8

2004	Bidvest	7107.67	17949.02	154.4	59.5	41.3
2005	Bidvest	8122.57	21123.33	164.4	120.3	79.4
2006	Bidvest	10249.35	27994.5	168.7	197.9	94.3
2007	Bidvest	12202.43	32847.93	174.7	390.4	184.9
2008	Bidvest	16745.46	41861.39	208.9	544.1	456.1
2009	Bidvest	16607.05	38484.38	271.6	604.7	816.3
2010	Bidvest	18547.55	43344.92	326.3	570.8	1167.9
2011	Bidvest	20530.93	47829.92	445.8	709.4	1350.2
2012	Bidvest	22505.59	55895.15	483.3	945.6	1780.3
2013	Bidvest	25757.52	66678.42			
2014	Bidvest		80975.47			
2000	Capitec					
2001	Capitec					
2002	Capitec	127.46	408.88	179	118.1	0
2003	Capitec	135.77	434.43	243.09	148.19	25.84
2004	Capitec	146.76	510.48	304.97	163.63	48.88
2005	Capitec	114.38	805.21	398.68	238.57	280.7
2006	Capitec	133.96	1251.27	13678	547.31	595
2007	Capitec	155.64	2191.64	18143	914.18	896.55
2008	Capitec	196.17	2936.37	19773	2192.12	1528.12
2009	Capitec	240.13	4969.42	22853	3222.5	3316.81
2010	Capitec	281.61	9488.22	24326	5607.47	7360.33
2011	Capitec	375.19	14439.52	26241	10916.19	10449.88
2012	Capitec	543.12	23621.84	27585	18408.27	17692.06
2013	Capitec	697.51	38346.72	33174	30658	29000.19
2014	Capitec	855.25	46190.97	36247	33690	35448.68
1997	FNB					
1998	FNB	3557.1	201724.4	1627.3	97849.2	97147.3
1999	FNB	3582.8	202064.2	6133.8	84299.7	97769.9
2000	FNB	18011.5	222782.7	6391	92673.1	109713.2
2001	FNB	3497	271430.9	7175.5	112477.3	135238.6
2002	FNB	4045	374766	8379	180236	178059
2003	FNB	4068	393674	9564	191414	192864
2004	FNB	4456	424867	11336		219061
2005	FNB	4610	462739	42089		237888
2006	FNB	5011	579787	48026		309304
2007	FNB	6411	721559	54413	387020	421568
2008	FNB	8859	823944	32423	453669	488423
2009	FNB	10220	809851	22914	426079	478083
2010	FNB	10018	845240	25118	443765	512469
2011	FNB	10542	697927	28185	472615	552879
2012	FNB	12026	769765	29095	533347	606281

2013	FNB	13453	865732	30247	610498	697035
2014	FNB	14495	945535	35258	696311	768234
1994	Grindrod	641.46	934.59			
1995	Grindrod	738.18	1099.11			
1996	Grindrod	892.42	1315.57			
1997	Grindrod	1205.16	1607.77			
1998	Grindrod	1139.14	1718.81			
1999	Grindrod	1006.04	1520.18			
2000	Grindrod	1076.35	1603.52			
2001	Grindrod	1046.57	1909.18			
2002	Grindrod	1093.48	1904.67			
2003	Grindrod	961.88	2092.5			
2004	Grindrod	1535.1	2642.99			
2005	Grindrod	2069.18	4978.62			
2006	Grindrod	2336.91	7270.41			
2007	Grindrod	3046.95	9928.06			
2008	Grindrod	4540.51	13983.58			
2009	Grindrod	3923.38	12631.1			
2010	Grindrod	4564.23	13891.43			
2011	Grindrod	5267.57	20521.12			
2012	Grindrod	5443.76	22073.5			
2013	Grindrod	6698.87	28422.13			
2014	Grindrod					
1994	Investec	9.92	2122.62	39.24	686.85	1366.73
1995	Investec	12.84	2630.73	52.59	857.74	1305.5
1996	Investec	23.03	7922.07	75.46	1135	1350.19
1997	Investec	85.82	8701.99	129.46	1749.5	2856.97
1998	Investec	75.92	9852.27	142.62	2017.46	3195.35
1999	Investec	86.84	11238.07	235.49	2254.31	3919.46
2000	Investec	102.34	16749.01	308.21	3253.08	6822.49
2001	Investec	115.85	17091.1	350.85	3416.34	5991.78
2002	Investec	186.76	16956.93	2535.54		7068.22
2003	Investec	205.98	14914.04	649.94		6354.87
2004	Investec	146.33	15318.78	568.45		7211.29
2005	Investec	28.73	18042.65	521.39	7402.46	6805.43
2006	Investec	26.92	23900.95	608.22	9604.59	8699.17
2007	Investec	131.51	26299.69	750.28	10358.82	10650.1
2008	Investec	141.35	34103.55	894.89	20129.11	12133.12
2009	Investec	174.53	37364.9	924.79	22916.74	14572.57
2010	Investec	161.26	46571.87	1024.65	19191.22	21934.04
2011	Investec	279.8	50941.27	1328.3	21436.49	24441.26
2012	Investec	171.69	51550.4	1397.97	21055.57	25343.77

2013	Investec	134.1	52010.1	1476		24460.67
2014	Investec	108.74	47141.91	1473.02	18850.94	22609.78
2004	Mercantile	23.6	2731.7	224	1269.9	2065.5
2005	Mercantile	25.8	3421.3	228.4	1727.4	2549.1
2006	Mercantile	21.5	4465.5	228.6	2130.8	3542
2007	Mercantile	16.7	4720	250.1	2871.9	3770.8
2008	Mercantile	36	5930.4	259.2	3462.6	4391.5
2009	Mercantile	32	5828.7	253.8	3694.4	4248.7
2010	Mercantile	27.5	6263	286.1	3788.5	4567
2011	Mercantile	20	6090.4	314.4	4435.1	4273
2012	Mercantile	19.1	7082.7	334.7	5244.1	4738.2
2013	Mercantile	27.3	7566.8	337.5	5123.9	5048.3
2014	Mercantile	26.9	8383.9	358.4	5942.6	5797.1
1994	Nedbank	1107	56836	2200	43610	39975
1995	Nedbank	1216	68766	2606	52945	47785
1996	Nedbank	1273	80283	3060	64352	63004
1997	Nedbank	1484	95644	3467	74720	75182
1998	Nedbank	1878	117527	4965	90143	86019
1999	Nedbank	1630	129844	4054	92901	99754
2000	Nedbank	1793	158259	4818	108544	107752
2001	Nedbank	2046	197665	5689	136190	105399
2002	Nedbank	2613	324767	7985	184380	198227
2003	Nedbank	2613	313113	11725	217404	222056
2004	Nedbank	2597	327840	10939	227692	234380
2005	Nedbank	2683	352258	11157	253622	278582
2006	Nedbank	3750	424912	11882	313747	368449
2007	Nedbank	4610	488856	13620	380034	310512
2008	Nedbank	6127	567023	13741	442092	382281
2009	Nedbank	6606	570703	15100	460099	356365
2010	Nedbank	7493	608718	16598	486499	387598
2011	Nedbank	7996	648127	18919	507545	440960
2012	Nedbank	9624	682958	20563	538036	543101
2013	Nedbank	10679	749594	22419	590828	588011
2014	Nedbank					
1995	Sasfin	1.05	68.38			13.33
1996	Sasfin	1.05	86.01			24.32
1997	Sasfin	8.74	141.11			33.56
1998	Sasfin	14.26	268.52			54.87
1999	Sasfin	15.19	288.05	62.21	156.08	0
2000	Sasfin	20.97	416.31	95.47	164.55	112.67
2001	Sasfin	37.49	931.9	148.41	589.3	254.2
2002	Sasfin	45.71	1174.78	186.17	816.3	268.82

2003	Sasfin	40.07	1256.05	176.94	887.98	248.3
2004	Sasfin	40.55	1382.43	-7.72		268.57
2005	Sasfin	43.24	1772.1	197.23	1115.34	402.02
2006	Sasfin	49.38	2460.08	245.44	1222.69	626.85
2007	Sasfin	60.54	2544.95	500.38		745.78
2008	Sasfin	94.63	3015.75	542.79		1108.05
2009	Sasfin	187.64	3181.15	615.65		881.38
2010	Sasfin	184.41	3551.52	436.39		911.56
2011	Sasfin	175.38	4373.26	488.99		1215.45
2012	Sasfin	57.39	5472.49	474.66		1787.3
2013	Sasfin	53.8	6252.79	561.05		2161.14
2014	Sasfin	55.74	8168.16	657.66		2706.58
1994	Standard	2021	88124	3722	63573	63613
1995	Standard	2381	101105	4364	74182	72041
1996	Standard	2690	127760	4921	88293	85709
1997	Standard	2602	139859	5927	99790	94501
1998	Standard	2648	160384	7020	108734	109162
1999	Standard	2756	253522	8051	112878	134784
2000	Standard	2906	284980	8464	125059	144005
2001	Standard	2738	395234	9998	159574	198943
2002	Standard	2911	477748	12755	182312	212778
2003	Standard	3403	540566	13781	201371	246113
2004	Standard	4114	620173	20124	248705	293245
2005	Standard	4593	765690	24404	312829	386039
2006	Standard	5242	968991	26467	417776	496790
2007	Standard	7216	1182126	34068	549423	578057
2008	Standard	9746	1503653	41552	672062	714760
2009	Standard	12250	1292506	44596	628987	662530
2010	Standard	14907	1332409	45273	620738	697771
2011	Standard	14920	1492829	48373	686236	749181
2012	Standard	15733	1560349	50791	726265	786407
2013	Standard	16882	1690929	59953	763882	853088
2014	Standard					
2000	Ubank					
2001	Ubank	22.9	1219.8	86	1101.2	881.2
2002	Ubank	47.6	1341.4	164	1180.1	912.4
2003	Ubank	46.8	1464.3	196.2	1296.6	1003.5
2004	Ubank	52	1721.8	246.9	1509.2	1242.7
2005	Ubank	49.3	19.3	275.2	1705.5	1464.1
2006	Ubank	38.7	2206.8	275.6	200.2	1656.2
2007	Ubank	46.9	2324.7	331.5	338.3	1747.2
2008	Ubank	48.8	2639.4	338.7	506.8	1959.2

2009	Ubank	81.1	3099.2	421.7	672.4	2361.4
2010	Ubank	92	3313.1	453.7	467.6	2656.3
2011	Ubank	73.8	3390.9	448.3	840.1	2810.5
2012	Ubank	47.8	3518.8	443.6	1055.9	2882.3
2013	Ubank					
2014	Ubank					

Year	Bank	Dep_p	STF	TE	NIM	OC	RiskC.1	TriskC	T.loan
1994	ABSA	0.12	1963.4	5449.8	4.79			8.8	
1995	ABSA	0.12	2099	6091	4.71		6.3	8.5	
1996	ABSA	0.14	3173	7211	4.6		6.5	9.4	
1997	ABSA	0.17	4666	8092	4.56		7.1	8.3	
1998	ABSA	0.16	5810	9839	4.64		8	9.8	
1999	ABSA	0.2	7256	11445	4.54		8.6	10.4	
2000	ABSA	0.12	7244	11965	4.27		8.2	10.9	
2001	ABSA	0.1	7454	14359	4.48		6.5	10.7	
2002	ABSA	0.08	28525	17107	3.93		5.7	11.2	292160
2003	ABSA	0.1	28525	17107	3.75				199297
2004	ABSA	0.08	53714	19521	3.73				230098
2005	ABSA	0.06	43860	23965	3.43	5689	7.7	10.7	302189
2006	ABSA	0.06	38812	34921	4.26	7564	9.1	12.3	374823
2007	ABSA	0.12	48781	42560	3.68	8190	9.2	12.5	463939
2008	ABSA	0.14	111922	53293	3.35	8860	11	14	540144
2009	ABSA	0.12	86245	56490	3.13	9147	11.6	14.7	518451
2010	ABSA	0.08	110262	62149	3.43	10235	11.9	14.8	506483
2011	ABSA	0.06	142096	68405	3.45	10695	13.3	16.2	505462
2012	ABSA	0.05	150344	84445	3.74	10514	13.7	17.5	534954
2013	ABSA	0.05	149089	85201	3.78	23560			
2014	ABSA								
1995	African	0.1	0	-31.2	6.58	83.2	0	0	568.6
1996	African	0.24	0	122.6	6.59	32.7	0	0	414.3
1997	African	0.18	0	157.4	10.17	78.1	0	44.4	522.4
1998	African	0.11	0	162	9.63	62.3	0	0	756.4
1999	African	0.44	752.1	964.9	20.52	139.3	0	0	3624.5
2000	African	0.75	909.6	1739.9	22	297.1	0	0	4290.1
2001	African	0.27	1104.5	1213.5	21.1	367.2	24.8	34.1	4285.1
2002	African	0.64	757.1	1874.6	20.23	425	28.56	31.43	6632.1
2003	African	0.52	668.6	2088.1	24.75	581.1	38.4	40.8	6126.7
2004	African	0.96	747	1892	31.16	681	33.1	34.7	6197

2005	African	0.72	574	2076	32.93	480	33.3	34.3	6353
2006	African	0.38	0	2246	36.7	570	30.7	31.2	7499
2007	African	0.81	0	2341	36.98	612	24.6	28.5	10644
2008	African	0.39	0	2463	21.61	634	21	25.5	15762
2009	African	1.09	0	3217	17.54	704	20.5	30.1	20994
2010	African	2.76	0	8979	15.18	895	20.4	28.9	30487
2011	African	2.04	0	10659	14.8	1271	19.9	28.6	41690
2012	African	0.88	15384	10975	14.85	1374	20.3	29	54625
2013	African	0.59	15781	7801	14.42	1340	15.7	24	60476
2014	African								
1994	Bidvest		37	482.86		2444.02			
1995	Bidvest		62	572.95		3265.69			
1996	Bidvest		62	844.57		512.11			
1997	Bidvest		95	1661.57		621.94			
1998	Bidvest		95	2769.63		1249.7			
1999	Bidvest		120	3198.3		1933.47			
2000	Bidvest	2.38	120	3502.59	0.49	2629.85		0	18.8
2001	Bidvest	2.65	120	4165.78	6.31	3860.3		0	10.9
2002	Bidvest	14.78	120	6370.03	4.37	6252.73		0	16.5
2003	Bidvest	10.08	95	6103.45	6.73	7302.76		107.5	25.2
2004	Bidvest	6.71	63.22	6426.62	5.31	8203.9		104.3	59.5
2005	Bidvest	4.12	105.98	7642.42	3.25	10030.77		97.1	120.3
2006	Bidvest	4.33	142.72	9158.7	5.12	12151.91	113.11	114.8	197.9
2007	Bidvest	3.49	183.98	10824.97	8.33	14275.57	28.88	27.74	390.4
2008	Bidvest	2.24	244.69	13778.08	9.15	16659.98	13.28	12.55	544.1
2009	Bidvest	1.31	279.86	14297.63	9.18	18406.57	14.23	12.78	604.7
2010	Bidvest	0.7	350.09	17392.94	7.69	17933.35	23.59	21.93	570.8
2011	Bidvest	0.5	154.28	18456.99	2.77	18956.21	0	16.2	709.4
2012	Bidvest	0.43	211.22	22599.45	4.49	21136.1	0	17.1	945.6
2013	Bidvest		276.17	27550.72		23677.21			
2014	Bidvest		271.28	33011.12		29463.15			
2000	Capitec								
2001	Capitec								
2002	Capitec		0	391.2		108.8			118.1
2003	Capitec	0.13	0	385.93	164.01	145.5	1.14		148.2
2004	Capitec	0.07	0	428.15	207.31	186.2	4.59		163.6
2005	Capitec	0.06	16.84	473.42	251.61	231.6	73.54		238.6
2006	Capitec	0.07	7.15	563.82	183.94	292.9	314.35	56	547.3
2007	Capitec	0.08	111.93	1117.46	113.78	346.1	554.23	83.6	914.2
2008	Capitec	0.07	14.42	1217.43	40.46	4071	1371.56	36.4	2192.1
2009	Capitec	0.08	150.04	1406.2	33.85	565.7	2361.25	43.1	3238.1
2010	Capitec	0.07	1306.3	1727.98	24.77	670	4787.38	36.8	5607.4

2011	Capitec	0.07	988.66	3450.51	21.87	819.7	7631.7	37.5	10916.2
2012	Capitec	0.06	1198.83	5185.35	21.11	1139.4	12750.89	39	18408.2
2013	Capitec	0.06	2022.91	8512.99	20.74	1434.8	21802.42	41.3	30657.7
2014	Capitec	0.06	4757.04	9982.11	20.53		27896.46	39	
1997	FNB								
1998	FNB	0.03	10573.4	9423.2		10071	7.7	10.2	102024
1999	FNB	0.16	24110.9	11182.2	2.81		6.3	10.5	106658
2000	FNB	0.09	24242.7	15159.7	2.72		6.9	10.9	106906.9
2001	FNB	0.07	33252.9	17590.7	2.68	3162.3	8.2	11.4	127752.4
2002	FNB	0.07	102127	21222	2.66	3836	8.7	11.6	179510
2003	FNB	0.09	23005	22737	2.95	4532	7.6	10.3	187933
2004	FNB	0.06	100678	25838	2.47	4485	10.1	13.8	209665
2005	FNB	0.06	20728	32234	3.54	6081	8.8	11.8	228003
2006	FNB	0.05	28348	39504	3.54	9749	9	12.8	317016
2007	FNB	0.06	0	47220	8.22	10274	9.8	13.6	391570
2008	FNB	0.07	0	51066	4.21	13598	11.13	13.75	453669
2009	FNB	0.07	0	52097	2.59	11641	12.3	11.7	426079
2010	FNB	0.04	0	58963	2.68	12214	13.5	13.5	443765
2011	FNB	0.04	0	64219	2.98	13090	15	16.5	472615
2012	FNB	0.03	0	69807	3.5	12214	13.2	14.7	533347
2013	FNB	0.03	0	79033	3.56	31486	14.8	16.3	598975
2014	FNB	0.03	0	88217	3.84		14.8	16.7	
1994	Grindrod		0	364.73		685.12			
1995	Grindrod		0	412.97		811.54			
1996	Grindrod		0	574.35		950.94			
1997	Grindrod		0	549.86		1033.24			
1998	Grindrod		0	603.86		1007.76			
1999	Grindrod		0	387.52		1013.55			
2000	Grindrod		0	535.06		1405.58			
2001	Grindrod		0	721.84		1639.62			
2002	Grindrod		27.04	524.74		2012.28			
2003	Grindrod		0	616.38		1758.03			
2004	Grindrod		0	841.37		2148.46			
2005	Grindrod		0	1943.95		2622.96			
2006	Grindrod		0	2822.79		3389.77			
2007	Grindrod		457.88	3438.98		4133.99			
2008	Grindrod		138.55	6775.01		5830.37			
2009	Grindrod		104.09	5836.13		4745.93			
2010	Grindrod		129.37	5970.72		4879.89			
2011	Grindrod		190.26	9311.11		5642.39			
2012	Grindrod		626.38	10240.89		5478.55			
2013	Grindrod		1044.43	12132.67		6728.51			

2014	Grindrod								
1994	Investec	0.08	617.2	215.9	3.39			15.8	
1995	Investec	0.15	643.81	372.7	3.08		17.4	21.2	
1996	Investec	0.29	3372.95	424.35	1.6		15.3	19.8	
1997	Investec	0.2	5151.82	538.33	1.47		15.6	19.5	
1998	Investec	0.22	5129.41	819.51	1.33	921	15.8	19.8	17006
1999	Investec	0.22	5888.13	598.2	1.46	1890	13.6	13.9	22430
2000	Investec	0.12	7935.13	594.33	0.88	1201	8.2	11.9	33854
2001	Investec	0.16	8622.7	612.09	0.97	1469	8.1	15.3	38925
2002	Investec	0.1	4780	767.78	1.26	496		19.6	55451
2003	Investec	0.12	390.66	678.77	1.03	546		19.4	33681
2004	Investec	0.08	750.46	805.4	1.07	411	8.3	19.8	38870
2005	Investec	0.09	2856.57	1065.41	1.24	446	10.9	19.5	45944
2006	Investec	0.08	6700.54	1512.09	1.53	630	11.1	16.3	71765
2007	Investec	0.08	6032.97	1820.42	1.59	755	10	14.7	88753
2008	Investec	0.12	5668.48	2210.02	2.2	865	9.2	13.9	116721
2009	Investec	0.13	5673.95	2620.54	2.22	1075	10.1	14.19	131662
2010	Investec	0.07	9621.5	3291.86	1.69	1073	11.3	15.61	129297
2011	Investec	0.06	13910.14	3961.1	1.61	1111	11.6	16.1	123109
2012	Investec	0.06	14431.98	4012.52	1.59	1170	11.6	16.1	130736
2013	Investec	0.06	13563.28	3941.52	1.59	1360	11	15.5	143901
2014	Investec	0.06	12121.95	4013.04	1.53		10.5	15.3	
2004	Mercantile	0.05	49.9	515.5	6.1	125.7	37.8	39.2	1269.9
2005	Mercantile	0.04	90.3	566.6	8.21	125.9	33.2	34.5	1727.4
2006	Mercantile	0.05	0	682.8	7.54	111.9	28.2	30.1	2130.8
2007	Mercantile	0.07	0	853.4	7.62	133	25.6	26.8	2871.9
2008	Mercantile	0.08	0	1296.8	8.98	125.8	26.9	27.3	3462.6
2009	Mercantile	0.06	0	1465.2	6.77	128.8	25.1	25.5	3694.4
2010	Mercantile	0.04	0	1566.8	6.45	156.1	23.7	23.8	3788.5
2011	Mercantile	0.04	0	1649.7	7.24	183.7	25.5	25.6	4435.1
2012	Mercantile	0.04	0	1685.9	5.43	169.2	23.7	23.8	5244.1
2013	Mercantile	0.05	30	1804.1	5.01	157.3	20.3	20.4	5123.9
2014	Mercantile	0.05	117.8	1915.6	4.81	172	22	22.2	5942.9
1994	Nedbank	0.12	1290	3121	4.31		7.8	9.4	
1995	Nedbank	0.14	1659	4382	4.28		8.5	10	
1996	Nedbank	0.13	2087	5395	4.31		8.4	9.9	
1997	Nedbank	0.14	2838	6888	4.19		9.3	10.6	
1998	Nedbank	0.18	2540	9131	4.91		8.8	10.8	
1999	Nedbank	0.12	5391	10066	3.8		10.5	12	
2000	Nedbank	0.1	3926	15980	3.66		11.5	13.2	
2001	Nedbank	0.11	1633	15711	3.34		8.6	11.4	
2002	Nedbank	0.09	29634	19536	2.91		11	7	

2003	Nedbank	0.1	31943	15101	2.8		10.1	5	
2004	Nedbank	0.07	42534	21787	2.75		12.1	8.1	
2005	Nedbank	0.05	39672	26309	3.33	5913	12.9	9.4	231228
2006	Nedbank	0.05	47952	29388	3.51	6149	11.8	8.3	291098
2007	Nedbank	0.09	55430	35125	3.38	6715	12.2	8.3	355590
2008	Nedbank	0.11	60727	40073	3.14	7075	12.3	9.4	420330
2009	Nedbank	0.1	54533	44984	3.07	7640	14.9	11.5	438357
2010	Nedbank	0.07	58868	47814	3.15	8251	15	11.7	457795
2011	Nedbank	0.06	66162	52685	3.24	9181	15.3	12.6	479042
2012	Nedbank	0.05	70210	57375	3.24	9699	14.9	11.6	497264
2013	Nedbank	0.04	74542	64336			15.7	12.5	
2014	Nedbank								
1995	Sasfin			20.6					
1996	Sasfin	0.04		28.66					
1997	Sasfin	0.04		49.53					
1998	Sasfin	0.05		117.77					
1999	Sasfin		0	139.57			56.5		
2000	Sasfin	0.17	6.43	118.87	12.99		34.1		
2001	Sasfin	0.24	11.83	137.34	10.76		26.7		
2002	Sasfin	0.32	11.35	164.4	6.53		15.7		
2003	Sasfin	0.51	10.34	179.86	6.47		30.6		
2004	Sasfin	0.36	14.32	237.26					
2005	Sasfin	0.21	19.38	396.45	8.92	189.9		25.7	1115.3
2006	Sasfin	0.15	24.92	668.63	7.55	237.1		31.2	1222.7
2007	Sasfin	0.17	35.37	774.41	7.94	170.4		33.7	1552.4
2008	Sasfin	0.16	55.11	840.92	8.11	215.9	24.99	28.13	1850.5
2009	Sasfin	0.24	49.69	930.73	7.54	231.1	27.61	31.32	1867.2
2010	Sasfin	0.19	58	1063.9	7.9	250.5	26.21	31.71	1982.8
2011	Sasfin	0.14	72.41	1108.87	7.23	252.1	26.83	31.73	2429.1
2012	Sasfin	0.13	69.06	1180.22	6.62	228.9	25.4	29.56	2931
2013	Sasfin	0.12	573.9	1226.7	5.68		23	26	3309.2
2014	Sasfin	0.13	1523.9	1320.96	4.86				
1994	Standard	0.09	3084	5695	5.03		8.2	12.3	
1995	Standard	0.11	3364	6588	4.87		8.9	13	
1996	Standard	0.13	6377	8361	4.59		8.6	11.5	
1997	Standard	0.14	7508	10231	4.56	2315	9.3	11.5	93672.9
1998	Standard	0.15	14834	12662	4.55	2787	10.1	11.2	102836.3
1999	Standard	0.11	36293	20354	4.34	3782.9	9.6	11.4	107119.7
2000	Standard	0.09	47928	25116	3.96	3172	11.1	14	113900
2001	Standard	0.08	80513	31666	3.46	3119	11.2	14.4	126156
2002	Standard	0.1	150417	32060	3.39	4045	10.9	14.3	146480
2003	Standard	0.1	15893	35264	3.21	4368	11.5	14.9	186529

2004	Standard	0.08	16855	38533	7.74	4801	11	15	233435
2005	Standard	0.07	16616	41692	9.61	5946	10.5	14.2	257925
2006	Standard	0.07	32150	55244	8.67	6416	10.8	14.8	331044
2007	Standard	0.07	56889	68506	5.58	7559	8.7	11.6	424473
2008	Standard	0.1	129614	99501	3.01	8355	11	13.3	487777
2009	Standard	0.08	132021	99369	2.81	9194	11.9	15.1	481678
2010	Standard	0.05	117827	103198	2.46	10880	12.9	15.3	488020
2011	Standard	0.04	140160	117533	2.52	10464	12	14.3	561552
2012	Standard	0.04	183793	130889	2.71	11817	11.2	14.3	601968
2013	Standard	0.04	91376	152648	2.95		13.2	16.2	
2014	Standard								
2000	Ubank								
2001	Ubank	0.02	0	305.7	7.27	86			1101.2
2002	Ubank	0.03	0	318.7	7.1	105.8			1180.1
2003	Ubank	0.03	0	346.1	8.87	128.3			1296.6
2004	Ubank	0.03	0	342.8	7.9	155.9			1509.2
2005	Ubank	0.02	0	333.2	6.22	160.1			1705.5
2006	Ubank	0.01	0	466.8	9.83	155.5	0	83	200.2
2007	Ubank	0.01	0	500.4	15.98	202.4	62.63	63.05	338.3
2008	Ubank	0.02	0	565	17.63	169.8	30.08	30.51	506.8
2009	Ubank	0.02	0	615.6	14.98	196.8	22.77	23.11	672.4
2010	Ubank	0.02	0	536.8	10.06	222.3	18.47	18.54	467.6
2011	Ubank	0.02	0	515.7	10.22	238.8	17.96	18.04	840.1
2012	Ubank	0.01	0	531.3	11.66	221.4	18.62	18.77	1055.9
2013	Ubank								
2014	Ubank								

APPENDIX 2: Sector level and Macroeconomic Data

Years	HHI	Infl	JSE_ALSI	GDP%	MmarketR	JSE_PSC	JSE_SSC (%)
1994		8.82	40.07	3.23	10.24	9994	-8.9
1995	0.17	8.71	41.13	3.12	13.07	19799	30.9
1996	0.17	7.32	49.63	4.31	15.54	28597	66
1997	0.15	8.62	51.34	2.65	15.59	50323	56.9
1998	0.14	6.87	48.58	0.52	17.11	88409	20.2
1999	0.14	5.21	51.31	2.36	13.06	39321	89.8
2000	0.14	5.37	59.17	4.15	9.54	73885	17.8
2001	0.13	5.63	64.13	2.74	8.49	23283	31.7
2002	0.15	9.17	73.34	3.67	11.11	59947	-4.4
2003	0.18	5.87	64.03	2.95	10.93	22700	11.3
2004	0.18	1.42	78.24	4.55	7.15	41824	42.3
2005	0.18	3.34	103.66	5.28	6.62	82155	28.6
2006	0.18	4.66	146.94	5.6	7.19	87780	21.2
2007	0.19	7.12	195.17	5.57	9.22	124851	47.9
2008	0.19	11.54	181.22	3.58	11.32	76690	-13.5
2009	0.19	7.13	98.25	-1.68	8.15	106984	12.2
2010	0.19	4.26	100	2.85	6.19	80856	-1.4
2011	0.19	5	109.19	3.34	5.29	87548	12.6
2012		5.65	120.57	3.09	5.07	78060	6.7
2013		5.75	141.6	2	4.79	93087	1.4
2014		6.07	164.76		5.45	153359	45

Appendix 3: Im-Pesaran-Shin Unit Root Tests Results

```
Im-Pesaran-Shin unit-root test for lsharep
-----------------------------------------
Ho: All panels contain unit roots           Number of panels       =      9
Ha: Some panels are stationary              Avg. number of periods =  14.78

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                   sequentially
Time trend:   Not included                  Cross-sectional means removed

ADF regressions: No lags included
--------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
--------------------------------------------------------------------------------
 t-bar                -1.9039                           (Not available)
 t-tilde-bar          -1.6840
 Z-t-tilde-bar        -1.3528        0.0881
--------------------------------------------------------------------------------


Im-Pesaran-Shin unit-root test for ltotalincome
----------------------------------------------
Ho: All panels contain unit roots           Number of panels       =     12
Ha: Some panels are stationary              Avg. number of periods =  17.75

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                   sequentially
Time trend:   Not included                  Cross-sectional means removed

ADF regressions: No lags included
--------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
--------------------------------------------------------------------------------
 t-bar                -2.5983                           (Not available)
 t-tilde-bar          -1.9590
 Z-t-tilde-bar        -2.6890        0.0036
--------------------------------------------------------------------------------


Im-Pesaran-Shin unit-root test for lintincome
--------------------------------------------
Ho: All panels contain unit roots           Number of panels       =     12
Ha: Some panels are stationary              Avg. number of periods =  16.42

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                   sequentially
Time trend:   Not included                  Cross-sectional means removed

ADF regressions: No lags included
--------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
--------------------------------------------------------------------------------
 t-bar                -2.8455                           (Not available)
 t-tilde-bar          -1.8600
 Z-t-tilde-bar        -2.3201        0.0102
--------------------------------------------------------------------------------
```

```
Im-Pesaran-Shin unit-root test for ltassets
-----------------------------------------
Ho: All panels contain unit roots           Number of panels       =     12
Ha: Some panels are stationary              Avg. number of periods =  17.83

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                           sequentially
Time trend:   Not included                  Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
------------------------------------------------------------------------------
 t-bar                -2.2336                           (Not available)
 t-tilde-bar          -1.7786
 Z-t-tilde-bar        -1.8624        0.0313
------------------------------------------------------------------------------


Im-Pesaran-Shin unit-root test for ltequity
-----------------------------------------
Ho: All panels contain unit roots           Number of panels       =     12
Ha: Some panels are stationary              Avg. number of periods =  17.75

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                           sequentially
Time trend:   Not included                  Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
------------------------------------------------------------------------------
 t-bar                -2.0151                           (Not available)
 t-tilde-bar          -1.6420
 Z-t-tilde-bar        -1.2435        0.1068
------------------------------------------------------------------------------


Im-Pesaran-Shin unit-root test for ltotalD
-----------------------------------------
Ho: All panels contain unit roots           Number of panels       =     11
Ha: Some panels are stationary              Avg. number of periods =  16.73

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                           sequentially
Time trend:   Not included                  Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
------------------------------------------------------------------------------
 t-bar                -2.3347                           (Not available)
 t-tilde-bar          -1.9376
 Z-t-tilde-bar        -2.5441        0.0055
------------------------------------------------------------------------------
```

```
Im-Pesaran-Shin unit-root test for diversification
-------------------------------------------------
Ho: All panels contain unit roots           Number of panels       =     12
Ha: Some panels are stationary              Avg. number of periods =  16.25

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                   sequentially
Time trend:   Not included                  Cross-sectional means removed

ADF regressions: No lags included
--------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
--------------------------------------------------------------------------------
 t-bar                -2.2197                           (Not available)
 t-tilde-bar          -1.8126
 Z-t-tilde-bar        -2.1139        0.0173
--------------------------------------------------------------------------------


Im-Pesaran-Shin unit-root test for HHIrev
-----------------------------------------
Ho: All panels contain unit roots           Number of panels       =     12
Ha: Some panels are stationary              Avg. number of periods =  16.25

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                   sequentially
Time trend:   Not included                  Cross-sectional means removed

ADF regressions: No lags included
--------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
--------------------------------------------------------------------------------
 t-bar                -2.7436                           (Not available)
 t-tilde-bar          -2.0042
 Z-t-tilde-bar        -2.9951        0.0014
--------------------------------------------------------------------------------


Im-Pesaran-Shin unit-root test for depo_price
---------------------------------------------
Ho: All panels contain unit roots           Number of panels       =     11
Ha: Some panels are stationary              Avg. number of periods =  16.64

AR parameter: Panel-specific                Asymptotics: T,N -> Infinity
Panel means:  Included                                   sequentially
Time trend:   Not included                  Cross-sectional means removed
ADF regressions: No lags included
--------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic      p-value         1%      5%      10%
--------------------------------------------------------------------------------
 t-bar                -2.2557                           (Not available)
 t-tilde-bar          -1.9182
 Z-t-tilde-bar        -2.4635        0.0069
--------------------------------------------------------------------------------
```

Appendix 4: Related research outputs by the candidate

1. ***Mishi S.,*** *Sibanda K. and Tsegaye A. (2016)* ***Industry concentration and risk-taking: Case of South African Banking sector,*** *African Review of Finance Journal (forthcoming)*

2. **Mishi S** and Khumalo S. **Determinants of risk-taking behaviour among financial intermediaries in South Africa;** *Journal of Economics and Behavioural Sciences, Dubai (Under Review)*

3. **Mishi S**., and Tsegaye A. (2012), **The Role of Banks in Monetary Policy Transmission in South Africa,** *ERSA Working Paper No. 295***,** *July 2012*

4. **Mishi S** and Tsegaye A. **Market prices as complete and unbiased estimates of bank fragility in South Africa;** *2014 Global Development Finance Conference, Dubai 2-3 September*

5. **Mishi S** and Khumalo S. **Determinants of risk-taking behaviour among financial intermediaries in South Africa;** *2014 Global Development Finance Conference, Dubai 2-3 September*

6. **Mishi S.,** Sibanda K. and Tsegaye A. **Industry concentration and risk-taking: Case of South African Banking sector;** *2013 Global Development Finance Conference; 5, 6-7 November 2013, Cape Town, South Africa*

7. Maredza A., Kapingura F.M. and **Mishi S. Exploring The Nexus Between Bank Competition And Productivity In The South African Banking Sector;** Time Series And Competition Policy, University Of Stellenbosch, 4-5 March 2013

8. **Mishi S,** Shoko AW. and Makaula N. **Stock Market and Bank Lending Channel: Evidence from South Africa;** University of Namibia, 4TH International Conference on Accounting and Finance (ICAF 2012), 09-10 Oct. Hilton Hotel, Windhoek, Namibia

Appendix 5: English editor's certificate

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Professional EDITORS Group

To whom it may concern:

This document certifies that the doctoral thesis whose title appears below has been edited for proper English language, grammar, punctuation, spelling, and overall style by Rose Masha, a member of the Professional Editors' Group whose qualifications are listed in the footer of this certificate.

Title:

Dynamic interactions between stock markets and banks in South Africa: testing for market disciplining of banks

Author:

Mishi Syden

Date Edited:

23 January 2016

Signed:

Rose Khanyisile Masha

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Bachelor of Library and Information Science, Hons (English Language Teaching), HDE, MA (Hypermedia in Lang. Learning), PhD (Education).

Appendix 6: Similarity Report from Turnitin