DETERMINANTS OF CAPITAL STRUCTURE: AN EMPIRICAL STUDY OF SOUTH AFRICAN FINANCIAL FIRMS

by

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ABSTRACT

The main objective of the thesis was to investigate the factors that determine capital structures of financial firms using two separate samples of banks and insurance companies. In the first instance, the results of the study showed that the financing behaviour of banks mirrors that of non-financial firms. It was also observed bank financing behaviour can be best explained by the pecking order theory. Risk and size variables were observed to be negatively related to the Tier 1 regulatory capital ratio, whereas the dividend variable was positively related. Similarly, risk and size were found to be negatively associated with buffer capital, while dividends were positively related. The 2007–2009 global financial crisis (GFC) was found to have negatively affected the financial structures of banks. Consistent with similar studies, it was observed that banks have a target capital structure, and adjust to this target at an adjustment speed of 44%.

With regard to insurance companies, it was observed that the firm-level determinants of capital structure explain insurer leveraging. Unlike banks, the 2007–2009 GFC positively affected the capital structure of insurance companies. Similar to banks, results showed that insurers have target capital structures which they seek to achieve in their financing and adjust to such targets at a rate of 21%, which is lower than that of banks.

The study contributes to the body of knowledge in four major ways. Firstly, it adds to the literature on the capital structure of financial firms, which area has not been extensively and conclusively studied. Using a different environment, it validates the 'standard corporate finance view' as has been observed in the few studies on financial firms. Secondly, it validates the 'buffer view' and 'regulatory view' of capital structures of financial firms that have taken prominence since the last GFC. Thirdly, the study recognises that banks and insurance companies are fundamentally different with regard to capital structure and regulation and therefore warranted separate treatment in studies. This is in contrast with recent studies that do not recognise the heterogeneity of the two types of firms. Fourthly, to the researcher's knowledge this study is the first to examine the impact of business cycles/financial crises on the financing patterns of financial firms. Confirming the fundamental differences between banks and insurance companies, the study observed that financial crises have a negative impact on capital structures of banks (meaning that they deleverage

during crises). In contrast, financial crises have a positive impact on capital structures of insurance companies (meaning, unlike banks, they leverage during crises).

Keywords: bank, insurance, capital structure, firm level, buffer, leverage, target, South Africa

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DECLARATION

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DETERMINANTS OF CAPITAL STRUCTURE: AN EMPIRICAL STUDY OF SOUTH AFRICAN

FINANCIAL FIRMS

I declare that the above thesis is my own work and that all the sources that I have used or quoted

have been indicated and acknowledged by means of complete references.

A.B Sibindi   23 August 2017

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SIGNATURE   DATE

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LIST OF ACRONYMS

BIS	Bank for International Settlements
diff-GMM	Difference generalised method of moments
EIOPA	European Insurance and Occupational Pensions Authority
EU	European Union
FE	Fixed effects
FGLS	Feasible generalised least squares
FIC	Financial Intelligence Centre
FSB	Financial Services Board
G7	Group of 7 countries
GDP	Gross domestic product
GFC	Global financial crisis
GMM	Generalised method of moments
IAIS	International Association of Insurance Supervisors
ICP	Insurance Core Principles
IMF	International Monetary Fund
JSE	Johannesburg Stock Exchange
LM	Lagrange multiplier
LSDV	Least square dummy variable
M&M	Modigliani and Miller
NCA	National Credit Act (2005)
NCR	National Credit Regulator
NPV	Net present values
OLS	Ordinary least squares
RE	Random effects
ROA	Return on assets
ROAA	Return on average assets

SAM   Solvency Assessment and Management

SARB   South African Reserve Bank

SPV   Special-purpose vehicle

syst-GMM   System generalised method of moments

CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1   INTRODUCTION

The 2007–2009 global financial crisis (GFC) brought to the fore the importance of financial sector stability for the general well-being of economies. The failure of financial institutions in the developed world came at a huge cost to the taxpayer. The International Monetary Fund estimates that between 2007 and 2010, $5.5 trillion of bank assets were written down (IMF, 2009: 53). Governments have provided the bulk of the funds needed by banks to recapitalise (Goddard, Molyneux & Wilson, 2009: 363). Although the South African banking industry was largely unscathed, the GFC mutated into a recession and South Africa entered a period of recession in 2009 with the gross domestic product (GDP) contracting by minus 1.8%. It is estimated that close to one million jobs were lost (National Treasury, 2011: 4). According to the same report by National Treasury, the financial sector in South Africa comprises over R6 trillion in assets (of which roughly R4.5 trillion belong to banks and insurance companies), contributes 10.5% of the GDP per year, employs 3.9% of the employed and contributes at least 15% of corporate income tax. As such, securing the financial sector – particularly the banking and insurance sectors – has become a policy imperative now more than ever before.

The costs of the financial crisis will continue to be quantified long into the future. What continues to seize the minds of regulators and academics alike is the question: What caused the financial crisis? Scholars have advanced several explanations, the chief ones being risk taking, financial innovation, securitisation and leverage (Affinito & Tagliaferri, 2010; Casu, Clare, Sarkisyan & Thomas, 2011; Hyun & Rhee, 2011; Nijskens & Wagner, 2011; Shleifer & Vishny, 2010; Wilson, Casu, Girardone & Molyneux, 2010). As such, the financing (capital structure) of financial institutions is a core challenge that needs to be addressed to safeguard the financial sector. The monetary authorities have attempted to safeguard the health of the financial sector by re-regulating the sector.

Bank regulators are grappling with the implementation of the Basel III guidelines, which prescribe the level of debt-to-equity (leverage) to which banks must conform. Hitherto, banking regulation was largely premised on the Basel I and subsequently Basel II guidelines developed by the Bank for International Settlements (BIS). These guidelines prescribed the amount of capital banks must keep to safeguard against financial and operational risks. The efficacy of banking regulation will largely be underpinned by resolving the capital structure conundrum – that is, determining the factors that affect the financing decision of banks.

Similarly, insurance regulators are preoccupied with the strengthening of solvency regulations for the insurance sector. In the European Union (EU), a Solvency II legislative framework was promulgated in 2009. It replaced the Solvency I framework for the regulation of insurance business in the EU. The main objectives of the Solvency II framework are to increase consumer protection, modernise supervision, deepen EU market integration and increase international competitiveness of EU insurers. In South Africa, the Solvency Assessment and Management (SAM) framework for the regulation of insurance companies was developed by the Financial Services Board (FSB) in response to the financial crisis. It is largely based on the Solvency II guidelines. SAM is a risk-based supervisory framework that seeks to improve policyholder protection and contribute to financial stability through aligning insurers' regulatory capital requirements with the underlying risks of the insurer.

The foregoing compels that a study focusing on the financing policies of financial firms be conducted. The present study lends empirical evidence to help resolve the capital structure 'puzzle' associated with the financing behaviour of financial firms. Suffice to highlight that the capital structure debate continues unabated since the pioneering work of Modigliani and Miller (M&M) (1958), who argued that the value of a firm is invariant to its capital structure. Subsequent research has proven the contrary (see for example Berger, Herring & Szegö 1995; Inderst & Muller, 2008). It has subsequently been demonstrated that capital structure choices have a bearing on firm value. Early scholars such as Titman and Wessels (1988), Rajan and Zingales (1995) and Frank and Goyal (2009) isolated the firm-level determinants that affect capital structure choices of non-financial firms. These are size, profitability, market-to-book value, collateral, debt tax shield, non-debt tax shield, dividends, risk and age, among the more 'reliably important' factors.

Extant studies have been conducted to unravel the capital structure policies of non-financial firms. Notwithstanding, empirical studies to investigate the determinants of capital structures of financial firms are scant. Financial firms have been excluded from most studies of a panel nature. This has largely been based on two premises. Firstly, there is a notion that because financial firms are regulated, their financing behaviour will be anomalous. Secondly, the exclusion criterion has been founded on the fact that financial firms could have an additional source of income, ordinarily not available to other firms by dint of the business they conduct. The additional source of financing for banking institutions is in the form of deposits, while for insurance companies it is in the form of premiums.

There is scant research on the factors that determine the capital structures of financial firms. Among other studies that have been conducted, Gropp and Heider (2010) were the first to probe whether the standard determinants of leverage in non-financial firms carry over to banking institutions by employing a sample of large US and European banks. Their results were in the affirmative. Subsequently, Fiordelisi, Marques-Ibanez and Molyneux (2011) investigated the relationship between bank risk and capital for European banks. They found that the levels of bank capital increase bank efficiency. Several studies have since been conducted to examine the financing behaviour of banks (see for instance, in the context of China (Lim, 2012), Nigeria (Ukaegbu and Oino, 2014) and Turkey (Baltaci and Ayaydin, 2014). This research effort sought to complement such studies on capital structure by specifically focusing on financial firms within a developing economy setting.

The rest of the chapter is arranged as follows: Section 1.2 gives an overview of the financial sector with special focus on the banking and insurance sectors in South Africa. Section 1.3 synthesises the research problem. Sections 1.4 and 1.5 outline the significance of the study and the conceptual framework underpinning this study. Section 1.6 outlines the aim and states the research questions and objectives guiding this study. Section 1.7 gives an overview of the delimitations of this study, and Section 1.8 concludes the chapter by presenting the thesis outline.

1.2 THE FINANCIAL SECTOR IN SOUTH AFRICA

The South African financial sector has grown in leaps and bounds over the years. This could be attributed to several reasons, chief among them being financial liberalisation, globalisation, technological enhancements and economic growth. According to Akinboade and Makina (2006: 106), there are two levels of the formal financial sector in South Africa. These are the institutional and market levels. At the institutional level are the banking and non-banking financial intermediaries, whereas at the market level are the stock market, the bond market, the money market and the foreign exchange market. For the purposes of this study, the institutional level that was considered is that of the banking and insurance sectors. An overview of these institutions is presented in turn.

1.2.1 An overview of the banking sector in South Africa

The profile of the South African banking sector is presented in Table 1.1 below.

Table 1.1: A profile of the banking sector in South Africa

Type of Bank	Number
Registered banks	17
Mutual banks	3
Co-operative banks	2
Local branches of foreign banks	15
Foreign banks with approved local representative offices	31

Source: SARB (2017)

The other important metrics for this sector that were considered are the capital and total assets ratios. These are profiled in figures 1.1 and 1.2 respectively. These data

show that the banking sector has grown greatly over the years. In addition, it would seem that the capital ratios have improved over the years in the aftermath of the GFC.
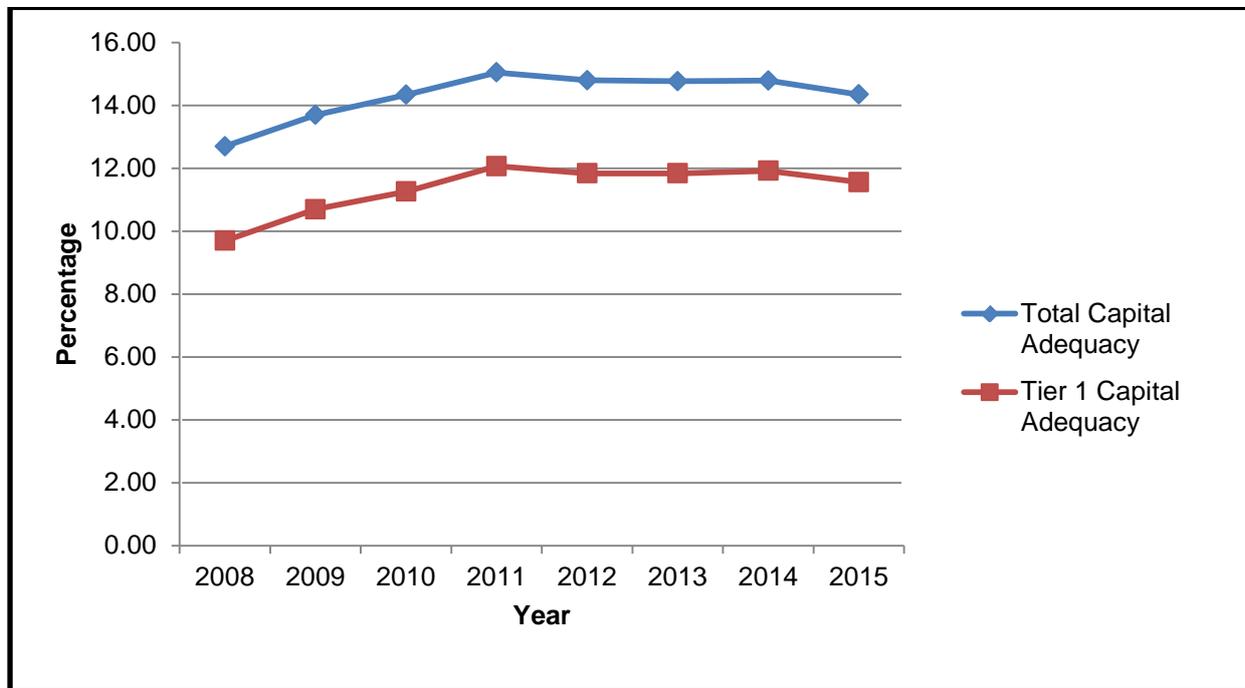
Figure 1.1: Trends in capital ratios of South Africa banks

Source: Researcher's own compilation – adapted from SARB (2017)
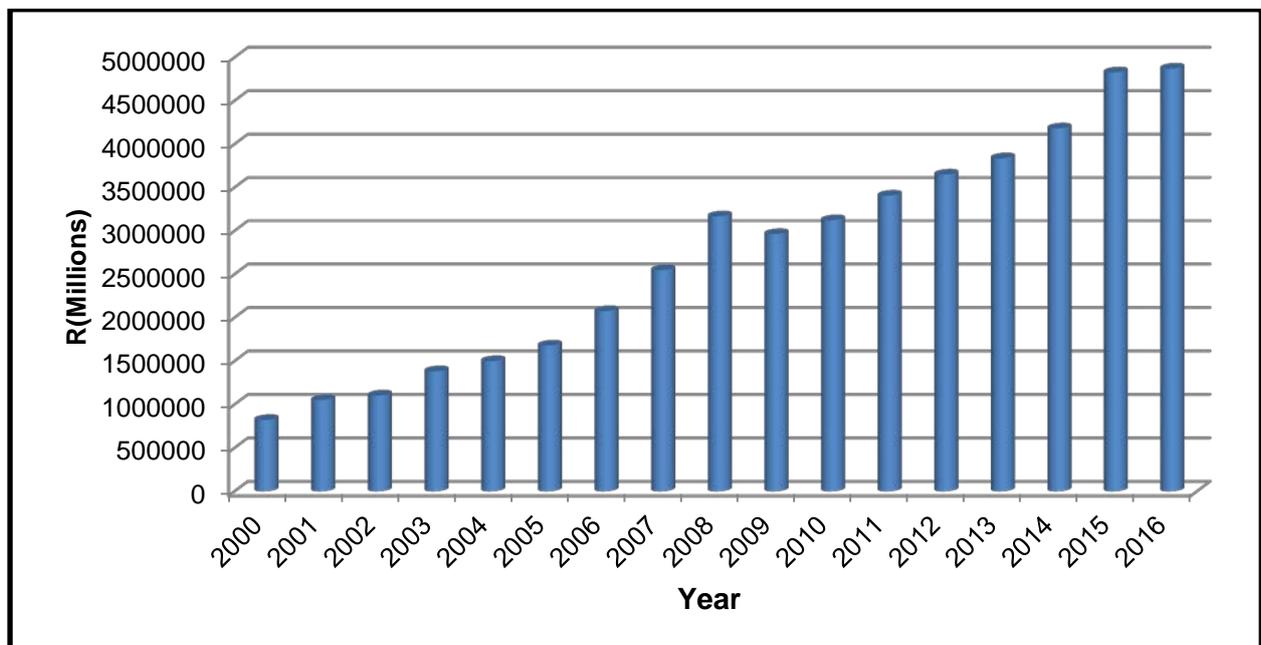
Figure 1.2: Trends in total assets of the South African banking industry

Source: Researcher's own compilation – adapted from SARB (2017)

1.2.2 An overview of the insurance sector in South Africa

The insurance sector in South Africa comprises of 73 long-term insurers and 7 long-term reinsurers, 93 short-term insurance companies and 7 short-term reinsurance companies (FSB, 2014a & 2014b). In South Africa the insurance companies that transact life insurance business are referred to as long-term insurers. Similarly, the companies that transact non-life (property) insurance are referred to as short-term insurers (Sibindi & Godi, 2014).

The key metrics of the insurance companies for the period 2011–2015 are given in Table 1.2. The gross premiums of long-term insurance companies show a remarkable growth of 53% from approximately R301 billion registered in 2011 to roughly R461 billion registered in 2015. On the other hand, the premiums of short-term insurance companies show a growth of 40% from approximately R81 billion registered in 2011 to the levels of roughly R114 billion registered in 2015.

A similar trend is observed when evaluating the total assets with the long-term insurance industry, registering a phenomenon growth in total assets of 54% from roughly R1.7 trillion in 2011 to R2.7 trillion in 2015. Comparatively, the short-term insurance industry experienced total assets growth of approximately 49.6% from roughly R90 billion in 2011 to R135 billion in 2015.

Table 1.2 Gross premiums and total assets of insurance companies in South Africa

YEAR	2011		2013		2015	
	Long-term insurers	Short-term insurers	Long-term insurers	Short-term insurers	Long-term insurers	Short-term insurers
Gross premiums / R'mil	300 650	80 951	429 703	96 178	461 160	113 909
Total assets / R'mil	1 722 777	90 472	2 278 148	111 686	2 660 938	135 363

Source: Researcher's own compilation – adapted from FSB (2011a, 2011b, 2015b & 2015c) reports

1.3   SYNTHESIS OF THE RESEARCH PROBLEM

The GFC heightened and brought to the fore the inadequacies of capital structure policies of financial institutions. High levels of leverage and an insatiable appetite for risk on the part of banks have been isolated as two of the proximate causes of the financial crisis. Further, regulatory forbearance has also been blamed for the financial crisis. In the aftermath of the 2007–2009 GFC, it has become a regulatory imperative to strengthen the capital regulations of financial firms among a cocktail of regulatory measures introduced.

The financing decisions of financial firms remain an enigma, increasingly attracting the attention of regulators and corporate finance scholars alike. Hitherto, financial firms have been excluded from extant studies on capital structure. Extant studies have focused nearly exclusively on non-financial firms (see for instance Flannery & Rangan, 2006; Frank & Goyal, 2009; Lemmon & Zender, 2010 and Rajan & Zingales, 1995). Financial firms are different from other firms by their very nature, in that they could have an additional source of financing in the form of deposits or premiums. Over and above this, they are regulated in their capital structure policy formulation.

While most non-financial firms choose their optimal capital ratios primarily in response to market constraints, regulated financial institutions must also heed their supervisors' capital adequacy requirements (Flannery & Rangan, 2008: 395). On the one hand, banking institutions must conform to the prescribed bank capital ratios. On the other hand, insurance companies must abide by the solvency ratios that are set by regulatory authorities. Notwithstanding, Gropp and Heider (2010) found evidence that the financing behaviour of large US banking institutions mirrors that of industrial firms. Moreover, they found that regulation is not a first-order determinant of the capital structures of banking institutions.

Subsequently, there are three schools of thought that have emerged on bank capital structure. The first viewpoint is the 'standard corporate finance view', which contends that bank capital structure is determined in the same manner as those of non-financial firms. The second school of thought is the 'regulatory view' of bank capital, which contends that regulation is binding and solely determines bank capital structure. The third school of thought is the 'buffer view' of bank capital, which is

premised on the notion that banks keep capital in excess of the regulatory requirements in line with bank-specific factors. Similarly, for the insurance sector there has been a growth in empirical work to test the standard corporate finance view and regulatory view.

The present study sought to establish the factors that are important in the determination of the capital structures of financial firms. This study was four-pronged in nature. Firstly, it tested the standard corporate finance view and disentangled the factors that determine a financial firm's capital structure. Secondly, it tested the regulatory view of capital. Thirdly, it tested the buffer view of bank capital. Lastly, it sought to establish whether financial firms have a target capital structure and if so, at what speed they adjust towards this target.

1.4   SIGNIFICANCE OF THIS STUDY

The significance of the study is mainly fourfold. Firstly, previous studies that sought to test the theories of capital structure and establish the determinants of capital structure have nearly exclusively focused on non-financial firms (see for instance Fama & French, 1998; Frank & Goyal, 2003, 2009; Graham & Harvey, 2001 and Shyam-Sunder & Myers, 1999). The justification for the exclusion of financial firms from studies on capital structure has either been that they are regulated entities or as a consequence of their intrinsic firm-level characteristics (such as having premiums or deposits as another source of capital).

Secondly, the status quo has been challenged and it has subsequently been proven, starting with Gropp and Heider (2010), that notwithstanding regulation, the determinants of capital structure of banking institutions are largely the same as those of non-financial firms. The caveat is that their study was based on large US banks. As such it is open to conjecture – whether their results could be replicated across the financial sector as well across financial firms of different sizes.

The present study sought to increase the scope of research by focusing on two important sectors of the financial sector, namely the insurance and banking sectors. Unlike some recent studies, this study recognised the heterogeneity of banks and insurance companies and did not pool them together, but studies their financing behaviour in separate panels. Moreover, such studies have not factored into account

the spill-over effects of financial firm financing. Banks and insurance companies are dependent on one another for financing through their interactions in the interbank market for the former and in their dealings in the reinsurance markets for the latter. As such, previous studies have not corrected for cross-sectional dependence, hence the reliability of their results is questionable. In this study, tests for cross-sectional dependence were conducted. Where cross-sectional dependence was detected, it was corrected for. Furthermore, the sample for this study was drawn from the population of all South African banks and insurance companies, regardless of size.

Thirdly, this research effort was conducted in the aftermath of the 2007–2009 GFC. As such, this presented a window of opportunity for the investigation of the impact of the GFC on financial firm capital structures. As such this study sought to add to the growing body of literature which has sought to examine the impact of the GFC on firm leveraging (see for instance Ariff & Hassan, 2008; Harrison & Widjaja, 2014; Leitner & Stehrer, 2013; Morri & Artegiani, 2015; Zarebski & Dimovski, 2012 and Zeitun, Temimi & Mimouni, 2017).

Lastly, financial sector stability is a policy imperative that has preoccupied monetary and fiscal authorities alike (National Treasury, 2011). The reforms that are gaining impetus are largely anchored on the strengthening of the capital requirements of financial firms. Therefore, this research effort offers insights into the efficacy of capital regulation of financial firms in South Africa.

1.5   CONCEPTUAL FRAMEWORK

The conceptual framework that guided this research was multifaceted and comprised of three layers (refer to Figure 1.3). The first layer comprised of the determinants of capital structure. This was further broken down into two constituents, namely standard firm-level determinants of capital structure as well as financial firms' fixed effects (FE). In the first instance, it was established which standard firm-level determinants of capital structure as well as financial firm intrinsic factors determine the capital structures of financial firms.

The second layer comprised of the observed capital structure. In the second instance, the study examined whether the observed capital structures of financial

firms could be explained using existing capital structure theories. This analysis mainly relied on the pecking order and the trade-off theories of capital structure.

For the third layer, this study determined whether capital regulation is a first-order determinant of capital structure. It sought to determine whether the observed capital structures of financial firms exhibit some form of seeking 'optimal' financing behaviour or achieving target capital structures by financial managers, in which case the study sought to establish the speed of adjustment towards the target capital structures. This is an imperative that needs to be considered closely in light of the cycles that beset the financial sector from time to time.
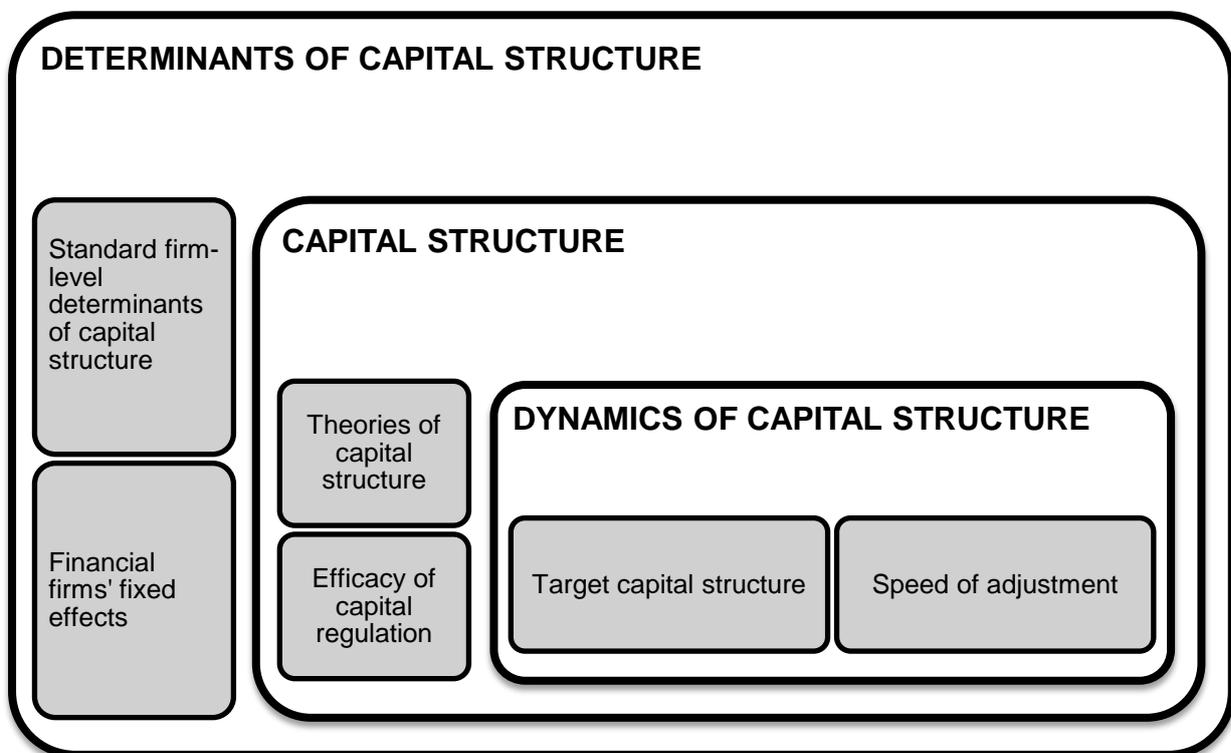
Figure 1.3: Conceptual framework

Source: Researcher's own compilation

1.6   AIM OF THE STUDY

The primary aim of the study was to establish the factors that are important in the determination of the capital structures of South African financial firms, in order to evaluate the efficacy of capital regulation.

1.6.1 Research questions

To guide this study, the following research questions were set:

1. Do the standard firm-level determinants of capital structure explain the financial leveraging of financial firms in South Africa?

2. Are the financing patterns of South African banks consistent with the buffer view of bank capital structure?

3. Is capital regulation of first-order importance in the determination of the capital structures of financial firms in South Africa?

4. Do South African financial firms seek to achieve a target capital structure in their financing behaviour?

5. What is the speed of adjustment towards the target capital structure by South African financial firms?

1.6.2 Research objectives

The following research objectives were central to this study:

1. To establish whether the standard firm-level determinants of capital structure explain the financial leveraging of South African financial firms

2. To determine whether South African bank financing conforms to the buffer view of bank capital structure

3. To evaluate whether capital regulation is of first-order importance in the determination of the capital structure of financial firms in South Africa

4. To determine whether South African financial firms seek to achieve a target capital structure in their financing behaviour

5. To determine the speed of adjustment towards the target capital structure by South African financial firms.

1.7   DELIMITATIONS OF THE STUDY

This study was based on the financial sector within a developing country setting. South Africa was chosen as the case study for this research for two reasons. Firstly, studies that have been conducted to probe what determines the capital structure of firms using South Africa as the single country of focus are very scant. Secondly, notwithstanding that South Africa is a developing country, its level of development and sophistication of the financial sector is nearly at par with developed economies, thereby making it an interesting proposition as a test case. For the purposes of this study, the segments of the financial sector under consideration were limited to the banking and insurance sectors in South Africa. As such, the words 'financial sector' bears reference to the banking and the insurance sectors.

1.8   THESIS OUTLINE

The rest of the thesis is structured as follows:

Chapter 2: Capital structure: Theory and empirical issues

This chapter reviews both theoretical and empirical literature on capital structure. It begins by tracing the evolution of capital structure theory from the seminal works of M&M (1958) and the more prominent theories of capital structure, such as the trade-off and pecking order theories, are considered. Further, the firm-level determinants of capital structure that are reliably important are also considered. The chapter ends by reviewing empirical studies on capital structure from both developed and developing country perspectives.

Chapter 3: Financial firm-specific determinants of capital structure and hypotheses development

This chapter begins by examining bank regulation with special focus on the bank capital standards as enshrined in the Basel accords. An appraisal of deposit insurance schemes as a method of safeguarding the banking sector is also conducted. The chapter then reviews the bank-specific determinants of capital structure. Further, in this chapter insurer capital regulation is considered. The focus is on solvency regulations that insurance companies conform to. In addition, insurer-

specific determinants of capital structure are considered. The chapter progresses to examine the capital regulation in place in South Africa to which financial firms must conform. The chapter ends by developing the research hypotheses tested in this study.

Chapter 4: Research methodology

This chapter begins by outlining the empirical framework underpinning this study. In particular, it pays regard to methodological issues by reviewing methodologies that have been employed in previous studies to examine the financing behaviour of firms. It also reviews the proxies that have been used for the leverage variable. The chapter evolves to consider the data and research design for this study. It progresses to discuss the panel data estimation techniques employed in the study. It also considers the formal tests of specification as well as robustness checks.

Chapter 5: Empirical results of the banking sector

In this chapter, the empirical results of the banking sector are presented and analysed. The chapter starts with the presentation of summary statistics for the banking sector. It progresses to present the empirical results. Firstly, the empirical results for testing the relationship between the firm-level determinants of capital structure and leverage are presented and discussed. Robustness checks were performed on the leverage variable. Secondly, the empirical results for testing the regulatory view of bank capital are presented. Thirdly, the empirical results of testing the buffer view of bank capital are presented and discussed. Lastly, the results for testing for the existence of a target capital structure are presented and analysed.

Chapter 6: Empirical results of the insurance sector

In this chapter, the empirical results of the insurance sector are presented and analysed. The chapter begins by presenting and discussing the summary statistics for the insurance panel of companies. It progresses to present and analyse the empirical results of testing whether the firm-level determinants of capital structure predict insurer leveraging. The chapter develops to present and analyse the results for testing the relationship between the solvency variable and the firm-level determinants of capital structure. Lastly, the chapter presents the empirical results of testing for the existence of a target capital structure for insurance companies.

Chapter 7: Summary of results, conclusions and directions for future research

This chapter begins by summarising the main findings of the thesis. This draws from both the literature review that has been conducted and the findings of this study. The chapter evolves to draw conclusions by identifying the contribution of this study to fill in the research gaps. The chapter concludes by giving recommendations and suggestions for future research drawing from the limitations of this study.

CHAPTER 2

CAPITAL STRUCTURE: THEORY AND EMPIRICAL ISSUES

2.1   INTRODUCTION

The financing decision is a critical concept in corporate finance. This chapter traces the evolution of the capital structure concept from theoretical as well as empirical perspectives. In essence, the issues that are discussed in detail are the factors that a firm takes into account when making its financing decision.

The rest of the chapter is structured as follows: Section 2.2 chronicles the evolution of capital structure theory by examining the main theories of capital structure and proffering their major predictions. Section 2.3 examines the firm-level determinants of capital structure. Section 2.4 reviews the empirical studies that have been conducted to establish the existence of a target capital structure as well to test the theories of capital structure in both developed and developing countries. Section 2.5 concludes the chapter.

2.2   THE EVOLUTION OF CAPITAL STRUCTURE THEORY

Capital structure theory is firmly founded upon the pioneering work of M&M (1958: 268). They posit that in a frictionless, efficient markets' world with no taxes or bankruptcy, the value of the firm is invariant to its capital structure. Put in other words, what they meant is that the value of the firm is not influenced by its financing decision, that is, its selection of debt and equity mix. However, what is implausible about their theory is the existence of a 'frictionless market'. Such a market is only an ideal environment and does not exist. Suffice to say that the environment that characterises the financial markets is one where the risk of bankruptcy is a reality and where firms have to pay corporate taxes. As such, in the absence of a frictionless market, the capital structure choices might have an influence on firm value and M&M's propositions will no longer hold.

M&M (1963: 438) later relaxed the proposition of perfect markets and incorporated corporate tax into their models. The rationale for doing so was the realisation that debt is tax-deductible and therefore, a firm that utilises debt is bound to enjoy an

interest tax shield. As such, as increasingly more debt is used, the market value of the firm would increase by the present value of the interest tax shield. However, they also caution that notwithstanding the existence of a tax advantage for debt financing, it does not necessarily mean that corporations should at all times seek to use the maximum possible amount of debt in their capital structures. For one thing, other forms of financing, notably retained earnings, may in some circumstances be cheaper still when the tax status of investors under personal income tax is taken into account (Modigliani & Miller, 1963: 442).

In the real-word scenario, their propositions hardly hold and have subsequently been challenged by several scholars. Subsequent departures have proven that such an ideal world does not exist and that there are imperfections such as taxes, costs of financial distress and especially regulation in the case of financial institutions (see for instance Berger *et al.*, 1995; DeMarzo & Duffie, 1995; Froot & Stein, 1998; Miller, 1995 and Smith & Stulz, 1985). Among the early scholars, Robichek and Myers (1966: 2) argue that, on one hand, in the absence of taxes, the value of the firm will not change for moderate amounts of leverage, but will decline with high degrees of leverage, and on the other hand, in the presence of taxes an optimal degree of leverage will exist. Borch (1969: 1) demonstrates that the earnings of a firm are represented by a discrete stochastic process, in which the terms can take negative values. As such, earnings can be added to the firm's working capital, or paid out as dividends. If a firm has debt, part of the earnings must be set aside to service the debt. As a consequence, a firm is ruined and has to cease its operations if the working capital becomes negative. This is contrary to the M&M irrelevance proposition.

Jensen and Meckling (1976: 40) postulate that in their financing decisions, firms would aim to minimise agency costs due to the conflict that may exist between shareholders and debtholders. They define the parties to this relationship as the managers (agent) and the bondholders as well as the shareholders, being the principals. Furthermore, they define agency costs as (1) the monitoring expenditures by the principal, (2) the bonding expenditures by the agent and (3) the residual loss. Jensen and Meckling (1976: 54) proved that an optimal capital structure can be obtained by trading off the agency cost of debt against the benefit of debt.

Miller (1977: 262) rebuts the optimal capital structure school of thought by factoring in personal income taxes into the M&M irrelevance proposition. He argues that even in a world in which interest payments are fully deductible in computing corporate income taxes, the value of the firm, in equilibrium, will still be independent of its capital structure. The major limitations of Miller's proposition would seem to be his implausible assumptions of the absence of capital gains tax and the risk of bankruptcy. Subsequently, Schneller (1980: 127) investigated the impact of taxation on the optimal capital structure of the firm when all investors belong to the same tax brackets. He demonstrated that, in the presence of capital gains tax and the possibility of bankruptcy, for the dividend-paying firm, interior solutions for the capital structure decision are possible due to the disparity between the capital gains and dividend income tax rates and the possibility of illiquidity. Schneller (1980: 127) contends that Miller's proposition only holds in situations whereby the dividend-paying firm is always liquid.

It is trite to highlight that capital structure theory has evolved from the M&M (1958: 268) capital structure irrelevance proposition. Notwithstanding that they were premised on the existence of perfect markets, the propositions have become the building blocks upon which capital structure is anchored. However, what has been unravelled by empirical studies is that firm value varies with debt-equity mix. The questions that remain intriguing and preoccupy the minds of scholars to this day are: Is there an optimal capital structure? What firm-specific factors are reliably important in determining firm leverage? The following sections consider the main theories of capital structure.

2.2.1 Trade-off theory

In a world where capital market behaviour departs from the M&M setting, Kraus and Litzenberger (1973: 911), in their study that would later on become the theoretical foundation of the static trade-off theory, found that optimal leverage reflects a trade-off between the tax benefits of debt and the deadweight costs of bankruptcy. This was aptly formalised by Myers (1984: 576) in his static trade-off framework, which postulates that firms set a target debt-to-value ratio and gradually move towards it, the same way that firms adjust dividends to move towards a target dividend payout ratio. In essence, the trade-off theory is a capital structure theory that focuses on the

balance between the benefits of an interest tax shield and the costs of issuing debts to determine the optimum level of debts that a firm ought to issue to maximise its interests (Rasiah & Kim, 2011: 150).

The optimum point of the trade-off can be achieved when the marginal value of benefits, including the tax shield from debt financing, just equalises the incremental present value of costs associated with issuing more debts. Figure 2.1 summarises the static trade-off theory. The horizontal base line expresses M&M's idea that V, the market value of the firm – the aggregate market value of all its outstanding securities – should not depend on leverage when assets, earnings and future investment opportunities are held constant. However, the tax-deductibility of interest payments induces the firm to borrow to the margin where the present value of interest tax shields is just offset by the value loss due to agency costs of debt and the possibility of financial distress (Myers, 1993: 5). In essence, what is encapsulated in Figure 2.1 is that an all-equity financing firm will have a constant market value, as compared to a firm that is funded out of both equity and debt. A firm that is also financed by debt will enjoy debt tax shield benefits up to an optimum point where the present value of interest tax shields equates to the present value of financial distress (bankruptcy costs). Beyond this point it will no longer be optimum for the firm to finance its operations out of more debts, as it will risk choking from interest payments and, worst, risks going bankrupt.

The static trade-off theory is premised on firms choosing a financial policy that predicates upon comparing the costs and benefits of debt that are derived from the optimal capital structure, such as the tax advantage of debt, the alleviation of free cash flow agency costs, the costs of financial distress as well as the agency costs of stakeholders (Rasiah & Kim, 2011: 153). In essence, the static trade-off theory determines an optimal capital structure by adding various imperfections, including taxes, costs of financial distress and agency costs, but retains the assumptions of market efficiency and symmetric information (Baker & Wurgler, 2002: 25). This view is also buttressed by Carpentier (2006: 5), who contends that the static trade-off theory maintains that firms select an optimal capital structure by trading off the advantages of debt financing against its cost. The optimum debt level maximises firm value and should become a target debt level.
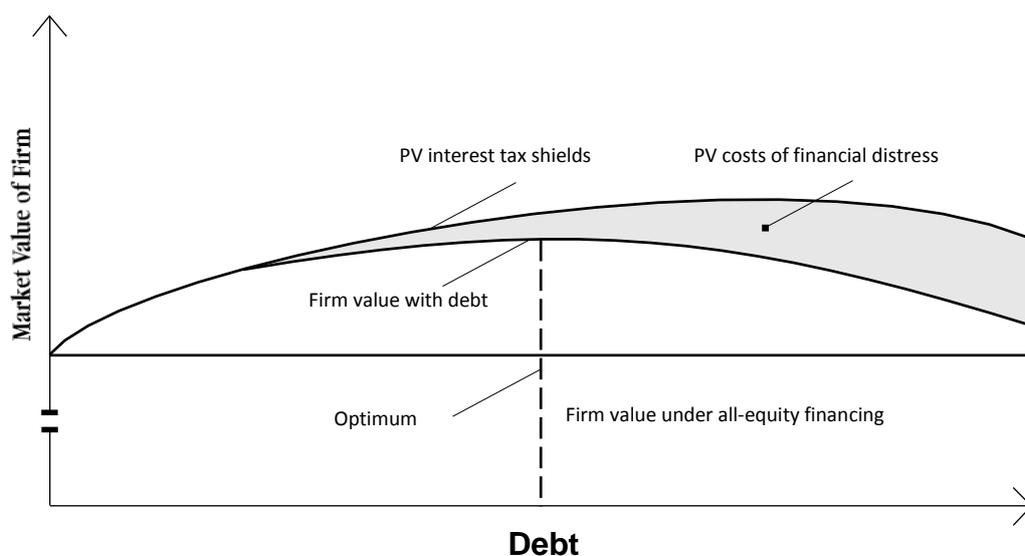
Figure 2.1: The static trade-off theory of capital structure

Source: Myers (1993: 5)

According to Antoniou, Guney and Paudyal (2008: 64), the trade-off theory implies that a major borrowing incentive is the tax advantage of interest payment. To the contrary, DeAngelo and Masulis (1980: 4) postulate that tax deductions for depreciation and investment tax credits can be considered as substitutes for the tax benefits of debt financing. These features can lead to market equilibrium, where each firm has an interior optimal leverage. Accordingly, firms with higher amounts of non-debt tax shields will have lower debt levels. Therefore, a firm's motivation to borrow declines with an increase in non-debt tax shields. The other limitation of the static trade-off was aptly put by Myers (2001: 89), who observes as follows:

> [T]he trade-off theory is in immediate trouble on the tax front, because it seems to rule out conservative debt ratios by tax paying firms. If the theory is right, a value-maximising firm should never pass up interest shields when the probability of financial distress is remotely low. Yet there are many established profitable companies with superior credit ratings operating for years at low debt ratios …

The dynamic trade-off theory developed as a corollary to the static trade-off theory. Its proponents aver that the capital structure decision is a continuous one and that different firms allow the actual leverage ratio to deviate from the target ratio by different amounts (Fischer, Heinkel & Zechner, 1989). Put more formally, Fischer *et*

al. (1989: 33) hypothesise that firms that allow wide swings in their debt ratios, for instance firms with large debt ratio ranges, have a low effective corporate tax rate, a high variance of underlying asset value, a small asset base (for instance small firms) and low bankruptcy costs. Dangl and Zechner (2004) and Frank and Goyal (2009), among other scholars, provide empirical support for the dynamic trade-off theory.

The dynamic version of the trade-off theory implies that firms passively accumulate earnings and losses, letting their debt ratios deviate from the target as long as the costs of adjusting the debt ratio exceed the costs of having a suboptimal capital structure (Hovakimian, Hovakimian & Tehranian, 2004: 523). Firms wait to adjust their leverage until the costs of debt recapitalisation are offset by the benefits, either an increased tax advantage or decreased expected bankruptcy cost, depending on whether the firm decides to increase or decrease leverage (Leary & Roberts, 2005: 2577). The size and frequency of the recapitalisation depend, in large part, upon the structure of the adjustment cost function. Barclay and Smith (2005: 15) corroborate this view and assert that even if managers set target leverage ratios, unexpected increases or shortfalls in profitability, along with occasional attempts to exploit financing 'windows of opportunity', can cause companies to deviate from their targets. In such cases there will be what amounts to an optimal deviation from those targets – one that depends on the transaction costs associated with adjusting back to the target relative to the (opportunity) costs of deviating from the target. What is instructive is that firms will continuously rebalance their capital structures to their target ranges as long as the costs of adjustments do not deter them from doing so.

In contrast to the static trade-off strategy, a dynamic capital structure strategy initially uses much less debt (Dangl & Zechner, 2004: 12). These authors further propound that a dynamic recapitalisation strategy anticipates the fact that debt will be increased if the firm value increases by a sufficient amount. Hovakimian *et al.* (2004: 523) contend that firms that were highly profitable in the past are likely to be underleveraged, while firms that experienced losses are likely to be overleveraged. Furthermore, this implies that profitability will be negatively related to observed debt ratios in samples dominated by firms that do not issue, but will have a positive effect on the probability of debt versus equity issuance.

The major predictions of the trade-off theories can be enumerated as follows: Firstly, in the absence of adjustment costs, the dynamic trade-off theory predicts that firms continuously adjust their capital structures to maintain the value-maximising leverage ratio (Leary & Roberts, 2005: 2576). In essence, this means that firms have an optimal capital structure and will gravitate towards this target capital structure.

Secondly, on one hand, the static trade-off theory predicts firm leverage to be positively associated with profitability (Leary & Roberts, 2005; Myers, 2001; Rasiah & Kim, 2011) and on the other hand, the dynamic trade-off theory predicts an inverse relationship (Frank & Goyal, 2009; Hovakimian *et al.*, 2004; Lemma & Negash, 2014; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1999).

Thirdly, the static trade-off theory predicts a positive relationship between leverage and asset tangibility. This is confirmed by Bradley, Jarrel and Kim (1984: 874), Harris and Raviv (1991: 323), Rajan and Zingales (1995: 1455) and Frank and Goyal (2009: 3). The reasoning is that firms with tangible fixed assets are able to offer collateral for debt.

Fourthly, a negative association between leverage and growth is to be expected. According to the static trade-off theory, the cost of financial distress increases with expected growth, forcing managers to reduce the debt in their capital structure (Antoniou *et al.*, 2008: 62). Empirical support of this notion is found from Hovakimian, Opler and Titman (2001: 22) and Barclay and Smith (2005: 14), among other scholars.

Fifthly, the static trade-off theory predicts a positive relationship between leverage and the effective tax rate. As such, firms with a higher taxable income should borrow more debt to take advantage of the interest tax shield (Rasiah & Kim, 2011: 157). This prediction is corroborated by Fischer *et al.* (1989: 33) and Graham (1996: 41).

Sixthly, the static trade-off theory predicts a positive association between leverage and firm size. According to Frank and Goyal (2009: 7), large, more diversified firms face lower default risk. In addition, older firms with better reputations in debt markets face lower debt-related agency costs. It is generally accepted that firm size is an inverse proxy of the probability of bankruptcy and, hence, larger firms have higher debt capacity and may borrow more to maximise their tax benefits (Antoniou *et al.*,

2008: 64). Due to lower information asymmetry, larger firms are likely to have easier access to debt markets, and able to borrow at lower cost. As such, the trade-off theory predicts larger, more mature firms to have relatively more debt. This prediction is corroborated by the findings of Antoniou *et al.* (2008: 80), Frank and Goyal (2009: 26), Al-Najjar and Hussainey (2011: 334), Lim (2012: 197) and Lemma and Negash (2014: 81), among other scholars.

Lastly, the trade-off theory predicts a negative association between leverage and non-debt tax shield. Non-debt tax shields include investment tax credits and depreciation. According to DeAngelo and Masulis (1980: 4), tax deductions for depreciation and investment tax credits can be considered as substitutes for the tax benefits of debt financing. As such, firms with higher amounts of non-debt tax shields will have lower debt levels. Therefore, a firm's motivation to borrow declines with an increase in non-debt tax shields (Antoniou *et al.*, 2008: 64).

In evaluating the trade-off theory on the basis of the empirical studies conducted, it would seem that, overall, it is plausible in explaining the financing behaviour of firms. Its predictions relating to the relationship between leverage and asset tangibility or leverage and growth are highly supported by empirical studies. On the contrary, its prediction regarding the relationship between leverage and profitability seems to be anomalous to the financing behaviour of firms.

2.2.2 Pecking order theory

The pecking order theory of capital structure was proposed by Myers and Majluf (1984: 219), who reason that it is generally better to issue safe securities than risky ones. Firms should go to bond markets for external capital, but raise equity by retention if possible. That is, external financing using debt is better than financing by equity. This view is also espoused by Myers (1984: 581), who proffers that there is a pecking order in which firms arrange their financing. Therefore, a firm would prefer internal to external financing and debt to equity if it has the capacity to issue the securities. In essence, in this pecking order model, a financial hierarchy descends from internal funds, to debt, to external equity (Chirinko & Singha, 2000: 418). Put in other words, managers will tend to have the priority to fund projects by using retained earnings, and issue debts when the retained earnings are exhausted, and

lastly will only turn to the issuance of equity when it is not sensible to issue any more debts (Rasiah & Kim, 2011: 151).

Within a pecking order framework, the firm has no well-defined target debt-to-equity ratio (Myers, 1984: 576). This theory implies that corporate managers making financing decisions are not really thinking about a long-run target debt-to-equity ratio. Instead, they take the path of least resistance and choose what at the time appears to be the lowest-cost financing vehicle – generally debt – with little thought to the future consequences of these choices (Barclay & Smith, 2005: 8).

The pecking order theory is classified as an information cost theory. Implicit in the pecking order theory is information asymmetry. Information asymmetry arises as a result of managers (insiders) having more information than investors (outsiders), which they use to their advantage. Information asymmetry epitomises itself as the likelihood that a firm's managers know more about the firm's financial condition and future growth opportunities than do outside investors (Rasiah & Kim, 2011: 153). The pecking order theory is based on a difference of information between corporate insiders and the market. The driving force is adverse selection (Frank & Goyal, 2003: 237). The implication of the pecking order theory is that there is no optimal capital structure (Baker & Wurgler, 2002: 26; Shyam-Sunder & Myers, 1999: 220). Nonetheless, if there is an optimum, the cost of deviating from it is insignificant in comparison to the cost of raising external finance. Raising external finance is costly, because managers have more information about the firm's prospects than outside investors, and because investors know this.

The discussion now turns to the main predictions of the pecking order theory. Firstly, the pecking order theory predicts a negative relationship between leverage and profitability (Antoniou *et al.*, 2008: 67; Baker & Wurgler, 2002: 7; Myers, 2001: 93). Intuitively, firms that are profitable are more inclined to tap into retained earnings to fund their investment requirements than to seek recourse to debt markets. This prediction is consistent with the findings of Booth, Aivazian, Demirgüç-Kunt and Maksimovic (2001: 117), Antoniou *et al.* (2008: 73), Ahmad and Abbas (2011: 211), Al-Najjar and Hussainey (2011: 334), Bartoloni (2013: 114) and Elsas, Flannery and Garfinkel (2014: 4), among other scholars.

Secondly, the pecking order theory predicts that firm leverage is negatively related to asset tangibility. The rationale behind this prediction is aptly explained by Frank and Goyal (2009: 9), who observed that there is low information asymmetry associated with tangible assets, which makes equity issuances less costly. Therefore, leverage ratios should be lower for firms with higher tangibility. Empirical support for this prediction is provided by Ahmad and Abbas (2011: 211), Al-Najjar and Hussainey (2011: 334) and Ahmed and Shabbir (2014: 172).

Thirdly, the pecking order theory predicts that firm leverage is positively related to growth. The pecking order theory implies that firms with more investments, holding profitability fixed, should accumulate more debt over time (Frank & Goyal, 2009: 8). This prediction is consistent with the evidence of Ahmed, Ahmed and Ahmed (2010: 10).

Fourthly, the pecking order theory predicts that firm leverage is inversely related to the size of the firm. According to Frank and Goyal (2009: 8), the pecking order theory is usually interpreted as predicting an inverse relation between leverage and firm size. This is due to the fact that large firms are less subject to manager–investor information asymmetry and therefore borrow at a lower cost (Rasiah & Kim, 2011: 157).

To sum up: The pecking order theory is one of the most plausible information asymmetry theories that have been put forth to explain the financing decisions of firms. The pecking order theory derives much of its influence from a view that it fits naturally with a number of facts about how companies use external finance (Frank & Goyal, 2003: 218). There is strong empirical support for its predictions relating to profitability and asset tangibility. However, its prediction relating to size and growth is moderately supported. Moreover, it seems that its predictions become more robust for large firms. It could be conjectured that the pecking order theory complements rather than outperforms the static trade-off theory.

2.2.3 Signalling theory

The signalling theory is another strand of the information asymmetry theories, of which the origins can be traced to the work of Ross (1977). He posits that if managers possess inside information, then the choice of a managerial incentive

schedule and of a financial structure signals information to the market, and in competitive equilibrium the inferences drawn from the signals will be validated (Ross, 1977: 23). He maintains that the one empirical implication of the theory is that in a cross-section, the values of firms will rise with leverage, as increasing leverage increases the market's perception of value. A signal is an action taken by a firm's management that provides clues to investors about how management views the firm's prospects (Besley, Brigham & Sibindi, 2015: 268). Therefore, managers, in exercising their choice of capital structure, will send out a signal to the market. For instance, if managers believe that their firms have favourable prospects and are undervalued, they will try to avoid selling shares and issue debt instead. This will avoid the dilution of ownership and the share of the 'spoils' with new shareholders. To the contrary, if managers believe that their firms are overvalued and prospects are bleak, they will issue shares rather than issue debt. This would mean bringing in new investors to share the losses.

According to Barclay and Smith (2005: 11), the signalling model assumes that corporate financing decisions are designed primarily to communicate managers' confidence in the firm's prospects and, in cases where management thinks the firm is undervalued, to increase the value of shares. With better information about their companies than outside investors, managers who think their firms are undervalued might attempt to raise their share prices simply by communicating this information to the market. Barclay and Smith (2005) further contend that as management is often reluctant to issue forecasts or release strategic information, and the mere announcement that their firm is undervalued generally is not enough, the challenge for managers therefore is to find a credible signalling mechanism.

There are various ways with which management can send signals to the market. Firstly, increasing leverage has been suggested as one such potentially effective signalling device (Barclay & Smith, 2005: 12). The rationale behind this is explicable as follows: Debt obligates the firm to make a fixed set of cash payments over the term of the debt security; if these payments are missed, there are potentially serious consequences, including bankruptcy. Further, Barclay and Smith (2005) observe that equity is more forgiving. Although stockholders also typically expect cash payouts, managers have more discretion over these payments and can reduce or omit them in times of financial distress. For this reason, adding more debt to the firm's capital

structure can serve as a credible signal of higher expected future cash flows. Increases in the debt ratio also signal quality and that lenders are prepared to lend (Antoniou *et al.*, 2008: 62). Because lower-quality firms have higher marginal expected bankruptcy costs for any debt level, managers of low-quality firms do not imitate higher-quality firms by issuing more debt (Harris & Raviv, 1991: 311).

Secondly, managers can send a signal to the market by dint of their dividend policy. According to Antoniou *et al.* (2008: 64), increased dividends signal increased future earnings, upon which the firm's cost of equity will be lower, favouring equity to debt. Further, dividend payments signal a firm's future performance, and therefore high dividend-paying firms benefit from a lower equity cost of capital. Myers and Majluf (1984: 220) contend that a firm should not pay a dividend if it has to recoup the cash by selling stock or some other risky security. Therefore, dividends could help convey managers' superior information to the market. However, Miller (1995: 484) suggests that the dividend-cutting route to boost equity capital instead of issuing shares might also send the wrong signal to the market, resulting in the fall of the firm's share price.

Antoniou *et al.* (2008: 59) are among the scholars who found evidence in support of the signalling theory. They investigated how firms operating in capital market-oriented economies (the UK and the USA) and bank-oriented economies (France, Germany and Japan) determine their capital structure by using panel data and a two-step system generalised method of moments (syst-GMM) procedure. They report an inverse relation between leverage and dividends in the USA, which supports the view that dividend payments signal a firm's future performance, and therefore high dividend-paying firms benefit from a lower equity cost of capital.

The inherent limitation of the signalling theory is that it suggests that managers' private information about the firm's prospects plays an important role in both their financing choices and how the market responds to such choices. However, as it is difficult to identify when managers have such proprietary information, it is not easy to test this proposition (Barclay & Smith, 2005: 9).

2.2.4 Market timing theory

The marketing timing theory is an information asymmetry theory that developed as a corollary to the signalling theory and was proposed by Baker and Wurgler (2002).

They postulate that capital structure evolves as the cumulative outcome of past attempts to time the equity market. In other words, managers only discern between issuing equity and debt as a result of market conditions. On the one hand, if the conditions are favourable for the issuance of equity over debt, they will float shares, and on the other hand, if the conditions favour the debt market, they will borrow to meet the funding requirements of the firm. Baker and Wurgler (2002: 4) contend that there are two scenarios of market timing. In the first instance, firms tend to announce equity issues following the release of information, which may reduce information asymmetry. The second instance involves irrational investors or managers and time-varying mispricing or perceptions of mispricing. Managers issue equity when they believe its cost is irrationally low and repurchase equity when they believe its cost is irrationally high. When investors are overly bullish, managers issue shares, and relatively bearish investors lead managers to issue debt (Elsas *et al.*, 2014: 2). Therefore, a firm's leverage at any point in time therefore reflects the correlation between historical security mispricing and new investment opportunities.

Barclay and Smith (2005: 11) buttressed the phenomenon of market timing and observed that if management has favourable information that is not yet reflected in market prices, the release of such information will cause a larger increase in stock than in bond prices, and so the current stock price will appear more undervalued to managers than current bond prices. As such, to avoid diluting the value of existing shareholder claims, companies that have profitable uses for more capital but believe their shares to be undervalued will generally choose to issue debt rather than equity. Conversely, managers who think their companies are overvalued are more likely to issue equity. What stands out is that the market timing hypothesis asserts that managers routinely exploit information asymmetries to benefit current shareholders (Flannery & Rangan, 2006: 470).

The major predictions of the market timing theory of capital structure are now discussed. Firstly, firms that time the market have no optimal capital structure. This view is posited by Baker and Wurgler (2002: 29), who observed that there is no optimal capital structure, so market timing financing decisions simply accumulates over time into the capital structure outcome. There is no reversion to a target capital ratio if market timing is the dominant influence on firm leverage (Flannery & Rangan, 2006: 470). Secondly, the market timing theory suggests a positive relation between

leverage ratio and the market equity premium (Antoniou *et al.*, 2008: 65). Therefore, if a firm requires external capital at the time of a high market equity premium, managers are likely to opt for debt. Thirdly, the market timing theory suggests a negative relationship between firm leverage and the market-to-book asset ratio. Managers tend to issue shares when the firm's market-to-book ratio is high (Flannery & Rangan, 2006: 470).

The market timing theory seems to be a plausible firm financing theory from the perspective that it pays regard to the dynamic state of financial markets. Among other scholars, Hovakimian *et al.* (2004: 520), Leary and Roberts (2005: 29), Flannery and Rangan (2006: 471) and Elsas *et al.* (2014: 29) lend empirical support to this theory. Frank and Goyal (2009: 27), however, point out that its limitation is that by itself, market timing does not make any predictions for many of the patterns in the data that are accounted for by the trade-off theory.

2.2.5 Agency cost theory

The agency cost theory was advanced by Jensen and Meckling (1976). They reason that an agency conflict between the owner-manager and outside shareholders derives from the manager's tendency to appropriate perquisites out of the firm's resources for his/her own consumption (Jensen & Meckling, 1976: 313). As such, agency costs are borne by a firm to align the interests of the agents (managers) to those of their principals (shareholders). They contend that these agency costs are the sum of the monitoring expenditures by the principal, the bonding expenditures by the agent and the residual loss. Agency costs represent important problems in corporate governance in both financial and non-financial industries. The separation of ownership and control in a professionally managed firm may result in managers exerting insufficient work effort, indulging in perquisites, choosing inputs or outputs that suit their own preferences, or otherwise failing to maximise firm value (Berger & Di Patti, 2006: 1066).

In essence, managers do not always behave in the best interests of their investors and therefore need to be disciplined. Debt serves as a disciplining device because default allows creditors the option to force the firm into liquidation. Moreover, debt also generates information that can be used by investors to evaluate major operating decisions, including liquidation (Harris & Raviv, 1990: 321). Jensen and Meckling

(1976: 343) argue that notwithstanding the absence of tax benefits, debt would be utilised if the ability to exploit potentially profitable investment opportunities is limited by the resources of the owner. If the owners of a project cannot raise capital, they will suffer an opportunity loss, represented by the increment in value offered to them by the additional investment opportunities. Therefore, even though they will bear the agency costs from selling debt, they will find it desirable to incur them to obtain additional capital as long as the marginal wealth increments from the new investments projects outweigh the marginal agency costs of debt. The agency cost hypothesis argues that shortening the effective maturity of debt can mitigate conflicts of interest (Jun & Jen, 2003: 6). They reason that using shorter-term debt forces managers to periodically generate information for investors to evaluate return and risk of major operating decisions. Investors will therefore reprice the debt upon maturity based on new information. This approach mitigates asset substitution and underinvestment problems.

Conflict also manifests itself between debtholders and equityholders. As such, agency costs can be triggered by the conflicts between debt and equity investors (Myers, 2001: 96). Harris and Raviv (1991: 301) contend that conflicts between debtholders and equityholders arise because the debt contract gives equityholders an incentive to invest suboptimally. Further, they argue that the cost of the incentive to invest in value-decreasing projects created by debt is borne by the equityholders who issue the debt. This phenomenon is referred to as the 'asset substitution effect' and is an agency cost of debt financing.

The agency costs theory of capital structure states that an optimal capital structure will be determined by minimising the costs arising from conflicts between the parties involved (Rasiah & Kim, 2011: 151). Under the agency costs hypothesis, high leverage or a low equity-asset ratio reduces the agency costs of outside equity and increases firm value by constraining or encouraging managers to act more in the interests of shareholders (Berger & Di Patti, 2006: 1066). Therefore, greater financial leverage may affect managers and reduce agency costs through the threat of liquidation. According to Baker and Wurgler (2002: 25), agency problems can call for more or less debt. On the one hand, too much equity can lead to free cash flow and conflicts of interest between managers and shareholders, and on the other hand, too much debt can lead to asset substitution and conflicts of interest between managers

and bondholders. Notwithstanding that the use of debt controls the agency costs of managerial discretion, it also generates its own agency costs (Booth *et al.*, 2001: 100). A highly debt-financed firm might forgo good investment opportunities due to the debt overhang problem.

The main predictions of the agency cost theory are now discussed. Firstly, the agency cost theory predicts an optimal capital structure. An optimal capital structure can be obtained by trading of the agency cost of debt against the benefit of debt (Harris & Raviv, 1991: 301). Secondly, the agency cost theory predicts that leverage is positively related to profitability. More profitable firms tend to use more debt due to the disciplining role that debt has on managers (Teixeira, Silva, Fernandes & Alves, 2014: 37). Thirdly, the theory predicts that leverage is positively associated with efficiency. In other words, the agency costs hypothesis predicts that an increase in leverage raises efficiency (Berger & Di Patti, 2006: 1074).

The agency cost theory, although theoretical plausible, has posed considerable challenges to test empirically. The absence of clear-cut evidence could be partly explained by the intrinsic difficulty in defining a measure of performance that is close to the theoretical definition of agency costs (Berger & Di Patti, 2006: 1067). There are, for instance, numerous metrics that can be used to measure firm efficiency. As such, analysing the relationship between leverage and efficiency becomes a hit-and-miss affair. It is trite to highlight that the agency cost theory is more applicable to mature firms and hence falls short when it comes to explaining the financing behaviour of small firms. Therefore, the empirical support for this theory is mixed. Among the scholars who found evidence in support of the agency cost theory are Jun and Jen (2003) and De Jonghe and Öztekin (2015). To the contrary, Al-Najjar and Hussainey (2011) did not find evidence to support this theory.

2.2.6 Free cash flow theory

Jensen (1986) takes the argument about agency costs further by advancing the free cash flow theory of debt. He premises this on the 'control hypothesis' notion – that debt can be beneficial in motivating managers and their organisations to be efficient. Free cash flow is cash flow in excess of that required to fund all projects that have positive net present values (NPVs) when discounted at the relevant cost of capital. Conflicts of interest between shareholders and managers over payout policies are

especially severe when the organisation generates substantial free cash flow (Jensen, 1986: 323). According to Rasiah and Kim (2011: 152), corporate managers have the incentive to misuse free cash flow on perquisites and bad investment. Debt financing confines the free cash flow available to managers and thereby means to control these firms' difficulties. Therefore, debt can be utilised in reducing agency costs of free cash flows. The threat caused by failure to make debt service payments serves as an effective motivating force to make such organisations more efficient (Jensen, 1986: 324).

Barclay and Smith (2005: 10) aver that the natural inclination of corporate managers is to use excess cash to sustain growth at the expense of profitability, either by overinvesting in their core businesses or, perhaps worse, by diversifying through acquisition into unfamiliar ones. In addition, unless management finds another way to assure investors that it will resist this tendency, companies that aim to maximise firm value should distribute their free cash flow to investors. According to Antoniou *et al.* (2008: 62), increases in the debt ratio also signal quality and that lenders are prepared to lend. However, Jensen (1986: 324) cautions that increased leverage also comes at a cost. As leverage increases, the usual agency costs of debt rise, including bankruptcy costs. The optimal debt-equity ratio is the point at which firm value is maximised; the point where the marginal costs of debt just offset the marginal benefit.

The major predictions of the free cash flow theory are the following: Firstly, the free cash flow theory predicts a positive relationship between leverage and profitability. In other words, profitable firms are likely to utilise more and more debt in their financing. Secondly, the theory predicts is that it reveals which mergers and takeovers are more likely to destroy, rather than create, value; it shows how takeovers are both evidence of the conflicts of interest between shareholders and managers and a solution to the problem (Jensen, 1986: 328). Acquisitions are one way managers spend cash instead of paying it out to shareholders. Therefore, the theory implies that managers of firms with unused borrowing power and large free cash flows are more likely to undertake low-benefit or even value-destroying mergers.

2.2.7   Contracting costs theory

The contracting cost theory was advanced by Myers (1977: 147). He reasoned that a firm with risky debt outstanding, and which acts in its shareholders' interest, will follow a different decision rule than one that can issue risk-free debt or issues no debt at all (Myers, 1977: 149). He proffers that the firm financed with risky debt will, in some states of nature, pass up valuable investment opportunities – opportunities that could make a positive net contribution to the market value of the firm. Issuing risky debt reduces the present market value of the firm by inducing a future strategy that is suboptimal. The loss in market value is absorbed by the firm's current shareholders. Therefore, in the absence of taxes, the optimal strategy is to issue no risky debt. If there is a tax advantage to corporate borrowing, the optimal strategy involves a trade-off between the tax advantages of debt and the costs of the suboptimal future investment strategy. Therefore, the suboptimal investment policy is an agency cost induced by risky debt.

Implicit in Myers's (1977) hypothesis is the underinvestment problem. At worst, this agency cost is borne by firms whereby their managers pass on positive NPV projects as a consequence of being highly geared. The antithesis to this problem is that of overinvestment. This was aptly expressed by Barclay and Smith (2005: 10), who observed that if too much debt can lead to underinvestment (and more demanding stakeholders), too little can lead to overinvestment.

According to Barclay and Smith (2005: 12), the contracting cost hypothesis predicts that the greater the growth opportunities (relative to the size of the firm), the greater the potential underinvestment problem associated with debt financing and hence the lower the firm's leverage ratio. Conversely, the more limited a firm's growth opportunities, the greater the potential overinvestment problem and therefore the higher the firm's leverage.

According to Barclay, Smith and Watts (1997: 5), to attenuate the problem of underinvestment, firms can make use of short-term debt with a view to rolling it forward or issue no debt. To the contrary, to mitigate the problem of overinvestment, firms can pay higher dividends or offer share repurchases to their shareholders as a way of dealing with the free cash flow problem. Barkley *et al.* (1997) observed that the natural inclination of many corporate managers is to use such free cash flow to

sustain growth at the expense of profitability through their misguided efforts to gain market share in mature businesses, or perhaps worse, through diversifying acquisitions. They suggest that to maximise firm value, such managers must distribute corporate free cash flow to investors. This can be done by paying higher dividends or by major substitutions of debt for equity, for instance in the form of leveraged share repurchases.

Empirical support for the contracting cost theory is found from Barclay *et al.* (1997: 12) and Barclay and Smith (2005: 14), among other scholars. Using an entire sample of 6 700 industrial companies in the USA available on the Compustat database over a 30-year period, Barclay *et al.* (1997: 12) found that the most important systematic determinant of a firm's leverage ratio and dividend yield would appear to be the extent of its investment opportunities. Companies whose value consisted largely of intangible growth options had significantly lower leverage ratios and dividend yields, on average, than companies whose value was represented primarily by tangible assets. They reason that this pattern of financing and dividend choices can be explained by the fact that on the one hand, for high-growth firms, the underinvestment problem associated with heavy debt financing and the flotation costs of high dividends make both policies potentially very costly. However, on the other hand, for mature firms with limited growth opportunities, high leverage and dividends can have substantial benefits in controlling the free cash flow problem (Barclay *et al.*, 1997: 12). To the contrary, Graham and Harvey (2001: 236) did not find empirical support for the contracting costs theory.

2.2.8 A synopsis of the main theories of capital structure

A primer of the literature tracing the origins of the major capital structure theories as well as evidence in support of and against the theories is presented in Table 2.1. The next section offers a consideration of the firm-level factors that determine the choice of capital structures.

Table 2.1: A synopsis of the main theories of capital structure

Theory	Origins of the theory	Evidence in support of theory	Evidence against theory
Trade-off theory	Kraus and Litzenberger (1973: 911); formalised by Myers (1984: 576)	Fischer *et al.* (1989: 33); Graham (1996: 41); Dangl and Zechner (2004); Antoniou *et al.* (2008: 80); Frank and Goyal (2009: 26); Babatunde (2016: 79)	DeAngelo and Masulis (1980: 4); Fama and French (1998: 841)
Pecking order theory	Myers and Majluf (1984: 219)	Booth *et al.* (2001: 117); Graham and Harvey (2001: 234); Antoniou *et al.* (2008: 73); Ahmad and Abbas (2011: 211); Al-Najjar and Hussainey (2011: 334); Bartoloni (2013: 114); Lim (2016: 9); Singh (2016:1650); Prędkiewicz and Prędkiewicz (2017:631)	Helwege and Liang (1996: 431); Frank and Goyal (2003: 241)
Signalling theory	Ross (1977: 23)	Harris and Raviv (1991: 311); Welch (1996: 267); Antoniou *et al.* (2008: 59)	Norton (1991: 173); Barclay and Smith (1995: 609); Barclay *et al.* (1997: 11); Barclay and Smith (2005: 15)
Market timing theory	Baker and Wurgler (2002: 4)	Hovakimian *et al.* (2004: 520); Barclay and Smith (2005: 14); Leary and Roberts (2005: 29); Flannery and Rangan (2006: 471); Elsas *et al.* (2014: 29)	Hovakimian (2006: 222); Frank and Goyal (2009: 27)
Agency costs theory	Jensen and Meckling (1976: 313)	Jun and Jen (2003); De Jonghe and Öztekin (2015)	Norton (1991: 173); Graham and Harvey (2001: 235)
Free cash flow theory	Jensen (1986: 323)	Opler and Titman (1993: 1996); Agrawal and Jayaraman (1994: 140); Barclay *et al.* (1997: 12); Carroll and Grifith (2001: 152); Zhang, Cao, Dickinson and Kutan (2016: 116)	Howe, He and Kao (1992: 1965); Graham and Harvey (2001: 236)
Contracting cost theory	Myers (1977: 147)	Barclay *et al.* (1997: 12); Barclay and Smith (2005: 12)	Graham and Harvey (2001: 236)

Source: Researcher's own compilation

2.3 THE FIRM-LEVEL DETERMINANTS OF CAPITAL STRUCTURE

There are reliably important firm-level determinants that usually turn up in extant literature and have a demonstrable effect on the capital structure choices of firms. In this section these firm-level determinants are discussed with a view to providing insight into what the major theories of capital structure predict about them.

2.3.1 Size

It is expected that as firms grow, they become more profitable and also accumulate more tangible assets along their growth trajectory (Sibindi, 2016:228). As a consequence thereof, it would seem as though such firms will have a considerable amount of free cash flows. The *a priori* expectation from a pecking order theory perspective is that as firms grow, they generate more profits and hence can make use of internally generated resources as opposed to seeking recourse from the debt market. As such, large firms are expected to be lowly geared as opposed to small firms. Contrary to this prediction by the pecking order theory, the expectation from both the trade-off and market timing models is that large firms should be highly leveraged as compared to small firms by reason of the ensuing debt interest tax shields they stand to enjoy. Moreover, the dictate of the free cash flow theory is that the use of debt will mitigate the agency costs brought about by the abundance of free cash flows in large firms. In addition, firm size is arguably an inverse proxy of the probability of bankruptcy (Antoniou *et al.*, 2008:64; Frank & Goyal, 2009: 8; Rajan & Zingales, 1995: 1456). As such, due to lower information asymmetry, larger firms are likely to have easier access to debt markets and hence are able to borrow at lower cost.

In sync with the foregoing, the empirical evidence is mixed. Notwithstanding, by and large the scale tilts in favour of the positive association between leverage and firm size prediction. The empirical evidence to support the positive leverage-firm size nexus prediction can be found in the studies by Antoniou *et al.* (2008: 73), Ahmed *et al.* (2010: 9), Al-Najjar and Hussainey (2011: 334), Lim (2012: 197), Bartoloni (2013: 142) and Lemma and Negash (2014 :81), among other scholars.

To the contrary, Titman and Wessels (1988: 6) lend support to the inverse leverage-firm size relationship. They contend that the cost of issuing debt and equity securities is also related to firm size. In particular, small firms pay much more than large firms to issue new equity and also somewhat more to issue long-term debt. This suggests that small firms may be more leveraged than large firms and may prefer to borrow short-term (through bank loans) rather than issue long-term debt because of the lower fixed costs associated with this alternative.

However, Rajan and Zingales (1995: 1451) aptly observed that the effect of size on equilibrium leverage is more ambiguous. Larger firms tend to be more diversified and fail less often, so size (computed as the logarithm of net sales) may be an inverse proxy for the probability of bankruptcy. If so, size should have a positive impact on the supply of debt. However, size may also be a proxy for the information outside investors have, which should increase their preference for equity relative to debt. This aberrant behaviour of firms is evidenced in Faulkender and Petersen (2006: 58). They argue that larger firms are less risky and more diversified, and therefore the probability of distress and the expected costs of financial distress are lower. They may also have lower issue costs (owing to economies of scale), which would suggest that they have higher leverage. However, in their study Faulkender and Petersen (2006) found that larger firms are less leveraged, and that the magnitude of this effect is not small.

To summarise the empirical evidence, it would seem that large firms are more inclined to issue debt as opposed to small firms. Notwithstanding this prediction, it could be conjectured that capital structure decisions are not cast in stone. As such, the aberration in the behaviour of large firms in crafting their financing policy can be explicable in terms of the abundance of capital structure choices with which they find themselves.

2.3.2 Asset tangibility

As companies grow, they accumulate more and more tangible assets. Tangible assets, such as property, plant and equipment, are easier for outsiders to value than intangibles, such as the value of goodwill from an acquisition, and this lowers expected

distress costs (Frank & Goyal, 2009: 9). Further, according to Rajan and Zingales (1995: 1451), if a large fraction of a firm's assets is tangible, assets should serve as collateral, diminishing the risk of the lender suffering the agency costs of debt (such as risk shifting). Assets should also retain more value in liquidation. Therefore, the greater the proportion of tangible assets on the balance sheet (fixed assets divided by total assets), the more willing lenders should be to supply loans, and the higher leverage should be. In addition, tangibility makes it difficult for shareholders to substitute high-risk assets for low-risk ones. The lower expected costs of distress and fewer debt-related agency problems predict a positive relation between tangibility and leverage. Moreover, these tangible assets can be pledged as collateral when borrowing from financial institutions.

As such, it is expected from a trade-off theory perspective that as companies grow, they will borrow more by dint of having more tangible assets to pledge as collateral, in order to enjoy the debt interest tax shield. This view is espoused by Antoniou *et al.* (2008: 63), who contend that in the case of bankruptcy, tangible assets are more likely to have a market value, while intangible assets will lose their value. Therefore, the risk of lending to firms with higher tangible assets is lower and, hence, lenders will demand a lower risk premium. Therefore, there is presumed to be a positive relationship between leverage and asset tangibility. In addition, Harris and Raviv (1990: 323) contend that firms with higher liquidation value, for example those with tangible assets, will have more debt, will have a higher-yield debt and will be more likely to default, but will have higher market value than similar firms with lower liquidation value, whereas the pecking order theory predicts an inverse relationship between firm leverage and asset tangibility. This can be attributed to low information asymmetry associated with tangible assets, making equity issuances less costly. Therefore, leverage ratios should be lower for firms with higher tangibility (Frank & Goyal, 2009: 9).

On the one hand, the positive firm leverage-asset tangibility prediction finds empirical support from Faulkender and Petersen (2006: 57) and Antoniou *et al.* (2008: 73), among other scholars. On the other hand, Bradley *et al.* (1984: 874), Ahmad and Abbas (2011: 208) and Al-Najjar and Hussainey (2011: 333) report an inverse relationship

between firm leverage and asset tangibility. The dichotomy in the predictions can perhaps be explained by the observation that the determination of the capital structure of a firm is as a result of the interplay of many factors that are not necessarily mutually exclusive.

2.3.3 Profitability

From the pecking order theory vantage point, highly profitable firms are expected to employ more and more internal resources to finance the firms at the expense of using debt or floating shares. Profitability is associated with the availability of internal funds and therefore may be associated with less leverage in terms of the pecking order theory (Baker & Wurgler, 2002: 7). Therefore, firm leverage is negatively associated with profitability.

Bartoloni (2013) found evidence to lend credence to the inverse firm leverage-profitability nexus. He found that more profitable firms tend to use internal finance more, as implied by the negative relationship linking a firm's debt ratio and return on sales. In addition, he reasons that the role of a firm's profitability in reducing the need for external finance characterises all firms, regardless of size as measured by employment, although large firms show a lower sensitivity of leverage to profit variations. This prediction is also supported by the empirical evidence found by Shyam-Sunder and Myers (1991: 221), Rajan and Zingales (1995: 1457), Booth *et al.* (2001: 117), Hovakimian *et al.* (2001: 3), Faulkender and Petersen (2006: 57), Utrero-González (2007: 22), Antoniou *et al.* (2008: 67), Frank and Goyal (2009: 26), Ahmed *et al.* (2010: 10), Ahmad and Abbas (2011: 209), Al-Najjar and Hussainey (2011: 334) and Lemma and Negash (2014: 81), among other scholars.

Contrarily, the trade-off theory predicts a positive relationship between firm leverage and profitability. From the trade-off vantage point, highly profitable firms are expected to make use of more and more debt in order to benefit from the debt interest tax shield and maximise the value of the firm. According to Hovakimian *et al.* (2004: 523), the positive firm leverage-profitability association may arise for a number of reasons. For example,

other things being equal, higher profitability implies potentially higher tax savings from debt, lower probability of bankruptcy and potentially higher overinvestment, all of which imply a higher target debt ratio. This view is buttressed by Myers (2001: 89), who asserts that high profitability means that the firm has more taxable income to shield and that the firm can service more debt without risking financial distress.

Notwithstanding the foregoing, it is plausible to conjecture that both predictions of the pecking order and trade-off theories are admissible, as they have been supported by empirical findings by equal measure. However, it is instructive to posit that the predictions complement rather than outwit each other. This was perhaps demonstrable in the study by Hovakimian *et al.* (2004: 534), who suggest that their results on profitability could be reflecting an interaction of trade-off and pecking order considerations. They observed that specifically, if firms have target debt ratios but also prefer internal funds to external financing, the tendency to issue debt when operating performance is high, as implied by the target leverage hypothesis, will be tempered by the preference for (and availability of) internal financing. The tendency to issue equity when operating performance is poor will be reinforced by the lack of internal funds, forcing the firm to seek external equity financing.

2.3.4 Growth

Frank and Goyal (2009: 8) contend that growth increases the costs of financial distress, reduces free cash flow problems and exacerbates debt-related agency problems. Growing firms place a greater value on stakeholder co-investment. Therefore, the trade-off theory predicts that growth reduces leverage. Antoniou *et al.* (2008: 62) posit that a negative relation is expected between growth opportunities and leverage for two main reasons. Firstly, according to the trade-off theory, the cost of financial distress increases with expected growth, forcing managers to reduce the debt in their capital structure. Secondly, in the presence of information asymmetries, firms issue equity instead of debt when overvaluation leads to higher expected growth. Antoniou *et al.* (2008) further observed, however, that internal resources of growing firms may not be sufficient to finance their positive NPV investment opportunities and, hence, they may have to raise external capital. In essence, if firms require external finance, they issue debt before

equity according to the pecking order theory. Therefore, growth opportunities and leverage are positively related in terms of the pecking order theory.

Empirical support in favour of the negative firm leverage-growth prediction is found in the studies by Rajan and Zingales (1995: 1455), Hovakimian *et al.* (2001: 22), Barclay and Smith (2005: 13) and Antoniou *et al.* (2008: 86), among other studies. However, empirical support for the positive firm leverage-growth prediction is found in the studies by Ahmed *et al.* (2010: 10), Ahmad and Abbas (2011: 208) and Al-Najjar and Hussainey (2011: 333).

2.3.5 Debt tax shield

Taxes and the costs of financial distress were the first major frictions considered in determining optimal capital ratios (Berger *et al.*, 1995: 395). Berger *et al.* (1995) also contend that because interest payments are tax-deductible, but dividends are not, substituting debt for equity enables firms to pass greater returns to investors by reducing payments to the government. The trade-off theory predicts a positive relationship between firm leverage and effective tax rate. As such, high tax rates increase the interest tax benefits of debt.

The trade-off theory predicts that to take advantage of higher interest tax shields, firms will issue more debt when tax rates are higher (Frank & Goyal, 2009: 9). Debt is advantageous for tax reasons. The net tax advantage of debt is the difference between the corporate tax advantage of debt (interest is corporate tax-deductible) and the personal tax disadvantage of debt (Dangl & Zechner, 2004: 184).

According to Rasiah and Kim (2011: 154), the most significant reason that prompt firms to raise debts are due to the tax shield that results from the tax savings generated by making interest payments on debt. They suggest that as a result, by using debt, the estimated tax liability of firms could be deducted, thereby increasing their after-tax cash flow, causing more lucrative firms to utilise higher levels of debt for the sake of increasing their debt tax shield. The firm's tax shield from debt is the present value of tax savings created by paying tax-deductible interest payments on debt instead of dividend payments made to shareholders. As such, Faulkender and Petersen (2006:

60) argue that firms with higher marginal tax rates prior to the deduction of interest expenditures should have higher interest tax shields and therefore more leverage.

From the pecking order theory vantage point, a negative relationship is expected to subsist between firm leverage and the effective tax rate. All things being equal, a higher effective tax rate also reduces the internal funds of profitable firms, and subsequently increases the cost of capital (Rasiah & Kim, 2011: 157). As a result, an expectation for the negative relationship between the effective tax rate and leverage ratio is created within the framework of the pecking order model.

The empirical evidence that lends credence to the positive firm leverage-effective tax rate prediction can be found in the study by Booth *et al.* (2001: 97), among other studies. However, Fama and French (1998: 841) did no find evidence that debt has any net tax advantage. Notwithstanding, when they included the simulated marginal (pre-interest income) tax rates, they found a negative and not a positive coefficient. They reason that this could be as a result of employing a different proxy for the debt ratio. For instance, when they employed an alternative proxy for leverage and made use of the long-term debt-to-market value of assets, the coefficient becomes positive. Suffice to highlight that the empirical results may not conform to *a priori* expectations as a result of the sensitivity of the regression to the proxy chosen to represent either the debt or the tax variables.

2.3.6 Non-debt tax shield

The non-debt tax shield prediction is principally a departure from the trade-off theory view of firm leverage. It was advanced by DeAngelo and Masulis (1980: 27) based on the model advanced by Miller (1977), which incorporated personal income tax as a determinant of capital structure. They conjecture that tax deductions for depreciation and investment tax credits can be considered as substitutes for the tax benefits of debt financing. These features can lead to market equilibrium, where each firm has an interior optimal leverage (Antoniou *et al.*, 2008: 64). Therefore, it seems that firm leverage is also determined by intangible assets such as depreciation, which substitute the benefits derived from debt interest tax shield.

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The *a priori* expectation from a trade-off theory premise therefore is that firm leverage is inversely associated with non-debt tax shield. Non-debt tax shield proxies – that is, net operating loss carried forward, depreciation expense and investment tax credits – should be negatively related to leverage (Frank & Goyal, 2009: 9). Accordingly, firms with higher amounts of non-debt tax shields will have lower debt levels. Moreover, it would seem that higher corporate tax levels tend to favour the use of debt, while non-debt tax shields such as depreciation deductions can be used as substitutes for debt tax advantage and therefore reduce the leverage level of firms (Utrero-González, 2007: 483). Therefore, a firm's motivation to borrow declines with an increase in non-debt tax shields (Antoniou *et al.*, 2008: 64).

The empirical results in support of the inverse firm leverage non-debt tax shield prediction are somewhat mixed. Empirical support for this prediction is found in the studies by Antoniou *et al.* (2008: 80) and Lim (2012: 198), among other studies. To the contrary, according to Barclay and Smith (2005: 15), studies that examine the effect of non-debt tax shields (depreciation, tax loss carried forward and investment tax credits) on corporate leverage have found that companies with more non-debt tax shields appear to have, if anything, more debt in their capital structures. For instance, such anomalous behaviour of firms is reported by Bradley *et al.* (1984: 877). They found evidence of a strong direct relation between firm leverage and the relative amount of non-debt tax shields. This contradicts the theory that focuses on the substitutability between non-debt and debt tax shields. In addition, they reason that a possible explanation is that non-debt tax shields are an instrumental variable for the securability of the firm's assets, with more securable assets leading to higher leverage ratios.

2.3.7 Age

Age is one of the most important factors that determine the capital structure of firms. The age of a firm is intricately linked to other determinants of capital structure as well. For instance, on one hand, older firms are expected to be profitable and hence have more internal resources at their disposal. The dictate would therefore be to follow the financial hierarchy and finance out of retained earnings first. On the other hand, older firms are expected to have generated a reputation in the debt market and hence can be

evaluated favourably. Notwithstanding the abundance of free cash flow, conventional wisdom dictates that older firms seek financing from the debt markets first. Therefore, the prediction is that firm leverage is positively related to age.

Proponents of the 'reputational view' include Harris and Raviv (1991: 305). They assert that the longer the firm's history of repaying its debt, the better its reputation and the lower its borrowing cost. Older, more established firms find it optimal to choose the safe project, that is, to not engage in asset substitution to avoid losing a valuable reputation. Young firms with little reputation may choose the risky project. If they survive without a default, they will eventually switch to the safe project. As a result, firms with long track records will have lower default rates and lower costs of debt than firms with brief histories.

Ramjee and Gwatidzo (2012: 61) espouse the foregoing. They contend that there is no agreement on the impact of age on leverage in the literature. For example, age can be used as a proxy for reputation. In this reputational role, older firms tend to have acquired sufficient reputation to access debt markets; therefore, one would expect a positive relationship between age and leverage. However, it may also be the case that firms that survive are those that are more profitable. In line with the pecking order theory, older, more profitable firms tend to use internal funds rather than debt; therefore, in this case, one can expect a negative relationship between age and leverage.

The empirical evidence regarding the firm leverage-age prediction appears to be mixed. Among other scholars, Johnson's (1997: 58) results conform to the *a priori* expectation of a positive relationship between firm leverage and the age variable. To the contrary, Ahmed *et al.* (2010: 10), Huynh and Petrunia (2010: 1007) and Ramjee and Gwatidzo (2012: 61), among other scholars, report a negative relationship.

2.3.8 Risk

In finance parlance, risk is defined as the probability of a loss occurring, resulting in the impairment of earnings. In the context of firm financing, risk measures the volatility of the cash flows or earning prospects of a firm. The trade-off theory predicts a negative relationship between firm leverage and risk. In other words, a firm that has highly

volatile cash flows must avoid debt financing. The intuition behind this is that highly volatile cash flows could result in financial distress. As such, to avoid going bankrupt, firms with high levels of volatile cash flows must desist from debt financing.

According to Antoniou *et al.* (2008: 64), firms with high earnings volatility carry a risk of the earnings level dropping below their debt-servicing commitments. Such an eventuality may result in rearranging the funds at a high cost or facing the risk of bankruptcy. Therefore, firms with highly volatile earnings should have lower debt capital. This view is bolstered by Frank and Goyal (2009: 9). They postulate that firms with more volatile cash flows face higher expected costs of financial distress and should use less debt. More volatile cash flows reduce the probability that tax shields will be fully utilised.

The pecking order theory, however, predicts a positive relationship between firm leverage and risk. This ought to be premised on the notion that the volatility of cash flows implies the volatility of earnings. As such, the firm becomes constrained to finance out of retained earnings. It would therefore have to seek funding from the external markets, starting off with the debt market, to avoid the problem of adverse selection. In synch with this view, Frank and Goyal (2009: 9) assert that firms with volatile shares are expected to be those about which beliefs are quite volatile. It would seem plausible that such firms suffer more from adverse selection. If so, the pecking order theory would predict that riskier firms have higher leverage. Frank and Goyal (2009) further suggest that firms with volatile cash flows might need to periodically access the external capital markets.

Ahmed *et al.* (2010: 10) found a positive relationship between capital structure and risk of insurance companies. They contend that the debt ratio increases with the increase of claim ratio of Pakistan insurance companies, while Al-Najjar and Hussainey (2011: 335) report a negative relationship between firm leverage and risk. They studied a sample of UK firms and their results show that there is a negative relationship between firms' risk and capital structure. They aver that firms with high risk will tend to have a higher risk of default and less access to debt financing.

2.3.9 Dividend policy

The interaction of dividend policy and firm leverage can be explained in two ways. Firstly, signalling is one mechanism by which dividend policy filters into the capital structure decision. Increased dividends signal increased future earnings, and so the firm's cost of equity will be lower, favouring equity to debt. To the contrary, a dividend cut might signal financial distress and send out a negative sentiment to the equity market. Therefore, from the signalling theory perspective, firm leverage is anticipated to be inversely related to the dividend payout ratio.

Secondly, from the premise of the contracting cost theory, one way to attenuate the free cash flow problem of overinvestment is to increase the dividend payout ratio. Similarly, to mitigate the problem of suboptimal investment, the firm can pursue a restrictive dividend policy and thereby reduce its dividend payout ratio. In the former case, the firm is constrained to access more debt and in the latter case the firm is liberated to seek more debt.

Antoniou *et al.* (2008: 80) report an inverse relation between leverage and dividends in the USA. They assert that this supports the view that dividend payments signal a firm's future performance, and therefore high dividend-paying firms benefit from a lower equity cost of capital. Lemma and Negash (2014: 81) also found an inverse relationship between firm leverage and dividend payout ratio based on a study of firms drawn from nine developing economies in Africa, namely Botswana, Egypt, Ghana, Kenya, Mauritius, Morocco, Nigeria, South Africa and Tunisia.

2.3.10 The major predictions of trade-off theory versus the pecking order theory

A summary of the major predictions by the two 'contestant' theories, namely the pecking order and trade-off theories, is given in Table 2.2. Suffice to highlight that the predictions are divergent. In the next section the empirical studies that have been conducted to test the capital structure theories are considered.

Table 2.2: The predictions of the pecking order theory versus the trade-off theory

Variable Theory	Size	Profitability	Asset tangibility	Growth	Debt tax shield	Non-debt tax shield	Risk
Pecking order	Positive	Negative	Negative	Positive	Negative	No prediction	Positive
Trade-off	Positive	Positive	Positive	Negative	Positive	Negative	Negative

Source: Sibindi (2016:232)

2.4 EMPIRICAL STUDIES

Extant empirical studies on capital structure focus on (1) whether firms have a target capital structure, (2) evidence of capital structures of firms in developed countries and (3) evidence of capital structures in developing countries. These are considered in turn.

2.4.1 Do firms have a target capital structure?

The static trade-off theory has managers seeking optimal capital structure (Shyam-Sunder & Myers, 1999: 226). These scholars posit that random events would cause managers to drift away from the optimal capital structure, and they would then have to work back gradually. If the optimum debt ratio is stable, a mean-reverting behaviour towards this target capital structure would be expected. The first caveat was perhaps aptly put by Flannery and Rangan (2008: 407), who observed that in a frictionless world, firms would always maintain their target leverage. However, transaction costs may prevent immediate adjustment to a firm's target, as the firm trades off adjustment costs against the costs of operating with a suboptimal debt ratio. The second caveat is enunciated by Barclay and Smith (2005: 15). They contend that even if managers set

target leverage ratios, unexpected increases or shortfalls in profitability, along with occasional attempts to exploit financing 'windows of opportunity', can cause companies to deviate from their targets. In such cases, there will be what amounts to an optimal deviation from those targets – one that depends on the transaction costs associated with adjusting back to the target relative to the (opportunity) costs of deviating from the target.

This section first delves into empirical studies on the existence of a target capital structure before it considers the empirical evidence of the determinants of the speed of adjustment towards the target capital structure. Firstly, Elsas *et al.* (2014: 1380) evaluated US firms' leverage determinants by studying how firms paid for 2 073 very large investments between 1989 and 2006. They found strong evidence consistent with target adjustment behaviour for their sample firms. First, they found that the type of securities issued to finance a large investment significantly depends on the deviation between a firm's target and actual leverage. Overleveraged firms issue less debt and more equity when financing large projects, and vice versa. This result holds for a variety of methods for estimating leverage targets. Second, they demonstrated that firms making large investments converge unusually rapidly towards target leverage ratio.

Secondly, Flannery and Rangan (2006: 471) employed a sample of US firms (excluding financial firms and regulated utilities) included in the Compustat industrial annual tapes between the years 1965 and 2001. Their evidence indicates that firms do target a long-run capital structure, and that the typical firm converges towards its long-run target at a rate of more than 30% per year. In addition, they aver that this adjustment speed is roughly three times faster than many existing estimates in the literature, and affords targeting behaviour an empirically important effect on firms' observed capital structures. They also contend that target debt ratios depend on well-accepted firm characteristics. Firms that are underleveraged or overleveraged by this measure soon adjust their debt ratios to offset the observed gap.

Thirdly, Leary and Roberts (2005: 2577), by utilising a sample of non-financial and non-utility firms listed on the annual Compustat files for the years 1984 to 2001, performed a non-parametric analysis of the leverage response of equity-issuing firms, and also

examined the impact of introducing adjustment costs into their empirical framework. They found that firms are significantly more likely to increase (decrease) leverage if their leverage is relatively low (high), if their leverage has been decreasing (accumulating), or if they have recently decreased (increased) their leverage through past financing decisions. This is consistent with the existence of a target range for leverage, as in the dynamic trade-off model.

Fourthly, Hovakimian *et al.* (2004: 520), using annual firm-level data from the Compustat industrial, full coverage and research files for all US firms (and also excluding financial firms) for the years 1982 to 2000, found evidence consistent with a hybrid hypothesis that firms have target debt ratios but also prefer internal financing to external funds. They also found that profitability has no effect on target leverage.

Fifthly, Hovakimian *et al.* (2001) tested for the existence of a target debt level by employing firm-level data of US firms from the 1997 Standard and Poor's Compustat annual files (including the research file) for the 1979–1997 period. They also excluded financial firms. They found that specifically, when firms either raise or retire significant amounts of new capital, their choices move them towards the target capital structures suggested by the static trade-off models, often more than offsetting the effects of accumulated profits and losses (Hovakimian *et al.*, 2001: 22). They further suggest that the tendency of firms to make financial choices that move them towards a target debt ratio appears to be more important when they choose between equity repurchases and debt retirements than when they choose between equity and debt issuances.

From the foregoing it is impelling to suggest that there exists a target capital structure that each firm seeks to achieve. It would seem that it is a target range and firms seek to operate within this target range. The attainment of this target is also dependent on firm-level characteristics. Having established that there is compelling evidence for the existence of a target capital structure, the main focus of empirical studies on firm leverage has changed to investigating the determinants of the speed of adjustment towards the target debt ratio. The main determinants of the speed of adjustment that have been cited in literature are size, the cost of adjustment, the distance between observed leverage and target leverage and growth.

Antoniou *et al.* (2008: 83) employed a sample comprising of all non-financial firms, traded in the major stock exchanges of the five major economies of the world – France, Germany, Japan, the UK and the USA – from 1987 to 2000. Using dynamic models of estimation, such as a two-step syst-GMM procedure, they found evidence that reveals the presence of dynamism in the capital structure decisions of firms operating in the Group of 5 countries. They contend that managers assess the trade-off between the cost of adjustment and the cost of being off target. Therefore, the speed at which they adjust their capital structure may crucially depend on the financial systems and corporate governance traditions of each country.

Mukherjee and Mahakud (2010: 261) studied the dynamics of capital structure in the context of Indian manufacturing companies in a partial-adjustment framework during the period 1993/1994–2007/2008. They considered all the companies available in the PROWESS database. They found strong evidence of a positive relationship between the speed of adjustment and the distance variable. They reason that this result confirms the idea that the firm's cost of maintaining a suboptimal debt ratio is higher than the cost of adjustment and that the fixed costs of adjustments are not significant. Therefore, the firms that are sufficiently away from their target leverage always want to reach the optimal very quickly. A positive relationship was also found between size of the firm and the adjustment speed. They contend that this result lends support to the hypothesis that for large firms the adjustment costs are relatively lesser than for small firms due to the less asymmetric information. Therefore, the adjustment speed to the target leverage ratio has been more for large firms than small firms. Furthermore, they also found evidence that firms with higher growth opportunities adjust faster towards their target leverage. This confirms the *a priori* expectation that a growing firm may find it easier to change its capital structure by altering the composition of new issuances.

Lastly, Öztekin and Flannery (2012:108) estimated a standard partial adjustment model of leverage for firms in 37 countries during the period 1991–2006. They found that the mean adjustment speed is approximately 21% per year with a half-life of three and two years for book and market leverage, respectively, but that the estimated adjustment speeds vary from 4% (in Columbia) to 41% (in New Zealand) per year. In terms of the

half-life of adjustment, the mean speed implies three years, and the range varies between one and a half and 17 years. As such, they reject the constraint that firms in all countries have the same adjustment speed. They reason that variation in leverage adjustment speeds must reflect something about the costs and benefits of moving towards target leverage. They further conjecture that the effectiveness of a country's legal, financial and political institutions is systematically related to cross-country differences in adjustment speeds. Moreover, their results suggest that higher aggregate adjustment costs reduce estimated adjustment speed by roughly 12% of the average country's adjustment speed, even after they account for adaptations to firm characteristics that tend to raise adjustment speeds. As such, they contend that evidence that adjustment speeds vary plausibly with international differences in important financial system features provides support for the applicability of a partial adjustment model of leverage adjustment to private firms.

In the final analysis it would seem that firms set a target debt ratio. They gravitate towards this target ratio. It could be that they operate within a target range of this ratio. Notwithstanding the quest to operate within this target range, there are some factors that can aid or militate against this objective. For instance, the prohibitive adjustment costs can hinder firms from rebalancing their debt ratio should it fall outside the optimum range. In the next section the empirical studies that have been conducted on the determinants of capital structure in the developed world are considered.

2.4.2 Empirical evidence of capital structures of firms in developed countries

Extant studies conducted on capital structure policies of firms have sought to test the practical efficacy of capital structure theories – the main 'contestants' being the pecking order theory and the trade-off theory. These studies have further sought to establish the firm-level determinants of capital structure. It is trite to highlight that there is every reason to discern between developed countries and developing countries in a review of empirical studies on firm financing behaviour, as it is believed that the nature of frictions in developing countries is dissimilar to those found in developing markets.

Titman and Wessels (1988: 2) employed a sample of manufacturing firms in the USA found on the Compustat database for the period 1974–1982. Their results suggest that firms with unique or specialised products have relatively low debt ratios. The proxies they employed for uniqueness are the firms' expenditures on research and development, selling expenses and the rate at which employees voluntarily leave their jobs. They also found that smaller firms tend to use significantly more short-term debt than larger firms. However, they aver that their model explains virtually none of the variation in convertible debt ratios across firms and they found no evidence to support theoretical work that predicts that debt ratios are related to a firm's expected growth, non-debt tax shields, volatility or the collateral value of its assets. Notwithstanding, they found some support for the proposition that profitable firms have less debt relative to the market value of their equity.

Using international data from Group of 7 (G7) countries for the period 1987–1991, Rajan and Zingales (1995: 1421) investigated the determinants of capital structure choice by analysing the financing decisions of public firms in the major industrialised countries. They found that at an aggregate level, firm leverage is fairly similar across the G7 countries. In addition, they found that factors identified by previous studies, as correlated in the cross-section with firm leverage in the USA, are similarly correlated in other countries as well. Specifically, they found that profitability and market-to-book value have a negative impact on capital structure, whereas asset tangibility and firm size have a positive effect on capital structure.

The reliability of the pecking order theory, among other theories, was tested by Frank and Goyal (2003: 217). Their test was conducted on a broad cross-section of publicly traded US firms for the period 1971–1998. They report that, contrary to the pecking order theory, net equity issues track the financing deficit more closely than do net debt issues. While large firms exhibit some aspects of pecking order behaviour, the evidence is neither robust to the inclusion of conventional leverage factors, nor to the analysis of evidence from the 1990s. Financing deficit is less important in explaining net debt issues over time for firms of all sizes. They also contend that in contrast to what is often suggested, internal financing is not sufficient to cover investment spending on average.

Instead, they found that external financing is heavily used. They also found evidence that debt financing does not dominate equity financing in magnitude.

The two 'contestant' theories of capital structure (pecking order theory and trade-off theory) were pitied against each other by Shyam-Sunder and Myers (1999: 221). They examined the financing behaviour of 157 US firms listed on the Compustat database (excluding financial firms and regulated utilities) for the period 1971–1989. They found that a simple pecking order model explains much more of the time-series variance in actual debt ratios than a target adjustment model based on the static trade-off theory. Moreover, they demonstrate that the pecking order hypothesis can be rejected if actual financing follows the target-adjustment specification. They further assert that on the other hand, this specification of the static trade-off hypothesis will appear to work when financing follows the pecking order. They reason that this false positive results from time patterns of capital expenditures and operating income, which create mean-reverting debt ratios even under the pecking order. As such, they posit that they have grounds to reject the pecking order, but not the static trade-off specification. Finally, they conclude that the pecking order is a much better first-cut explanation of the debt-equity choice, at least for the mature, public firms in their sample.

Frank and Goyal (2009: 1) examined the relative importance of many factors in the capital structure decisions of publicly traded US firms from 1950 to 2003. They found that the most reliable factors for explaining market leverage are median industry leverage, market-to-book assets ratio, tangibility, profits, log of assets and expected inflation. Market-book-value (the growth variable) and profitability were found to be inversely related to leverage. On the other hand, tangibility, median industry leverage, log of assets (size variable) and inflation were found to be directly (positively) associated with firm leverage. Further, they found that dividend-paying firms tend to have lower leverage. When considering book leverage, somewhat similar effects are found. However, for book leverage, the impact of firm size, the market-to-book ratio and the effect of inflation were found not to be reliable. They assert that their empirical evidence seems reasonably consistent with some versions of the trade-off theory of capital structure.

More recently, the profit-leverage conundrum has been revisited by Frank and Goyal (2015: 1448). The evidence they lead tilt the scale in favour of the trade-off theory. Following from other studies on capital structure, they made use of a sample of non-financial firms found on the Compustat database for the period 1971–2009. Their results suggest that more profitable firms really do borrow more and not less. Further, their evidence points to more profitable firms repurchasing their own equity. They experience an increase in both the book value of equity and the market value of equity. Less profitable firms tend to reduce their debt and to issue equity. They also found evidence that firm size and market conditions also matter. Larger firms tend to be more active in the debt markets, while smaller firms tend to be relatively more active in the equity markets. During good times there is more use of external financing.

Frank and Goyal (2015: 1448) further posit that the usual profits-leverage puzzle result is primarily driven by the increase in equity that is experienced by the more profitable firms. They reason that the puzzle should be restated as asking: Why do firms not take sufficiently large offsetting actions to fully undo the change in equity? What limits the magnitudes of the typical leverage response to profit shocks? They assert that in a frictionless model the partial response appears puzzling. They contend that there is good empirical reason to believe that rebalancing entails both fixed and variable costs and that firm size matters. The rebalancing costs can be fully avoided by doing nothing. Accordingly, the firm must decide whether any given shock is big enough to be worth responding to. If it is, then the firm must decide how big a response is called for.

The empirical evidence on the capital structures of firms in the developed countries that was reviewed in this section was inconclusive. Notwithstanding, the trade-off and pecking order theories have been demonstrated to be reliable in explaining firm financing behaviour in the developed countries.

2.4.3 Empirical evidence of capital structures of firms in developing countries

Gwatidzo and Ojah (2009:1) investigated corporate capital structure in Africa by employing a panel of listed non-financial firms in Ghana, Kenya, Nigeria, South Africa and Zimbabwe. They paid particular regard to the extent to which firm characteristics

and cross country institutional differences determine the way firm raise capital. Their results indicated that African firms are as about leveraged as firms in emerging economies such as Mexico, Thailand, Brazil, South Korea, Malaysia and Turkey. They also found evidence supportive of the pecking order theory among Africa's listed firms, with most of them relying heavily on internal finance. Further, their results also documented that country-specific factors play a role in determining corporate leverage.

Mukherjee and Mahakud (2010: 250) investigated the dynamics of capital structure in the context of Indian manufacturing companies in a partial-adjustment framework during the period 1993/1994–2007/2008. They applied a partial-adjustment model and used the generalised method of moments (GMM) technique to determine the variables that affect the target capital structure and the factors affecting the adjustment speed to target capital structure. They found firm-specific variables such as size, tangibility, profitability and market-to-book ratio to be the most important variables that determine the target capital structure across the book and market leverage. Further, they found that factors such as size of the firm, growth opportunity and the distance between the target and observed leverage determine the speed of adjustment to target leverage for these Indian manufacturing companies. They argue that their overall results are consistent with the dynamic trade-off theory of capital structure.

Ramjee and Gwatidzo (2012: 52) employed a dynamic model to investigate the capital structure determinants for 178 firms listed on the Johannesburg Stock Exchange (JSE) for the period 1998–2008. The sample of firms was also used to examine the cost and speed of adjustment towards a target debt ratio. They analysed the speed of adjustment towards the target debt ratio by estimating a system of GMM. Further, they also examined the determinants of target capital structure for South African listed firms. Their results suggest that a target debt-equity ratio does exist for South African firms. In addition, they also found that these firms bear greater transaction costs when adjusting to a target debt ratio than to a target long-term debt ratio. However, they do adjust to their target ratios relatively quickly.

Their study also reveals that firms with a larger proportion of tangible assets have higher debt ratios, more profitable firms operate at lower levels of leverage, larger firms

operate at higher levels leverage, and fast-growing firms prefer debt to equity when raising funds. Further, they found that when firms require finance, they prefer internal to external sources of finance. They reason that these firms seem to take into account the trade-off between the costs and benefits of debt when making financing decisions. The evidence that they lead suggests that the capital structure decisions of South African listed firms follow both the pecking order and the trade-off theories of capital structure.

Chipeta, Wolmarans and Vermaak (2012: 171) investigated the dynamics of firm leverage within the context of a transition economy of South Africa. They employed a sample consisting of non-financial firms that were listed on the JSE before and after the financial liberalisation phase. They utilised the I-Net Bridge database to source audited income statements, balance sheets and financial ratios for a sample of firms that operated from 1989 to 2007. Their data were split between the two regimes, namely the pre-liberalisation period (1989–1994) and the post-liberalisation period (1995–2007). Their results confirm the predictions of most the theories of capital structure.

For the pre-liberalisation period, on the one hand, they report an inverse relationship between firm leverage and the profitability and size variables. On the other hand, they found a positive relationship between firm leverage and the tax variable. Further, for the post-liberalisation period they found that on the one hand, firm leverage is positively associated with the size, growth and dividend payout variables. On the other hand, firm leverage was found to be negatively related to the profitability, tax and asset tangibility variables. Moreover, they found that the empirical relationship between the firm-specific determinants of capital structure and leverage is statistically stronger for the post-liberalised regime than the pre-liberalised era. The same holds for the coefficient on the target leverage. They reason that this confirms their conjecture that transaction costs are lower in a post-liberalised regime.

The dynamics of capital structure adjustment speeds for financially constrained and unconstrained South African listed non-financial firms across the business cycle were examined by Auret, Chipeta and Krishna (2013:75). They established that macroeconomic conditions affect the speed at which South African firms adjust toward their target capital structures. Their results documented evidence that although not

overwhelming, firms adjust faster in unfavourable macroeconomic states, suggesting that the cost of deviating from optimum leverage are higher in such conditions and that firms adjust faster in order to avoid such costs. Their results were also indicative that financial constraints affect adjustment behaviour as adjustment speeds for the constrained and unconstrained samples differed in several aspects.

Lemma and Negash (2013b:1081) examined the role of institutions, macroeconomic conditions, industry and firm characteristics on firm's capital structure decision within the context of nine select African countries (Botswana, Egypt, Ghana, Kenya, Mauritius, Morocco, Nigeria, South Africa and Tunisia). They utilised a sample of 986 firms over the period 1999 to 2008 and applied a series of models that link institutional, macroeconomic, industry and firm-specific characteristics on the one hand and measures of capital structure on the other. The syst-GMM and seemingly unrelated regression were used to estimate the models. They established that the legal and financial institutions, income level of the country in which a firm operates, the growth rate of the economy and inflation matter in capital structure choices of firms. Their results also suggested that probability of default, agency cost, market timing, financing needs and access to finance, firm's investment opportunities and quality of law enforcement have a central role in the determination of capital structure of firms.

Lemma and Negash (2014: 64) also examined the role of institutional, macro-economic, industry and firm characteristics on the adjustment speed of corporate capital structure within the context of developing countries. They utilised a sample of 986 firms drawn from nine developing countries in Africa (as mentioned in Section 2.3.9) over a period of ten years (1999–2008). Their study applied a dynamic partial adjustment model that links capital structure adjustment speed and institutional, macro-economic and firm characteristics. Their analysis was carried out using syst-GMM. They found evidence that firms in developing countries temporarily deviate from (and partially adjust to) their target capital structures. Their results also indicate that more profitable firms tend to rapidly adjust their capital structures than less profitable firms. They also found that the effects of firm size, growth opportunities and the gap between observed and target leverage ratios on adjustment speed are functions of how one measures capital

structure. Further, they also established that adjustment speed tends to be faster for firms in industries that have relatively higher risk and countries with common-law tradition, less developed stock markets, lower income and weaker creditor rights protection. They reason that their evidence reveals that the capital structure of firms in developing countries not only converges to a target, but also faces varying degrees of adjustment costs and/or benefits in doing so. This suggests not only that dynamic trade-off theory explains capital structure decisions of firms, but also rules out the dominance of information asymmetry-based theories within the context of firms in developing countries.

Empirical work on firm financing behaviour within the context of South Africa has increased tremendously over the years. Other such studies that have examined the capital structure phenomena include: Chipeta (2016); Chipeta and Mbululu (2013); Chipeta, Wolmarans and Vermaak (2013); Gwatidzo and Ojah (2014); Lemma (2015); Lemma and Negash (2011, 2012, 2013a) and Marandu and Sibindi (2016).

On the balance of evidence that was presented in this section, arguably the trade-off and pecking order theories can best predict firm financing in the developing countries. The two theories complement each other in explaining the capital structures of firms in the developing countries.

2.5   CONCLUSION

The discussions in this chapter have been anchored on capital structure theory and a review of the empirical studies that have been conducted to interpret firm financing behaviour. The starting point was to review the MM irrelevance propositions. These were subsequently demonstrated not to hold in a world with frictions such as taxes and transactions costs. Further, the main theories of capital structure were considered. These are the trade-off, pecking order, signalling, market timing, agency cost, free cash flow and contracting cost theories. The major predictions as well as the limitations of these theories were articulated.

The firm-level determinants of capital structure that usually come to the fore in extant studies were documented. These are size, profitability, growth, asset tangibility

(collateral), debt tax shield, non-debt tax shield, risk, dividend policy and age. Their interaction with firm leverage was demonstrated. Suffice to highlight that in some instances, there is a dichotomy in the predictions by the major theories of capital structure. The 'horse race' is usually between the pecking order theory and the trade-off theory. To reconcile the predictions, it is imperative to highlight that the aforementioned theories complement rather than substitute one another in explaining the financing behaviour of firms. As such, the financing behaviour of firms reveals some element of dynamism.

A review of empirical studies on the existence of a target capital structure was conducted. In the main it was demonstrated that firms set a target ratio and actively seek to achieve it. There are a number of factors that might promote or deter firms from achieving this target. These are size, adjustment costs and the distance between the observed and target leverage.

Lastly, the financing behaviour of firms in both developed and developing countries was considered. Notwithstanding that the results are mixed, it seems that in the main firm financing behaviour is best explained by the pecking order and trade-off theories in both categories of countries.

The empirical studies that have been considered in this chapter have excluded financial firms from their analysis. The reasons that have been advanced are that financial firms are peculiar in the sense that they are regulated. As such, regulation is another friction that curtails firms in crafting their financial policy. The next chapter focuses on financial firm-specific determinants of capital structure and capital regulation. The hypotheses for this study are also developed in the next chapter.

CHAPTER 3

FINANCIAL FIRM-SPECIFIC DETERMINANTS OF CAPITAL STRUCTURE AND HYPOTHESES DEVELOPMENT

3.1   INTRODUCTION

The regulation of the financial sector is crucial to securing the sector and instilling discipline among the market participants. This is essential in fostering a financially sound and secure financial market. Reregulating the financial sector has become a policy imperative now more than ever before, in the aftermath of the 2007–2009 GFC. The questions that boggle the mind are: Is capital regulation effective? and Does financial regulation influence the capital structure choices of financial firms? This chapter seeks to probe and help resolve these central questions and stipulates the hypotheses that were developed for this study.

The rest of the chapter is organised as follows: Section 3.2 outlines the regulation of banks, paying particular regard to capital regulation and deposit insurance schemes. Section 3.3 discusses the regulation of insurance companies. Section 3.4 outlines financial regulation in South Africa. Section 3.5 considers the bank-specific determinants of capital structure. Section 3.6 reviews the determinants of capital structure of insurance companies. Section 3.7 develops the hypotheses for this study. Section 3.8 concludes the chapter.

3.2   THE REGULATION OF BANKS

The banking sector is critical to any economy by reason of its performance of the intermediation role. The main thrust of the financial regulation of banks is to ensure the safety and financial soundness of the banking sector. At worst, the financial problems bedevilling a banking institution could precipitate a bank run. The failure of a large bank, then, can cause psychological contagion, leading depositors to start runs on other banks (Hart & Zingales, 2011: 3). This is a situation whereby the depositors will 'panic' and withdraw their funds in anticipation of the bankruptcy and demise of their banking

institution. As the banking institutions are interconnected, the demise of one banking institution can result in a contagion effect, resulting in the distress of other banking institutions. Bank runs cause real economic problems because even 'healthy' banks can fail, causing the recall of loans and the termination of productive investment (Diamond & Dybvig, 1983: 402). Suffice to highlight that there is systemic risk posed by the failure of one banking institution. As such, monetary authorities have a vested interest in regulating the banking sector. Therefore, the attainment of a safe and financially sound banking sector is predicated on the establishment of an effective financial regulatory regime. The two approaches that are at the disposal of monetary authorities are the micro-prudential and the macro-prudential regulatory regimes. The former regime involves the bank regulator specifically tailoring an individualistic regulatory response for each banking firm, while the latter regime involves the bank regulator taking a holistic view of banking regulation and promulgating standardised regulations for the entire industry.

It is imperative to highlight that in the aftermath of the 2007–2009 GFC, monetary authorities have leaned towards the macro-prudential regime. Hanson, Kashyap and Stein (2011: 5) aver that in the simplest terms, one can characterise the macro-prudential approach to financial regulation as an effort to control the social costs associated with excessive balance sheet shrinkage on the part of multiple financial institutions hit with a common shock. This variant of macro-prudential regulation model focuses on two facets, namely financial soundness (prudential) and market conduct, hence it has become known as the 'twin-peaks' regulatory model. In essence, the GFC have led to a re-examination of risk-assessment practices and regulation of the financial system, with a renewed interest in systemic fragility and macro-prudential regulation. This requires a focus not on the risk of individual financial institutions, but on an individual bank's contribution to the risk of the financial system as a whole (Anginer, Demirgüç-Kunt & Zhu, 2014: 312).

Over the years, financial regulation of the banking sector has mainly been anchored on the twin pillars of capital regulation and the creation of a bank 'safety net', such as the

introduction of compulsory deposit insurance schemes. Various other instruments have been adopted for the regulation of the banking sector, including the government safety net, restrictions on asset holdings, capital requirements, chartering and bank examination, disclosure requirements, consumer protection and various remedies to promote competition (Jokipii & Milne, 2008: 1440). Traditionally, bank capital regulation has been thought of as a corollary to the introduction of deposit insurance (Hart & Zingales, 2011). The existence of this insurance makes debt a cheap source of financing for banks. Further, Hart and Zingales (2011) contend that depositors and other creditors will lend at low interest rates because they know that their debts are secure: They will be repaid by the bank if things go well and by the government if things go badly. Therefore, the standard view of capital regulation is that it offsets the risk-taking incentives provided by deposit insurance (Allen, Carletti & Marquez, 2011). Capital requirements, then, are a necessary evil to prevent banks from abusing the ability to borrow cheaply, dumping large losses onto taxpayers. Against this backdrop, bank capital regulation and deposit insurance are considered next in turn.

3.2.1   Bank capital regulation

The primary reason why banks hold capital is to absorb risk, including the risk of liquidity crunches, and to protect against bank runs and various other risks, most importantly credit risk (Berger & Bouwman, 2009: 3786). Capital is the main line of defence against negative shocks. For small banks, capital is important at all times because they face shocks more often than medium and large banks, and they have limited (and relatively costly) access to the financial market in the event of unanticipated needs (Berger & Bouwman, 2013: 155). As such, it is imperative that bank regulators ensure that the banks hold sufficient levels of capital by enacting bank capital regulations. According to Kashyap, Rajan and Stein (2008: 444), the traditional view of bank capital regulation rests on four premises. The first premise is that it is essential to protect the deposit insurer (and society) from losses due to bank failures given the existence of deposit insurance; when a bank defaults on its obligations, losses are incurred that are not borne by either the bank's shareholders or any of its other financial

claimholders. Therefore, Kashyap *et al.* (2008) reason that bank failures are bad for society, and that the overarching goal of capital regulation – and the associated principle of prompt corrective action – is to ensure that such failures are avoided.

The second premise is that of incentive alignment. Simply put, by increasing the economic exposure of bank shareholders, capital regulation boosts their incentives to monitor management and to ensure that the bank is not taking excessively risky or otherwise value-destroying actions. A corollary is that any policy action that reduces the losses of shareholders in a bad state is undesirable from an *ex ante* incentive perspective – this is the usual moral hazard problem.

The third premise is that of imposing higher capital charges for riskier assets to the extent that banks view equity capital as more expensive than other forms of financing. A regime with 'flat' (non-risk-based) capital regulation inevitably brings with it the potential for distortion, because it imposes the same cost-of-capital mark-up on all types of assets. For example, relatively safe borrowers may be driven out of the banking sector and forced into the bond market, even in cases where a bank would be the economically more efficient provider of finance. The response to this problem is to tie the capital requirement to some observable proxy for an asset's risk.

The last premise is that of seeking the license to do business. In essence, capital regulation compels troubled banks to seek re-authorisation from the capital market in order to continue operating. In other words, if a bank suffers an adverse shock to its capital, and it cannot convince the equity market to contribute new financing, a binding capital requirement will necessarily compel it to shrink. As such, capital requirements can be said to impose a type of market discipline on banks.

The foregoing is supported by Morrison and White (2005: 1548), who contend that two main theories predominate as to the role played by capital requirements. The first of these, which they call the 'moral hazard' theory, is most closely associated with economic theorists as well as public-choice economists. They assert that if banks do not have sufficient equity 'at stake' when they make their investment decisions, they may make decisions that, although optimal for equityholders, are suboptimal from the point

of view of society as a whole. For example, banks may be tempted to make excessively risky and even negative NPV investments that maximise the returns to equity at the expense of debtholders or the deposit insurance fund. The second theory, which they refer to as the 'safety net' theory, conjectures that a bank's capital forms a kind of cushion against losses for depositors. As such, they reason that if the bank starts to lose money, equity value must fall to zero before debtholders start to lose, so depositors cannot lose out if regulation ensures that the bank must be closed or recapitalised before this occurs.

Notwithstanding the compelling case for capital regulation, several scholars have highlighted the shortcomings of regulations. According to Naceur and Kandil (2009: 71), excessive regulations may increase the cost of intermediation and reduce the profitability of the banking industry. Simultaneously, as banks become more constrained, their ability to expand credit and contribute to economic growth will be hampered during normal times. This view is also espoused by Instefjord (2005: 343), who observed that any regulation that is aimed to minimise the costs associated with systemic risk in the banking sector runs the risk of ignoring potential benefits to consumers of credit. Moreover, restricting bank activities through a higher capital requirements ratio could be negatively associated with bank development, adversely affecting credit expansion and credit growth. Hanson *et al.* (2011: 25) surmise that the most glaring weak spot in financial reform thus far – one that cuts across both the Dodd–Frank legislation and the Basel III process – is the failure to fully come to grips with the shadow banking system. They reason that if one takes a macro-prudential view, the overarching goal of financial regulation must go beyond protecting insured depositories and even beyond dealing with the problems created by 'too-big-to-fail' non-bank intermediaries. Notwithstanding that higher capital and liquidity requirements on banks will no doubt help to insulate banks from the consequences of large shocks, the danger is that, given the intensity of competition in financial services, they will also drive a larger share of intermediation into the shadow banking realm.

Hart and Zingales (2011: 483) cast aspersions on financial regulators' exercise of power. They liken this to empowering a regulator with the right to life and death. On the

one hand, the regulator can arbitrarily close down perfectly functioning financial institutions for political reasons. On the other hand, the regulator, under intense lobbying by the regulated, can be too soft, a phenomenon known in the banking literature as 'regulatory forbearance'. This view is also espoused by Kim and Santomero (1988: 1230), who contend that to the extent that there exist other financial institutions that offer close substitutes for bank products but that are not subject to the same capital (and other bank) regulation, the banking industry will be adversely affected by the regulators' safety goal.

A corollary to regulatory forbearance is regulatory arbitrage. Regulatory arbitrage exists when there are loopholes in the regulation that can be exploited by the financial institutions. According to Petitjean (2013: 17), regulatory arbitrage is also likely to keep generating costly negative spill-over effects on the whole economy because of the ever more complex set of future regulatory constraints. On the one hand, a regulation-free banking system is certainly not an option. On the other hand, while preventive measures such as the micro-prudential rules aimed at lowering the probability of bank failure are probably unavoidable as part of an overall regulatory regime, they face strong limitations as a large part of banks' business is devoted to exploiting arbitrage opportunities and loopholes created by regulatory innovations. Further, Petitjean (2013: 18) contends that given the enormity of the financial crisis, there clearly were serious fault lines in regulatory and supervisory arrangements. As such, the rules enshrined in thousands of pages behind the Basel II Accord did not prevent the crisis, the reason being that regulatory arbitrage always finds routes around particular regulatory rules.

Bank capital regulation has evolved over the years. Perhaps the most formal attempt to come up with universal bank regulation underpinned by best practices came to being in 1988 when the Group of 10 central banks' working group under the auspices of the BIS crafted the framework titled "International convergence of capital measurement and capital standards", which set out a corset of rules that were intended to ensure financial stability and a level playing field among international banks. This would then form the basis of the Basel Capital Accords. These are now considered in turn.

(a)   Basel I

The Basel I Accord was the outcome of the working Group of 12 countries' central bank representatives. Its two focal objectives were to strengthen the soundness and stability of the international banking system as well as to diminish existing sources of competitive inequality among international banks (Balthazar, 2006: 17). The Basel I Accord placed emphasis on reducing credit risk. Although the Basel I Accord was supposed to be applied to internationally active banks, many countries applied it also at national bank level. The salient feature of the accord was that it was anchored on a minimum capital level to which banks were to conform. The main principle of the solvency rule was to assign to both on-balance and off-balance sheet items a weight that was a function of their estimated risk level, and to require a capital level equivalent to 8% of those weighted assets. The accord set out to define capital and the structure of risk weights. Specifically, it categorised capital into Tier 1 and Tier 2, as set out in Table 3.1. Tier 2 capital was limited to a maximum of 100% of Tier 1 capital. The risk weights are set out in Table 3.2.

Table 3.1: A definition of capital

Tier 1	– Paid-up capital – Disclosed reserves (retained profits, legal reserves)
Tier 2	– Undisclosed reserves – Asset revaluation reserves – General provisions – Hybrid instruments (must be unsecured, fully paid-up) – Subordinated debt (max. 50% Tier 1, min. 5 years – discount factor for shorter maturities)
Deductions	– Goodwill (from Tier 1) – Investments in unconsolidated subsidiaries (from Tier 1 and Tier 2)

Source: Balthazar (2006: 18)

A portfolio approach is taken to the measure of risk, with assets classified into four buckets (0%, 20%, 50% and 100%) according to the debtor category. This means that some assets (essentially bank holdings of government assets such as treasury bills and bonds) have no capital requirement, while claims on banks have a 20% weight, which translates into a capital charge of the value of the claim. Similarly, the Basel I Accord

also proposed weights to be charged on off-balance sheet items, as set out in Table 3.3 These are derivatives, namely interest rates, foreign exchange, equity derivatives and commodities.

Table 3.2: Risk weights assigned to assets

%	Item
0	– Cash
	– Claims on OECD central governments
	– Claims on other central governments if they are denominated and funded in the national currency (to avoid country transfer risk)
20	– Claims on OECD banks and multilateral development banks
	– Claims on banks outside OECD with residual maturity <1 year
	– Claims on public sector entities (PSE) of OECD countries
50	– Mortgage loans
100	– All other claims: claims on corporate, claims on banks outside OECD with a maturity >1 year, fixed assets, all other assets.

Source: Balthazar (2006: 18)

Table 3.3 Credit-conversion factors

%	Item
0	– Undrawn commitments with an original maturity of max. 1 year
20	– Short-term self-liquidating trade-related contingencies (e.g. a documentary credit collateralised by the underlying goods)
50	– Transaction-related contingencies (e.g. performance bonds)
	– Undrawn commitments with an original maturity >1 year
100	– Direct credit substitutes (e.g. general guarantees of indebtedness**)**
	– Sale and repurchase agreements
	– Forward purchased assets

Source: Balthazar (2006: 19)

The main advantages of the Basel 1 Accord can be enumerated as follows:

- It revolutionised banking regulation, as it became the yardstick for international best practice in addressing risk management from a bank's capital adequacy perspective.
- Arguably, it could have resulted in the increase in the observed bank capital ratios in the 1990s with banks achieving capital ratios in excess of the 8% threshold stipulated by the accord. Since the introduction of the Basel Accord in 1988, the risk-based capital ratios in developed economies have increased significantly (BIS, 1999: 6).
- Moreover, it was simple to apply the Basel I Accord, as it clearly discerned between the types of capital as well as the risk weights to apply on assets. In other words, it proposed simple tier calculations: Tier 1 capital ratio of 4% and total capital ratio (tiers 1 and 2) of 8%.

On the other hand, the major limitations of the accord are as follows:

- It exclusively focused on credit risk and other risks, such as market risk, operational risk and strategic risk, among others, were outside its purview.
- There exists the notion that fixed minimum capital requirements can affect the real economy through reductions in lending when banks are capital-constrained. Evidence in support of this notion can be found in a study by BIS (1999: 27), whereby in certain countries in some periods banks may have cut back lending to achieve higher capital requirements or maintain existing requirements.
- There was a 'one-size-fits all' approach to capital regulation. The requirements were virtually the same, whatever the risk level, sophistication and activity type of the bank (Balthazar, 2006: 36).
- It was backward-looking and hence focused on existing assets rather than the future composition of a bank's portfolio.
- The accord was not as 'risk-sensitive', for instance, a corporate loan to a highly geared small firm attracted the same capital as a loan to an AAA-rated large corporate of 8% because they are both risk-weighted at 100%.

- An arbitrary measure of 8% total capital ratio was applied. Suffice to say that this was not based on any explicit solvency target.
- It is possible that the introduction of minimum regulatory capital requirements may have harmed the competitiveness of the banking industry. If capital standards require a bank to maintain an equity position in excess of what it would hold voluntarily, or in response to market pressure, then these standards constitute an external constraint on a bank's operations. In theory, any kind of external interference with the activities of a business firm could harm its short-run profitability or growth and possibly undercut its long-run viability (BIS, 1999: 37).

In view of the above limitations of the Basel I Accord, it became necessary to review the accord in order to strengthen the regulatory framework. These efforts gave birth to the Basel II Accord.

(b)   Basel II

The Basel II Accord was conceived in 2007 after a culmination of years of extensive work to revise the Basel I Accord. The objectives of this accord were to increase the quality and the stability of the international banking system, to create and maintain a level playing field for internationally active banks and to promote the adoption of stronger risk-management practices by the banking industry (BIS, 2004:2). The accord was anchored on three pillars, namely minimum capital requirements, supervisory review and market discipline. This is illustrated in Figure 3.1.

The first pillar, of minimum capital requirements, set out the amount of capital that banks must hold with the 8% threshold remaining the reference value. Further, the Basel II Accord Pillar 1 widened the scope of coverage of risks to also cater for market and operational risks. The accord also afforded banks the latitude to develop their own internal models specific to their portfolios under the advanced approaches. In other words, capital requirements now became more closely aligned to internal economic capital estimates (the adequate capital level estimated by the bank itself, through its internal models).

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                BASEL II FRAMEWORK

            ┌─────────────────────────────┐
            │        Three Pillars        │
            └─────────────────────────────┘

    Minimum          Supervisory         Market
    Capital            Review           Discipline
  Requirements

    ┌───────────────────────────────────────────┐
    │ Fostering financial stability, better risk │
    │  management and a level playing field      │
    └───────────────────────────────────────────┘
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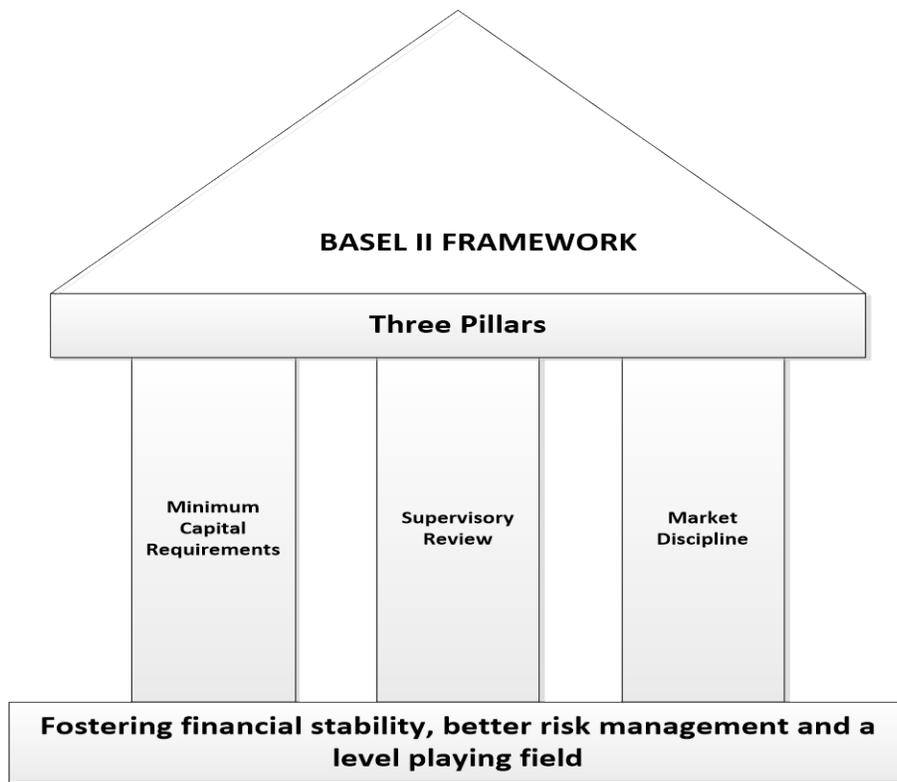
Figure 3.1: The three pillars of Basel II

Source: Researcher's own compilation

The second pillar consisted of the internal controls and supervisory review process. It required banks to have internal systems and models to evaluate their capital requirements in parallel to the regulatory framework and integrate the banks' particular risk profile (Balthazar, 2006: 46). Furthermore, the second pillar outlined the principles that a bank must follow to make adequate capital provision to cover other risks that are not covered under the ambit of the first pillar, including reputational risk, interest rate risk, liquidity risk and strategic risk. In addition, according to Balthazar (2006: 46), under Pillar 2, regulators were also expected to see that the requirements of Pillar 1 are effectively respected, and to evaluate the appropriateness of the internal models set up by the banks. If the regulators considered the capital as not being sufficient, they could take various actions to remedy the situation.

The third pillar of the accord focused on market discipline. In essence, the third pillar set forth the reporting requirements for market disclosure such as credit risk exposure and

credit quality of securitisation holdings. As such, banks were required to build comprehensive reports on how they were complying with the accord and also to report on their internal risk-management systems. Those reports would have to be published at least twice a year.

The advantages of the Basel II Accord can be enumerated as follows:

- It offered a somewhat forward-looking risk-sensitive approach to capital calculation.
- The accord also made provision for other risk sources that were not covered by the Basel I Accord.
- It offered more flexibility, as some of the requirements were left to the discretion of national regulators.
- It ensured better recognition of risk-reduction techniques.
- The accord improved oversight, as it conferred more powers to the national regulators as they have the responsibility to evaluate a bank's capital adequacy considering its specific risk profile.
- It provided detailed mandatory disclosures of risk exposures and risk policies.

The main limitations of the Basel II Accord were as follows:

- The accord did not capture and make capital provision for all the risks (such as liquidity risk) explicitly.
- Its excessive reliance on external ratings and incorrect internal rating models also allowed for artificial reduction of capital requirements and decrease of banks' capacity to withstand systemic crises (Dănilă, 2012: 131).

The limitations of the Basel Accord II highlighted above were laid bare during the course of the 2007–2009 GFC. It became imperative, therefore, for the committee to respond to the new regulatory challenges facing the banking sector. These efforts culminated into the Basel Accord III in 2010, which was to be implemented in phases as from 2013 to 2019.

(c)   Basel III

The Basel III Accord was developed, among other reasons, to reinforce the capital requirements in terms of both quality and quantity. The narrative by the Basel Committee on Bank Supervision is perhaps instructive and helps interrogate the rationale behind the accord.

> One of the main reasons the economic and financial crisis, which began in 2007, became so severe was that the banking sectors of many countries had built up excessive on- and off-balance sheet leverage. This was accompanied by a gradual erosion of the level and quality of the capital base. At the same time, many banks were holding insufficient liquidity buffers. The banking system therefore was not able to absorb the resulting systemic trading and credit losses nor could it cope with the reintermediation of large off-balance sheet exposures that had built up in the shadow banking system. The crisis was further amplified by a procyclical deleveraging process and by the interconnectedness of systemic institutions through an array of complex transactions. During the most severe episode of the crisis, the market lost confidence in the solvency and liquidity of many banking institutions. The weaknesses in the banking sector were rapidly transmitted to the rest of the financial system and the real economy, resulting in a massive contraction of liquidity and credit availability. Ultimately the public sector had to step in with unprecedented injections of liquidity, capital support and guarantees, exposing taxpayers to large losses. (BIS, 2010: 1)

As such, the Basel III Accord was developed to stem this tide. In essence, the interventions were centred on enhancing capital requirements. This was buttressed by its mandate to reduce procyclicality and promote countercyclicality by introducing capital conservation and countercyclical buffers to curtail systemic risk. The other salient features of the accord are that firstly, it sought to stem financial leverage by introducing a leverage ratio in order to limit a bank's recourse to debt. Secondly, the accord introduced a liquidity coverage ratio that will ensure that banks have sufficient high-quality liquid assets to cover a 30-day stressed funding scenario.

The advantages of the Basel III Accord can be enumerated as follows:

- It further promotes the financial soundness and stability of banking institutions by stipulating higher capital ratios.
- It enhances coverage of risks such as liquidity and quantifies counterparty credit risk.
- It is forward-looking and addresses risks relevant to bank-specific portfolios and the macro-economic environment.
- The accord embeds stricter data governance and data requirements.
- It revised the Basel II grey areas on securitisations.
- The accord sets more conservative market risk requirements.
- It attempts to lessen the dependency on rating agents.

3.2.2 Deposit insurance

Deposit insurance schemes are the second instrument used by regulators to foster financial stability of banking firms by curtailing the incentive for bank runs to develop. Deposit insurance schemes are there to protect depositors against the loss of their deposits should their banking institution fail. In essence, deposit insurance guarantees that the promised return will be paid to all who withdraw (Diamond & Dybvig, 1983: 413). Therefore, in the event of the failure of the banking institution, depositors' loss will be partially or fully indemnified. Suffice to highlight that the limit of indemnity depends on the insured deposit amount. Further, there are two variants to the deposit insurance schemes: They are either compulsory or voluntary. Deposit insurance schemes have continued to gain prominence universally. According to the International Association of Deposit Insurers (2016), 125 countries worldwide have some form of explicit or implicit deposit-protection scheme in place. In practice, this manifests as follows: Bank deposits below a certain amount have explicit insurance while bank deposits above that amount may enjoy some implicit insurance if the bank is too big to fail (Diamond & Rajan, 2000: 2455). Against this backdrop the benefits and limitations of deposit insurance schemes are now reviewed.

The benefits of deposit insurance schemes are great for the economy at large. According to Anginer *et al.* (2014: 313), deposit insurance protects the interests of unsophisticated depositors and helps prevent bank runs, which can improve social welfare. They further observe that a positive stabilisation effect of deposit insurance is naturally more important during economic downturns when contagious bank runs are more likely to occur. This viewpoint is bolstered by Chen, Chow and Liu (2014: 13), who aver that deposit insurance acts as a financial safety net for preventing bank runs and maintaining public confidence. Deposit insurance is a subsidy to banks that could help them survive because it enables them to raise funds at close to the risk-free rate and improve profitability (Berger & Bouwman, 2013: 150).

Allen *et al.* (2011) demonstrate that in some cases, deposit insurance can improve the allocation of resources by reducing the use of costly capital. They reason that without deposit insurance, limited liability implies that banks must pay a high rate of interest to compensate for losses when they default. Bhattacharya, Boot and Thakor (1998: 752) contend that without any deposit insurance, there is excessive information production by depositors and ex-post inefficient bank runs may arise too often, more than that required to discipline bank management's choice of assets.

The downside of deposit insurance is the inherent moral hazard problem attributable to any insurance arrangement. This is a situation whereby the insured (in this case the insured bank), having purchased insurance protection, no longer acts as if it were uninsured, and becomes reckless in its conduct, thereby magnifying the risk at hand. In the present context, this might mean that the bank that has sought deposit-protection insurance become reckless in its lending. There is extant literature that explores this notion. Among the proponents of this standpoint are Bhattacharya *et al.* (1998: 755–456), who posit that deposit insurance engenders two forms of moral hazard. Firstly, it induces the insured bank to keep a lower level of cash asset reserves than it would in the absence of deposit insurance, as the deposit insurer is available to absorb liquidity shocks. The bank may suffer. Secondly, it induces the insured bank to invest in riskier assets than it would if it were uninsured. It is also essential that the regulators ensure that an appropriate level of coverage is selected. According to Chen *et al.* (2014: 13), if

coverage is too low, it fails to protect small and unsophisticated depositors. They further state that problems related to moral hazards are likely to occur if the level of coverage is set too high. Their reason for this is because a higher level of coverage provides incentives for banks to take greater risks and the potential to lead to an overall rise in the level of instability within the financial system. Aside from the moral hazard conundrum, there is the issue of mispricing of bank debt; the reasoning being that in the absence of deposit-protection insurance, the market will price debt to accurately reflect the risk and monitors or imposes risk covenants to control risk. However, in the presence of deposit-protection insurance this practice diminishes (Prescott, 2001: 43).

From the foregoing, the uncontested facts are that the benefits of deposit-protection insurance outweigh its limitations. What is required of regulators therefore is to choose a deposit-protection insurance scheme that is priced appropriately and that will curtail the deviant behaviour of banks. Furthermore, effective regulation requires that regulatory authorities achieve the right mix by complementing capital regulation with an optimally priced deposit insurance regime.

3.3   THE REGULATION OF INSURANCE COMPANIES

The regulation of insurance companies follows the same pattern as that of banking institutions. It is aimed at fostering the financial stability of insurance companies as well as instilling market discipline. In insurance one metric that is of greater importance in gauging financial stability is the solvency margin. The solvency margin is the amount by which the assets exceed the liabilities. The ratio of the solvency margin to the premiums or to the volume of underwritings is a generally accepted measure of solvency in non-life insurance (Gebizlioglu & Dhaene, 2009: 1). The solvency of life insurance companies is usually measured by the ratio of solvency margin to the amount of technical reserves. The risk capital for an insurer must be sufficient to a high degree of confidence in order to cover the unexpected losses stemming especially from the claim amounts so that the problem of insolvency is not faced with at all. On the one hand, solvency regulation seeks to protect policyholders against the risk that insurers will not be able to meet their financial obligations. On the other hand, market regulation

attempts to ensure fair and reasonable insurance prices, products and trade prices (Klein, 1995: 368).

The regulation of insurance companies has evolved over the years, focusing on the twin objectives of safeguarding the financial stability and instilling market discipline of insurance companies. The European Insurance and Occupational Pensions Authority (EIOPA) and International Association of Insurance Supervisors (IAIS) bodies have been at the forefront of developing standards that are considered to be best practices in the regulation of insurance companies. The IAIS was established in 1994 and has regulators from more than 140 countries. Its mandate is to develop principles, standards and other supporting material for the supervision of the insurance sector and to assist in their implementation (IAIS, 2014: 2). The IAIS has developed the Insurance Core Principles (ICP), which were implemented in 2011 and provide guidance to regulators on enforcing solvency requirements and market conduct. On the other hand, the European Commission and later its body EIOPA have developed frameworks that have proven to be the mainstay of solvency regulations. These have come to be known as Solvency I and Solvency II, respectively. At the core of these standards are capital requirements. Capital standards are the linchpin of solvency regulations (Klein, 1995: 369). This view is buttressed by Mathur (2001: 60), who contends that the purpose of solvency regulation, of which capital adequacy is a major component, is to ensure the financial soundness of insurers and the need for it generated by costly information and agency problems (limited liability diminishes the incentive to maintain safety). The standards and ICP are now discussed in turn.

3.3.1   Solvency regulations

The solvency regulations were enacted to ensure the financial stability of insurance firms. They entail capital adequacy regulations. The European Commission issued the first directive (Directive 73/239/EEC) in 1973, which set forth the regulations and administrative provisions relating to the taking up and pursuit of the business of direct insurance other than life assurance. Directive 73/239/EEC formed the bedrock of the Solvency 1 regime. This directive had then been varied by 13 other directives. The 2007–2009 GFC necessitated that the regulators revisit the regulatory framework of

insurance companies. Likewise, the regulators responded with a cocktail of regulatory interventions to fortify the financial soundness of insurance companies. It is instructive to note that there was a paradigm shift in regulation to that of macro-prudential focus. As such, the regulatory responses of the insurance sectors mirrored those of the banking sector. The European Commission also led the way and issued Directive 2009/138/EC in 2009, on the taking up and pursuit of the business of insurance and reinsurance, which is the basis of the Solvency II framework.

(a)   Solvency I

Solvency I was born out of the European Commission Directive 73/239/EEC in 1973. According to Swain and Swallow (2015: 142), Solvency I is a simple, rules-based regulatory framework that prescribes basic requirements for insurance companies. Solvency I was introduced as an interim measure to allow for a more fundamental review of the European solvency regime. As such it has some flaws. Chiefly among the limitations of Solvency I are the following:

- It lacked risk-sensitivity. Owing to its simplistic factor-based approach, this did not lead to an accurate assessment of each insurer's risks.
- It failed to adequately differentiate between the riskiness of different product lines. Insurers should have more capital when writing riskier, more volatile business, but this was not necessarily the case under Solvency I because of the way the capital requirements were calculated (Swain & Swallow, 2015: 142).
- It did not entail an optimal allocation of capital, i.e. an allocation that is efficient in terms of risk and return for shareholders.
- It took a partial balance sheet approach. The basic European Solvency I capital requirements ignored the risks that may crystallise on the asset side of the balance sheet.

The above limitations necessitated that the Solvency I framework be reviewed. This led to the enactment of the Solvency II regime in 2009.

(b)   Solvency II

The structural weaknesses of Solvency I, which had been laid bare during the 2007–2009 GFC, necessitated the revision of the framework. Out of this process was born Solvency II in 2009 with an implementation date of 2012. The main objectives of Solvency II were to ensure better regulation and deeper integration of EU insurance market as well as the protection of policyholders and increasing the competitiveness of EU insurers (Peleckienė & Peleckis, 2014: 823). The Solvency II framework is analogous to the Basel III framework in that it is supported by three pillars (refer to Figure 3.2).

SOLVENCY II FRAMEWORK

Three Pillars

| QUANTITATIVE REQUIREMENTS Capital Requirements | SUPERVISORY REVIEW Governance, Risk Management and Supervision | MARKET DISCIPLINE Disclosure and Transparency |

Enhancing solvency, better risk management and fostering market discipline
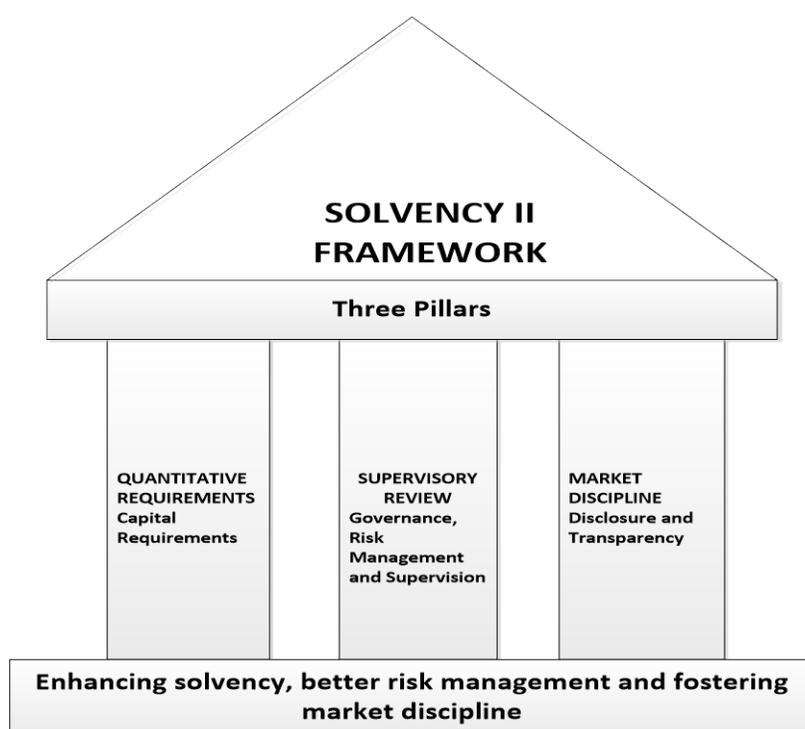
Figure 3.2: The three pillars of Solvency II

Source: Researcher's own compilation

The three pillars of Solvency II can be described as follows: Firstly, Pillar 1 sets out quantitative requirements, including the rules to value assets and liabilities (in particular, technical provisions), to calculate capital requirements and to identify eligible own funds to cover those requirements. Secondly, Pillar 2 focuses on supervisory review. It sets

out requirements for risk management, governance, as well as the details of the supervisory process with competent authorities. Lastly, Pillar 3 focuses on market discipline. Essentially, Pillar 3 addresses transparency, reporting to supervisory authorities and disclosure to the public, thereby enhancing market discipline and increasing comparability, leading to more competition (European Commission, 2015).

The salient features of the Solvency II regime are the following:

- Enhanced quality of capital: The emphasis with the solvency regime is to improve the quality of capital. Solvency II takes a cue from the banking sector and classifies capital into three tiers. Tier 1 comprises of the highest-quality capital, being equity and retained earnings. This should be able to absorb losses on a going-concern basis. Tier 2 capital comprises of subordinated debt and is of lower quality that only needs to absorb losses on insolvency. Tier 3 capital is the lowest quality of capital permitted and has only limited loss-absorbing capacity (Swain & Swallow, 2015: 144).

- Forward-looking risk-based capital requirements: Capital requirements under Solvency II are forward-looking and economic in that they are to be tailored to the specific risks borne by each insurer, allowing an optimal allocation of capital. They are defined along a two-step ladder, including the solvency capital requirements and the minimum capital requirements, in order to trigger proportionate and timely supervisory intervention. The solvency capital requirement is the quantity of capital that is intended to provide protection against unexpected losses over the following year. The minimum capital requirements denote a level below which policyholders would be exposed to an unacceptable level of risk (European Commission, 2015).

- Improved governance and risk management: Equally key to the Solvency II is good governance practices and strong risk management, which are essential aspects of a prudential regulatory framework. As such, Solvency II requires insurers to take a comprehensive approach to considering their risks through own risk and solvency assessment.

- Market discipline through firm disclosures: Solvency II introduces new reporting and disclosure requirements for firms, with the aim of improving the availability of

information to the market. Firms will be required to publish a solvency and financial condition report annually and disclose additional information privately to regulators. In this report, firms need to clearly explain aspects of their approach to Solvency II, such as the use of an internal model and any non-compliance with regulatory solvency requirements (Swain & Swallow, 2015: 146).

In conclusion, the solvency regulations are macro-prudential regulations that are set to secure the insurance industry in the aftermath of the 2007–2009 GFC. It is plausible that they seek to enhance the capital requirements, risk management and market discipline of insurance firms. To engrain all these imperatives into business practice, the IAIS crafted what would be considered the ICP into a code of conduct for application by insurance regulators. It is important to note that the ICP framework complements the solvency regimen.

3.3.2 Insurance Core Principles

The ICP were developed by the IAIS and implemented as from 2011. According to the IAIS (2015), the ICPs provide a globally accepted framework for the supervision of the insurance sector. The ICP material is presented according to a hierarchy of supervisory material. The ICP statements are the highest level in the hierarchy and prescribe the essential elements that must be present in the supervisory regime in order to promote a financially sound insurance sector and provide an adequate level of policyholder protection. There are 26 ICPs in the framework. A review of the ICPs that are consistent with the three pillars of Solvency II follows.

Firstly, ICP17 provides for capital adequacy. It makes it incumbent upon the supervisor to establish capital adequacy requirements for solvency purposes so that insurers can absorb significant unforeseen losses and to provide for degrees of supervisory intervention. This is consistent with the first pillar of Solvency II, which focuses on quantitative requirements. Secondly, ICP 8 focuses on risk management and internal controls. It provides that the supervisor requires an insurer to have, as part of its overall

corporate governance framework risk management and internal controls. This is consistent with the second pillar of Solvency 2, which focuses on supervisory review. Thirdly, ICP 20 provides for public disclosure. It makes it a requirement that insurers disclose relevant, comprehensive and adequate information on a timely basis in order to give policyholders and market participants a clear view of their business activities, performance and financial position. This is expected to enhance market discipline and understanding of the risks to which an insurer is exposed and the manner in which those risks are managed. This is consistent with the third pillar of the Solvency II framework. The other parallels are set out in Table 3.4. Suffice to highlight that the Solvency II and ICP frameworks reinforce each other in the regulation of insurance companies.

Table 3.4: Comparison matrix of Solvency II and Insurance Core Principles

SOLVENCY II	INSURANCE CORE PRINCIPLES
Pillar 1: Quantitative requirements Capital requirements	ICP 14: Valuation ICP 15: Investment ICP 16: Enterprise risk management for solvency purposes ICP 17: Capital adequacy
Pillar 2: Supervisory review Governance, risk management and supervision	ICP 7: Corporate governance ICP 8: Risk management and internal controls ICP 9: Supervisory review and reporting
Pillar 3: Market discipline Disclosure and transparency	ICP 19: Conduct of business ICP 20: Public disclosure

Source: Researcher's own compilation

3.4 FINANCIAL REGULATION IN SOUTH AFRICA

Financial regulation in South Africa has evolved over the years from the traditional silo approach to the present-day dispensation of macro-prudential regulation (twin-peaks

approach). Arguably, financial regulation in South Africa mirrors global best practices. According to the IMF (2014: 10), South Africa's financial sector is large and sophisticated. Financial sector assets amount to 298% of the GDP, a ratio exceeding that of most emerging market economies. Further, non-banking financial institutions, which have grown rapidly in recent years, hold about two-thirds of financial assets – also unusually large for an emerging market economy. Botha and Makina (2011: 31) contend that the financial services sector of South Africa is well developed, just like those in advanced economies, such that regulatory issues are equally important to warrant the attention of authorities both nationally and internationally. Botha and Makina (2011) further state that internationally, South Africa is a member of the Group of 20 countries and a member of BIS and has one seat on the Financial Stability Board, which coordinates regulation at the international level. These imperatives therefore lead the South African regulators to embrace global best practices.

According to the IMF (2014: 10), the South African financial sector has a high degree of concentration and interconnectedness. The top five banks hold 90.5% of banking assets, the top five insurers account for 74% of the long-term insurance market, and the seven largest fund managers control 60% of unit trust assets. All major banks are affiliated with insurance companies through holding companies or direct ownership. Bank-affiliated insurers underwrite a substantial proportion of private pension assets, and some banks also own fund managers that offer unit trusts. These imperatives therefore lay bare the necessity for South African regulators to embrace the twin-peaks model in order to best manage systemic risk.

3.4.1   Banking regulation in South Africa

The banking sector in South Africa is regulated by a number of statutory bodies. At the apex of the regulatory authorities is the South African Reserve Bank (SARB). The SARB was established in 1921 and is responsible for ensuring the overall soundness of the South African monetary, banking and financial system. This includes specific responsibilities for monetary policy, banking supervision and currency (BIS, 2015: 6). Besides the SARB, other authorities directly or indirectly involved in banking supervision include the FSB, the Financial Intelligence Centre (FIC) and the National Credit

Regulator (NCR), which are each governed by a dedicated Act (IMF, 2010: 6). The FSB is responsible for supervising non-banking financial institutions such as insurance companies, pension funds, money market funds and stockbrokers. The FIC's principal task is to combat abuse of financial services, while the NCR is principally a consumer-protection agency. The relevant Acts provide for cooperation between the SARB and the other authorities. Table 3.5 summarises the principal Acts that regulate the banking sector.

Table 3.5: Principal Acts in the regulation of South African banks

Act	Main provisions relating to banking
The Banks Act, 1990 (as amended in 2007)	1. Confers to the SARB bank licensing and supervision authority of banks 2. Conduct of the business of a bank 3. Prudential requirements
Banks Amendment Act, 2013	1. Provides that a contravention of the Financial Intelligence Centre Act, 2001, is a cause for suspension or cancellation of registration as a bank 2. Aligns the Banks Act, 1990, with the Companies Act, 2008 3. Makes provisions to comply with the requirements of the Basel Committee of Banking Supervision
Mutual Banks Act, 1993 (amended 1999)	Provides for the regulation and supervision of the activities of juristic persons doing business as mutual banks
Co-operative Banks Act, 2007	1. Promotes the development of sustainable and responsible co-operative banks 2. Establishes an appropriate regulatory framework and regulatory institutions for co-operative banks that protect members of co-operative banks 3. Provides for the registration of deposit-taking financial services co-operatives as co-operative banks 4. Provides for the regulation and supervision of co-operative banks 5. Provides for the establishment of co-operative banks supervisors and a development agency for co-operative banks
Financial Intelligence Centre Act, 2001	Banks are required to : 1. Report to the FIC cash transactions above a prescribed limit 2. Report to the FIC electronic transfers of money to or from the country above a prescribed limit. 3. Report to the FIC suspicious and unusual activities conducted by a person or business.
National Credit Act (NCA), 2005	1. Prohibits certain unfair credit and credit-marketing practices 2. Promotes responsible credit granting and use and prohibits reckless credit granting
Financial Services Board Act, 1990	Provides for the establishment of a board to supervise compliance with laws regulating financial institutions and the provision of financial services

Source: Researcher's own compilation

Notwithstanding, the authorities were planning to adopt a twin-peaks model, which was expected to be finalised during 2016, that includes a Prudential Authority and a Financial Sector Conduct Authority (BIS, 2015: 6). Subsequently, a bill that provides for the adoption of the twin peaks model was passed by the National Assembly and National Council of the Provinces in December 2016 and May 2017 respectively. According to the IMF (2010: 4), banking supervision in South Africa has been effective and has contributed to reducing the impact of the GFC on the financial sector. Throughout the crises, the banks have remained profitable and capital adequacy ratios have been maintained well above the regulatory minimum. The SARB has timeously implemented the requirements of the Basel accords over the years. Suffice to highlight that in the South African dispensation, the provisions of the accords need to be first codified into law before they can take effect. This has been done by the amendments to the Banking Act in 2007 and 2013 to give effect to the provisions of the Basel II and Basel III accords, respectively. The provisions of the Basel II Accord were implemented as from 1 January 2008, whereas the Basel III provisions were implemented as from 1 January 2013.

The South African banking sector was largely unscathed during the 2007–2009 GFC. This has been in part attributable to the quality of banking supervision (IMF, 2010: 6). This can be closely linked to the regulatory framework adopted by the country. According to the National Treasury (2011: 13), a sound framework for financial regulation and well-regulated institutions ensured that potential risks were anticipated and appropriate action was taken to mitigate them. The same report notes that South African regulators have generally not followed a light-touch approach. Sustainable credit extension has been possible through effective legislation, such as the NCA (which came into effect in 2008), strong regulatory action and good risk-management systems at banks. This viewpoint is reinforced by the NCR (2012: 20), which concurs that it is widely acclaimed that South Africa was largely insulated from the GFC because of its more rigorous regulatory environment, which governs the extension of credit.

The NCA is acknowledged to have gone a long way in ensuring that South Africa was not as seriously affected by global patterns as were many of the world's leading

economies. Figure 3.3 depicts the trends in credit immediately before and after the implementation of the NCA in January 2008. The credit advanced by banks in South Africa contracted from R102 billion in the last quarter of 2007 to a lowest of R50 billion in the second quarter of 2009. Thereafter, credit started to grow steadily to a peak of R108 billion in the last quarter of 2011. Thereafter, it fluctuated between this value and R121 billion.
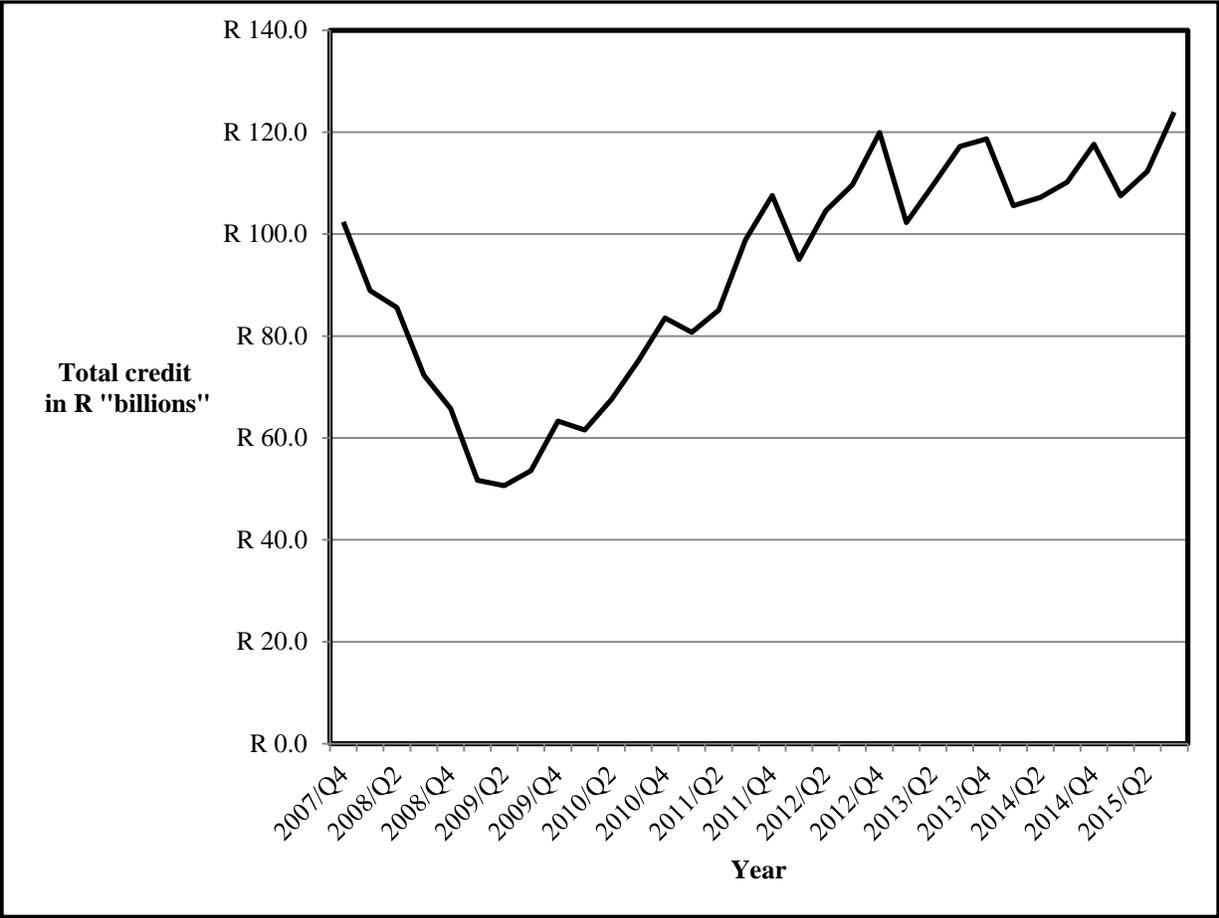
Figure 3.3: Trends in consumer credit in South Africa

Source: Researcher's compilation from data obtained from Quantec database

The total number of mortgages granted also declined from a high of roughly 100 800 in the last quarter of 2007 to a low of 33 100 in the third quarter of 2009. The growth in new mortgages granted has remained roughly stagnant at these levels with a highest of

roughly 45 800 achieved in the third quarter of 2011 (see Figure 3.4). The foregoing gives credence to the notion that perhaps the implementation of the NCA in South Africa curtailed the reckless lending practices of banks. Arguably, this in turn insulated the South African banking sector from the 2007–2009 GFC.
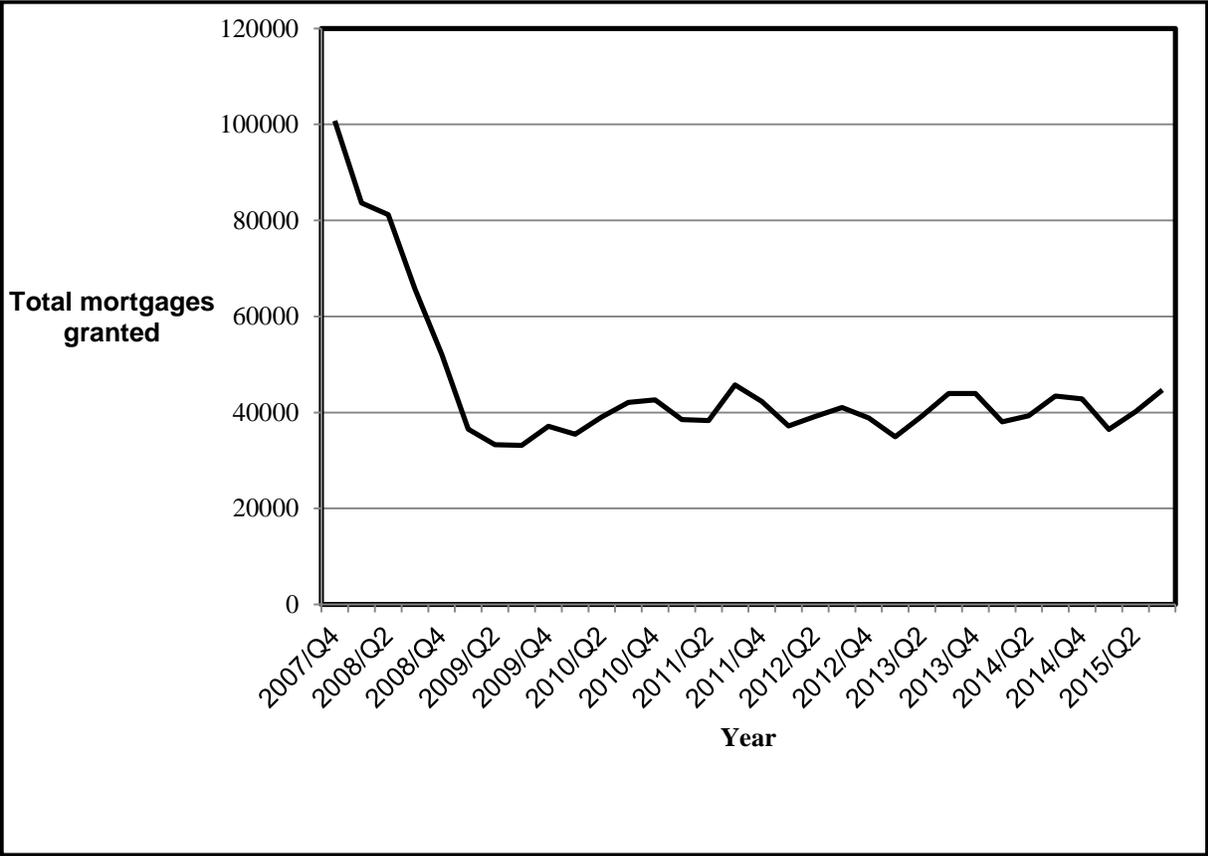
Figure 3.4: Trends in total number of mortgages granted in South Africa
Source: Researcher's compilation from data obtained from Quantec database.

Notwithstanding that the South African regulators have embraced the Basel capital standards, they have not implemented any deposit insurance scheme to date. According to the IMF (2010: 8), the implementation of a deposit insurance scheme with mandatory membership in the commercial banking sector is needed. The report further states that deposit insurance should primarily aim to protect small depositors and avoid creating ambiguities in bank intervention powers. The IMF (2010: 8) also notes that

limited progress has been made in the launching of a deposit insurance scheme in South Africa.

A draft Deposit Insurance Bill has been on the drawing board since 2008. It was circulated by the National Treasury to interested parties for comments, but discussions between the relevant parties are still ongoing and no timeline for finalisation or public consultation of the proposals has been set. The IMF (2014: 7) also reinforces the need for regulatory authorities in South Africa to introduce deposit insurance in order to reduce systemic liquidity risk. Therefore, it would seem as if the deposit insurance scheme is the missing link in banking regulation in South Africa.

3.4.2 Insurance regulation in South Africa

The primary board that regulates the insurance sector in South Africa is the FSB. The FSB is responsible for promoting the maintenance of a fair, safe and stable insurance market for the benefit and protection of policyholders. The FSB supervises and enforces insurers' compliance with the financial soundness, governance and conduct of business requirements of the Long-term and Short-term Insurance Acts. Further, the FSB also develops regulatory proposals on how these requirements may need to be adapted to best meet the objectives of insurance regulation and supervision. Similar to the banking dispensation, there are other regulatory authorities that also regulate the insurance sector; this includes the SARB and the NCR.

Principally, the Short-Term Insurance Act of 1998, the Long-Term Insurance Act of 1998, the Insurance Laws Amendment Act of 2008 and the Companies Act of 2008 govern the transaction of insurance business in South Africa (Sibindi & Zingwevu, 2015: 100). Table 3.6 outlines the key statutes that regulate the conduct of insurance business in South Africa.

Insurance regulation in South Africa has evolved over the years and takes its cue from global best practices. The insurance industry is also moving towards the twin-peaks regulatory regime in tandem with the banking industry. In the aftermath of the 2007–2009 GFC, far-reaching insurance regulatory reforms have been instituted.

Table 3.6: Principal Acts in the regulation of insurance companies

Act	Main provisions relating to insurance
Long-Term Insurance Act (Act 52 of 1998)	To provide for the registration of long-term insurers, for the control of certain activities of long-term insurers and intermediaries and for matters connected therewith
Short-Term Insurance Act (Act 53 of 1998)	To provide for the registration of short-term insurers, for the control of certain activities of short-term insurers and intermediaries and for matters connected therewith
Insurance Laws Amendment Act (Act 27 of 2008)	To amend certain provisions relating to the Long-Term Insurance Act and the Short-Term Insurance Act
Financial Advisory and Intermediary Services Act (Act 37 of 2002)	1. To protect the consumer, the financial services industry and all staff employed therein, whether they render advice or not 2. To create a profession within the financial services industry 3. To regulate the giving of advice
Financial Services Ombudsman Schemes Act (Act 37 of 2004)	1. To provide for the recognition of financial services ombudsman schemes 2. To lay down minimum requirements for ombudsman schemes 3. To promote consumer education with regard to ombudsman schemes
Companies Act (Act 71 of 2008)	1. To provide for the incorporation, registration, organisation and management of companies, the capitalisation of profit companies, and the registration of offices of foreign companies carrying on business within South Africa 2. To define the relationships between companies and their respective shareholders or members and directors 3. To provide for equitable and efficient amalgamations, mergers and takeovers of companies 4. To provide for efficient rescue of financially distressed companies 5. To provide appropriate legal redress for investors and third parties with respect to companies
National Credit Act (NCA), 2005	1. Prohibits certain unfair credit and credit marketing practices 2. Promotes responsible credit granting and use and prohibits reckless credit granting
Financial Services Board Act, 1990	Provides for the establishment of a board to supervise compliance with laws regulating financial institutions and the provision of financial services

Source: Researcher's own compilation

These have been premised on the adoption of the Solvency II provisions as well as the ICP framework. In the South African dispensation a derivative framework (analogous to Solvency II), called Solvency Assessment and Management (SAM), which is also based on three pillars, has been developed since 2011. The SAM framework is being codified into law through the amendment of the relevant insurance laws expected to be finalised in 2017. The enhanced prudential framework for insurers forms part of the twin-peaks reforms, which seek to significantly enhance South Africa's financial regulatory and supervisory framework by enabling a proactive, pre-emptive and risk-based approach to regulating and supervising the financial sector (FSB, 2015a: 6). SAM consists of three pillars, namely financial soundness, governance and risk management, and disclosure requirements. This is illustrated in Figure 3.5.
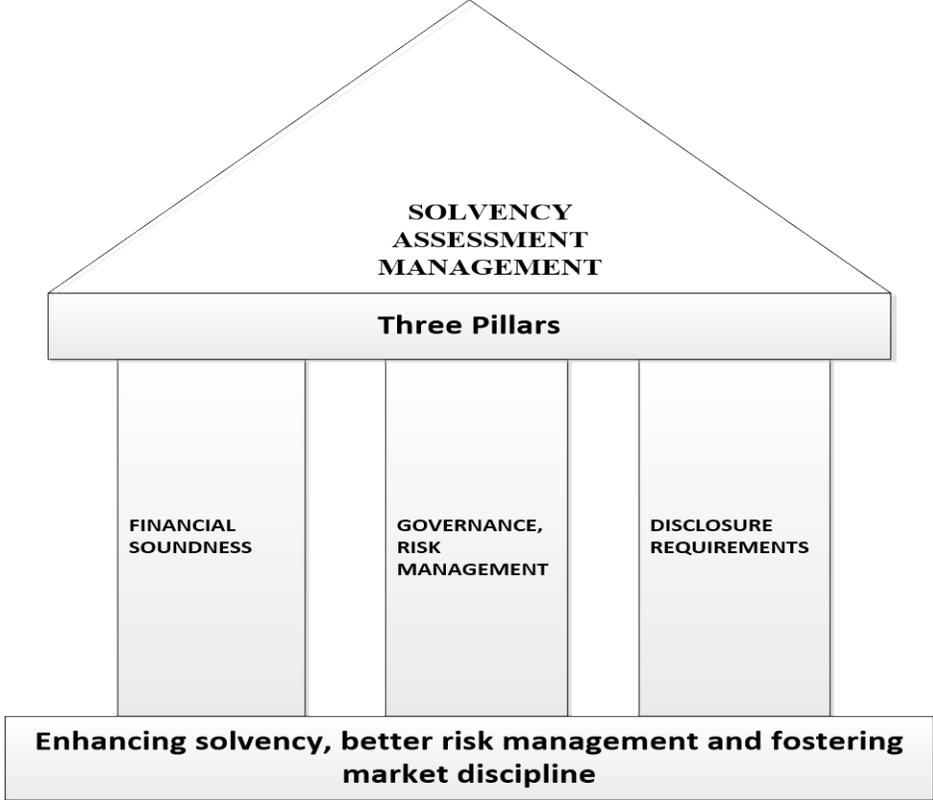
Figure 3.5: The three pillars of SAM

Source: Researcher's own compilation

The provisions of SAM are intended to enhance the financial soundness and foster the market discipline of insurance companies in South Africa. It is envisaged that all the provisions of the SAM framework will be implemented in 2017 once the Insurance Amendment Bill has been passed into law. In the interim, the FSB has implemented some of the reforms through subordinate regulations. For instance, the core provisions of Pillar 2 of governance and risk management have been instituted through board notice 158 of 2014, which came into effect in April 2015.

In summary, South Africa embraces best practices in insurance regulation. The South African insurance regulatory landscape can be said to be dynamic. As such, the researcher's hunch was that the insurance regulatory imperative would probably have a bearing on the capital structure choices of insurance companies. In the next section the determinants of banks' capital structure are discussed.

3.5   THE DETERMINANTS OF BANKS' CAPITAL STRUCTURE

Extant studies on capital structure have generally excluded financial firms from their analysis. This has been premised on the notion that financial firms have peculiar firm characteristics. For instance, in the context of banking institutions, the deposit-taking ability sets them apart from other non-financial firms. This ability to generate deposits lends them an extra source of finance. The second peculiar feature of banking firms is that they are subject to capital regulation, which could also have a bearing on their capital structure choices. The standard view is that capital regulation constitutes an additional, overriding departure from the M&M irrelevance proposition. Subsequently, it has been proven by Gropp and Heider (2010) that there are similarities between the capital structures of banks and non-financial firms. Against this backdrop it is imperative to examine the capital structure imperatives of banking institutions, paying particular regard to bank-level firm characteristics that may impact on the capital structure choices.

3.5.1   Banking regulation

The regulation of banking firms may promote or curtail banks from operating at their desired target capital structure. According to Ahmad and Abbas (2011: 201), following

mandatory bank capital standard requirements, banks are involved in both voluntary and involuntary capital structure decisions. Ahmad and Abbas (2011) further state that voluntary capital structure decisions of banks are considered the same as in non-financial settings; the same theories and determinants of capital structure are applied to decisions relating to capital structure. Involuntary capital structure decisions are enforced on the banks by regulatory authorities after deviating from the prescribed and adequacy capital requirements as directed by the regulators. The motivation behind the holding of buffer capital is one such voluntary capital structure decision by banks, which continues to baffle researchers and regulators alike.

Several reasons have been advanced in attempting to address the rationale behind banks keeping buffer capital. Buffer capital may be defined as the amount of capital that banks hold in excess of the minimum regulatory capital requirement. Berger *et al.* (1995: 8) contend that banks may hold a substantial buffer of additional capital as financial slack so that they can borrow additional funds quickly and cheaply in the event of unexpected profitable investment opportunities. Similarly, such a buffer of capital protects against costly unexpected shocks to capital if the financial distress costs from low capital are substantial and the transactions costs of raising new capital quickly are very high. Buffer capital can further act as a cushion, absorbing costly unexpected shocks, particularly if the financial distress costs from low capital, and the costs of accessing new capital quickly, are high (Jokipii & Milne, 2008: 1441). Proponents of the 'buffer capital view' argue that banks hold capital as a buffer against insolvency. As such, banks have an incentive to avoid failure through a variety of means, including holding a capital buffer of sufficient size, holding enough liquid assets and engaging in risk management (Cebenoyan & Strahan, 2004: 2). The impact of regulation has banks holding capital buffers, or discretionary capital, above the regulatory minimum in order to avoid the costs associated with having to issue fresh equity at short notice (Gropp & Heider, 2010: 595). In essence, by holding capital as a buffer, banks essentially insure themselves against costs related to market discipline or supervisory intervention in the event of a violation of the requirements.

The empirical evidence in support of the buffer capital view has been mixed. In support, Gambacorta and Mistrulli (2004: 443), among other scholars, found evidence that for all kinds of banks the buffer capital has always been much greater than zero. Gambacorta and Mistrulli (2004) reason that this is consistent with the hypothesis that capital is difficult to adjust and that banks create a cushion against contingencies. Koziol and Lawrenz (2009:871) also found evidence that banks do not hold the minimum capital, but have voluntary capital buffers. Harding, Liang and Ross (2013) found evidence that there exists an interior optimal capital ratio for banks with deposit insurance, a minimum capital ratio and bank franchise value. They reason that banks voluntarily choose to hold capital in excess of the required minimum. Allen *et al.* (2011) and Jacques and Nigro (1997) also found evidence that banks will hold buffer capital in excess of regulatory requirements.

There is another strand of literature that does not find support for the buffer view of capital. Gropp and Heider (2010: 589) found that high levels of banks' discretionary capital do not appear to be explained by buffers that banks hold to insure against falling below the minimum capital requirement. Moreover, banks that would face a lower cost of raising equity at short notice (profitable, dividend-paying banks with high market-to-book ratios) tend to hold significantly more capital. Teixeira *et al.* (2014: 56) also failed to find evidence in support of the buffer view.

It is also instructive to note that the conservation of buffer capital has been instituted in the Basel III Accord, regardless of the unresolved debates. Suffice to conjecture that the advantages of banks keeping buffer capital outweigh the disadvantages. According to BIS (2010: 9), the purpose of a buffer is to provide capital sufficient for a banking firm to withstand downturn events and still remain above its regulatory minimum capital requirement.

As has been demonstrated hitherto, capital requirements and deposit insurance are the two regulatory instruments that are in the armoury of the banking regulator that could have a bearing on the capital structure choices of banking firms. Gropp and Heider (2010: 589) set out to establish whether capital requirements are indeed a first-order determinant of banks' capital structure. They employed cross-section and time-series

variation in a sample of large, publicly traded banks spanning 16 countries, namely the USA and 15 countries of the EU from 1991 until 2004. They also sought to establish whether deposit insurance determines the capital structure of banking firms. To the contrary, they established that neither capital regulation nor deposit insurance is a first-order determinant of the capital structure of banks. They reason that the implication is that capital regulation is not binding. They also report similarities in the determinants of capital structures of banks and non-financial firms. Teixeira *et al.* (2014: 34) also set out to establish whether regulation is a first-order determinant of bank capital structure. They employed panel data of a sample of 560 banks, 379 from the USA and 181 from Europe, spanning 23 countries, for the period 2004–2010. They found that the factors affecting the capital structure of non-financial firms play an important role in explaining banks' capital structure. They reason that this suggests that regulation may not be a first-order determinant of banks' share of equity capital. They also document a strong similarity in the factors affecting the capital structure of banks and those of non-financial firms.

The foregoing suggests that banking regulation determines capital structure to a certain extent. Banking firms would stock up capital motivated by a variety of reasons, chief among them being fear of regulatory sanction, as well as the costs associated with raising capital at short notice should it fall below the required minimum. However, there are studies that have documented that the buffer capital stocked by banking firms is in excess and is inexplicable in terms of providing a cushion against the regulatory minimum. It has also been demonstrated that capital regulation might not necessarily be a first-order determinant of bank capital structure, but of secondary importance. This is a test for the efficacy of bank capital regulation. The implication is that the minimum capital requirements set for banks may not be binding in such a scenario. The majority of the studies also discount the moral hazard hypothesis of deposit insurance – that banks would seek to take advantage of mispriced deposit insurance. In addition, deposit insurance does not come to the fore as a primary determinant of capital structure.

3.5.2 Credit risk management

Banks manage credit risk in a variety of ways. The principal methods employed by banks to manage risks of their loan portfolio include the purchasing of credit derivatives as well as securitisation. One strand of literature has explored the relationship between risk management and the capital structure of banking institutions. This has been premised on the notion that banks that actively manage their credit risk through, for instance, the loan sales market (securitisation) are bound to keep lower levels of capital as compared to the banks that manage the credit risk passively. The second strand of literature advances the risk-absorption hypothesis. Proponents of this view posit that bank capital absorbs risk and expands banks' risk-bearing capacity.

The first strand of literature focuses on the relationship between credit risk management and capital structure choices. Among these studies, Cebenoyan and Strahan (2004: 2), using a sample of all domestic commercial banks in the USA, tested whether banks that are better able to trade credit risks in the loan sales market experience significant benefits. They found evidence that banks that purchase and sell their loans (their proxy for banks that use the loan sales market to engage in credit risk management) hold a lower level of capital per dollar of assets than banks not engaged in loan buying or selling. They also document that banks that operate on both sides of the loan sales market also hold less capital than either banks that only sell loans but do not buy them, or banks that only buy loans but do not sell them. They reason that this difference is important is because it suggests that the active rebalancing of credit risk – buying and selling rather than just selling (or buying) – allows banks to alter their capital structure. Further, Cebenoyan and Strahan (2004) posit that their results also suggest that banks use the risk-reducing benefits of risk management to take on more profitable but higher-risk activities to operate with greater financial leverage. Froot and Stein (1998: 55) found that at the same time that banks were investing in illiquid assets, most banks also appeared to engage in active risk-management programmes. They postulate that, holding fixed its capital structure, there are two broad ways in which a bank can control its exposure to risk. Firstly, some risks can be offset simply via hedging transactions in the capital market. Secondly, for those risks where direct hedging transactions are not

feasible, the other way for the bank to control its exposure is by altering its investment policies. Therefore, with illiquid risks, the bank's capital budgeting and risk-management functions become linked.

The second strand of literature tests the risk-absorption hypothesis. Among these studies, Allen, Carletti and Marquez (2015:613) developed a model that demonstrates that when banks directly finance risky investments, they hold a positive amount of equity capital as a way to reduce bankruptcy costs and always prefer to diversify, if possible. In contrast, when banks provide loans to non-financial firms that invest in risky assets, diversification is not always optimal. Berger and Bouwman (2009: 3784) examined bank liquidity creation by employing a sample including almost all commercial banks in the USA that were in business during the period 1993–2003. They found that for large banks, the relationship between capital and liquidity creation is positive, consistent with the expected empirical dominance of the 'risk-absorption' effect. In sharp contrast, for small banks, the relationship between capital and liquidity creation is negative, consistent with the expected dominance of the 'financial fragility crowding out' effect for these institutions. The relationship is not significant for medium banks, suggesting that the two effects cancel each other out for this size class.

Credit risk management carries much importance in the formulation of capital structure policies of banking organisations. It has been demonstrated that those banking institutions that actively manage credit risk will be much inclined to keep lower levels of buffer capital in comparison to those who do not actively manage the risk. On the other hand, the risk-absorption hypothesis predicts that large banks are most likely to keep higher levels of buffer capital in order to be best placed in absorbing more risks, as they grow their loan book.

3.5.3 Regulatory capital arbitrage

The 2007–2009 GFC were occasioned by high levels of risk taking by financial institution players and individuals alike. Arguably, banks assumed high levels of risk, made possible by exploiting regulatory capital arbitrage opportunities. According to BIS (1999: 21), banks in a number of countries were using securitisation to alter the profile

of their book. This may make a bank's capital ratio look artificially high relative to the riskiness of the remaining exposures, and in some cases may be motivated by a desire to achieve exactly this. The very broad risk categories in the Basel I Accord gave scope for banks to arbitrage between their economic assessment of risk and the regulatory capital requirements.

The motivation behind banks undertaking capital arbitrage is to keep financing costs at the lowest. The BIS (1999: 22) perhaps gives a persuasive account about regulatory capital arbitrage:

> [R]egulatory capital arbitrage reflects banks' efforts to keep their funding costs, inclusive of equity, as low as possible. As the cost of equity is generally perceived to be much greater than the cost of debt, when banks are required to maintain equity cushions exceeding what they would otherwise choose, it is natural for banks to view capital standards as a form of regulatory taxation…

The same report identifies four types of capital arbitrage, which are discussed below.

(i) Cherry-picking

This is the oldest form of capital arbitrage. Within a particular risk-weight category, such as 100% risk-weighted assets, cherry-picking is the practice of shifting the portfolio's composition towards lower-quality credits. For example, in order to boost its return on equity, a bank may decide to originate fewer BBB-rated loans in favour of more BB-rated loans. In this case, the bank's total risk-weighted assets and regulatory capital ratios would appear unchanged, even as its overall riskiness increased.

(ii) Securitisation with partial recourse

For many banks, securitisation is a more cost-effective approach to capital arbitrage than traditional cherry-picking. Securitisation involves the sale of assets to a 'special-purpose vehicle' (SPV), which finances this purchase through issuance of asset-backed securities to private investors. For bankruptcy, accounting and regulatory purposes, SPVs generally are treated as legally separate from the sponsoring bank, and so are not consolidated into the sponsor's financial statements and regulatory reports. In many

cases, a bank can treat securitised assets as 'true sales' for accounting and regulatory purposes, even though the bank retains most of the underlying risks through credit enhancements it provides to the asset-backed securities.

(iii) Remote origination

Many banks achieve even lower effective regulatory capital requirements (and therefore higher capital ratios) by structuring their securitisation programmes so that credit enhancements are treated as 'direct credit substitutes', which incur only an 8% capital requirement, rather than recourse. This is accomplished simply by having the SPV, rather than the bank itself, originate the securitised assets – a process termed 'remote origination'. Even though the bank is exposed to much the same risk as in a traditional securitisation, because the bank never formally owns the underlying assets, the credit enhancement is treated as a direct credit substitute.

(iv) Indirect credit enhancements

Under the Basel I Accord, in some instances it was possible to provide the economic equivalent of a credit enhancement in ways that were not recognised as financial instruments subject to any formal capital requirement. Investors are often willing to accept 'indirect credit enhancements', such as early amortisation and fast-payout provisions, in lieu of traditional financial guarantees. When this is possible, the use of indirect credit enhancements reduces even further a bank's regulatory capital charges against securitised assets, in some cases to zero, thereby increasing the amount of capital freed up through securitisation.

Subsequent to the Basel I Accord, banking regulators have attempted to eliminate the capital arbitrage opportunities through the revised Basel accords. For instance, the Basel III accord has strengthened the capital treatment for certain complex securitisations and also requires banks to conduct more rigorous credit analyses of externally rated securitisation exposures. However, it should be pointed out that banks are highly innovative and might as well find means to circumvent these requirements in quest of making more profits.

3.5.4   Standard firm-level determinants of capital structure

There is a growing body of literature that attests to the fact that standard non-financial firms' determinants of capital structure also carry over to the banking sector. The studies that have been conducted in the recent past that corroborated this fact include those by Teixeira *et al.* (2014), Jucá, De Sousa and Fishlow (2012), Ahmad and Abbas (2011) and Gropp and Heider (2010). Table 3.7 documents how banks' financing behaviour conforms to the predicted effects of firm leverage.

Table 3.7: Predicted effects of firm-level determinants on leverage

Firm-level determinant	Expected sign		Empirical evidence from the banking firms
	Pecking order theory	Trade-off theory	
Size	Positive	Positive	**Positive** Ahmad and Abbas (2011: 211) Baltaci and Ayaydin (2014:46) Gropp and Heider (2010: 598) Jucá *et al.* (2012: 23) **Negative** Teixeira *et al.* (2014: 56)
Profitability	Negative	Positive	**Positive** Teixeira *et al.* (2014: 56) Berger and Di Patti (2006: 21) **Negative** Ahmad and Abbas (2011: 211) Baltaci and Ayaydin (2014:46) Gropp and Heider (2010: 598) Jucá *et al.* (2012: 23)
Asset tangibility	Negative	Positive	**Positive** Gropp and Heider (2010: 598) Jucá *et al.* (2012: 23) **Negative** Teixeiraa *et al.* (2014)
Risk	Positive	Negative	**Positive** Teixeira *et al.* (2014: 56) **Negative** Gropp and Heider (2010: 598) Jucá *et al.* (2012: 23)
Growth	Positive	Negative	**Positive** Ahmad and Abbas (2011: 211) Teixeira *et al.* (2014: 56) **Negative** Gropp and Heider (2010: 598) Jucá *et al.* (2012: 23)

Source: Researcher's own compilation

From the foregoing it is apparent that the bank financing decision mirrors that of non-financial firms in many aspects. However, there are bank-specific fixed factors that also come into play in the determination of capital structure. These include banking regulation, credit risk management and regulatory capital arbitrage opportunities. The present study sought to focus more on the bank-specific factors. In the next section the determinants of the capital structure of insurance companies are considered.

3.6   THE DETERMINANTS OF INSURERS' CAPITAL STRUCTURE

The insurance sector also deviates from the M&M irrelevance proposition in the same fashion as the banking sector. This is principally because insurance companies are subject to capital regulation (solvency regulation) and also have available another peculiar source of funding in the form of premiums. As such, the imperatives that the insurance companies have to grapple with when they formulate their capital structure policies include paying regard to solvency and surplus requirements, among other issues. This therefore sets apart the insurance industry from other firms. However, as has been demonstrable with respect to banking firms, insurance companies' financing behaviour nevertheless mirrors that of non-financial firms. In this section, the key metrics in the capital allocation decision of an insurer and the empirical studies that have been conducted to study the financing behaviour of insurance companies are discussed.

The key metrics in the capital allocation decision of an insurer are surplus and solvency. Surplus is defined as the difference between the value of the assets and the value of the liabilities. According to Myers and Read (2001: 545), it is the convention in the insurance business to refer to capital as 'surplus'. They further state that surplus is important because more surplus means more collateral for outstanding policies. In addition, the function of surplus is to reduce the risk of default to an acceptably low level. On the other hand, solvency is defined as the ability of insurers to cover their liabilities and meet the financial requirements of doing insurance business. Insolvency occurs when the assets of the insurer are insufficient to meet the outstanding claims (Sherris, 2006). As such, the determination of economic capital and the allocation of

capital to lines of business are important parts of the financial and risk management of an insurance company.

There is a growing body of literature that pays particular regard to the determinants of the capital structure of insurance companies. Gatzert and Schmeiser (2008: 50) investigated the influence of corporate taxes on pricing and capital structure in property-liability insurance. They found that raising the corporate tax level leads to a higher insurance leverage, as premiums increase with the tax rate. They also reason that the correlation between the insurer's assets and liabilities has an effect on initial equity and tax payments. In particular, in the case of a negative correlation, more equity capital must be raised to maintain the same safety level as in the uncorrelated case, which also leads to a higher present value of taxes.

Ahmed and Shabbir (2014: 172) tested the pecking order theory by employing financial data of insurance companies of Pakistan over a five-year period from 2007 to 2011. Their empirical results indicate that size, profitability, liquidity, tangibility and risk are important determinants of the capital structure of insurance companies of Pakistan. Further, they report that Pakistani insurers seem to follow a pecking order pattern of financing in terms of profitability, risk, tangibility and liquidity, as all the coefficients are negative. However, with regard to size, a positive relationship subsists, which is consistent with the trade-off theory.

Cheng and Weiss (2012: 14) conducted tests of the trade-off and pecking order theories within the US property-liability insurance industry. Their sample period for the study, 1994–2003, coincided with the institution of risk-based capital requirements in this industry. They estimated a partial adjustment model to determine whether firms have an optimal capital structure and how quickly firms adjust to the optimum when deviations from the optimum occur. The results of their research indicate that the trade-off theory dominates the pecking order theory for property-liability insurers. Further, their results indicate that the speed of adjustment towards the optimum tends to be faster for insurers that are marginally less well capitalised (2 < risk-based capital ratio < 3) compared to very well-capitalised insurers (risk-based capital ratio > 3). They reason is that this is consistent with the idea that capital holding costs might be higher for less

well-capitalised firms, providing them with an incentive to adjust towards the optimum more quickly.

Ahmed *et al.* (2010:10) investigated the determinants of capital structure of life insurance companies of Pakistan over the period of seven years from 2001 to 2007. Their empirical results indicate that size, profitability, liquidity and risk are important determinants of capital structure of life insurance companies of Pakistan. In addition, they document that life insurance companies follow a pecking order pattern of financing in terms of profitability, liquidity and age, as leverage has a negative relationship with profitability, liquidity and age. On the other hand, they report a positive relationship between leverage and size, which is consistent with the trade-off theory.

The capital structure decision of insurance companies therefore resembles that of non-financial firms in most respects. Therefore, the standard firm-level determinants of capital structure also determine the capital structure of insurance companies. However, the points of departure that seem to have a bearing on the insurer's financing decision are solvency regulation and the recourse to an additional source of financing, in the form of premiums. As such, this study sought to unravel the relationship between insurer financing and solvency regulation.

3.7   HYPOTHESES DEVELOPMENT

The hypotheses developed for the study were founded on the literature review conducted. Hitherto, it has been demonstrated that the standard firm-level determinants of capital structure are also reliably important in the determination of the capital structure of financial firms. As such, the starting point was to develop the hypotheses that relate to the standard firm-level determinants of capital structure.

The point of departure was that financial firms have peculiar attributes that non-financial firms do not have. These are regulation and recourse to other sources of funding such as bank deposits and insurance premiums. Therefore, the second set of hypotheses is dedicated to probe the relationship between financial firm leverage and financial firms'

FE determinants of leverage. The last set of hypotheses is dedicated to investigate the dynamics of capital structure in financial firms.

3.7.1 Standard firm-level determinants of leverage

Drawing from existing studies (Al-Najjer & Hussainey, 2011; Frank & Goyal, 2009; Gropp & Heider, 2010; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1991; Titman & Wessels, 1988, among other studies), there are reliably important factors that have been identified that affect firm leverage. These are profitability, asset tangibility (collateral), size, market-to-book value (growth) and dividends. The *a priori* expectation is that the financing behaviour of financial firms mirrors that of non-financial firms.

Hypothesis 1: *There is a significant relationship between profitability and financial firm leverage.*

This hypothesis was premised on the notion that highly profitable firms are presumed to generate retained earnings. As such, according to the pecking order theory they are more inclined to fund any value-adding projects firstly out of retained earnings. Therefore, the pecking order predicts a negative relationship between profitability and firm leverage. Indeed, most empirical studies have confirmed this prediction (see Bartoloni, 2013; Booth *et al.*, 2001:117; Rajan & Zingales, 1995: 1457; Shyam-Sunder & Myers, 1991: 221, among other studies on non-financial firms). Similarly, studies on financial firms have also bolstered this prediction (refer to Ahmad & Abbas, 2011: 211; Gropp & Heider, 2010: 598 and Jucá *et al.*, 2012:23, among other studies).

On the contrary, the trade-off theory predicts a positive association between firm profitability and firm leverage. The trade-off theory predicts that highly profitable firms are more likely to finance out of debt in order to enjoy the benefits of debt tax-deductibility. However, this benefit seems to accrue the most to large and very large firms, who have generated goodwill on the debt market and as such are rated favourably and can access debt at preferential terms. The pecking order prediction seems to be the most plausible one and most empirical studies seem to lend credence more to the negative prediction. A negative relationship was therefore predicted to subsist between profitability and firm leverage.

Hypothesis 2: *There is a significant relationship between asset tangibility and financial firm leverage.*

This hypothesis was formulated based on the assumption that companies with more tangible assets have more collateral. As such, they can pledge these assets as collateral and hence access the debt markets. The high collateral value of assets available to be pledged makes it possible for the firm to finance its operations out of more debt. In essence, the risk of lending to firms with higher tangible assets is lower and, hence, lenders will demand a lower risk premium. As a consequence of debt financing, the firm would be expected to enjoy the benefits of a debt interest tax shield. On the one hand, the trade-off theory predicts a positive relationship between asset tangibility and firm leverage. Among other studies on financial firms, Gropp and Heider (2010: 598) and Jucá *et al.* (2012: 23) found a positive relationship between asset tangibility and firm leverage. Yet, on the other hand, the pecking order theory predicts an inverse relationship between asset tangibility and firm leverage. This can be attributed to low information asymmetry associated with tangible assets, making equity issuances less costly. Empirical support of this prediction can be found in Bradley *et al.* (1984: 874), Ahmad and Abbas (2011: 208) and Al-Najjar and Hussainey (2011: 333), for instance. Nonetheless, the positive prediction is the most persuasive. The researcher reasoned that equity issuance is mainly associated with large firms. As such, this prediction may not hold for all categories of firms.

Hypothesis 3: *There is a significant relationship between growth and financial firm leverage.*

Arguably, high-growth firms run the risk of bankruptcy if they were to fund their operations more out of debt. This is predicted by the trade-off theory, which postulates that in the financing continuum, there is an optimum point to which the benefit that derives from the debt interest tax shield is maximum, beyond which point the benefit diminishes. As such, premised on the trade-off theory, the prediction was that as companies grow, they will finance more and more out of equity as opposed to debt. An inverse relationship was expected to subsist between leverage and growth. In contrast, the pecking order predicts a positive relationship between financial leverage and

growth. This is based on the presupposition that firms will observe a hierarchy of financing when faced with investment opportunities that are value-adding. As such, they will finance first out of retained earnings, followed by debt, before they consider equity. The implication is that if that were the case, firm leverage will be positively associated with growth. It should be pointed out, however, that the empirical evidence in this regard is mixed.

Hypothesis 4: *There is a significant relationship between dividend payout and bank leverage.*

This hypothesis is predicated on the notion that the dividend policy sends out signals to the market. An increase in dividend payout might send out a signal to the market that the future prospects of the firm are bright and conversely a dividend cut might signal that the future prospects of a firm are bleak. In the former instance, the firm will receive favourable valuation from the equity market, hence making equity issuance the most favourable. Therefore, the expectation is that firm leverage is inversely related to dividend payout. This has been corroborated by the empirical findings of, among other scholars, Antoniou *et al.* (2008: 80), Frank and Goyal (2009: 1) and Lemma and Negash (2014: 81).

Hypothesis 5: *There is a significant relationship between size and financial firm leverage.*

The effect of size on financial leverage can be twofold. From the pecking order theory vantage point, as firms grow, they are bound to generate more retained earnings. As such, they should be in a position to fund their operations more out of retained earnings and hence substitute debt. Therefore, a negative relationship is predicted to exist between firm leverage and size, whereas the trade-off theory predicts that large firms should be highly leveraged as compared to small firms as they stand to enjoy the benefits of debt interest tax shields. As such, from the trade-off theory point of view the prediction is that firm leverage is positively associated with size. Notwithstanding, empirical support for the positive firm leverage and size relationship is overwhelming (see for instance Ahmed *et al.*, 2010: 9; Antoniou *et al.*, 2008: 73; Al-Najjar &

Hussainey, 2011: 334; Bartoloni, 2013: 142; Lemma & Negash, 2014: 81; and Lim, 2012: 197, among other scholars).

Hypothesis 6: *The global financial crisis has significant explanatory power in financial firm leveraging.*

This hypothesis was based on the notion that there is a significant relationship between leverage and the dummy variable representing the 2007–2009 GFC. This hypothesis tested how financial firms will adjust their leveraging in the face of business cycles or financial crises.

3.7.2 Banking sector-specific determinants of leverage

In this section the bank-specific factors that might have a bearing on bank leverage are considered. Principally, the bank-specific pertinent features that might affect bank financing resulting in them deviating from the M&M irrelevance proposition are regulation, risk and deposit taking (third source of financing).

Hypothesis 7: *Credit risk has significant explanatory power in bank leveraging.*

This hypothesis was formulated based on the presupposition that financial firms are 'opaque' organisations. As such, their business activities are not subjected to the same level of scrutiny as would be the case with non-financial firms. Arguably, the problem of information asymmetry is greatest with financial firms. This is exacerbated by their risk-bearing role. Inherent to the problem of information asymmetry is the moral hazard problem. For instance, this arises where two parties enter into a transaction and the one party who has the best information about an asset or risk uses this to the detriment of the party who has the least information.

This phenomenon could manifest itself in the financing behaviour of financial firms. The 2007–2009 GFC was partly attributed to the bubble burst in the mortgage sector. This was occasioned by banks originating sub-prime loans and dumping them on the loan sales market. The notion is that banks that actively manage their credit risk will keep low levels of capital (see for instance Affinito & Tagliaferri, 2010; Casu *et al.*, 2011;

Cebenoyan & Strahan, 2004 and Froot & Stein, 1998). A positive relationship is predicted between leverage and credit risk.

Hypothesis 8: *The standard determinants of capital structure have significant explanatory power in non-deposit financing.*

This hypothesis was premised on the notion that banks have a third source of financing in the form of deposits. It sought to investigate the importance of deposits as a source of financing for banks. Essentially, in this hypothesis leverage is decomposed into deposit and non-deposit liabilities with a view to determining their relationship with standard-level determinants of capital structure. This followed the procedure of Gropp and Heider (2010: 603).

Hypothesis 9: *The standard determinants of capital structure have significant explanatory power in deposit financing.*

This hypothesis was a corollary to the above hypothesis on non-deposit financing. Deposit financing is a source of short-term funding for banking institutions. As such, this hypothesis tested how deposit leveraging is influenced by firm-level determinants of capital structure.

Hypothesis 10: *Bank leveraging is consistent with the buffer view of capital.*

Essentially, this hypothesis posits that banks hold excess levels of capital in line with bank intrinsic factors. This is dependent on bank characteristics such as size, growth and profitability, among other factors. There is a growing strand of empirical studies that have been undertaken and suggest that banks keep buffer (excess) levels of capital (refer to, among other scholars, Berger *et al.*, 1995; Berger, DeYoung, Flannery, Lee & Öztekin, 2008; Besanko & Kanatas, 1996; Gropp & Heider, 2010).

Banks are primarily motivated to keep buffer levels of capital for fear of regulatory sanction should the capital ratios deviate from the prescribed minimum. Further, they may be motivated to keep excess levels of capital if the adjustment costs are prohibitive. Possibly the banks could be stoking up capital for bad times to mitigate the business cycles. The buffer view may also be explained by information asymmetry that

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might exist in bank financing. For instance, dividend-paying, high-growth, profitable and large banks are rated favourably by the equity market and hence can issue equity at short notice. As such, they can hold low levels of capital (Gropp & Heider, 2010: 595). Table 3.8 outlines the major predictions of the buffer view of capital.

Table 3.8: Predicted effects of the buffer view of capital

Firm-level determinant	Predicted effect
Profitability	Positive
Asset tangibility	No prediction
Growth	Positive
Dividends	Positive
Size	Positive/Negative
Risk	Negative

Source: Adapted from Gropp and Heider (2010: 595)

Hypothesis 11: *The standard determinants of capital structure have significant explanatory power in capital regulation.*

This hypothesis presupposed that there is a significant relationship between capital regulation and the standard determinants of capital structure. Quintessentially, this hypothesis evaluated the efficacy of regulation. The expectation was that the standard determinants of capital structure will be of first-order importance in determining capital regulation (see, for instance, Gropp & Heider, 2010: 590).

3.7.3 Insurance sector-specific determinants of leverage

The insurance sector shares similarities with the banking sector in that it is subject to capital regulation (solvency regulation) and also has a third source of financing in the form of premiums. As such, the expectation is that in a world where the M&M irrelevance proposition does not hold, insurance companies stand to benefit from their capital structure choices.

Hypothesis 12: *Reinsurance has significant explanatory power in insurer leveraging.*

This hypothesis was predicated on the notion that reinsurance brings about risk divesture. As such, the higher the reinsurance cessions, the lower the risk of bankruptcy an insurer faces. This results in a favourable credit risk assessment by lenders. Consequently, the insurer is able to access more loans from the debt market. A direct relationship is predicted to exist between the reinsurance variable and insurer leverage.

Hypothesis 13: *The standard firm-level determinants of capital structure have significant explanatory power in the solvency ratio.*

The hypothesis posited that solvency regulation is of first-order importance in the determination of the capital structure of an insurance company. If that be the case, the standard determinants of capital structure should not offer any significant explanatory power in the solvency ratio variable.

Hypothesis 14: *The standard determinants of capital structure have significant explanatory power in premium liabilities.*

This hypothesis postulated that insurance companies finance their balance sheet growth out of premiums. A fundamental concept in insurance is that of risk pooling and diversification. Attendant to this is the generation of capacity to underwrite new business. This derives in part from the premium reserves that have been accumulated. Taking cognisance of this imperative, this hypothesis decomposes leverage into premium and non-premium liabilities. As such, the expectation was that the standard determinants of capital structure will be significantly associated with premium leverage in the same fashion as predicted by the theories of capital structure.

Hypothesis 15: *The standard determinants of capital structure have significant explanatory power in non-premium liabilities.*

Non-premium liabilities (non-premium leverage) are a proxy for long-term debt. This hypothesis essentially tested the robustness of the leverage variable by exploring the relationship between firm-level determinants of capital structure and the long-term debt variable.

3.7.4 Dynamics of capital structure choices

The last hypothesis sought to establish the dynamics in the selection of capital structures of both banks and insurance companies. It sought to determine whether financial firms exhibit some form of seeking 'optimality' in selecting their capital structures. Extant studies have been conducted in this regard (see, for instance, Elsas *et al.*, 2014: 1380; Flannery & Rangan, 2006: 471; Leary & Roberts, 2005: 2577; Mukherjee & Mahakud, 2010: 261 and Öztekin & Flannery, 2012: 108). The majority of these studies confirm that firms will actively seek to achieve a target capital structure.

Hypothesis 16: *Financial firms do adjust their capital structure to a target.*

3.8 CONCLUSION

In this chapter the importance of financial regulation was discussed. It was demonstrated that financial regulation of both the banking and the insurance sectors is essential for the preserving and fostering of financial stability of the financial sector. Regulation also provides the safety net to protect the vulnerable members of society. The chapter also reviewed the instruments available to the bank supervisory authorities in order to regulate the banking industry. These included the bank capital requirements that are enshrined in the Basel accords as well as deposit-protection insurance schemes. A discussion on the Basel accords followed, with particular regard to their advantages and limitations. This was followed by a discussion of deposit insurance schemes. Further, the financial regulation of the insurance sector was considered.

The pertinent issues that were considered include the evolution of the solvency standards and ICP. Financial regulation was also discussed in the context of South Africa. Suffice to highlight that South Africa has kept abreast with global developments and embraces global best practices. Having demonstrated that capital regulation of banks and insurance companies represents a primary departure from the M&M irrelevance proposition, the determinants of capital structures of banks and insurance companies, respectively, were considered. It was also established that there are bank

fixed effects as well as insurer fixed effects that influence the capital structure decision. It was also demonstrated that the standard capital structure determinants also determine the capital structures of banks and insurance companies in the same manner. The chapter concluded by developing the hypotheses for this study. The next chapter presents and discusses the research methodology employed in the study.

CHAPTER 4

RESEARCH METHODOLOGY

4.1   INTRODUCTION

This chapter begins by outlining the empirical framework that underpins this study. The empirical framework lays bare the econometric methods that have been employed to study capital structure dynamics. Both static and dynamic panel data models have been employed in extant studies. Moreover, the empirical framework signposts any caveats to consider when utilising various estimation methods employed in this study. As such, this informs the methodological choices that drove this research effort.

The chapter evolves to consider the research design for this study. The population and sampling frame is considered in this context. The econometric methods employed in this study are then considered. This study employs panel data methods. Further the chapter discusses estimation methods and lastly the specification of panel data tests.

The chapter is organised as follows: Section 4.2 outlines the empirical framework for the research. Section 4.3 discusses the research design of this study. Section 4.4 describes the estimation methods employed in this study. Section 4.5 outlines the formals tests of specification for panel data employed in this study and Section 4.6 concludes the chapter.

4.2   EMPIRICAL FRAMEWORK

In this section the empirical framework that guided this study is discussed. The empirical framework considers the methodological considerations that have informed previous studies on capital structure. This is beneficial for the present study in that it provided the basis of what proxies to adopt for the various variables under consideration as well as alerted of any caveats to consider in this research effort. In essence, the empirical framework informed the methodological choices that drove this research effort. It sought to appraise what methods have been used hitherto in similar studies in order to select the most appropriate method. It is pertinent to highlight that in this study, the determinants of capital structure are synonymous with the determinants of leverage.

As such, for the purposes of this study, both terms – capital structure and leverage – bear the same meaning.

Principally, dynamic and static econometric models have been employed to analyse the financing behaviour of firms. In this section, the methodologies applied in select studies of the determinants of capital structure and on the target leverage and speed of adjustment are explored. Suffice to highlight that the former category of studies have typical embraced the static panel data models, while the latter category of studies have employed dynamic panel models.

4.2.1 The determinants of leverage

Studies of the determinants of capital structure have invariably used panel data techniques of one form or the other to analyse their data. Selected studies are documented in Table 4.1.

Table 4.1: Select studies on the determinants of leverage

Author(s)	Estimation method(s)
Ahmed *et al.* (2010)	Pooled OLS
Al-Najjar and Hussainey (2011)	FE
Anarfor (2015)	FE
Antoniou *et al.* (2008)	syst-GMM
Bartoloni (2013)	Pooled OLS, FE, RE and GMM
Booth *et al.* (2001)	Pooled OLS and FE
Frank and Goyal (2009)	Multivariate regression analysis
Gropp and Heider (2010)	Pooled OLS and FE
Rajan and Zingales (1995)	Tobit model
Titman and Wessels (1988)	Analytical factor model

Source: Researcher's own compilation

Static models have often been employed to analyse the relationship between leverage and its determinants. In the main, these are the pooled ordinary least squares (OLS) model, the fixed effects (FE) model and the random effects (RE) model. Among other scholars, Anarfor (2015) and Al-Najjar and Hussainey (2011) employed the FE estimation method. On the other hand, others studies such as that of Bartoloni (2013), Gropp and Heider (2010) and Booth *et al.* (2001) employed a combination of estimation methods and hence in the final analysis made an inference based on the model that had the best fit. In this research effort the researcher took his cue from such studies and hence employed a combination of estimation techniques to test the relationship between leverage and its determinants.

4.2.2   Target leverage and speed of adjustment

Extant studies on determining whether there exists a target capital structure that firms seek to achieve have typically estimated a partial adjustment model; the reasoning being that leverage contemporaneously determines itself. In other words, current leverage is partly determined by previous levels. As such, leverage is a dynamic variable. Consequently, dynamic models have often been specified to investigate the financing behaviour of firms – that is, whether firms seek to achieve a target leverage ratio, and if so, what the speed of adjustment towards this leverage ratio is. Table 4.2 documents some of the studies that have explored the target leverage and the speed of adjustment towards the target.

Table 4.2: Select studies on target leverage and speed of adjustment

Author(s)	Estimation method(s)
De Jonghe and Öztekin (2015)	syst-GMM
Gropp and Heider (2010)	Pooled OLS and FE
Lemma and Negash (2014)	syst-GMM
Lemmon, Roberts and Zender (2008)	Pooled OLS, FE and syst-GMM
Mukherjee and Mahakud (2010)	GMM
Öztekin and Flannery (2011)	LSDV and syst-GMM
Ramjee and Gwatidzo (2012)	GMM

Source: Researcher's own compilation

The main estimation techniques that have been employed to estimate the relationship are the FE, difference generalised method of moments (diff-GMM) and syst-GMM.

4.3   RESEARCH DESIGN

4.3.1 Sample description and data sources

The population for this study comprised of South African insurance companies and banking institutions both listed and not listed on the JSE. In the sampling frame the researcher considered all the banks and insurance companies with complete data sets for the ten-year period running from 2006 to 2015. The Bureau van Dijk Bankscope database was used to source the audited financial statements of the banks. The financial information for the insurance companies was sourced from the Orbis databases and the FSB.

The banking sample comprised of 16 banks. As such, there were 160 observations for the banking sample. The insurance sample comprised of 26 insurance companies. There were 260 observations for the insurance companies. The list of the banks and insurance companies and their sub-sectors is provided in appendices A and B, respectively.

4.3.2 Variable definition

Standard corporate finance regression analysis has been employed in extant studies to analyse the relationship between capital structure and its determinants. The *a priori* expectations of this relationship were considered in the development of the hypotheses for this study. The proxies employed for the dependent variable as well as the independent variables in this study are considered next in turn.

4.3.2.1   Dependent variables

In this study, three dependent variables were employed to test the relationship between leverage and its determinants. The primary dependent variable employed for this study was book leverage. The book leverage measure (BLE) is a broad measure of leverage,

defined as *one minus the ratio of book value of equity to book value of assets.*[1] This follows from Gropp and Heider (2010). Suffice to highlight that many proxies have been employed to define the leverage variable. There are three strands of literature in this regard. In the first instance, scholars rely on one measure of leverage. In the second strand, scholars rely on two measures of leverage, namely book leverage and market leverage. In the last strand of literature, scholars rely on the broadest measure of leverage and have three proxies for leverage, namely total debt ratio, short-term debt ratio and long-term debt ratio. Some of the proxies are enumerated in Table 4.3.

Table 4.3: Proxies used for leverage

Author(s)	Proxy used
Antoniou *et al.* (2008)	Book leverage = book value of total debt / book value of total assets Market leverage = book value of debt / (market value of equity + book value of total debt)
Bartoloni (2013)	Leverage = debt ratio = total debt / total assets
Booth *et al.* (2001)	Leverage defined as: 1. Total debt ratio = total liabilities/(total liabilities + net worth) 2. Long-term debt book ratio = (total liabilities – current liabilities) / (total liabilities – current liabilities + net worth)
Frank and Goyal (2009)	Leverage defined as: 1. TDM = total debt / market value of assets 2. TDA = total debt / book value of assets 3. LDM = long-term debt / market value of assets 4. LDA = long-term debt / book value of assets

Source: Researcher's own compilation

The major contestation has been whether to employ book leverage, market leverage or both. Notwithstanding that the conundrum remains unresolved, studies that have

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[1]

$Since\ total\ assets = total\ liabilites + equity$

$\rightarrow \dfrac{Total\ assets}{Total\ assets} = \dfrac{total\ liabilities}{total\ assets} + \dfrac{equity}{total\ assets}$

$\rightarrow \dfrac{Total\ liabilities}{Total\ assets} = 1 - \dfrac{equity}{total\ assets},$

$hence\ BLE = 1 - \dfrac{E}{TA}$

employed both measures demonstrate that the results are robust to either proxy adopted. Therefore, the inference is largely the same irrespective of whether book leverage or market leverage was employed (see, for instance, Antoniou *et al.*, 2008; Frank & Goyal, 2004; Gropp & Heider, 2010; Hovakimian *et al.*, 2001; Rajan & Zingales, 1995 and Titman & Wessels, 1988, among other scholars). Moreover, the justification for using book value leverage is premised on other considerations. Firstly, capital regulation of banks is imposed on book values and not market values and hence this became the variable of interest for the purposes of this study. Secondly, as the sample of financial firms included firms that were not listed on the JSE, there was scant availability of market value data.

Because banks have an additional source of financing, in the form of deposits, in this study leverage was also decomposed to analyse the dynamics of deposit financing. The secondary measures of leverage employed for the banking sector in this study were deposit leverage (deposit liabilities) and non-deposit leverage (non-deposit liabilities). Deposit leverage (DEPOSIT) equals the *ratio of total deposits to total assets*. This is consistent with Gropp and Heider (2010: 605). Non-deposit leverage (NON-DEP) is the difference between book leverage and deposit leverage.

For the insurance sector, the researcher also employed secondary measures of leverage to estimate the relationship. These were non-premium liabilities ("non-premium leverage") and premium reserves ("premium leverage"). Premium leverage (PRL) equals the *ratio of total gross provisions to total assets*. Non-premium leverage (NON-PREM) is equal to *book leverage minus premium leverage*.

This study also examined the relationship between regulation and the determinants of capital structure. In the case of banks, the proxy employed for regulation (Reg) was the *Tier 1 regulatory capital ratio (T1C),* whereas for insurance companies the *solvency ratio[2] (Sol)* was employed as the dependent variable*.*

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[2] This study employed the actual solvency ratio as the proxy for the regulatory variable. This is defined as the ratio of surplus to total assets, that is, (assets minus liabilities) / total assets.

Lastly, the study also examined the buffer view of capital in the case of banking firms. The dependent variable employed in this regard was *the excess of Tier 1 regulatory capital ratio over the prescribed Tier 1 regulatory capital ratio (BUFFER).*

4.3.2.2 Independent variables

The independent variables consist of the firm-level determinants of capital structure as well as dummy variables. The firm-level determinants of capital structure that are reliably important and were considered for this study are size, growth, asset tangibility, profitability, risk and reinsurance. The dummy variables that were employed for this study were to capture the effects of the 2007–2009 GFC as well as a dummy variable to capture one remaining firm-level determinant of capital structure: dividends. The proxies to capture these variables employed in this study are now considered in detail.

- **Size**

To measure size, the researcher employed the natural logarithm of total assets. There is a direct relationship between size and the value of assets held. Larger companies are expected to have more assets. Most studies on the determinants of capital structure have employed this proxy to measure size. Such studies include that of Al-Najjar and Hussainey (2011), Antoniou *et al.* (2008), Booth *et al.* (2001), Frank and Goyal (2009), Mukherjee and Mahakud (2010) and Öztekin and Flannery (2011). Other studies have employed the logarithm of sales or net sales to capture the effect of size (see, for instance, Barclay & Smith, 2005; Rajan & Zingales, 1995; Titman & Wessels, 1988). The researcher was persuaded to employ the total assets variable, as this proxies on the one hand both the loan activity and investment activities of banks and on the other hand underwriting and investment activities of insurance companies.

- **Growth**

The growth variable is defined as the annual growth rate of total assets. The researcher took his cue from Titman and Wessels (1998) and Anarfor (2015), among other scholars, in defining growth as such; the reasoning being that the higher the growth rate, the higher the growth prospects of the firm. The alternative definition that has also been used widely in empirical studies would have been to proxy growth prospects with

the market-to-book value ratio (see, among other scholars, Booth *et al.*, 2001; Frank & Goyal, 2009 and Teixeira *et al.*, 2014). However, as already pointed out earlier, the researcher could not proceed as such due to the scant availability of market value data. Moreover, this measure could be inadmissible for some firms in the study sample, as they were not listed on the stock exchange.

- **Asset tangibility**

In this study, asset tangibility is defined as the ratio of fixed assets to total assets. The ratio of fixed assets to total assets expresses the collateral value. Fixed assets offer collateral value. If collateral value is high, the firm would be viewed in good light in the debt market. As such, it could access loans at concessionary rates. The researcher was motivated to employ the fixed assets to total assets ratio as a proxy for asset tangibility, as extant studies have also utilised this measure. The empirical studies that have employed this measure include that of Rajan and Zingales (1995), Frank and Goyal (2009), Mukherjee and Mahakud (2010), Öztekin and Flannery (2011) and De Jonghe and Öztekin (2015).

- **Profitability**

Various measures have been employed in empirical studies to capture the effect of profitability. This is partly because profitability is defined in several ways. In this study the researcher employed the return on assets (ROA[3]) measure as the proxy for profitability. Boot *et al.* (2001) and Anarfor (2015), among other scholars, employed ROA as an indicator of profitability in similar studies. In the case of the banking sample, this was defined as the return on average assets (ROAA[4]).

- **Risk**

Risk was defined in two distinct ways for the study sample of financial firms. For the banking institutions, the focus was on credit risk. The proxy employed for credit risk was the *ratio of impaired loans to gross loans*. For the insurance sample, the measure

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[3] $ROA = \dfrac{Net\ income}{Total\ Assets}$

[4] $ROAA = \dfrac{Net\ income}{Average\ total\ assets}$

utilised to capture underwriting risk was the *ratio of total underwriting expenses to gross premiums written.*

- **Reinsurance**

The reinsurance variable is the added explanatory variable for the insurance panel. It is defined as the *one minus the ratio of net premiums to gross premiums (alternatively one minus retention ratio).* The *a priori* expectation was that reinsurance brings about the diversification of risk. As such, with risk minimised, the insurance company's credit rating improves in the debt market. Debt becomes the favourable financing option. As such, a positive relation was predicted to exist between the reinsurance variable and leverage.

- **Dummy variables**

The researcher employed two dummy variables in this study. The first one is the dummy variable for dividends. The rationale was that the payment of dividend sends out a signal to the market and hence can have an impact on bank leverage. It is defined as 1 when a bank pays out a dividend and 0 when the bank does not declare a dividend. The second dummy variable (GFC) was to capture the effects of the 2007–2009 GFC. It will be defined as 1 for the years when the financial crisis occurs and 0 otherwise.

4.3.3 Panel data analysis

In this thesis the researcher employed panel data econometric analysis to unravel the relationship between leverage and its determinants as well as to test whether there is a target capital structure towards which financial firms will gravitate.

Panel data combines cross-section and time-series data. There are several advantages that accrue from employing panel data. According to Baltagi (2008: 6–8), the main benefits of panel data can be enumerated as follows:

- Controlling for individual heterogeneity. Panel data suggest that firms, individuals or countries are heterogeneous. To the contrary, time-series and

cross-sectional studies do not control for heterogeneity and might run the risk of obtaining biased results.

- Panel data give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency.
- Panel data are better able to study the dynamics of adjustment.
- Panel data are better able to identify and measure effects that are simply not detectable in pure cross-section or pure time-series data.
- Biases resulting from aggregation over firms or individuals may be reduced or eliminated.
- Panel data allow for the construction and the testing of more complicated behavioural models than purely cross-sectional or time-series data.

According to Baltagi (2009: 8–10), the limitations of panel data are that it could be susceptible to the following:

- Design and collection problems. These include problems of coverage, non-response, frequency of interviewing and reference period.
- Distortion of measurement errors. Measurement errors might arise for instance because of faulty responses due to unclear questions, memory errors and deliberate distortion of responses.
- Selectivity problems. These include self-selectivity, non-response and attrition.
- Short time-series dimension. Typical micro panels involve annual data covering a short time span for each individual.
- Cross-section dependence. Macro panels on countries or regions with long time series that do not account for cross-country dependence may lead to a misleading inference.

Notwithstanding the above limitations of panel data, the benefits of utilising panel data far outweigh the potential drawbacks for this study. The main benefits that accrued to

this study as a result of utilising panel data were that they control for panel heterogeneity of the sample of banks and insurance companies, thereby ensuring that the researcher's inferences were not biased. Panel data also confer more degrees of freedom and more efficiency to the analysis as compared to time-series or cross-sectional studies. Moreover, the panel data techniques enabled the researcher to test the dynamic capital structure model in order to establish the speed of adjustment towards the target capital structure.

According to Greene (2012: 385), the general modelling framework for analysing panel data can be expressed as following regression model:

$$y_{i,t} = \mathbf{x}'_{i,t}\boldsymbol{\beta} + \mathbf{z}'_i\boldsymbol{\alpha} + \varepsilon_{i,t} \tag{4.1}$$
$$= \mathbf{x}'_{i,t}\boldsymbol{\beta} + c_i + \varepsilon_{i,t}$$

where there are K regressors in x_{it}, not including a constant term. The heterogeneity or individual effect is $\mathbf{z}'_i\boldsymbol{\alpha}$, where $\mathbf{z}_i$ contains a constant term and a set of individual or group-specific variables that may be observed.

Greene (2012: 386–387) further contends that here are four broad categories of panel data models. These are pooled regression, FE, RE and random parameters models. These can be derived from Equation (4.1). Each model is considered in turn.

4.3.3.1   Pooled regression

Pooled models assume that regressors are exogenous. If $\mathbf{z}_i$ contains only a constant term, then OLS provides consistent and efficient estimates of the common $\boldsymbol{\alpha}$ and the slope vector $\boldsymbol{\beta}$. The model is specified as follows:

$$y_{i,t} = \mathbf{x}'_{i,t}\boldsymbol{\beta} + \alpha + \varepsilon_{i,t} \tag{4.2}$$

4.3.3.2   Fixed effects

If $\mathbf{z}_i$ is unobserved but correlated with x_{it} , then the least squares estimator of $\boldsymbol{\beta}$ is biased and inconsistent as a consequence of an omitted variable. The model was therefore modified as follows:

$$y_{i,t} = x'_{i,t}\beta + \alpha_i + \varepsilon_{i,t} \tag{4.3}$$

where $\alpha_i = z'_i\alpha$ embodies all the observable effects and specifies an estimable conditional mean. The FE approach takes α_i to be a group-specific constant term in the regression model.

4.3.3.3   Random effects

If the unobserved individual heterogeneity, however formulated, can be assumed to be uncorrelated with the included variables, then the model may be formulated as follows:

$$y_{i,t} = x'_{i,t}\beta + \alpha + \mu_i + \varepsilon_{i,t} \tag{4.4}$$

This is a linear regression model with a compound disturbance that may be consistently albeit inefficiently estimated by least squares. The RE approach specifies that μ_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 (Greene, 2012: 387). Estimation is then by a feasible generalised least squares (FGLS) estimator (Cameron & Trivedi, 2010: 238). The advantages of the RE model is that it yields estimates of all coefficients. The drawback is that these estimates are inconsistent if the FE model is appropriate.

4.3.3.4   Random parameters

The random parameters model can be viewed as a regression model with a random constant term. It is specified as follows:

$$y_{i,t} = x'_{i,t}(\beta + h_i) + (\alpha + \mu_i) + \varepsilon_{i,t} \tag{4.5}$$

where h_i is a random vector that induces the variation of the parameters across individuals. It represents a natural extension in which researchers broaden the amount of heterogeneity across individuals while retaining some commonalities.

In this study, the pooled regression, FE and RE models were employed. Post-estimation diagnostics test were conducted in order to ensure that the estimated model was robust.

4.4 ESTIMATION METHODS

To examine the relationship between leverage and its determinants, the static panel data model was employed. The researcher employed a battery of diagnostics tests to ensure that the model was well specified and to ensure that the most appropriate estimation technique to run the regression was selected. A dynamic panel data model was specified to study the target leverage and determine the speed of adjustment towards the target level. The researcher also carried out diagnostics tests in order to select the most appropriate model specification and estimation technique. The econometric analysis was conducted by employing Stata version 14 software.

4.4.1 The static panel data model

A static panel data model was used in three instances in this study. Firstly, the model was employed to estimate the relationship between leverage and its determinants. Secondly, it was employed to test the relationship between the regulatory variable and the determinants of capital structure. Lastly, the static panel data model was used to test the buffer view of capital.

For the banking panel, to test the relationship between leverage and its determinants, the static panel data model was specified as follows:

$$Lev_{i,t} = x'_{i,t}\beta + \alpha_i + \varepsilon_{i,t} \tag{4.6}$$

where

$Lev_{i,t}$ = leverage (BLE, DEP, NON-DEP) for bank i at time t

$x'_{i,t}$ = vectors of explanatory variables (size, profit, growth, asset tangibility, dividend, risk and GFC) for bank i at time t

β = a vector of slope parameters

α_i = group-specific constant term that embodies all the observable effects

$\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model

To test the relationship between the regulatory variable and the firm-level determinants, the static panel data model was specified as follows:

$$T1C_{i,t} = \mathbf{x}'_{i,t}\boldsymbol{\beta} + \alpha_i + \varepsilon_{i,t} \qquad\qquad (4.7)$$

where

$T1C_{i,t}$ = Tier 1 capital regulatory variable for bank *i* at time *t*

$\mathbf{x}'_{i,t}$ = a vector of explanatory variables (size, profit, growth, asset tangibility, dividend, risk and GFC) for bank *i* at time *t*

β = a vector of slope parameters

α_i = group-specific constant term that embodies all the observable effects

$\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model

Lastly, to test the relationship between buffer capital and its determinants, the static panel data model was specified as follows:

$$BUFFER_{i,t} = \mathbf{x}'_{i,t}\boldsymbol{\beta} + \alpha_i + \varepsilon_{i,t} \qquad\qquad (4.8)$$

where

$BUFFER_{i,t}$ = buffer capital for banking firm *i* at time *t*

$\mathbf{x}'_{i,t}$ = a vector of explanatory variables (size, profit, growth, asset tangibility, dividend, risk and GFC) for banking firm *i* at time *t*

β = a vector of slope parameters

α_i = group-specific constant term that embodies all the observable effects

$\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model

For the insurance panel, to test the relationship between leverage and its determinants, the static panel data model was specified as follows:

$$Lev_{i,t} = x'_{i,t}\boldsymbol{\beta} + \alpha_i + \varepsilon_{i,t}$$ (4.9)

where

$Lev_{i,t}$ = leverage (BLE, PREM, NON-PREM) for insurer i at time t

$x'_{i,t}$ = vectors of explanatory variables (size, profit, growth, asset tangibility, reinsurance, and GFC) for insurer i at time t

β = a vector of slope parameters

α_i = group-specific constant term that embodies all the observable effects

$\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model

To test the relationship between the regulatory variable and the firm-level determinants, the static panel data model was specified as follows:

$$SOL_{i,t} = x'_{i,t}\boldsymbol{\beta} + \alpha_i + \varepsilon_{i,t}$$ (4.10)

where

$SOL_{i,t}$ = solvency ratio for insurer i at time t

$x'_{i,t}$ = a vector of explanatory variables (size, profit, growth, asset tangibility, risk, reinsurance and GFC) for insurer i at time t

β = a vector of slope parameters

α_i = group-specific constant term that embodies all the observable effects

$\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model.

Equations (4.6) (4.7) (4.8) (4.9) and (4.10) were estimated by employing the pooled regression model, FE model and the RE model. Having estimated the equations, diagnostic tests were conducted on the base models. This enabled the researcher to determine whether the model was well specified and to select the most appropriate estimator among the pooled OLS, FE and the RE estimators. In the event that cross-sectional dependence was detected, the FE with Driscoll and Kraay (1998) standard errors estimator was employed.

4.4.2 The dynamic panel data model

Extant studies have modelled the target capital structure by employing a partial adjustment framework. Among other studies, these include that of Flannery and Rangan (2006), Antoniou *et al.* (2008), Mukherjee and Mahakud (2010), Ramjee and Gwatidzo (2012), Lemma and Negash (2014) and De Jonghe and Öztekin (2015). The researcher took his cue from such studies and specified a partial adjustment framework in order to determine whether there exists a target capital structure as follows:

$$Lev_{i,t}^* = x_{i,t}'\beta + \varphi_{i,t} \tag{4.11}$$

where

$Lev_{i,t}^*$ = target leverage
$x_{i,t}'$ = a vector of explanatory variables (size, profitability, growth, asset tangibility dividend, risk, dividend and GFC) for bank i at time t

or

$x_{i,t}'$ = a vector of explanatory variables (size, profitability, growth, asset tangibility, risk, reinsurance and GFC) for insurer i at time t

β = a vector of slope parameters

$\varphi_{i,t}$ = disturbance term

Firms will seek to gravitate to the target capital structure. They could be impeded in adjusting to this optimal ratio due to the presence of adjustment costs. Therefore, firms would adjust towards their target leverage as follows:

$$Lev_{i,t} - Lev_{i,t-1} = \delta(Lev_{i,t}^* - Lev_{i,t-1}), \text{ with } 0 < \delta < 1 \tag{4.12}$$

The parameter δ is the coefficient of adjustment or the speed of adjustment. The speed of adjustment is inversely related to adjustment costs (Ramjee & Gwatidzo, 2010: 58). If $\delta=1$, the actual change in leverage is equal to the desired and the adjustment is transaction cost-free. If $\delta=0$, there is no adjustment in leverage. The absence of adjustment is possible when adjustment costs are excessively high or the cost of adjustment is significantly higher than the cost of remaining off target (Antoniou *et al.*, 2008).

Substituting the equation of target leverage, Equation (4.11), into Equation (4.12) yielded the following:

$$Lev_{i,t} = (1 - \delta)Lev_{i,t-1} + x'_{i,t}\delta\boldsymbol{\beta} + \delta\varphi_{i,t} \tag{4.13}$$

The dynamic panel data model as specified in Equation (4.13) is fraught with two sources of persistence over time. These are autocorrelation due to the presence of the lagged dependent variable (Lev_{it-1}) among the regressors as well as the presence of individual effects characterising the heterogeneity among the individuals. This renders estimation with either OLS or GLS biased and inefficient. Several ways have been advanced to mitigate the problems of autocorrelation and heterogeneity. Firstly, Anderson and Hsiao (1982) suggest first differencing to get rid of the individual effects and then using, for instance, $\Delta Lev_{i,t-2} = (Lev_{i,t-2} - Lev_{i,t-3})$ or simply $Lev_{i,t-2}$ as an instrument for $\Delta Lev_{i,t-1}$. These instruments will not be correlated with the error term as long as they are not serially correlated. This instrumental variable estimation method leads to consistent but not necessarily efficient estimates of the parameters in the model because it does not make use of all the available moment conditions (Baltagi, 2009: 148).

Secondly, Arellano and Bond (1991) propose a GMM procedure that is more efficient than the Anderson and Hsiao (1982) estimator by also differencing the model and using instruments in levels. They demonstrate that additional instruments can be obtained in a dynamic panel model if one utilises the orthogonality conditions that exist between lagged values of the dependent variable and the disturbance term (Baltagi, 2009: 149).

This estimation framework is also referred to as the diff-GMM. The differenced dynamic model is specified as follows:

$$\Delta Lev_{i,t} = (1 - \delta)\Delta Lev_{i,t-1} + \Delta(\boldsymbol{x_{i,t}})'\delta\boldsymbol{\beta} + \Delta\delta\varphi_{i,t} \qquad (4.14)$$

The major limitation of a differenced model is that differencing wipes away individual effects and hence might result in loss of information. Subsequently, Blundell and Bond (1998) proposed a syst-GMM estimator to improve on the work of Arellano and Bond (1991) and Arellano and Bover (1995). This was based on the notion of exploiting the initial condition in generating efficient estimators of the dynamic panel data model when T is small. Arellano and Bover (1995) showed that by adding the original equation in levels (for instance Equation 4.11) to the system, additional moment conditions can be brought to bear to increase efficiency. Blundell and Bond (1998) demonstrated that an additional mild stationary restriction on the initial conditions process allows the use of an extended syst-GMM estimator. This uses lagged differences of the dependent variable as instruments for equations in levels in addition to lagged levels of the dependent variable as instruments for equations in first differences. In essence, the syst-GMM estimator is more efficient than the diff-GMM estimator.

To estimate the dynamic model, firstly, initial diagnostics were performed on the base pooled OLS, FE and RE models. Subsequently, both the diff-GMM and the syst-GMM estimators were employed. The caveat is that the diff-GMM and syst-GMM estimators may not be the most efficient estimators taking cognisance of the study sample properties. Banks are dependent on one another for funding through the interbank market. Similarly, insurance companies are reliant on one another, for instance, for facultative reinsurance in order to create underwriting capacity. As such, presumably there is cross-section dependence among the banks and insurance companies respectively.

This renders estimation within the framework of GMM inefficient and unreliable. As such, two estimators that are cross-sectional dependence-consistent were also considered. These were the FGLS (Kmenta, 1986; Parks, 1967) and LSDV (with Kiviet, 1995 correction) estimators.

4.5 FORMAL TESTS OF SPECIFICATION FOR PANEL DATA

The principal departure of this study from other studies of capital structure is that it employed a variety of diagnostic techniques in order to ensure that the results estimated were reliable. As such, several tests of specification were conducted to ensure that the estimation methods were consistent and yielded reliable estimates of parameters for both panels of the financial firms (banks and insurance companies). These tests were conducted for both the static model and the dynamic model specification. These are considered next in turn.

4.5.1 Testing the joint validity of fixed effects

The first test that was applied in this study was that of the poolability of panel data. An applied Chow test or F-test to test for the validity of cross-sectional effects was employed in this study. The hypotheses in this test were specified as follows:

H_0: $\alpha_1 = \alpha_2 = \alpha_{n-1} = 0$ (no individual effects: same intercept for all cross-sections)

H_A: $\alpha_1 \neq \alpha_2 \neq \alpha_{n-1} \neq 0$

According to Baltagi (2009: 15), the test statistic is calculated as follows:

$$F = \frac{(RRSS-URSS)/(N-1)}{URSS/(NT-N-K)} \sim F_{(N-1),(NT-N-K)} \tag{4.12}$$

where

RRSS = restricted residual sum of squares, being that of OLS on the pooled model

URSS = unrestricted residual sum of squares, being that of the LSDV regression

The null hypothesis was rejected if $F > F_{crit}$ and the conclusion was that fixed effects are valid and therefore firms are heterogeneous and should not be pooled. In this case, one would reject the pooled OLS estimation framework and proceed to estimate within the fixed effects realm.

4.5.2 Testing for time (period) effects

Testing the joint validity of time (period) effects follows the same procedure as for testing for the validity of fixed effects. The hypotheses under consideration were:

H_0: $\lambda_1 = \lambda_1 = \lambda_{n-1} = 0$ (no time [period] effects: same intercept for all cross-sections)

H_A: $\lambda_1 \neq \lambda_2 = \lambda_{n-1} \neq 0$

In the case where the null hypothesis was rejected and time effects were found to be valid, time dummies were incorporated into the estimated model and the model took a two-way form.

4.5.3 Testing for random effects

The next test that was considered was the Breusch-Pagan (1980) Lagrange multiplier (LM) test to test for heteroscedasticity or serial correlation. The null hypothesis was that variance of the error term is constant. The alternative hypothesis was that the variance of the error term is non-constant. This rendered estimation with OLS inappropriate. In this instance the RE were present.

The hypotheses under consideration were:

H_0: $\delta_\mu^2 = 0$ (constant variance across firms)

H_A: $\delta_\mu^2 \neq 0$

4.5.4 Fixed effects or random effects: Hausman (1978) test of specification

To discern whether to select the RE model or the FE model, the Hausman test specification was employed. Greene (2012: 419) contends that the FE approach has one considerable virtue and there is little justification for treating the individual effects as uncorrelated with the other regressors, as is assumed in the RE model. As such, the RE treatment may suffer from inconsistency due to this correlation between the included variables and the random effect. The null hypothesis was that of exogeneity between

the regressors and error term. The null hypothesis was rejected in favour of endogeneity between the regressors and the error term (FE model).

The hypotheses being tested were:

H₀: $E(\mu_{it}|X_{it}) = 0$

H_A: $E(\mu_{it}|X_{it}) \neq 0$

4.5.5 Test for cross-sectional dependence: Pesaran (2004) CD test

The cross-sectional dependence test was used to test whether residuals are correlated across entities. This may lead to the problem of contemporaneous correlation. Therefore, erroneously ignoring possible correlation of regression disturbances over time and between subjects can lead to biased statistical inference (Hoechle, 2007: 281).

The hypotheses tested were:

H₀: $\rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ (residuals across firms are not correlated)

H_A: $\rho_{ij} \neq \rho_{ji} = 0$

4.5.6 Test for heteroscedasticity: Modified Wald test for group-wise heteroscedasticity

This modified Wald statistic computed in this test was used to establish whether the residual in the estimated FE model was homoscedastic. The model was estimated assuming homoscedasticity of the residual. In the absence of the same, it rendered the estimation biased. The estimation had to be corrected to obtain heteroscedasticity robust standard errors.

H₀: $\delta_i^2 = \delta$ *for all i* (constant variance)

H₀: $\delta_i^2 \neq \delta$ *for all i*

The next two tests were generated for the GMM estimation.

4.5.7   Test for serial correlation

For consistent estimation, the Arellano Bond estimators require that the error term be serially uncorrelated. As such, it is imperative to test for the serial correlation of the error term. The null hypothesis was of autocorrelation. In the absence of autocorrelation, this had to be rejected in first-differenced errors but was insignificant in higher orders (order greater than 2).

4.5.8   Test for validity of identification restrictions: Sargan test

The last test considered under the dynamic panel model was the Sargan test, which tests for the validity of identification restrictions, for instance whether the model is well specified. It also ascertains whether instruments are more than regressors. Diff-GMM and syst-GMM can generate instruments prolifically. If instruments outnumber regressors, then equations outnumber unknowns and the system cannot be solved. This generates a very huge matrix that finite samples cannot estimate. Sargan test basically informs whether the estimated model is over-fitted with instruments.

4.6   CONCLUSION

This chapter first considered the empirical framework guiding this study. This laid the foundation for the methodological choices for this study. In the main these are the proxies used for the dependent and independent variables as well as the estimation techniques utilised in this study. The research design was discussed next. This considered the panel data econometric models employed in this study. The chapter then discussed the estimation methods, namely the pooled regression, FE, RE and random parameters models. In this study, the static panel model was specified in three instances; firstly, to establish the relationship between leverage and its determinants; secondly, to test the 'regulatory view' of capital structure; and thirdly, to test the 'buffer view' of bank capital structure. The pooled effects, RE and FE estimators were employed to estimate the static models.

On the other hand, a partial adjustment framework was specified to determine whether there is a target capital structure that financial firms seek. The estimation methods under the dynamic panel model considered in this study were then explored. These are the Arellano and Bond (1991) estimator (diff-GMM), the Bond and Blundell (1998) estimator (syst-GMM). The chapter concludes by considering the formal tests of specification conducted in this study. These tests were conducted in order to avoid misspecification and hence ensure that the estimated model was robust in order to draw reliable inferences. The next chapter presents the empirical results of the banking sector.

CHAPTER 5

EMPIRICAL RESULTS OF THE BANKING SECTOR

5.1   INTRODUCTION

This chapter presents the empirical results of testing the hypotheses developed in this thesis pertaining to the banking sector. Principally there were four main questions being resolved. The first question was whether the standard corporate finance view of capital structure also carries over to the banking sector. The second question was whether bank capital regulation constitutes the sole source of overriding departure from the M&M capital structure irrelevance propositions. In essence the purpose of this question tested was to establish the efficacy of bank capital regulation. The third central question probed whether the buffer view of bank capital subsists. The fourth question probed whether banks have a target capital structure which they seek to attain and if so, at what speed do they adjust towards this target.

Panel data econometric techniques were employed to conduct the analysis. On the one hand, a static model was specified to estimate the firm-level and bank-specific determinants of capital structure. On the other hand, a dynamic model was specified to estimate the target capital structure of banks as well as the speed of adjustment. In each instance, an attempt was made to select the most robust estimation technique by applying a battery of initial diagnostics tests.

The rest of the chapter is organised as follows: Section 5.2 presents the descriptive statistics and analyses the trends thereof. Section 5.3 presents and discusses the results of testing the relationship between leverage and firm-level determinants of capital structure. Section 5.4 reports on the results of the bank-specific determinants of capital structure. Section 5.5 presents the tests and analyses the results to establish whether banks seek to achieve a target capital structure. Section 5.6 then concludes the chapter.

5.2   DESCRIPTIVE STATISTICS

This section presents the summary statistics of all the variables. The trends of the variables over time are also described and analysed.

The descriptive statistics of the variables are presented in Table 5.1. These are the central measures of tendency (mean and median), standard deviation and minimum and maximum values for the sample of banking firms under consideration.

South African banks on average experience a mean year-on-year growth of 15.9% of their total assets. They also realise profits with a mean ROA of 1.9%. This is modest in comparison to non-financial firms. Ramjee and Gwatidzo (2012: 59) in comparison report a mean ROA of 17% for their sample of non-financial firms. The mean asset tangibility level of banks is 1% of total assets. This implies that on average, 1% of banks' total assets consist of fixed assets. The average size of the bank approximated by the natural logarithm of total assets is 10.85. On average, in any given year, 65% of the banks pay dividends.

South African banks are highly leveraged in line with global norms. The mean book leverage of the banks is close to 86.9% of total assets. This is close to the levels reported by Gropp and Heider (2010: 593) in the case of large US and EU banks of 92.6% of assets. Comparatively, the median book leverage is 91.6%, which is close to the levels reported by Gropp and Heider (2010: 593), who report a median book leverage of 92.7% for the same sample of banks.

South African banks are highly leveraged in comparison to non-financial firms. Ramjee and Gwatidzo (2012: 59) report for a sample of South African non-financial firms a mean book leverage of 59% of total assets. On further analysis, South African banks' leveraging exhibits a sustained upward trajectory in the aftermath of the 2007–2009 GFC.

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Table 5.1: Summary statistics of the variables

Variable	Mean	Median	Standard deviation	Minimum	Maximum
Book leverage	0.8696	0.9160	0.1095	0.3800	1.1300
Deposit leverage	0.7602	0.8225	0.1897	0.0240	0.9547
Non-deposit leverage	0.1186	0.0907	0.1470	0.0071	0.7826
Tier 1 capital	0.1637	0.1330	0.1140	-0.2000	1.1311
Buffer capital	0.0957	0.0688	0.1135	-0.2600	1.0561
Growth	0.1592	0.1199	0.1962	-0.5775	1.1195
Profit	0.0191	0.0134	0.0380	-0.1694	0.2036
Asset tangibility	0.0102	0.0089	0.0083	0.0005	0.0400
Risk	0.0528	0.0249	0.0870	-0.0528	0.6878
Size	10.8500	8.7100	5.0200	6.1800	27.5700
Dividend	0.6500	1	0.4785	0	1
GFC	0.3000	0	0.4597	0	1

Note: GFC is the dummy variable representing the 2007–2009 GFC.

Source: Researcher's own compilation

The average book leverage values of South African banks increased from roughly 87.5% of total assets in 2007 to 88.9% of total assets in 2015. These trends are depicted in Figure 5.1.
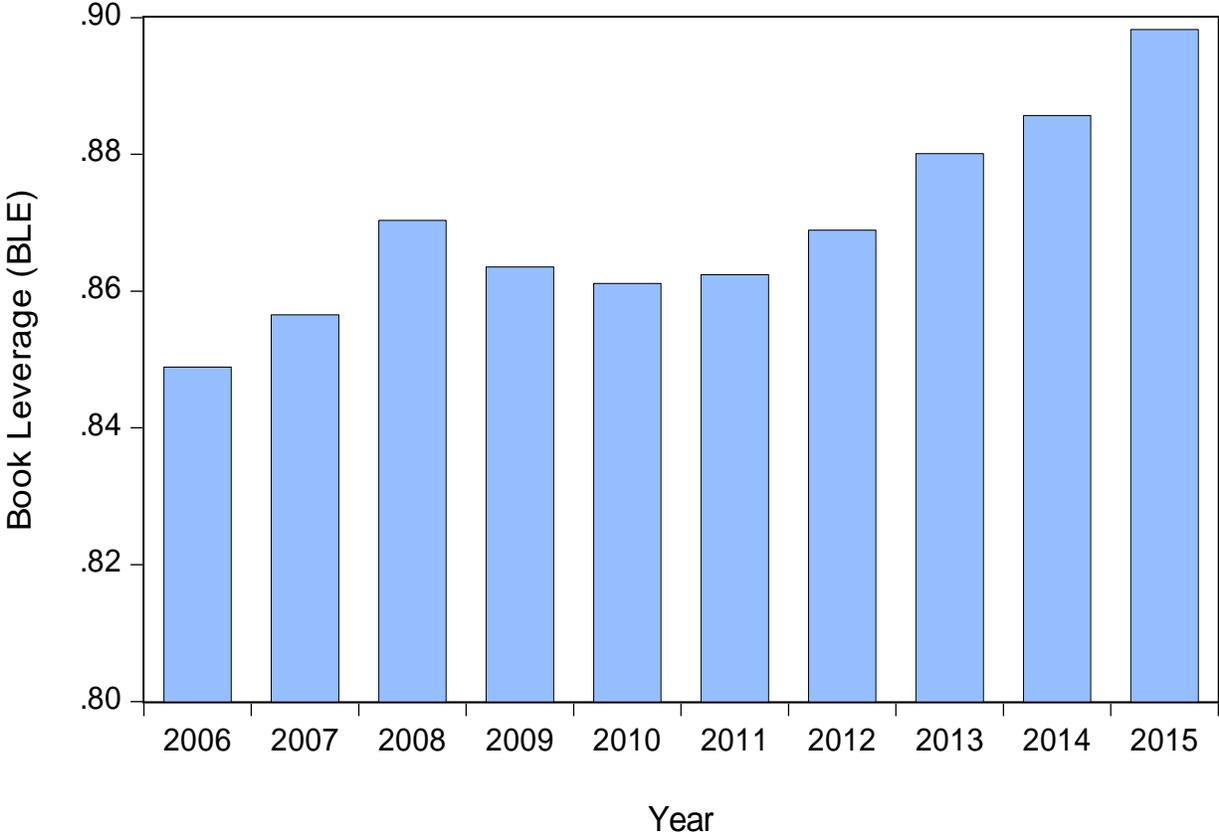
Figure 5.1: Trends in average book leverage of banks

Source: Researcher's own compilation

The book leverage of banks consists of deposit leverage and non-deposit leverage. When book leverage is decomposed into these two constituents, it is demonstrable that deposit leverage constitutes the bulk of book leverage. On the one hand, mean deposit leverage accounts for 76% of total assets. Yet on the other hand, mean non-deposit leverage accounts for 11.9% of total assets.

It is a fallacy that it seems as though banks are financing their balance sheet growth out of debt, yet that not is the case. When the liabilities of banks are decomposed, it is

demonstrated that bank deposits are the source of their balance sheet growth (refer to Figure 5.2, which depicts the trends in bank capital structure). In essence, deposit liabilities of banks exhibited a sustained increase from levels of 73.5% of total assets in 2006 to 80.6% of total assets in 2015. Comparatively, non-deposit leverage decreased from a high of 14.5% of total assets in 2007 to a low of 7.9% of total assets in 2014. Similarly, equity financing declined from a peak of 13.6% of total assets in 2006 to a low of 9.9% of assets in 2015. Therefore, it can be deduced that deposit financing was substituting both equity and non-deposit financing for the period under consideration.
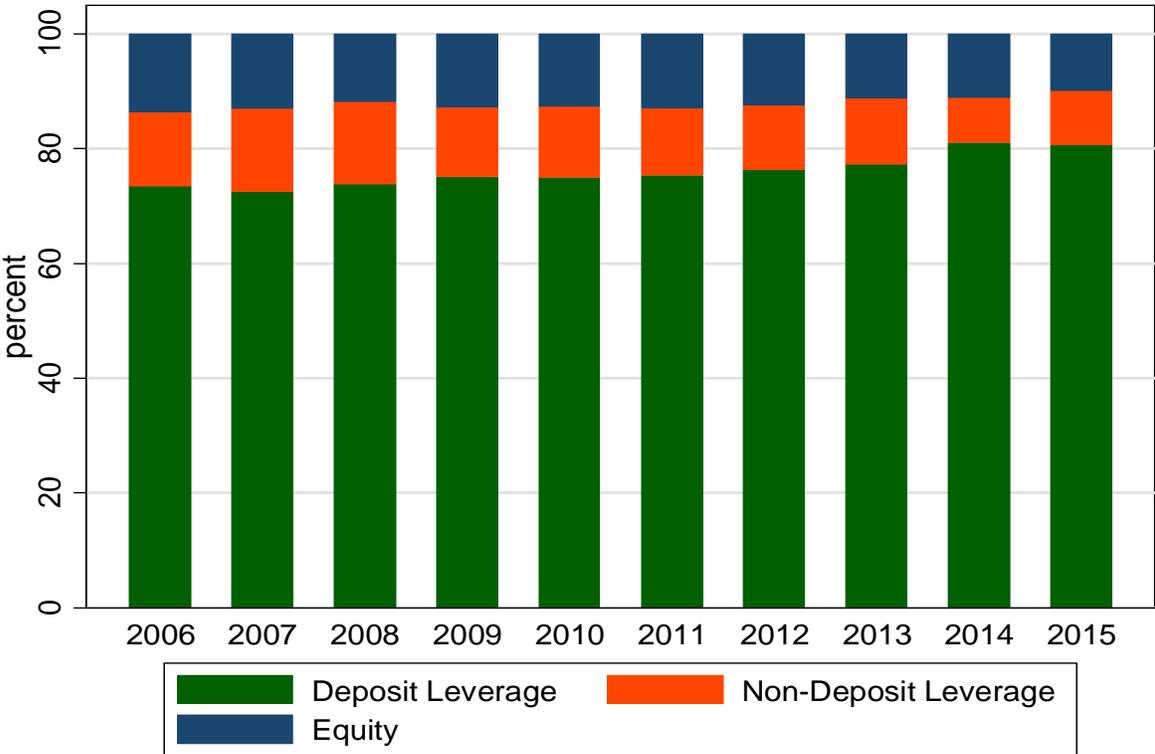
Figure 5.2: Trends in bank capital structure

Source: Researcher's own compilation

The mean Tier 1 regulatory capital for the sample of banks is 16.4% and the median is 13.3%. This is in excess of the regulatory capital requirements.[5] The variation of the

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[5] The Tier 1 regulatory capital minimum requirements implemented in South Africa was 7.5% leading up the implementation of Basel II provisions in 2008. The Tier 1 capital ratio was set at 7%. The ratio was further revised with the implementation of Basel III in 2013 to 6%.

Tier 1 capital ratio is depicted in Figure 5.3. The mean Tier 1 regulatory capital ratio started off at peak levels in 2006 of 20.7%, and then fell during the period corresponding to the GFC to a low of 15.6% in 2008, before it steadily increased from 2009 until it reached a peak of 17.8% in 2010. It then gradually declined as from 2011 to a reach a low of 13.8% in 2015. Notwithstanding, the mean Tier 1 regulatory capital ratio of banks has remained in excess of the regulatory minimum. This lends credence to the buffer view of capital.
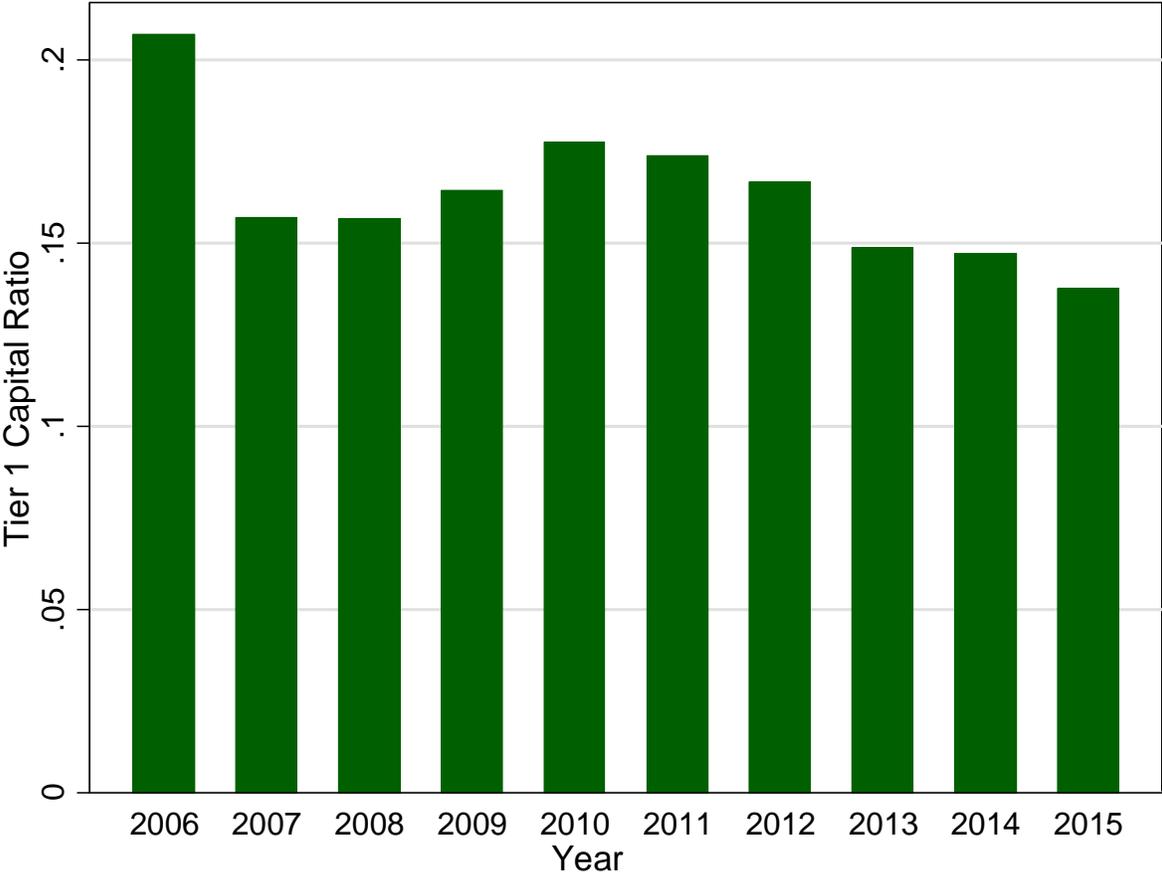
Figure 5.3: Trends in average Tier 1 regulatory capital ratio

Source: Researcher's own compilation

Banks seem to store buffer levels of capital. Buffer capital is defined as the excess of the actual Tier 1 regulatory capital over the regulated minimum Tier 1 regulatory capital.

The variation in this buffer is presented in Figure 5.4. On average, banks have maintained buffer capital levels ranging between 7% and 11%.
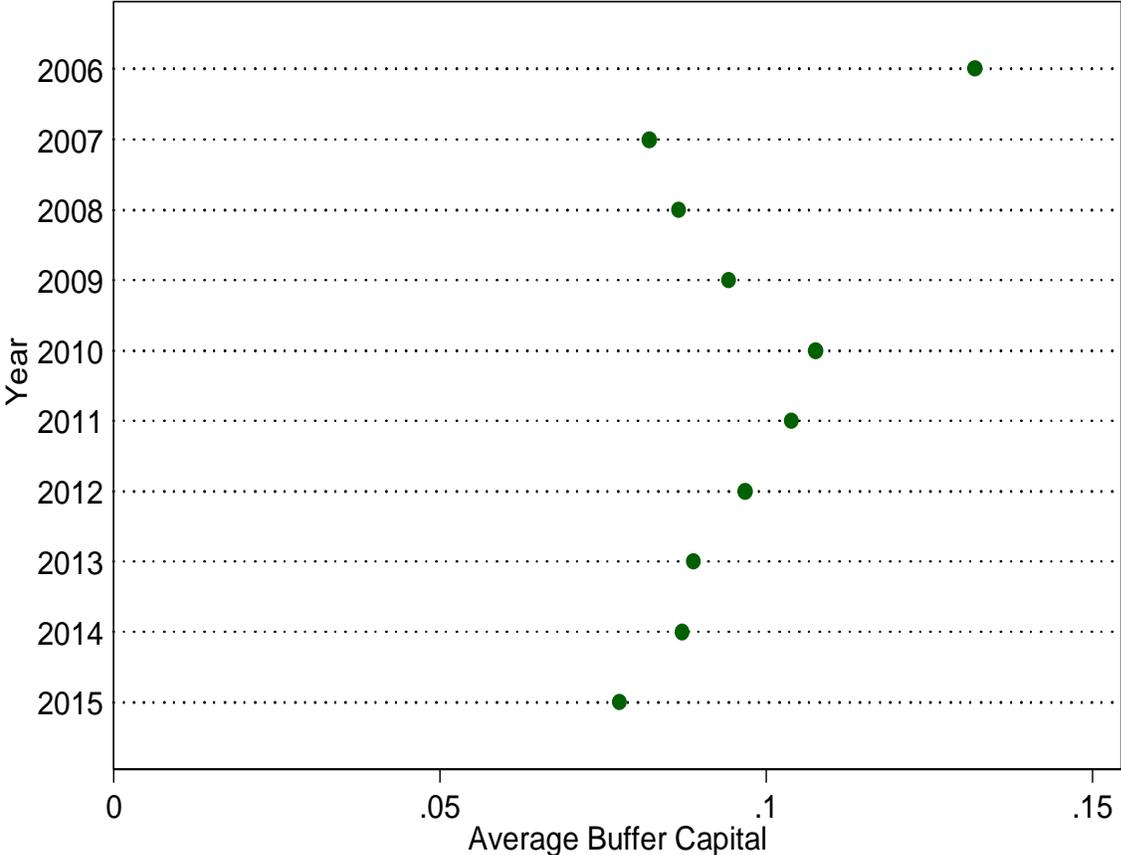
Figure 5.4: The variation of buffer capital

Source: Researcher's own compilation

The average risk experienced by banks is 5.3%. This metric is a measure of credit risk and is defined as the ratio of impaired loans to gross loans. The variation of the mean risk of banks is depicted in Figure 5.5.
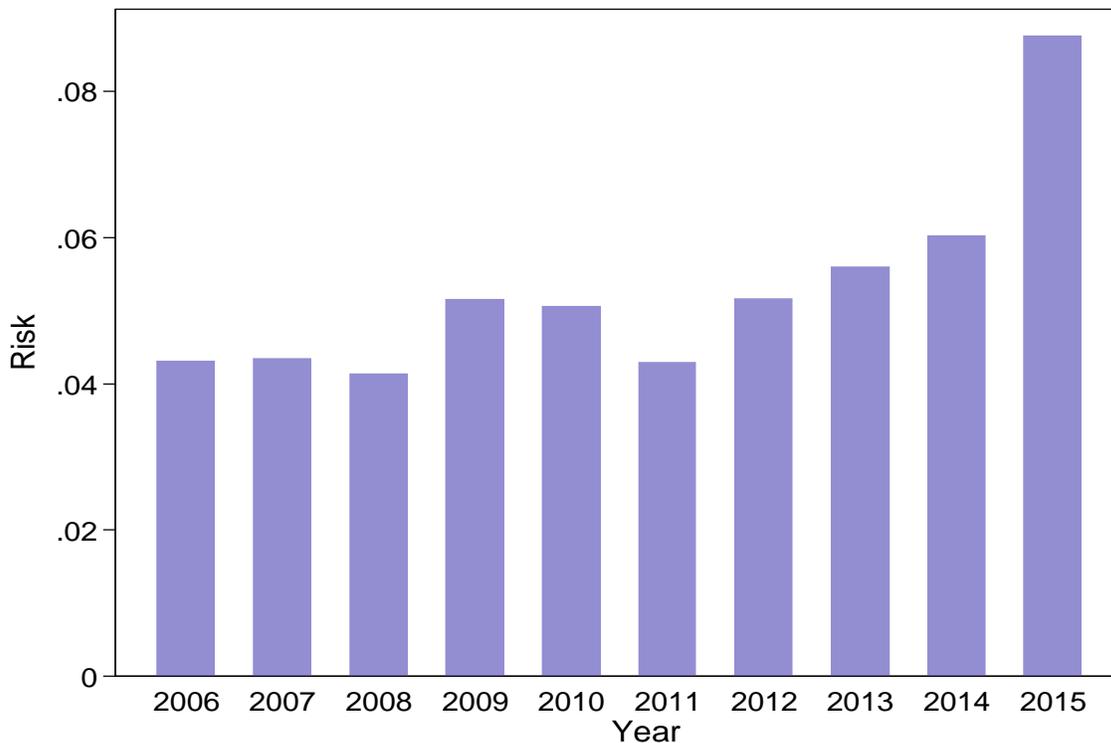
Figure 5.5: Trends in banks' credit risk

Source: Researcher's own compilation

It would seem that the average credit risk of banks receded in 2008. This corresponds to the year when the NCA (2005) came into effect. It could be that banks began to implement stringent credit risk assessment of individuals before they could grant credit. This curbed the increase in impaired loans. However, that trend was reversed in 2009. This could be as a result of the effects of the GFC. The credit risk of banks receded in 2010 before it started to increase and maintained the upward momentum in 2012.

5.3 BANK LEVERAGE AND FIRM-LEVEL DETERMINANTS OF CAPITAL STRUCTURE

Having established the trends in key variables, this section entails the analysis of the correlations among the key variables. A static model was specified to analyse the relationship between leverage and the firm-level determinants of capital structure. Initial

diagnostics techniques were conducted in order to select the most appropriate estimation technique. Subsequently, the regression was estimated. Robustness checks were performed to test whether the relationship between leverage and firm-level determinants was sensitive to the alternative definitions of leverage. The main dependent variable used in this study was book leverage, which is analogous to the total debt ratio. The first alternative definition of leverage was deposits and the other alternative definition was non-deposit leverage.

5.3.1 Correlation analysis of the main variables used for the banking panel

The correlations of the main variables used in this study are reported in Table 5.2. Suffice to highlight that the predictions were in line with the predictions of the major capital structure theories. Book leverage was negatively correlated with the growth variable and the correlation was statistically significant at the 5% level of significance. This is consistent with the predictions of the trade-off theory. Book leverage was also inversely correlated with profit and the correlation was highly significant. This can be explained premised on the predictions of the pecking order theory. The more profitable a bank is, the more likely that it will generate reserves than rely on debt to fund its assets. The negative correlation between book leverage was in line with the predictions of the trade-off theory. Size was positively correlated with book leverage. This can also be justified in terms of the trade-off theory of capital structure. Large banks are highly leveraged compared to small banks, the motivation being that they will derive a higher debt interest tax shield.

Further, book leverage was positively associated with dividend. This is rather anomalous, as one would expect that a dividend-paying bank will be sending out a signal to the market that it is in good financial health and is a going concern. This way, it will become favourable in the equity market and hence make equity the more attractive option. However, it could be that banks are constrained on the levels of equity they should hold, hence they will finance out of deposits and debt regardless.

The other correlations do not warrant much exploration and were by and large as expected. The growth variable was positively associated with the profit variable. This

means that high growth opportunities result in banks making more profits. Similarly, banks that grow offer more asset tangibility, hence the positive association between growth and asset tangibility. The profit variable was also positively related to asset tangibility. This implies that profitable banks are in a position to acquire more fixed assets. Profit was inversely related to risk. In essence, this implies that profitable banks are those who have a good book of business with low credit risk.

Dividends were positively associated with size. Large banks are more likely to pay dividends more often as compared to small banks. Risk was also negatively related to asset tangibility. The riskier the credit portfolio of the bank, the less likely the bank is to pay a dividend. The intuition is that such a bank has to make more provisions for impaired loans.

Book leverage was positively related with deposit leverage. In fact, deposit leverage explained 63.8% variation in book leverage. Non-deposit leverage was inversely correlated with deposit leverage and had approximately 84% explanatory power. The correlation was highly significant at the 1% level of significance.

This corroborates the findings that over time, deposit liabilities have been substituting debt and equity in bank financing. Deposit leverage was inversely associated with growth. The inference is that banks with growth prospects are relying more on long-term debt or other sources of non-deposit finance, rather than deposits, to pursue these opportunities. Conversely, non-deposit leverage was positively related to growth and the correlation was statistically highly significant.

Deposit leverage was inversely correlated with profit. This is explainable in terms of the pecking order theory. Profitable banks are likely to observe the financing hierarchy and finance out of retaining earnings before relying on deposits. Conversely, non-deposit leverage was positively correlated with profit. Deposit leverage is negatively correlated with asset tangibility. The rationale could be that small banks that have less asset tangibility rely more on debt financing rather than deposits, as compared to the big banks.

Table 5.2 Correlation matrix for the main variables used for the banking panel

	Book leverage	Deposit leverage	Non-deposit leverage	Growth	Profit	Asset	Risk	Size	Dividend
Book leverage	1.000								
Deposit leverage	0.638***	1.000							
Non-deposit leverage	-0.108	-0.835***	1.000						
Growth	-0.113*	-0.275***	0.274***	1.000					
Profit	-0.626***	-0.458***	0.143*	0.287***	1.000				
Asset	-0.356***	-0.209**	0.015	0.047	0.156*	1.000			
Risk	0.127	-0.299***	0.476***	-0.070	-0.485***	-0.002	1.000		
Size	0.253***	0.013	0.164**	-0.099	-0.197**	0.011	0.105	1.000	
Dividend	0.286***	0.110	0.063	-0.040	0.050	-0.105	-0.148*	0.179**	1.000

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The variables are defined as follows:
book leverage = 1-(Equity / total assets); growth = growth rate of total assets; profit = ROAA;
asset tangibility = fixed assets / total assets; risk = impaired loans / gross loans; size = natural logarithm of total assets;
dividend = dummy variable = (1 when dividend is paid and 0 when dividend is not paid).

Further, deposit leverage was negatively related to risk. To the contrary, non-deposit leverage is positively correlated with risk. Therefore, with increased credit risk, banks will fund their assets using non-deposit liabilities. Non-deposit leverage was positively related to size. Large banks are likely to employ debt in their financing predicated upon the trade-off theory.

On examining the correlation matrix, certain trends emerged. Firstly, the correlations involving deposit leverage move and are of the same sign as those involving the book leverage variable. This demonstrates that they are highly correlated. Secondly, the correlations involving non-deposit leverage were of an opposite sign to the ones involving the deposit leverage variable. Wherever the correlations were significant, they were of an opposite sign. This further demonstrates the substitutability of non-deposit liabilities by deposit liabilities.

5.3.2   Estimation framework and empirical results

The estimation framework to test the relationship between book leverage and capital structure was premised on an FE model. Initial diagnostic tests were conducted in order to estimate a robust model. Subsequently, the estimation of the model was done and the results and inferences thereof are now discussed.

5.3.2.1 Initial diagnostic tests of the regression of book leverage on firm-level factors

A battery of tests was conducted on the pooled OLS, FE and RE models. These included the tests for panel heterogeneity (presence of FE), significance of time effects, heteroscedasticity, RE, FE versus RE specification and lastly cross-sectional dependence. The results of these tests are reported in Table 5.3. Firstly, the researcher tested for the joint validity of cross-sectional individual effects. The test confirmed the significance of individual effects, as the F-statistic (51.57) was greater than the test statistic (4.142). This test confirmed that banks are heterogeneous and that their

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financing decision is based on bank-specific factors. As such, in the presence of FE, the pooled OLS estimation method becomes inconsistent and inefficient.

The test for the joint validity of time effects also came out in the affirmative. As a consequence, the researcher specified a two-way error component to incorporate the time effects. The presence of time effects could be explained by the economic shocks that have an effect on bank financing. Any leveraging decision is bound to be affected by interest rates that are revised from time to time by monetary authorities in line with economic shocks. The Breusch-Pagan (1980) LM test confirmed the presence of RE. However, the Hausman (1978) specification test result favoured the use of the FE estimator over the RE estimator. The researcher also tested for heteroscedasticity of the error term and found that it was present.

Lastly, the researcher tested for cross-sectional dependence by applying the Pesaran (2004) cross-sectional dependence test on the one-way model. The null hypothesis of independence of cross-sections was rejected, as the test statistic was significant at the 1% level of significance. The correlation coefficient was 0.405. This result confirms the cross-sectional dependence among the banking firms, as they depend on one another for funding through their interactions in the interbank market.

Subsequently, when the researcher incorporated time effects and estimated a two-way model and rerun the test, it became negative. However, the alternative Frees test confirmed the presence of the cross-sectional effects for the two-way model. The researcher reasons that the incorporation of time effects controls for temporal dependence; nonetheless, the problem of spatial dependence remains. As such, the researcher employed the FE with the Driscoll and Kray (1998) standard errors estimator, which controls for heteroscedasticity and cross-sectional dependence.

Table 5.3: Diagnostic tests with book leverage as the dependent variable

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0: \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A: : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	F = 51.57	$F_{(0.01,15,137)} = 4.142$	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	F = 4.02	$F_{(0.01,9,129)} = 2.548$	Time effects are valid. The error term takes a two-way error component form.
Breusch-Pagan (1980) LM test for RE $H_0: \delta_\mu^2 = 0$ $H_A: \delta_\mu^2 \neq 0$	LM = 189.16	$\chi^2_{(15)} = 30.58$	There is significant difference in variance across the entities. RE are present.
Hausman (1978) specification test $H_0: E(\mu_{it}|X_{it}) = 0$ $H_A: E(\mu_{it}|X_{it}) \neq 0$	$m_3 = 41.41$	$\chi^2_{(6)} = 16.81$	Regressors not exogenous. Hence the FE specification is valid.
Heteroscedasticity $H_0: \delta_i^2 = \delta$ *for all i* $H_0: \delta_i^2 \neq \delta$ *for all i*	LM = 5246.6	$\chi^2_{(16)} = 31.99$	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$ **Pesaran (2004) CD test:**			
(i) One-way model	CD = 6.25 (0.405)	p = 0.000	Cross-sections are interdependent.
(ii) Two-way model	CD= -0.255 (0.368)	p = 0.7989	Cross-sections are independent.
Frees (1995) test	F = 0.529	α = 0.01 : 0.5198	Cross-sections are interdependent

5.3.2.2 Hypothesis testing and presentation of results

The regression output is presented in Table 5.4. It reports the pooled OLS and RE estimation results simply for comparison. Suffice to highlight that the estimated coefficients and signs of the RE and FE estimation outputs are comparable for most of the variables. However, the analysis was based on the FE with Driscoll and Kray (1998) estimation results for the reasons enunciated previously. The FE model was of good fit and well specified. The F-statistic value was 249.03 and was statistically significant at the 1% level of significance. The within R-squared correlation was relatively high at 0.649.

(i) ***Testing Hypothesis 1: There is a significant relationship between profitability and financial firm leverage.***

Highly profitable firms are presumed to generate more retained earnings. As such, according to the pecking order theory, they are more inclined to fund any value-adding projects firstly out of retained earnings. Therefore, the pecking order predicts a negative relationship between profitability and firm leverage. The estimation results confirmed an inverse relationship between bank's book leverage and profitability. All three models predicted a negative relationship between bank leverage and profitability (refer to Table 5.4).

The FE model predicted that a 1% increase in a bank's profits will result in a 7.5% decrease in a bank's book leverage. This result was highly significant at the 1% level of significance. Therefore, it could be said that bank financing mirrors that of non-financial firms, as explained by the pecking order theory. Among other scholars, Ahmad and Abbas (2011: 211), Gropp and Heider (2010: 598) and Jucá *et al.* (2012:23) also found an inverse relationship between firm leverage and profitability for their sample of financial firms.

Table 5.4: Panel regression results with book leverage as the dependent variable

	Pooled OLS	Random Effects	Fixed Effects with Driscoll and Kray (1998) standard errors
Growth	0.061	0.074***	0.076**
	(1.28)	(2.62)	(3.19)
Profit	-1.851***	-0.993***	-0.824***
	(-5.64)	(-11.67)	(-25.84)
Asset tangibility	-2.935**	-1.147	-0.205
	(-3.19)	(-0.82)	(-0.33)
Risk	-0.161**	0.212**	0.297***
	(-1.56)	(2.29)	(4.57)
Size	0.003**	0.007	0.023***
	(3.28)	(1.52)	(3.26)
Dividend	0.048***	-0.007	-0.008
	(3.62)	(-0.77)	(-1.10)
GFC	0.030***	0.003	-0. 016***
	(2.34)	(0.2)	(-2.74)
Constant	0.863***	0.808***	0.609***
	(51.46)	(12.53)	(6.84)
Adjusted R^2	0.5750	0.6343	0.6490
F-statistic			249.03***
LM-statistic		75910***	

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. Time dummies estimated for the FE and RE models are not reported here. The t-statistics for the pooled and FE models as well as the z-statistics for the RE model are reported in parentheses.

The table above shows the results of estimating the following regression for the sample of 16 South African banks for the period 2006–2015.

$$Leverage_{i,t} = x'_{i,t}\beta + \alpha_i + \varepsilon_{i,t}$$

where the dependent variable = book leverage; $x'_{i,t}$ = a vector of explanatory variables (size, profitability, growth, asset tangibility dividend, risk and GFC) for bank *i* at time t; β = a vector of slope parameters; α_i = group-specific constant term which embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model.

(ii) ***Testing Hypothesis 2: There is a significant relationship between asset tangibility and financial firm leverage.***

Firms with more tangible assets are presumed to offer more collateral and hence are viewed favourable in the debt market. Therefore, the trade-off theory predicts a positive relationship between leverage and asset tangibility. On the other hand, the pecking order theory predicts a negative relationship between firm leverage and asset tangibility. The results of the present study were inconclusive in this regard. The pooled OLS

regression predicted a negative and statistically significant relationship between book leverage and asset tangibility. Similarly, the RE estimator predicted a negative though statistically insignificant association between book leverage and asset tangibility. The FE estimator predicted a negative relationship between the book leverage and the asset tangibility variables, although statistically insignificant. Therefore, the results point to support of the pecking order theory, although not significant in all models despite the same sign. As such, the researcher did not find evidence in support of this hypothesis.

(iii) **Testing Hypothesis 3: There is a significant relationship between growth and financial firm leverage.**

The financing patterns of South African banking firms seem to be conforming to the prediction of the pecking order theory. The prediction was that firms faced with growth prospects will observe a financial hierarchy in financing their operations. The presupposition was that given the option between debt and finance, firms will choose debt first. Therefore, a direct relationship exists between book leverage and growth prospects. All three models predicted a positive relationship between book leverage and growth. The FE and RE predictions were statistically significant at the 5% and 1% levels of significance, respectively. The FE model predicted that a 1% increase in growth prospects will result in a 7.6% increase in leverage. The positive prediction is consistent with the findings of Ahmed *et al.* (2010: 10) and Al-Najjar and Hussainey (2011: 333), among other scholars who considered non-financial firms, as well as Ahmad and Abbas (2011: 211) and Teixeira *et al.* (2014: 56), who studied financial firms.

(iv) **Testing Hypothesis 4: There is a significant relationship between dividend payout and financial firm leverage.**

An inverse relationship was expected to subsist between book leverage and dividend payout. This was premised on the signalling theory. Based on this theory, the payment of a dividend sends out a signal to the market that the prospects of the firm are good and that it is a going concern. This will make equity the favourable option. To the contrary, the pooled OLS estimator predicted a positive relationship that was statistically

significant. However, the RE and FE estimators predicted an inverse relationship, although it was statistically insignificant at the 10% level of significance. Based on the FE estimator, which is the most appropriate, there was an inverse association between book leverage and dividends, although not significant.

(v) **Testing Hypothesis 5: There is a significant relationship between size and financial firm leverage.**

A positive association exists between bank book leverage and size. This prediction was consistent among all three estimators, although the RE estimator reported a statistically insignificant result. The FE estimator predicted that 1% increase in size will result in a 2.3% increase in book leverage. This positive association between bank book leverage and size is consistent with both the pecking order and trade-off theories prediction that large firms should be highly leveraged as compared to small firms. They stand to benefit from a debt interest tax shield. As firms grow, they also observe the financing hierarchy and would favour debt as opposed to equity. This result corroborates the findings of Gropp and Heider (2010: 598).

(vi) **Testing Hypothesis 6: The global financial crisis has significant explanatory power in financial firm leveraging.**

This hypothesis was based on the notion that there is an inverse relationship between leverage and the dummy variable representing the 2007–2009 GFC. This period was characterised by banks deleveraging and also strengthening their capital levels through the use of either retained earnings or equity issues. During this period, financing out of debt instruments became a less favourable option, as compared to financing out of retained earnings and equity.

The researcher found empirical support for this claim in the study results. According to the FE estimator results, it can be asserted with 99% confidence that book leverage is inversely related to the GFC.

(vii) ***Testing Hypothesis 7: Credit risk has significant explanatory power in bank leveraging.***

This hypothesis was predicated based on the notion that there is a positive relationship between bank leverage and credit risk. The pecking order theory predicts a positive relationship between leverage and risk. With increased credit risk there is bound to be increased cash flow volatility. Cash flow volatility implies the volatility of retained earnings. Banks are therefore forced to finance out of debt before utilising equity. The FE and RE estimators confirmed a direct relationship between bank leverage and credit risk. The FE model predicted that a 1% increase in leverage will result in a 33.3% increase in book leverage. The relationship was statistically significant at the 1% level of significance.

In Table 5.5 a comparison of the book leverage regression outcomes of this study with the empirical findings of other similar studies tested against the major predictions of capital structure theories is conducted. Firstly, it is evident that the financing patterns of South African banks mirror that of other financial firms. Secondly, there was no disparity observed in the financing patterns of banks and non-financial firms. Lastly, the capital structures of South African banks can be best explained by the pecking order theory.

Table 5.5: Book leverage: A comparison of predicted versus actual outcomes of the regression

Variable	Prediction	Studies of banks				Studies of non-financial firms			Empirical results of this study	Theory
		Gropp and Heider (2010)	Anarfo (2015)	Gocmen and Sahin (2014)	Jucá *et al.* (2012)	Ramjee and Gwatidzo (2012	Frank and Goyal (2009)	Antoniou *et al.* (2008)		
Growth	+/-	-	-	+	-	+	-	-	+	Pecking order
Profit	-	-	-	-	-	-	-	-	-	Pecking order
Size	+/-	+	+	+	-	+	+	+	+	Trade-off or pecking order
Asset tangibility	+	+	-	-	+	+	+	+	+ (insignificant)	n/a
Risk	-	-	n/a	-	-	+	-	+ (insignificant)	+	Pecking order
Dividend	-	-	n/a	n/a	- (insignificant)	n/a	-	+ (insignificant)	- (insignificant)	n/a

Source: Researcher's own compilation

5.3.3 Robustness tests of the dependent variable

This section reports on robustness checks carried out on the dependent variable used. Because book leverage of banks comprises of non-deposit liabilities and deposit liabilities, the researcher decomposed it into its constituents. Firstly, the non-deposit leverage variable was employed as the alternative definition of the dependent variable. Subsequently, the model was specified with deposit leverage as the dependent variable. The estimation framework remained the same, that is, initial diagnostic tests preceded the final model specification.

The initial diagnostic test results for the non-deposit and deposit leverage regressions against the determinants of capital structure are presented in appendices C and D, respectively. In both instances, cross-sectional individual effects were detected. Time effects were not detected. In each instance, a one-way error component model was specified. RE were also detected, confirming the suitability of the RE model over the pooled OLS model. Subsequently, when the Hausman (1978) specification test was performed, it favoured the use of an FE estimator over the RE estimator in both instances.

Heteroscedasticity was detected and cross-sections were deemed to be independent. In light of the foregoing, the estimation technique of choice that was selected was the FE estimator, which controls for heteroscedasticity. The regression outputs for both models are reported in appendices E and F, respectively. The estimated results when the alternative measures of leverage were employed are contrasted with the estimated results with book leverage as the dependent variable in Table 5.6.

Table 5.6: Robustness checks of the leverage variable

Dependent variable	Book leverage	Non-deposit leverage	Deposit leverage
Growth	0.076**	0.060**	0.026
Profit	-0.824***	0.970**	-1.601**
Asset	-0.205	-0.786	0.888
Risk	0.297***	-0.555***	0.946***
Size	0.023**	0.003	0.019
Dividend	-0.008	-0.001	-0.012

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively.

(i) Testing Hypothesis 8: The standard determinants of capital structure have significant explanatory power in non-deposit financing.

There are three statistically significant relationships that subsist between non-deposit leverage and the firm-level determinants of capital structure, as reported in Table 5.6. Firstly, non-deposit liabilities were positively associated with the growth variable. This corroborates the findings of Gocmen and Sahin (2014: 62). The FE estimator predicted a direct relationship between non-deposit leverage and growth. The result was statistically significant at the 5% level of significance. The coefficient of the growth variable was 0.06. In other words, a 1% increase in growth prospects leads to a 6% increase in non-deposit leverage (long-term) debt. This result was similar in sign and magnitude to the predicted result when book leverage was used as the dependent variable. This demonstrates that banks faced with growth opportunities are inclined to finance such prospects using long-term debt. The financing patterns of banks also conform to the pecking order theory.

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Secondly, profit was positively related to non-deposit leverage. The FE estimator predicted a positive and statistically significant relationship at the 5% level of significance. This is consistent with the findings of Gropp and Heider (2010: 605). Arguably, profitable South African banks are more inclined to utilise long-term debt to finance their operations in order to enjoy the debt interest tax shield benefit. This is in line with the *a priori* expectations of the trade-off theory.

Thirdly, the FE estimator predicted that an increase in the credit risk of banks results in a decline of their non-deposit leverage levels. The result was statistically significant at the 1% level of significance. This could be as a result of banks substituting long-term debt in favour of deposit financing in order to hedge cash flow volatility in the short term.

From the foregoing it can be deduced that the non-deposit leverage variable is robust for three out of the four relationships that were predicted when book leverage was used as the dependent variable. These are growth, risk and profits. The direction of the relationship predicted was only the same for the growth variable and oppositely signed for the profits and risk variables.

(ii) Testing Hypothesis 9: The standard determinants of capital structure have significant explanatory power in deposit financing.

There were only two statistically significant relationships that were predicted by the FE estimator. An inverse relationship was predicted to exist between deposit leverage and profitability. The result was statistically significant at the 5% level of significance. Gropp and Heider (2010: 605) obtained similar results. Therefore, profitable banks are least likely to rely on deposits as a source of funding, but will rely on retained earnings and then debt as an alternative source of funding.

There was a positive association between deposit leverage and risk. The relationship was highly statistically significant at the 1% level of significance. This implies that at higher levels of credit risk, South African banks are forced to finance out of deposits rather than long-term debt and equity. Therefore, the researcher found moderate support in favour of the hypothesis that standard firm-level determinants have significant explanatory power in deposit financing.

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The results documented in Table 5.6 also demonstrate the effective substitution between deposit leverage and non-deposit leverage of banks. This corroborates the results of the correlation analysis presented earlier. Whenever the predicted coefficient between non-deposit leverage and the explanatory variable was statistically significant, it was oppositely signed to the predicted coefficient between deposit leverage and that explanatory variable. For instance, the coefficient of non-deposit leverage was positive when profit was the regressor, as compared to the negative coefficient of deposit leverage when profit was the regressor.

5.4   BANK-SPECIFIC DETERMINANTS OF CAPITAL STRUCTURE

In this section, the bank-specific determinants of capital structure are considered. This is done in two steps. Firstly, the researcher tested the buffer view of bank capital by considering the correlations between buffer capital and the firm-level factors. Subsequently, the researcher estimated an FE model. Secondly, the regulatory view of bank capital was tested by considering the correlations between the Tier 1 regulatory capital ratio and the firm-level determinants of capital structure considered in this study. Subsequently, an FE model was estimated.

5.4.1   Empirical results of testing the buffer view of bank capital

The correlations of buffer capital and the firm-level determinants of capital structure are documented in Appendix G. Profit was positively correlated with buffer capital. Highly profitable banks keep more levels of capital in excess of the regulatory requirement. This is consistent with the predictions of the buffer view of capital. Asset tangibility was positively correlated with buffer capital. This implies that banks that have more tangible assets stock more capital. This is consistent with the buffer view of capital. Lastly, size was negatively correlated with buffer capital. Small banks are inclined to keep more levels of capital in comparison to large banks. This is because they have not generated goodwill to readily shore up capital in the equity or debt markets at short notice, should the need arise, as compared to the large banks.

5.4.2 Pre-estimation of buffer capital regression with firm-level factors

Initial diagnostics tests were conducted in order to correctly specify the model to estimate the determinants of buffer capital. The results are reported in Appendix H. The diagnostics confirmed the validity of FE, absence of time effects, interdependence of cross-sections, presence of RE and heteroscedasticity. In the absence of time effects, a one-way model was specified. Subsequently, the FE estimator was applied. However, in order to avert estimation inefficiency rendered by the detected cross-sectional dependence and heteroscedasticity, estimation was done within the framework of Driscoll and Kray (1998). According to Hoechle (2007: 282), the Driscoll and Kray (1998) estimator produces heteroscedasticity and autocorrelation-consistent standard errors that are robust to general forms of spatial and temporal dependence.

5.4.3 Estimation results of buffer capital regression with firm-level factors

Having run the initial diagnostics, the model was estimated. The results of the regression of the firm-level determinants of capital structure on buffer capital are reported in Table 5.7. These results were premised on testing the hypothesis stated below:

Testing Hypothesis 10: Bank leveraging is consistent with the buffer view of capital.

The estimated results document four statistically significant results. Firstly, bank credit risk was negatively related to buffer capital and the result was statistically significant at the 1% level of significance. Banks with high credit risk keep low buffer capital in comparison to banks with less credit risk. Secondly, size was negatively related to buffer capital and the result was statistically significant at the 5% level of significance. Arguably, large banks are keeping low levels of capital because of the ease with which they can raise capital in the event that they deviate from the prescribed levels. Thirdly, the dividends variable was positively related to buffer capital. The relationship was statistically significant at the 10% level of significance. Dividend-paying banks are keeping high buffer capital levels as compared to non-dividend-paying banks. The

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researcher reasons that this phenomenon could perhaps be best explained by the signalling theory.

Table 5.7: Panel regression results with buffer capital and Tier 1 capital as the dependent variables

	Dependent variable	
Explanatory variable	**Tier 1 capital**	**Buffer capital**
	Fixed Effects Driscoll and Kray (1998) standard errors	**Fixed Effects Driscoll and Kray (1998) standard errors**
Growth	-0.141	-0.147
	(-1.66)	(-1.70)
Profit	-0.598	-0.585
	(-1.13)	(-1.12)
Asset tangibility	1.628	1.731
	(0.64)	(0.68)
Risk	-1.006***	-0.997***
	(-4.18)	(-4.21)
Size	-0.051***	-0.042**
	(3.60)	(-2.97)
Dividend	0.077*	0.076*
	(2.18)	(2.10)
GFC	-0.023***	-0.025**
	(-3.37)	(-3.09)
Constant	0.747***	0.584***
	(5.00)	(3.93)
Adjusted R^2	0.4301	0.4182

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The t-statistics for the FE model are reported in parentheses.

The table above shows the results of estimating the following regression for the sample of 16 South African banks for the period 2006–2015.

$$Leverage_{i,t} = \boldsymbol{x}'_{i,t}\boldsymbol{\beta} + \alpha_i + \varepsilon_{i,t}$$

where the dependent variable = T1C or BUFFER; $\boldsymbol{x}'_{i,t}$ = a vector of explanatory variables (size, profitability, growth, asset tangibility, dividend, risk and GFC) for bank *i* at time t; β = a vector of slope parameters; α_i = group-specific constant term that embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model.

Dividend-paying banks send out the signal that their prospects are good and hence are viewed favourably by the debt and equity markets. Therefore, they are able to shore up their capital levels with much ease. Lastly, buffer capital was negatively associated with

the GFC dummy variable. This corroborates the findings of Jokipii and Milne (2008: 1450), who found a negative relationship between buffer capital and cycle.

Table 5.8 draws comparisons between the predicted and estimated effects of the regression when buffer capital was employed as the dependent variable. Suffice to highlight that by and large, the financing of South African banks conforms to the buffer view of capital, as the predicted results were in line with the estimated results for dividends, size and risk.

Table 5.8: Predicted effect versus estimated effect of firm-level factor on buffer capital

Firm-level determinant	Predicted effect	Results of this study
Profitability	Positive	Insignificant
Asset tangibility	No prediction	n/a
Growth	Positive	Insignificant
Dividends	Positive	Positive
Size	Positive/Negative	Negative
Risk	Negative	Negative

Source: Researcher's own compilation

5.4.4   Empirical results of testing the regulatory view of bank capital

The correlation matrix of the Tier 1 regulatory capital ratio and firm-level factors is documented in Appendix I. The Tier 1 regulatory capital ratio was positively correlated with profits. Profitable banks are associated with keeping high levels of capital. Banks with high asset tangibility are associated with high Tier 1 regulatory capital ratios.

Profits were negatively correlated with Tier 1 regulatory capital ratio. This implies that highly profitable banks are associated with observing low capital ratios. This could be

attributed to profitable banks being able to raise equity capital at short notice should the need arise and hence no persuasion to observe high Tier 1 regulatory capital ratios.

5.4.4.1 Pre-estimation of Tier 1 regulatory capital regression on firm-level factors

Diagnostics tests conducted on the initial estimated models revealed that FE were valid, time effects absent, cross-sections interdependent, RE present and heteroscedasticity present. In the absence of time effects, a one-way model was specified. Subsequently, the FE estimator was applied within the framework of Driscoll and Kray (1998) in order to mitigate estimation inefficiency rendered by the detected cross-sectional dependence and heteroscedasticity. The results of the diagnostics are reported in Appendix J.

5.4.4.2 Estimation results of the Tier 1 regulatory capital regression on firm-level factors

The estimation output of the regression of Tier 1 regulatory capital ratio and the firm-level determinants is presented in Table 5.7. The estimation is premised on the hypothesis restated below:

Hypothesis 11: The standard determinants of capital structure have significant explanatory power in capital regulation.

Firstly, a negative relationship subsisted between risk and the Tier 1 regulatory capital variable. A decrease in credit risk leads to an increase in capital. It could be that increased credit risk results in increased volatility of cash flows. This erodes profitability and ultimately retained earnings. As a result, the Tier 1 capital ratio falls. Similarly, with an increase in portfolio risk, the bank is viewed less favourable by the equity market and hence a risk premium is charged, which makes equity a less favourable proposition.

Secondly, size was negatively related to the regulatory variable. The relationship was statistically significant at the 1% level of significance. These findings are consistent with those of Gropp and Heider (2010: 613). Large banks are well diversified and have also generated goodwill in the market, which puts them in good stead to raise capital at short notice. As such, they might not have any incentive to hold high levels of capital. In addition, there is the paradigm that large banks are 'too big to fail'. Should their capital levels be eroded, the regulatory authorities or central government will come to their rescue, as witnessed during the 2007–2009 GFC.

Thirdly, a positive association existed between the regulatory variable and dividends. A 1% increase in dividends leads to a 7.7% increase in the Tier 1 capital ratio of South African banks. Paying out a dividend sends a signal to the equity market that the prospects of the bank are good. Arguably, such a bank could access the equity market at preferential terms.

Lastly, a negative relation existed between the Tier 1 regulatory capital ratio and the dummy variable representing the 2007–2009 GFC. During the 2007-2009 GFC, the capital levels of banks were eroded. This was partly due to a decline in profitability and hence retained earnings were curtailed during this period.

Further, wherever the estimated coefficient is significant, it is of opposite sign to the estimated coefficient when book leverage is used as the dependent variable. For instance, the coefficient of risk is negative when regressed on the regulatory variable, while the coefficient of risk is positive when regressed on book leverage. This demonstrates the substitutability of equity capital with debt.

The foregoing demonstrates that the standard firm-level determinants of capital structure have a moderate explanatory power in terms of the regulatory variable. If regulation constituted the overriding departure from the M&M irrelevance propositions and solely determines capital structure, the firm-level determinants should not offer any explanatory power in terms of the regulatory variable. As such, the researcher did not find evidence in support of the regulatory view.

5.5   TARGET CAPITAL STRUCTURE AND THE SPEED OF ADJUSTMENT

It is conceivable that banks also seek to achieve a target capital structure in their financing in a like fashion to non-financial firms, having established that bank financing mirrors that of non-financial firms. As such, this section addresses the question whether banks seek to achieve a target capital structure in their financing. Firstly, the correlations between the variables are considered in this section. Secondly, the section reports on initial diagnostics performed on the partial adjustment model estimated. Finally, inferences on a robust model that was estimated are reported. Robustness checks were conducted for the alternative definitions of leverage.

5.5.1   Correlation matrix of the main variables with lagged book leverage included

The correlation matrix of book leverage and firm-level determinants of capital structure with the inclusion of lagged book leverage is presented in Table 5.9. The lagged book leverage variable is highly correlated with book leverage. It explains 95% of the variation in book leverage. This demonstrates that leverage is persistent and has feedback. Current levels of bank leverage were determined by past levels of leverage. The firm-level determinants were correlated with the lagged dependent variable in the same manner as they were correlated with the book leverage variable. As such, the section does not delve much into these correlations. Suffice to highlight that a negative correlation existed between the lagged booked leverage variable and growth, risk, asset tangibility and profits. A positive relationship existed between the lagged book leverage variable and the size and dividend variables.

Table 5.9 Correlation matrix of the main variables with the lagged book leverage included

	Book leverage	Book leverage(-1)	Growth	Profit	Asset tangibility	Risk	Size	Dividend
Book leverage	1.000							
Book leverage(-1)	0.949***	1.000						
Growth	-0.201**	-0.411***	1.000					
Profit	-0.629***	-0.519***	0.411***	1.000				
Asset tangibility	-0.409***	-0.352***	0.131	0.261***	1.000			
Risk	-0.085	-0.170**	0.047	-0.178**	0.123	1.000		
Size	0.290***	0.288***	-0.127	-0.210***	-0.027	-0.004	1.000	
Dividend	0.280***	0.358***	-0.069	0.002	-0.143*	-0.196**	0.188**	1.000

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The variables are defined as follows:
book leverage= 1-(Equity / total assets); deposit leverage = total deposits / total assets; non-deposit leverage = book leverage – deposit leverage; growth = growth rate of total assets; profit = ROAA; asset tangibility = fixed assets / total assets; risk = impaired loans / gross loans; size = natural logarithm of total assets; dividend = dummy variable = (1 when dividend is paid and, 0 when dividend is not paid).

5.2 Pre-estimation of the target capital structure regression with book leverage as the dependent variable

In order to estimate a robust model, diagnostic tests were conducted on the initially estimated FE and RE model. The tests are reported in Appendix K. The diagnostics revealed that the FE were valid and the time effects invalid. Hence, a one-way error component model was specified. Further, heteroscedasticity of the error term was detected. The Hausman (1978) specification test also revealed that the regressors were not exogenous and were correlated with the error term. This is apparent from the correlation matrix reported in Table 5.9, as the lagged book leverage variable is highly correlated with the firm-level determinants of capital structure. The endogeneity arose from the correlation of the residual with the lagged dependent variable, which is referred to as Nickel bias. Further, the tests revealed the problem of cross-sectional dependence. At the first instance, in order to remedy the above problems, estimation was done within the framework of GMM. A one-step diff-GMM and one-step syst-GMM estimator was used to estimate the model. However, due to the small sample properties of the data employed in this study, caution was exercised in relying solely on these GMM estimators, as they performed moderately for small datasets.

At the second instance, two more estimators were considered. These were the FGLS (Kmenta, 1986; Parks, 1967) and the LSDV with Kiviet (1995) correction estimators. The FGLS estimator was efficient in the presence of Nickel bias, cross-sectional dependence and heteroscedasticity. However, it suffered from small sample bias. The best option under the circumstances was to use the LSDV with Kiviet (1995) correction. Judson and Owen (1999: 14) demonstrate that the corrected LSDV estimator is suitable for studies employing small data sets, as the bias is low. Notwithstanding, the results from the four estimators are reported. However, for interpretation purposes, the corrected LSDV results are used.

5.5.3 Estimation results of target capital structure with book leverage as the dependent variable

The estimation results of the regression to determine the existence of a target capital structure are presented in Table 5.10. The estimation is premised on the hypothesis restated below:

Hypothesis 16: Financial firms do adjust their capital structure to a target.

Table 5.10: Panel regression results to determine target capital structure with book leverage as the dependent variable

	Diff-GMM (one-step)	Syst-GMM (one-step)	FGLS (Kmenta, 1986; Parks, 1967)	LSDV with Kiviet (1995) correction
Leverage (-1)	0.554***	0.524***	0.790***	0.558***
	(3.88)	(3.97)	(20.78)	(7.98)
Growth	0.101***	0.067***	0.092***	0.080***
	(4.36)	(3.00)	(13.71)	(35.86)
Profit	-0.706***	-1.045***	-0.762***	-0.677***
	(-5.62)	(-4.76)	(-13.20)	(-47.86)
Asset tangibility	-1.294***	-1.000	-0.273	0.568
	(-2.28)	(-1.39)	(-0.81)	(1.00)
Risk	0.257***	-0.016	0.071*	0.211***
	(4.72)	(-0.19)	(1.78)	(8.47)
Size	0.007	0.001	-0.003*	0.013***
	(0.54)	(0.95)	(1.86)	(19.19)
Dividend	-0.011	0.021**	0.007***	0.003
	(-1.00)	(2.09)	(3.48)	(0.46)
GFC	0.013	0.016**	0.006**	0.013***
	(2.19)	(2.10)	(2.08)	(23.49)
AR(1)- statistic	-1.75*	-1.17		
AR(2)-statistic	0.846	0.965		
Sargan	7.12	27.9**		
LM-statistic			917***	
Number of observations	160	160	160	160

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The t-statistics are reported in parentheses. The table above shows the results of estimating the following regression for the sample of 16 South African banks for the period 2006–2015.

$$Leverage_{i,t} = (1 - \delta)Leverage_{i,t-1} + \delta\boldsymbol{\beta}\boldsymbol{x}'_{i,t} + \alpha_i + \varepsilon_{i,t}$$

where the dependent variable = book leverage; $Leverage_{i,t-1}$ = lagged book leverage; $x'_{i,t}$ = a vector of explanatory variables (size, profitability, growth, asset tangibility, dividend, risk and GFC) for bank *i* at time t; β = a vector of slope parameters; α_i= group-specific constant term that embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model; δ = the speed of adjustment.

The estimation results are consistent among the four estimators. The corrected LSDV estimator reported the coefficients conservatively and was used to draw inferences. The estimation results further corroborated the results of the estimation of the static model that was considered earlier on. The estimation results were equally signed for the coefficients of growth, profits, risk, size and the GFC dummy variables.

The results indicated that South African banks have a target capital structure and adjust to this target at a rate of $(1-\delta) = 1- 0.558 = 44.2\%$. This means that South African banks are able to adjust fully towards this target once in every 2.3 years. The results bear striking similarity to the study by Gropp and Heider (2010: 608), who found the speed of adjustment for their sample of US and EU banks to be 45%. They also reason that the fact that banks have high speeds of adjustment towards a target capital structure negates the regulatory view of bank capital. Comparatively, for their sample of South African non-financial firms, Lemma and Negash (2014: 86) found that their adjustment speed is 22.7% with respect to the total debt ratio. This is lower in comparison to the banks.

The speed of adjustment reflects the cost of adjustment. Arguably, the costs of adjustment in South Africa are comparable to those of developed countries. Ramjee and Gwatidzo (2012: 61) contend that the adjustment costs for South African firms are lower than for those in developed economies. Makina and Negash (2005: 145) demonstrated that stock market liberalisation brought about a decline in the cost of capital of firms in South Africa. As such, banks faced with lower adjustment costs are bound to adjust faster.

5.5.4 Robustness checks of target capital structure

In this section the robustness checks on the specified model of target capital structure with the alternative definitions of the dependent variable employed are discussed. The target capital structure regression was estimated with deposit leverage and next in turn with non-deposit leverage as the dependent variable. Following the same procedure, pre-estimation tests were conducted. The results of these diagnostic tests are reported in appendices L and M. Suffice to highlight that the same limitations that were identified

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when the book leverage was employed as the dependent variable were detected to be present. These are heteroscedasticity, cross-sectional dependence and Nickel bias. Consequently, estimation was done within the framework of estimators that mitigate these ills, namely the syst-GMM, FGLS (Kmenta, 1986; Parks, 1967) and the LSDV with Kiviet (1995) correction estimators. The results of the estimation are documented in Table 5.10. The corrected LSDV estimator results were used to draw inferences.

The estimated results for the dynamic model were consistent with those estimated for the static model, except that asset tangibility now offered statistically significant explanatory power in terms of deposit leverage. There is evidence that South African banks seek target deposit leverage. The speed of adjustment towards deposit leverage is $(1 - \delta) = 1 - 0.659 = 34.1\%$. In essence, this means that the banks can adjust fully towards this target once in every 2.9 years. This is slower compared to the speed of adjustment with regard to total book leverage. It also demonstrates that the costs of adjustment with respect to deposits are relatively higher. The researcher reasoned that the implication might be that the bank has to offer high interest rates on customer deposits as well as term deposits in order to attract more deposits.

There was also consistency in estimation output of the target capital structure with non-deposit leverage as the dependent variable, as presented in Table 5.11. It is trite to highlight that the predictions of the FGLS estimator were in tandem with those of the corrected LSDV for most of the statistically significant results. There were consistencies in the predictions for the lagged non-deposit leverage, growth, profit and asset tangibility variables. It is imperative to highlight that the explanatory power of the dynamic model seemed to increase in comparison to the static model. Unlike previously, when the static model was estimated, in additional the growth and asset tangibility variables now offered explanatory power in terms of the non-deposit leverage. Growth was positively related to non-deposit leverage. This implies that banks faced with growth prospects will finance out of debt. This is consistent with the predictions of the pecking order theory.

Table 5.11: Robustness checks of the target capital structure estimation

	Deposit leverage			Non-deposit leverage		
	Syst-GMM (one-step)	FGLS (Kmenta, 1986; Parks, 1967)	LSDV with Kiviet (1995) correction	Syst-GMM (one-step)	FGLS (Kmenta, 1986; Parks, 1967)	LSDV with Kiviet (1995) correction
Leverage (-1)	0.756***	0.872***	0.659***	0.600***	0.277***	0.310***
	(17.29)	(26.41)	(551.17)	(5.74)	(4.47)	(3.55)
Growth	0.004	0.028**	0.017	0.092**	0.089***	0.073***
	(0.17)	(2.07)	(0.92)	(2.58)	(6.78)	(8.75)
Profit	-1.511***	-0.938***	-1.442***	0.998**	0.705***	1.031***
	(-3.37)	(-4.93)	(-7.51)	(2.80)	(3.83)	(8.85)
Asset tangibility	-0.173	-0.135	1.692***	-0.518	-1.730***	-2.04***
	(-0.23)	(-0.64)	(4.44)	(-0.63)	(-4.33)	(-8.41)
Risk	-0.172*	0.027	0.428***	0.422***	0.577***	-0.425***
	(-1.87)	(0.29)	(3.90)	(6.52)	(4.18)	(-3.08)
Size	-0.002**	-0.002***	0.014	0.003***	0.002	-0.011
	(-2.92)	(-2.95)	(0.34)	(3.85)	(1.10)	(-0.31)
Dividend	0.017	0.006*	0.015	0.003	-0.001	-0.004
	(1.33)	(1.74)	(1.48)	(0.14)	(-0.04)	(-0.32)
GFC	0.011	0.005	0.020	0.004	0.021**	-0.005
	(1.68)	(1.61)	(0.83)	(0.30)	(2.08)	(-0.26)
AR(1)-statistic	0.185			-1.19		
AR(2)-statistic	0.290			0.93		
Sargan	107.65***			105.62***		
LM-statistic		1720***			283.05***	
Number of observations	160	160	160	160	160	160

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The t-statistics are reported in parentheses

The table above shows the results of estimating the following regression for the sample of 16 South African banks for the period 2006–2015.

$$Leverage_{i,t} = (1 - \delta)Leverage_{i,t-1} + \delta\boldsymbol{\beta}\boldsymbol{x}'_{i,t} + \alpha_i + \varepsilon_{i,t}$$

where the dependent variable = (non-)deposit leverage; $Leverage_{i,t-1}$ = lagged (non-)deposit leverage; $\boldsymbol{x}'_{i,t}$ = a vector of explanatory variables (size, profitability, growth, asset tangibility, dividend, risk and GFC) for bank *i* at time t; β = a vector of slope parameters; α_i = group-specific constant term that embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model; δ = the speed of adjustment.

A negative and statistically significant result was predicted to exist between asset tangibility and non-deposit leverage. This again is in synch with the predictions of the pecking order theory. The empirical results also suggested that South African banks have a target non-deposit leverage ratio which they seek to achieve in their financing. They adjust towards this target at an average speed of adjustment of $(1 - \delta) = 1 - 0.310 = 69\%$. This means that the banks can fully achieve this target once every 1.4 years. Comparatively, this demonstrates that banks are able to achieve their target long-term debt ratio rapidly as compared to achieving their deposit leverage target ratio. This demonstrates that South African banks will employ non-deposit liabilities first as an instrument of rapidly adjusting towards their target, should there be a widening leverage gap.

5.6   CONCLUSION

This chapter examined the determinants of bank capital structure and documented the empirical results of testing the four main questions relating to the financing behaviour of South African banks. Firstly, the standard corporate finance view of bank capital structure was tested. A static model was specified to estimate the relationship between bank leverage and firm-level determinants. Strong evidence was found in support of this school of thought, as the standard firm-level determinants of capital structure offered significant explanatory power in terms of the leverage variable. On the one hand, the growth opportunities, risk and size variables were found to be positively related to leverage. On the other hand, a negative relationship was found to exist between profits and bank leverage. This demonstrates that the financing behaviour of South African banks is consistent with the predictions of the pecking order theory. The results also confirm bank deleveraging during the 2007–2009 GFC, as a negative relationship subsisted between leverage and the dummy variable representing the GFC. As such, the financing behaviour of South African banks was found to mirror that of non-financial firms.

The second central question that was investigated was whether bank capital regulation constitutes the sole source of overriding departure from the M&M capital structure

irrelevance propositions. Quintessentially, this was a test of the regulatory view of bank capital. To test this question, the Tier 1 capital ratio was regressed on the firm-level determinants of capital structure. Very weak support was found in favour of this hypothesis. Some of the firm-level determinants of capital structure offered explanatory power in terms of the regulatory variable. Had it been that regulation solely determined bank capital structure, the explanatory power of the firm-level factors should have been curtailed. Moreover, when a dynamic model was estimated to establish whether banks seek to achieve a target capital structure in their financing, it was demonstrated that indeed banks have a target capital structure which they quest for. This behaviour is inconsistent with banks seeking to observe the minimum regulatory requirement. This finding demonstrates that at the worst case, bank capital regulation is not binding and may be ineffectual. This could be attributable to the bank individual effects. As such, it could be prudent for monetary authorities to consider instituting some variant of bank-specific capital regulations as opposed to sector-wide (one-size-fits-all) capital regulations.

Thirdly, the buffer view of bank capital was tested. The view tested was whether banks stock capital in excess of the regulatory minimum. Moderate support was found in favour of this school of thought. It was demonstrated that banks keep capital in excess of the minimum regulatory requirement. When the buffer capital variable was regressed on the firm-level determinants of capital structure, it was found that estimated results were consistent with the predictions of the buffer view. Specifically, the dividends variable was positively related to buffer capital, while size and risk were negatively related to buffer capital. This further diminishes the regulatory view of bank capital.

Lastly, this research effort probed whether banks seek to achieve a target capital structure in their financing and if so, whether they adjust faster comparatively to non-financial firms. It was established that indeed banks have a target capital structure that they seek to achieve in their financing. They adjust faster compared to non-financial firms. Further, the speed with which South African banks adjust to attain their target level is comparable to that of banks in the developed world and is reflective of the low adjustment costs. When leverage was decomposed, it was further demonstrated that

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the banks adjust faster to cover their non-deposit leverage gap as compared to covering their deposit leverage gap. South African banks are inclined to use long-term debt as an instrument of adjustment before they turn to deposits. It could be that adjustment costs are lower for long-term debt compared to that of deposits. In the next chapter the empirical results of the insurance sector are presented and discussed.

CHAPTER 6

EMPIRICAL RESULTS OF THE INSURANCE SECTOR

6.1   INTRODUCTION

The empirical results of testing the hypotheses developed in this thesis pertaining to the financing patterns of the insurance sector are presented and discussed in this chapter. This study employed a sample of 26 insurance companies (both short-term and long-term insurers) for the period 2006 to 2015. Three focal questions were investigated. Firstly, do the standard firm-level determinants of capital structure explain the financing behaviour of insurers? Secondly, does solvency regulation constitute the additional source of overriding departure from the M&M capital structure irrelevance propositions? The third question probed whether insurance companies have a target capital structure which they seek, and if so at what speed do they adjust to this target.

A static model was specified to estimate the relationship between leverage and the determinants of capital structure. Similarly, a static model was employed to estimate the relationship between the regulatory variable and the firm-level determinants of capital structure. Lastly, a dynamic model was specified to investigate whether insurance companies have a target capital structure to which they adjust. In each instance a battery of diagnostic tests were implemented for robustness.

The rest of the chapter is organised as follows: Section 6.2 presents the descriptive statistics and discusses trends that emerge thereof. Section 6.3 presents and discusses the results of testing the relationship between insurer leverage and firm-level determinants of capital structure. Section 6.4 reports on the results of testing the relationship between solvency and the firm-level determinants of capital structure. Section 6.5 presents the tests and analyses the results to establish whether insurance companies seek to achieve a target capital structure. Section 6.6 then concludes the chapter.

6.2   DESCRIPTIVE STATISTICS

The summary statistics of all the variables relating to the sample of insurance companies under consideration are presented in this section, as well as the trends of the variables over time.

The descriptive statistics of the variables are presented in Table 6.1. These are the central measures of tendency (mean and median), standard deviation and minimum and maximum values for the sample of South African insurance firms.

Table 6.1: Summary statistics of the variables used for the insurance panel

Variable	Mean	Median	Standard deviation	Minimum	Maximum
Book leverage	0.7496	0.7902	0.1997	0.1011	1.0336
Premium leverage	0.5431	0.5115	0.2227	0.0704	1.0319
Non-premium leverage	0.2078	0.1939	0.1630	-0.9964	0.7356
Solvency ratio	0.2503	0.2097	0.1997	-0.0336	0.8988
Growth	0.1534	0.1211	0.2687	-0.4836	0.8467
Profit	0.0716	0.0487	0.0827	-0.1471	0.5671
Asset tangibility	0.0503	0.0277	0.1085	-0.0741	0.8822
Risk	0.6047	0.7231	0.3035	-0.0071	1.4510
Size	22.31	21.93	2.02	17.85	27.17
Reinsurance	0.3610	0.1982	0.3411	0	1
GFC	0.3000	0	0.4591	0	1

Note: GFC is the dummy variable representing the 2007–2009 GFC.

Source: Researcher's own compilation

On average, South African insurers experience a mean year-on-year growth of 15.3% of their total assets. This is comparable to the banking sector, which experienced a growth of total assets of roughly 15.9% for the same period. In terms of profitability, South African insurers achieved a mean ROA of 7.2%. This is higher than that of the banking sector, which achieved a modest average ROA of 1.9% for the same period. The average book leverage of insurers was roughly 75% of total assets. This is lower than the levels observed for the banking sector, for which this study documents an average book leverage of 87%. Notwithstanding, South African insurers are highly leveraged in comparison to non-financial firms. Ramjee and Gwatidzo (2012: 59) report a mean book leverage of 59% of total assets for a sample of South African non-financial firms.

South African insurers on average held 5% of their assets as fixed assets. The underwriting risk level was roughly 60%. As an estimate, this means that the claims incurred relative to the gross written premium were 60%. Further, on average, South African insurers reinsured 36% of their risks to other insurance companies. The average total assets held by the insurance companies were R4.9 billion. The average actual solvency ratio of the sample of insurance companies was 25%. The average capital adequacy requirement[6] ratios for the short-term and long-term insurance companies are reported to be 2.3 and 2.6 respectively (FSB, 2015b & 2015c). This implies that the average required solvency ratio was 10.87% and 9.62% for short-term and long-term insurance companies respectively. Therefore, on average, the excess of the assets relative to liabilities over the total assets held by the insurance companies was 25%, which exceeded the average regulatory requirement of 10.87% and 9.62% for short-term and long-term insurance companies respectively.

The trend in the book leverage metric of the insurance companies is depicted in Figure 6.1. Suffice to highlight that the average book leverage of insurance companies did not vary much from year to year and was maintained in levels ranging from 72% to 78% of total capital.

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[6] Minimum required solvency ratios are calculated based on an individual insurer basis in South Africa.
$$Capital\ adequacy\ requirment = \frac{actual\ solvency\ margin}{minimum\ required\ solvency\ margin} = \frac{actual\ solvency\ ratio}{minimum\ required\ solvency\ ratio}$$
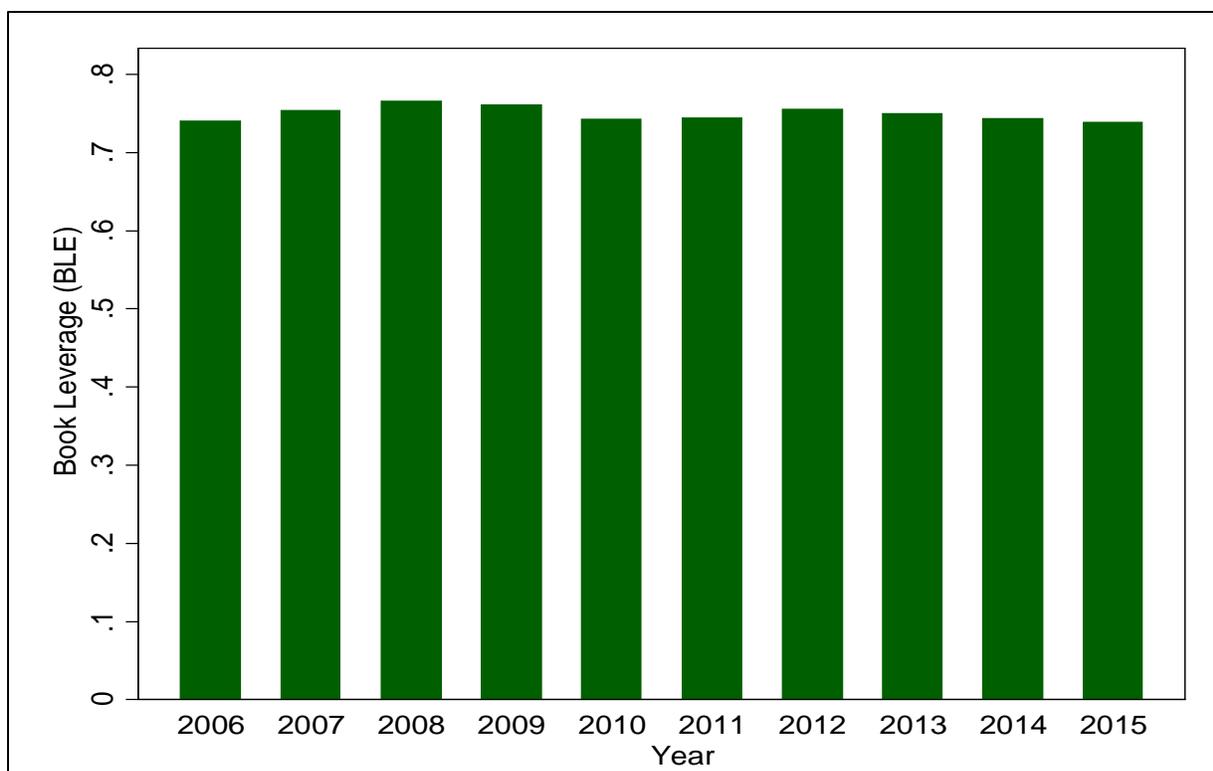
Figure 6.1: Trends in average book leverage of insurance companies

Source: Researcher's own compilation

The trends in insurance capital structure with leverage decomposed into 'premium leverage' (total gross provisions) and 'non-premium leverage' are documented in Figure 6.2. Premium leverage fluctuated narrowly within the 50% to 60% range. What is telling is that the premium metric showed a sign of contraction during the period corresponding to the 2007–2009 GFC. It declined from a high of around 56% in 2008 to a low of 51% in 2012. During this period, non-premium leverage (which is a proxy for long-term debt) increased from 21% in 2008 to 25% in 2012. In essence, non-premium leverage substituted premium leverage during the same period, as equity did not increase proportionately. It could be that South African insurance companies were now turning to the debt market to finance their operations, as debt financing became cheaper through successive interest rate cuts that were experienced during this period.
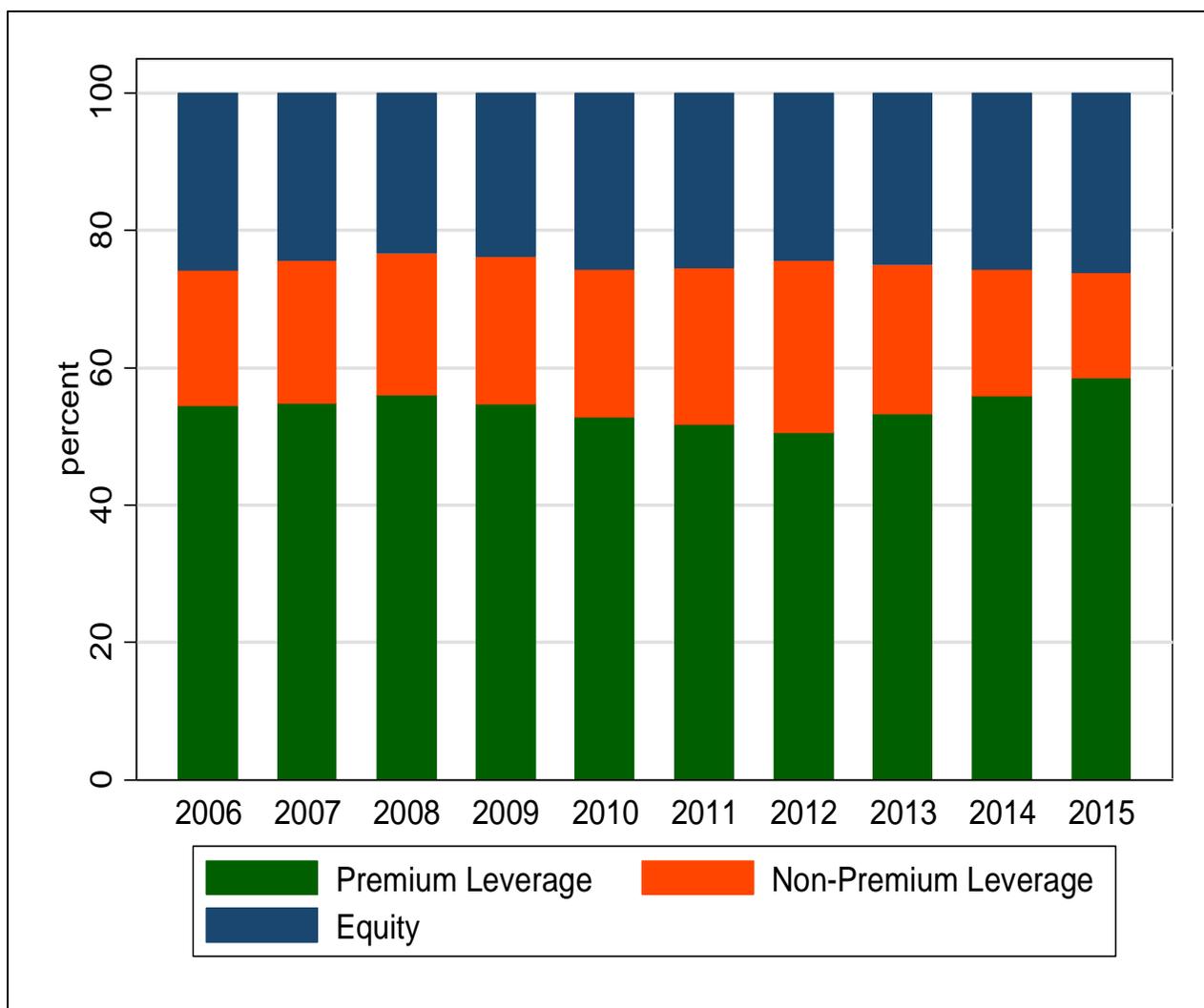
Figure 6.2: Trends in insurers' capital structure

Source: Researcher's own compilation

The mean solvency ratio for the sample of insurance companies was 25%. The variation of the solvency ratio is depicted in Figure 6.3. The average solvency ratio started off at peak levels of 25.9% in 2006 and then fell during the period corresponding to the GFC to a low of 23.6% in 2008, before it rebounded in 2009 until it reached a peak of 25.7% in 2010. The average ratio then tapered off thereafter before it rebounded to reach a level of 26.1% in 2015.
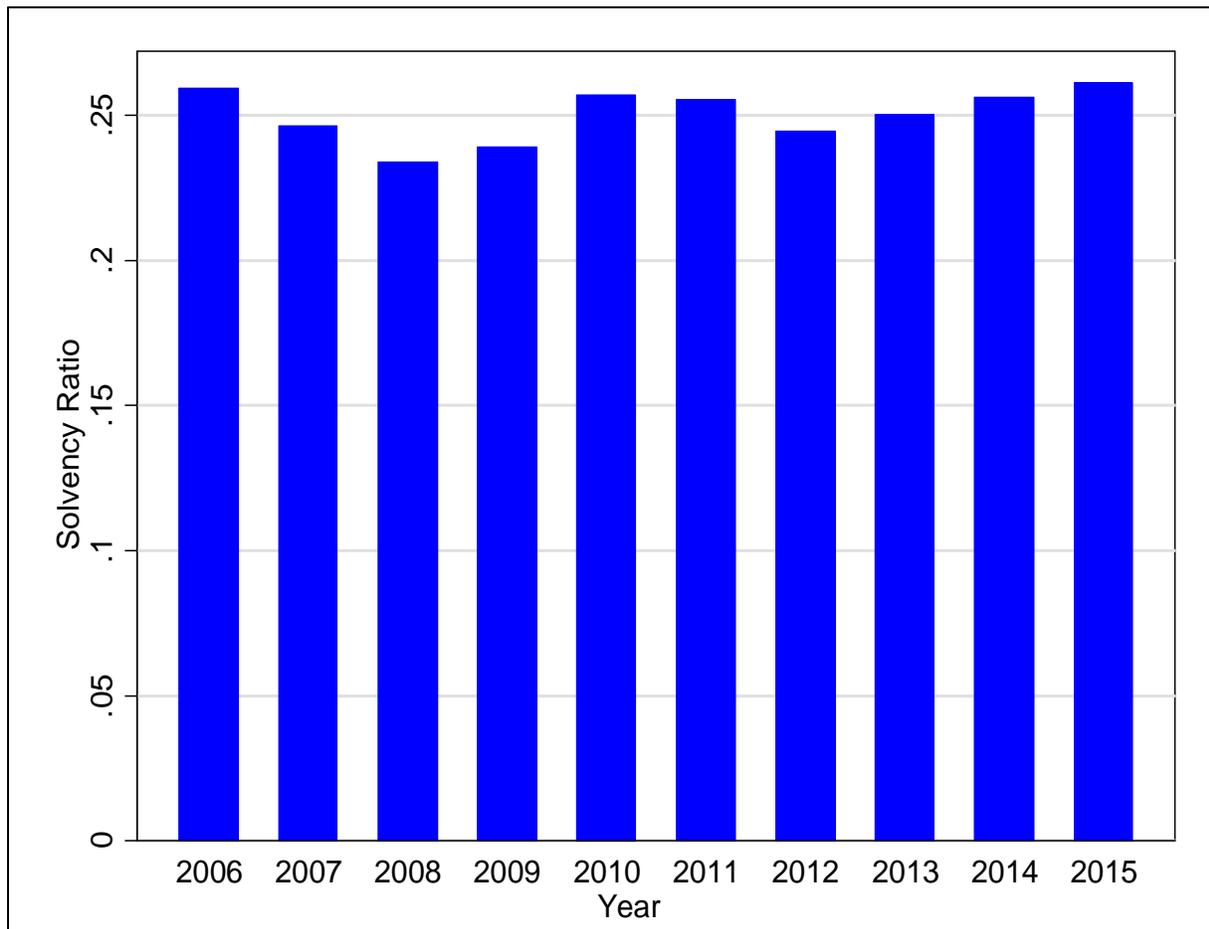
Figure 6.3: Trends in average solvency ratio

Source: Researcher's own compilation

6.3   INSURER LEVERAGE AND FIRM-LEVEL DETERMINANTS OF CAPITAL STRUCTURE

In this section the relationship between insurer leverage and firm-level determinants of capital structure is discussed. The correlations between the variables employed for the insurance sector were first considered. Subsequently, a static model was estimated. Pre-estimation techniques were employed in order to select the most efficient estimator. Robustness checks were performed to test whether the relationship between leverage and firm-level determinants was sensitive to the alternative definitions of leverage.

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6.3.1 Correlation analysis of the main variables employed for the insurance sector

The correlation matrix depicting the correlations between the main variables employed for the insurance sector is reported in Table 6.2. Book leverage was highly positively correlated with premium leverage and the result was highly significant. Book leverage was also positively correlated with non-premium leverage and the result was statistically significant. On the other hand, non-premium leverage was negatively correlated to premium leverage. In essence, non-premium leverage acted as a substitute of premium leverage.

The profit variable was negatively correlated with book leverage and the result was statistically significant. This result implies that highly profitable insurers are the least likely to utilise more of debt as a financing option, as they can tap onto a cheaper source of retained earnings. This is in line with the predictions of the pecking order theory. The asset tangibility variable was positively correlated with book leverage. The reasoning could be that the higher the value of tangible assets at the disposal of the insurance company, the more favourable it will become in the debt market, hence it can tap more on debt.

Size was also positively related to book leverage and the result was statistically significant. Large insurance companies are more likely to prefer debt finance to equity finance in order to benefit from an interest tax shield. This is in line with the predictions of the trade-off theory.

The reinsurance variable positively correlated with book leverage and the result was statistically significant. Arguably, reinsurance brings about risk diversification. Hence, those insurance companies that reinsure more of their assets can afford to borrow more from the debt markets. The correlations between the variables employed for the insurance sector were consistent with those of the banking sector reported in the previous chapter. Similarly, non-premium leverage seemed to be a substitute of premium leverage analogous to the case whereby deposit leverage acted as a substitute of non-deposit leverage for the banking sector. The correlations between the variables for the insurance sector were also similar to those of the banking sector.

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Table 6.2: Correlation matrix for the main variables used for the insurance panel

	Book leverage	Premium leverage	Non-premium leverage	Growth	Profit	Asset tangibility	Risk	Size	Reinsurance
Book leverage	1.000								
Premium leverage	0.702***	1.000							
Non-premium leverage	0.263***	-0.500***	1.000						
Growth	0.038	-0.080	0.163***	1.000					
Profit	-0.562***	-0.484***	-0.027	0.103	1.000				
Asset tangibility	0.167***	0.020	0.175***	-0.091	0.023	1.000			
Risk	0.110	0.142**	-0.066	-0.123**	0.156**	-0.001	1.000		
Size	0.209***	0.298***	-0.164**	-0.229***	-0.058	0.035	0.592***	1.000	
Reinsurance	0.155**	0.103*	0.057	0.127*	-0.346***	-0.032	-0.730***	-0.606**	1.000

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively.

6.3.2 Estimation framework and empirical results

This section reports on the pre-estimation tests conducted in order to ensure that the static model estimated was well specified as well as to select the most appropriate estimator to draw inferences. Subsequently, the model was estimated and inferences drawn thereof. Robustness checks were also conducted with the decomposition of the leverage variable.

6.3.2.1   Diagnostic tests

A battery of tests was conducted on the pooled OLS, FE and RE models. These included the tests for panel heterogeneity (presence of FE), significance of time effects, heteroscedasticity, random effects, FE versus RE specification and lastly cross-sectional dependence. The results of these tests are reported in Table 6.3. The researcher first tested for the joint validity of cross-sectional individual effects. The test confirmed the significance of individual effects, as the F-statistic (60.41) was highly statistically significant. This test confirmed that insurance companies are heterogeneous and that their financing decision is based on insurance-specific factors. As such, in the presence of FE the pooled OLS estimation method became inconsistent and inefficient.

The test for the joint validity of time-effects also came out in the affirmative. As a consequence, the researcher specified a two-way error component to incorporate the time effects. The Breusch-Pagan (1980) LM test confirmed the presence of RE. Notwithstanding, the Hausman (1978) specification test, which was used to discern which estimator to use between the FE and RE estimators, favoured the use of the FE estimator over the RE estimator. The researcher also tested for heteroscedasticity of the error term and found that it was present. Lastly, cross-sectional dependence was tested by applying the Pesaran (2004) cross-sectional dependence test on the one-way model. The null hypothesis of independence of cross-sections was rejected, as the test statistic was significant at the 1% level of significance. Subsequently, when the researcher incorporated time effects and estimated a two-way model and rerun the test, the Pesaran test became negative.

Table 6.3: Diagnostic tests with book leverage employed as the dependent variable

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0 : \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	F = 60.41	p = 0.0000	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	F = 7.97	p = 0.0000	Time effects are valid. The error term takes a two-way error component form.
Breusch-Pagan (1980) LM test for random effects $H_0: \delta_\mu^2 = 0$ $H_A: \delta_\mu^2 \neq 0$	LM=60.41	p = 0.0000	There is significant difference in variance across the entities. RE are present.
Hausman (1978) specification test $H_0: E(\mu_{it}|X_{it}) = 0$ $H_A: E(\mu_{it}|X_{it}) \neq 0$	m_3 = 27.46	p = 0.0001	Regressors not exogenous. Hence the FE specification is valid.
Heteroscedasticity $H_0: \delta_i^2 = \delta$ for all i $H_0: \delta_i^2 \neq \delta$ for all i	LM = 1816.3	p = 0.0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$ Pesaran (2004) CD test: Frees (1995) test	 CD = -1.928 (0.507) F = 4.654	 p = 0.139 α = 0.01: 0.5198	 Cross-sections are independent. Cross-sections are interdependent.

However, the alternative Frees test confirmed the presence of cross-sectional dependence. As such, reliance was placed on the Frees test, as the *a priori* expectation was that cross-sectional dependence should subsist between insurance companies, as they depend on one another indirectly for funding through the use of reinsurance. As a consequence of the foregoing, the researcher estimated the model using the FE with Driscoll and Kray (1998) estimator, which controls for heteroscedasticity and cross-sectional dependence.

6.3.2.2   Estimation results of book leverage regressed on firm-level factors

The estimation results of the regression of book leverage and firm-level factors are reported in Table 6.4. By and large, the results were in synch with those of the banking sector reported in the previous chapter.

(i) ***Testing Hypothesis 1: There is a significant relationship between profitability and financial firm leverage.***

The results validated this hypothesis and documented a negative and statistically significant relationship between profitability and book leverage. This is in accordance with the predictions of the pecking order theory. The FE estimator predicted that a 1% increase in profitability will lead to a 28.8% decline in debt financing utilised by the insurance companies. Chipeta and Deressa (2016: 658) also report a negative association between leverage and profitability for their sample of companies drawn across 12 sub-Saharan African countries.

(ii) ***Testing Hypothesis 3: There is a significant relationship between growth and financial firm leverage.***

The growth variable was positively associated with book leverage and the result was statistically significant at the 1% level of significance. All three estimators predicted a positive and statistically significant relationship between the growth variable and book leverage. High-growth insurance companies are utilising more debt financing, conforming to the pecking order theory of financing.

Table 6:4 Panel regression results with book leverage as the dependent variable

	Pooled OLS	Random Effects	Fixed Effects with Driscoll and Kray (1998) standard errors
Growth	0.112***	0.056***	0.050***
	(3.11)	(3.49)	(3.09)
Profit	-1.200***	-0.347***	-0.288***
	(-9.27)	(-5.09)	(-2.93)
Asset tangibility	0.366***	0.047	0.010
	(4.24)	(0.98)	(0.31)
Risk	0.213***	0.139***	0.171***
	(4.58)	(3.74)	(4.71)
Size	0.023***	0.053***	0.068***
	(3.50)	(6.72)	(6.14)
Reinsurance	0.203***	0.187***	0.116***
	(4.34)	(4.00)	(3.64)
GFC	0.016	0.031***	0.037***
	(0.78)	(3.51)	(4.14)
Constant	0.087	-0.579***	-0.910***
	(0.56)	(-3.11)	(-4.32)
Adjusted R^2	0.4420	0.3215	0.3397
F-statistic			3667.94***
LM-statistic		112.64***	

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. Time dummies estimated for the FE and RE models are not reported here. The t-statistics for the pooled and FE models as well as the z-statistics for the RE model are reported in parentheses.

The table above shows the results of estimating the following regression for the sample of 26 South African insurance companies for the period 2006–2015.

$$Leverage_{i,t} = x'_{i,t}\beta + \alpha_i + \varepsilon_{i,t}$$

where the dependent variable = book leverage; $x'_{i,t}$ = a vector of explanatory variables (size, profitability, growth, asset tangibility, reinsurance, risk and GFC) for insurer *i* at time t; β = a vector of slope parameters;

α_i= group-specific constant term that embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model.

(iii) ***Testing Hypothesis 5: There is a significant relationship between size and financial firm leverage.***

A positive relationship was proven between size and book leverage variable. There was consistency in the estimation results among the pooled OLS, RE and FE estimators. According to the FE estimation results, a 1% increase in size is likely to lead to a 7% increase in the use of debt financing. This is in line with the predictions of the trade-off theory. Therefore, South African insurance companies exhibit signs of trading off the benefits of an interest tax shield to that of bankruptcy in their financing behaviour.

(iv) ***Testing Hypothesis 6: The global financial crisis has significant explanatory power in financial firm leveraging.***

There was a positive association between the GFC and book leverage variables. The relationship was highly statistically significant. Unlike banking firms that deleveraged during the 2007–2009 GFC, insurance companies seemed to be taking more debt. Insurance companies rely less on financial debt as compared to banks. During the 2007–2009 GFC, the underwriting performance of insurance companies was curtailed with a fall in premiums. As such, insurance companies took more of financial debt to offset the fall in premiums as a funding source. In essence, debt substituted premium leveraging during this period.

(v) ***Testing Hypothesis 12: Reinsurance has significant explanatory power in insurer leveraging.***

The reinsurance variable was positively associated with the leverage variable. The result was statistically significant at the 5% level of significance. Arguably, reinsurance results in risk diversification and hence insurance companies become favourable in the debt markets. Consequently, they can absorb more risk and hence can borrow more in the debt markets.

The empirical results of testing the relationship between the firm-level determinants of capital structure and leverage are in synch with the empirical results for the banking sector. No disparities were observed in the financing behaviour of insurance companies and that of non-financial firms. Similarly, for the insurance sector, their financing behaviour can be best interpreted in terms of the pecking order theory.

6.3.2.3 Robustness checks of the dependent variable

Robustness checks were conducted with alternative definitions of leverage employed. Book leverage was decomposed into non-premium leverage (non-premium liabilities) and premium leverage (premium liabilities) and each employed as a dependent variable in turn. The FE with Driscoll and Kray (1998) standard errors estimator was employed to run the regression. The results are documented in Table 6.5. The results validated hypotheses 14 and 15 of this study. The estimation results indicated that the leverage variable was robust to either alternative definition.

A number of salient results came to the fore. Firstly, the estimated coefficients with the non-premium leverage variable as the dependent variable, wherever the estimated coefficient was significant, were equally signed to that of the book leverage estimation. On the one hand, the size and growth variables were positively related to the book leverage variable and the results were statistically significant at the 1% level of significance. On the other hand, the asset tangibility variable was negatively associated with non-premium leverage. Because the non-premium leverage variable proxies long-term debt, the implication of the estimated result for the size variable is that large insurers are utilising more long-term debt. This is in synch with the predictions of the trade-off theory. Conversely, the estimated coefficients for the growth and asset tangibility variables are in line with the predictions of the pecking order theory.

Table 6.5: Robustness checks of the leverage variable

Dependent variable	Book leverage	Non-premium leverage	Premium leverage
Growth	0.050***	0.066**	-0.014
	(3.09)	(2.06)	-(0.30)
Profit	-0.288***	-0.027	-0.254**
	(-2.93)	(-0.31)	-(2.58)
Asset tangibility	0.010	-0.255***	0.271***
	(0.31)	(-5.15)	(4.35)
Risk	0.171***	0.112*	0.059
	(4.71)	(2.10)	(1.41)
Size	0.068***	0.124***	-0.062
	(6.14)	(2.56)	(-1.26)
Reinsurance	0.116***	0.010	0.099**
	(3.64)	(0.27)	(2.55)

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The t-statistics are reported in parentheses.

Secondly, the estimated coefficients when premium leverage was employed as the dependent variable were oppositely signed to that of non-premium leverage, whenever the coefficient was significant. This demonstrates the substitutability of non-premium leverage with premium leverage. The premium leverage variable proxies short-term debt. As such, the observed phenomenon is analogous to long-term debt substituting short-term debt in the financing of insurance companies. The profit and size variables were negatively related to the premium leverage variable, whereas asset tangibility was positively related to premium leverage. Therefore, the estimated results suggested that large profitable insurance companies will make use of less short-term debt in their financing. This conforms to pecking order financing behaviour.

The results discussed in the foregoing demonstrate that the pecking order theory can be relied on to explain the financing behaviour of insurance companies. The robustness checks also demonstrated that the non-premium leverage ratio was highly correlated to the book leverage ratio. Therefore, the estimated results with the non-premium leverage variable as the dependent variable were robust to those of the book leverage variable regression. The estimated coefficients with the premium leverage as the dependent

variable were of the opposite sign. The inference is that the capital structure estimation is sensitive to the proxy of leverage employed. In the next section the estimation results of solvency and determinants of capital structure are considered.

6.4   SOLVENCY AND DETERMINANTS OF CAPITAL STRUCTURE

In this section the empirical results of estimating the relationship between solvency and the determinants of capital structure are discussed. An FE model was specified to estimate the regression. The results are reported in Table 6.6. The estimation was premised on the hypothesis restated below.

Testing Hypothesis 13: The standard firm-level determinants of capital structure have significant explanatory power in the solvency ratio.

The profit variable was positively related to the solvency variable. The result was statistically significant at the 5% level of significance. Highly profitable insurance firms are holding more capital. This is consistent with the prediction that insurers that are more profitable have high capitalisation (De Haan & Kakes, 2010: 1620). Furthermore, the risk variable was positively related to the solvency ratio, whereas the reinsurance and size variables were negatively related to the solvency ratio. The results were statistically significant. This is in line with the *a priori* expectations*.* According to De Haan and Kakes (2010: 1621), larger insurance companies have more scope for diversification than small insurers, hence their total losses are more predictable. As such, large firms probably need relatively lower capitalisation to achieve a particular level of insolvency risk. The results of the study confirmed this prediction with regard to size.

By the same token, greater use of reinsurance by insurance companies results in the lowering of capitalisation required to avert insolvency risk. Therefore, a negative relationship was expected to exist between the reinsurance variable and the solvency measure. The results of this study also affirmed this prediction. On the other hand, the

higher the inherent underwriting risk, the higher the capitalisation level of the insurer required. The result of this study also corroborated this prediction.

Table 6.6: Panel regression results with solvency ratio as the dependent variable

Explanatory variable	Fixed Effects with Driscoll and Kray (1998) standard errors
Growth	0.721
	(0.37)
Profit	0.350***
	(5.68)
Asset tangibility	0.050
	(0.24)
Risk	0.191***
	(4.87)
Size	-0.064***
	(-6.31)
Reinsurance	-0.097**
	(-3.37)
GFC	0.039***
	(3.58)
Adjusted R^2	0.3088
F-statistic	1838.18***

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The t-statistics are reported in parentheses.

The coefficient of the GFC dummy variable was positive and statistically significant. The implication is that South African insurance companies increased their capital levels during the period corresponding to the 2007–2009 GFC. The coefficients for the growth and asset tangibility variables were insignificant.

In view of the foregoing, the researcher found moderate support for the hypothesis that the standard firm-level determinants of capital structure have a predictive power on the solvency ratio. This finding diminishes the role of solvency regulation as being binding, but paints a picture whereby insurance companies are freely determining their solvency

ratios to conform to the regulatory minimum. Notwithstanding, it was noted that there has been a move towards risk capital-based solvency requirements with the anticipated adoption of the SAM regulatory regime in 2017 by the South African insurance industry.

6.5   TARGET CAPITAL STRUCTURE AND THE SPEED OF ADJUSTMENT

Insurance companies could as well be seeking to achieve capital structure optimality in their financing decisions, in the same manner as banks and other non-financial firms. In this section the empirical results of the target capital structure estimation are presented. The estimation framework involved conducting pre-estimation tests and then estimating a robust model.

6.5.1   Pre-estimation of the target capital structure regression with book leverage as the dependent variable

In order to estimate a robust model, diagnostic tests were conducted on the initially estimated FE and RE model. The tests are reported in Table 6.7. The diagnostics revealed that the fixed effects and time effects are valid. Subsequently, a two-way error component model was specified. Further, heteroscedasticity of the error term was detected. The Hausman (1978) specification test also revealed that the regressors were not exogenous and favoured the use of an FE over an RE estimator. Cross-sectional dependence was also detected, as the Frees test came out positive for the two-way model. Endogeneity arose from a dynamic model from the interaction of the lagged dependent variable with the error term.

In the first instance, in order to remedy the above problems, estimation was done with the framework of GMM. A one-step diff-GMM was used to estimate the model. However, due to the medium-size sample properties of the data employed in this study, caution was exercised in relying solely on the GMM estimators, as they perform moderately for small to medium datasets. Moreover, they do not control for spatial dependence.

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Table 6.7: Diagnostic tests to estimate a target capital structure for the insurance panel

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0 : \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A: : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	F = 4.67	p = 0.0000	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	F = 5.22	p = 0.0000	Time effects are valid. The error term takes a two-way error component form.
Hausman (1978) specification test $H_0: \mathrm{E}(\mu_{it}|\mathbf{X}_{it}) = 0$ $H_A: \mathrm{E}(\mu_{it}|\mathbf{X}_{it}) \neq 0$	m_3 = 47.63	p = 0.0000	Regressors not exogenous.
Heteroscedasticity $H_0: \delta_i^{\,2} = \delta$ *for all i* $H_0: \delta_i^{\,2} \neq \delta$ *for all i*	LM = 729.37	p = 0.0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$			
Pesaran (2004) CD test:			
One-way model	CD = 5.506 (0.377)	p = 0.0000	Cross-sections are interdependent.
Two-way model	CD = -1.047 (0.360)	p = 0.2950	Cross-sections are independent.
Frees (1995) test	F = 1.435	α = 0.01: 0.5198	Cross-sections are interdependent.

In the second instance, two more estimators were considered. These were the FGLS (Kmenta, 1986; Parks, 1967) and the LSDV with Kiviet (1995) correction estimators. The FGLS estimator was efficient in the presence of Nickel bias, cross-sectional dependence and heteroscedasticity, which are the characteristics of this dataset. Notwithstanding, the results from the three estimators are reported. However, for interpretation purposes the FGLS (Kmenta, 1986; Parks, 1967) was employed for the reasons enunciated above.

6.5.2 Estimation results of target capital structure with book leverage as the dependent variable

The estimation results of the regression to determine the existence of a target capital structure are presented in Table 6.8. The estimation was premised on the hypothesis restated below:

Hypothesis 16: Financial firms do adjust their capital structure to a target.

The estimation results were consistent among the three estimators. The estimation results further corroborated the results of the estimation of the static model that was considered earlier on. The estimation results were equally signed for the coefficients of growth, profit, size and the GFC dummy variables. The FGLS estimator documented that current leverage levels of South African insurance companies were positively related to past levels. This relationship indicates that insurance companies have a target capital structure towards which they gravitate. The speed of adjustment towards this target is at a rate of $(1 - \delta) = 1 - 0.794 = 20.6\%$. This is slower compared to South African banks who adjust towards their target at a rate 44.2%. Moreover, it is marginally slower than the speed of adjustment of South African non-financial firms whose speed of adjustment relative to the total debt variable is 22.7% (see Lemma & Negash, 2014: 86). It could be reasoned that the adjustment costs for insurance companies are higher as compared to non-financial firms.

Table 6.8: Panel regression results to determine target capital structure for insurance companies

	Diff-GMM (one-step)	LSDV with Kiviet (1995) correction	FGLS (Kmenta, 1986; Parks, 1967)
Leverage (-1)	0.797***	0.754***	0.794***
	(2.92)	(71.75)	(15.78)
Growth	0.043**	0.033***	0.067***
	(2.58)	(3.04)	(4.90)
Profit	-0.314***	-0.361***	-0.313***
	(-3.16)	(12.89)	(-5.61)
Asset tangibility	0.012	0.052	0.024
	(0.14)	(1.12)	(0.31)
Risk	0.029	0.041	0.062
	(0.57)	(1.40)	(0.21)
Size	0.053*	0.036***	0.080**
	(1.89)	(8.63)	(2.18)
Reinsurance	0.122***	0.059	0.041
	(3.16)	(1.02)	(1.03)
GFC	0.032**	0.028***	0.008
	(2.33)	(7.39)	(1.09)
AR(1)-statistic	-1.60		
AR(2)-statistic	-0.85		
Sargan	31.51		
LM-statistic			550***
Number of observations	260	260	260

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The t-statistics are reported in parentheses

The table above shows the results of estimating the following regression for the sample of 26 South African insurance companies for the period 2006–2015.

$$Leverage_{i,t} = (1 - \delta)Leverage_{i,t-1} + \delta\boldsymbol{\beta}x'_{i,t} + \alpha_i + \varepsilon_{i,t}$$

where the dependent variable = book leverage; $Leverage_{i,t-1}$ = lagged book leverage; $x'_{i,t}$ = a vector of explanatory variables (size, profitability, growth, asset tangibility, reinsurance, risk and GFC) for insurer *i* at time t; β = a vector of slope parameters; α_i = group-specific constant term that embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model; δ = the speed of adjustment.

The empirical results validated the hypothesis that insurance companies have a target capital structure which they seek to achieve in their financing behaviour. This demonstrates that their financing behaviour mirrors that of non-financial firms.

Notwithstanding, they adjust towards their target capital structures at a slower pace compared to non-financial firms and banks.

6.6   CONCLUSION

This chapter presented the empirical results of investigating the financing behaviour of the insurance sector. This study advances understanding of capital structure in several ways. In the first instance, the results are consistent with prior studies with regard to the capital structures of insurers mirroring those of non-financial firms. The results corroborate the findings of Ahmed *et al.* (2010), De Haan and Kakes (2010) and Ahmed and Shabbir (2014). Evidence was found of insurance firms conforming to the pecking order theory in their financing behaviour. Contrary to Cheng and Weiss (2012), who found that the trade-off theory dominates the pecking order in explaining insurer financing, the current study's results demonstrate that the converse is true in explaining the capital structure of South African insurance companies. In the second instance, this study established that the solvency ratio is determined by the firm-level determinants of capital structure. As such, this diminishes the role of solvency regulation being a first-order determinant of an insurer's capital structure. This is consistent with the findings of De Haan and Kakes (2010), who established that solvency regulation was not binding by utilising a sample of Dutch insurance companies.

However, the current study's results advance the frontier of knowledge in the following aspects: Firstly, it was established that insurance companies, unlike banking firms, would utilise more debt during an adverse business cycle such as the 2007–2009 GFC. Comparatively, insurance companies are constrained and utilise less financial debt, but rely more on technical reserves for funding. During the business cycle/financial crisis, the underwriting business was curtailed, resulting in a fall in premiums. Holding other factors constant, financial debt substituted premium leverage in the short term in the capital structure of insurance companies. Secondly, to the best of the researcher's knowledge, this study is the first study to investigate the existence of a target capital structure for insurance companies by taking into cognisance the cross-sectional

dependence that exists among insurance companies. It was established that insurance companies indeed have a target capital structure which they seek to achieve in their financing. They adjust towards this target at a rate of roughly 21%. Comparatively, this is lower than that of the banking sector, which adjusts at a speed of 44%. This further substantiates the view that insurer financing is less reliant on debt financing compared to banks, which are highly geared.

The next chapter concludes the study and proffers suggestions for future research from the gaps that have emerged.

CHAPTER 7

SUMMARY OF RESULTS, CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

7.1 INTRODUCTION

Firm financing is a central theme in corporate finance that continues to attract the attention of finance scholars and practitioners. In order to explain the financing patterns of firms, capital structure theory has evolved over the years and is firmly anchored on the seminal works of M&M (1958, 1963). In their irrelevance propositions, M&M argued that firm value is invariant to capital structure and hence capital structure choices of firms do not matter. Subsequent studies have proven that capital structure does matter. The main theories of capital structure that have been advanced in order to explain firm behaviour are the trade-off, pecking order, signalling, market timing, agency cost, free cash flow and contracting cost theories.

Extant empirical studies have been conducted to test these capital structure theories. Notwithstanding, until recently these studies have focused exclusively on non-financial firms. As such, the impetus behind the current study was to investigate what determines the capital structure choices of financial firms on which intensive research is still in its infancy so as to contribute to the body of knowledge in this area. South Africa was chosen as the country of focus. The motivation for choosing South Africa as a country of focus was two-fold. Firstly, it has a developed financial market, notwithstanding that it is a developing country, which offers the right conditions for studying capital structure dynamics. Secondly, the country has a large insurance sector, so the study was able to focus on both the banking and the insurance sectors, as they are closely intertwined and also account for the largest proportion of assets of financial firms in South Africa. Moreover, banking and insurance companies are peculiar in the sense that they have an additional financing instrument available at their disposal in the form of deposits and premiums, respectively.

The main aim of this study was to establish the factors that determine capital structures of South African financial firms. The banking and insurance sectors were used as units of study. The research objectives underpinning this study were five-fold. Firstly, the study aimed to establish whether the standard firm-level determinants of capital structure explain the financial leveraging of South African financial firms. Secondly, the study aimed to determine whether South African bank financing conforms to the buffer view of bank capital structure. Thirdly, the study evaluated whether capital regulation is of first-order importance in the determination of capital structure of financial firms in South Africa. Fourthly, the study sought to determine whether South African financial firms seek to achieve a target capital structure in their financing behaviour. Fifthly, the study sought to determine the speed of adjustment towards the target capital structure by South African financial firms. Finally, the study sought to investigate the effect of financial crises on the capital structure of financial firms.

The rest of the chapter is organised as follows: Section 7.2 discusses the theoretical and empirical insights into capital structure. Section 7.3 summarises the research findings of this study. Section 7.4 discusses the contribution of this study. Section 7.5 provides directions for future research.

7.2   THEORETICAL AND EMPIRICAL INSIGHTS

7.2.1 Theoretical insights on capital structure

A literature review of capital structure theory was conducted in this study, which offered insights into how to interpret firm financing behaviour. This helped in the formulation of the hypotheses for this study. The starting point was to review the MM irrelevance propositions. These were subsequently demonstrated not to hold in a world with frictions such as taxes and transactions costs. Further, the main theories of capital structure were considered. These are the trade-off, pecking order, signalling, market timing, agency cost, free cash flow and contracting cost theories.

The trade-off theory advanced by Kraus and Litzenberger (1973: 911) postulates that optimal leverage reflects a trade-off between the tax benefits of debt and the deadweight costs of bankruptcy. This was aptly formalised by Myers (1984: 576) in his static trade-off framework, which postulates that firms set a target debt-to-value ratio and gradually move towards it, the same way that firms adjust dividends to move towards a target dividend payout ratio. There is substantial empirical evidence in support of this theory.

Myers and Majluf (1984: 219) advanced the pecking order theory, which hypothesises that firms will observe a financial hierarchy in their financing. They reason that it is generally better to issue safe securities than risky ones. Firms should go to bond markets for external capital, but should raise equity by retention if possible. That is, external financing using debt is better than financing by equity. In other words, firms will first finance out of retained earnings, followed by debt, and would raise equity as a last resort. There is compelling empirical evidence to substantiate this theory.

The signalling theory is an information asymmetry theory of which the origins can be traced to the work of Ross (1977). He postulates that if managers possess inside information, then the choice of a managerial incentive schedule and of a financial structure signals information to the market, and in competitive equilibrium the inferences drawn from the signals will be validated (Ross, 1977: 23). There are two main ways in which these signals are transmitted to the market: either through the leveraging decision or utilising the dividend policy. The empirical evidence in support of this theory is moderate.

Baker and Wurgler (2002) advanced the market timing theory. They reason that capital structure evolves as the cumulative outcome of past attempts to time the equity market. In other words, managers only discern between issuing equity and debt as a result of market conditions. On the one hand, if the conditions are favourable for the issuance of equity over debt, they will float shares, and on the other hand, if the conditions favour the debt market, they will borrow to meet the funding requirements of the firm. There is strong empirical support of this theory, especially in developed countries characterised by well-developed financial markets.

Jensen and Meckling (1976) advanced the agency cost theory. They reasoned that an agency conflict between the owner-manager and outside shareholders derives from the manager's tendency to appropriate perquisites out of the firm's resources for his/her own consumption. In essence, managers do not always behave in the best interests of their investors and therefore need to be disciplined. Debt serves as a disciplining device because default allows creditors the option to force the firm into liquidation. Although plausible, this theory has posed some challenges to test empirically.

The free cash flow theory was advanced by Jensen (1986). He premises this on the 'control hypothesis' notion – that debt can be beneficial in motivating managers and their organisations to be efficient. For instance, debt financing constrains the free cash flow available to managers, as such debt can be utilised in reducing agency costs of free cash flows.

Myers (1977: 147) advanced the contracting cost theory. He reasons that a firm with risky debt outstanding, and which acts in its shareholders' interest, will follow a different decision rule than one which can issue risk-free debt or which issues no debt at all. Implicit in Myers's (1977) hypothesis is the underinvestment problem. Therefore, at worst, this agency cost is borne by firms whereby their managers pass on positive NPV projects as a consequence of being highly geared. The converse to this problem is that of overinvestment, which is occasioned by low gearing.

Drawing from extant studies on capital structure (Al-Najjer & Hussainey, 2011; Frank & Goyal, 2008; Gropp & Heider, 2010; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1991; Titman & Wessels, 1988, among other studies), it was established that there are reliably important factors that have been identified that affect firm leverage. These are profitability, asset tangibility (collateral), size, market-to-book value (growth) and dividends.

Highly profitable firms are presumed to generate retained earnings. As such, according to the pecking order theory they are more inclined to fund any value-adding projects firstly out of retained earnings. Therefore, the pecking order predicts a negative relationship between profitability and firm leverage. In contrast, the trade-off theory

predicts a positive relationship between firm profitability and firm leverage. The trade-off theory predicts that highly profitable firms are more likely to finance out of debt in order to enjoy the benefits of debt tax-deductibility. However, this benefit seems to accrue the most to large and very large firms, who have generated goodwill on the debt market and as such are rated favourably and can access debt at preferential terms. The pecking order prediction seems to be the most plausible one and most empirical studies seem to lend credence more to its prediction.

The high collateral value of assets available to be pledged makes it possible for the firm to finance its operations out of more debt. In essence, the risk of lending to firms with higher tangible assets is lower and, hence, lenders will demand a lower risk premium. The trade-off theory predicts a positive relationship between asset tangibility and firm leverage, whereas the pecking order theory predicts that they are negatively related. This can be attributed to low information asymmetry associated with tangible assets, making equity issuances less costly. Empirical evidence is mixed. Among other studies on financial firms, Gropp and Heider (2010: 598) and Jucá *et al.* (2012:23) found a positive relationship between asset tangibility and firm leverage. Bradley *et al.* (1984: 874), Ahmad and Abbas (2011: 208) and Al-Najjar and Hussainey (2011: 333) found empirical support for the negative relationship between asset tangibility and leverage variables.

Arguably, high-growth firms run the risk of bankruptcy if they were to fund their operations more out of debt. This is predicted by the trade-off theory, which postulates that in the financing continuum, there is an optimum point to which the benefit that derives from a debt interest tax shield is maximum, beyond which point the benefit diminishes. As such, premised on the trade-off theory, the prediction is that as companies grow, they will finance more and more out of equity as opposed to debt. An inverse relationship was expected to subsist between leverage and growth. In contrast, the pecking order predicts a positive relationship between financial leverage and growth. This is based on the presupposition that firms will observe a hierarchy of financing when faced with investment opportunities that are value-adding. As such, they

will finance first out of retained earnings, followed by debt, before they consider equity. The empirical evidence in this regard, however, is mixed.

An increase in dividend payout might send out a signal to the market that the future prospects of the firm are bright and conversely a dividend cut might signal that the future prospects of a company are bleak. In the former instance, the company will receive favourable valuation from the equity market, hence making equity issuance the most favourable. Therefore, the expectation was that firm leverage is inversely related to dividend payout. This has been corroborated by the empirical findings of, among other scholars, Antoniou *et al.* (2008: 80), Frank and Goyal (2009: 1) and Lemma and Negash (2014: 81).

The effect of size on financial leverage can be twofold. From the pecking order theory vantage point, as firms grow, they are bound to generate more retained earnings. As such, they should be in a position to fund their operations more out of retained earnings and hence substitute debt. Therefore, a negative relationship was predicted to exist between firm leverage and size, whereas the trade-off theory predicts that large firms should be highly leveraged as compared to small firms, as they stand to enjoy the benefits of debt interest tax shields. As such, from the trade-off theory point of view the prediction is that firm leverage is positively associated with size. Notwithstanding, empirical support for the positive firm leverage and size relationship is overwhelming (see, for instance, Ahmed *et al.*, 2010: 9; Al-Najjar & Hussainey, 2011: 334; Antoniou *et al.*, 2008: 73; Bartoloni, 2013: 142; Lemma & Negash, 2014:81; Lim, 2012: 197, among other studies).

Suffice to highlight that in some instances, there is a dichotomy in the predictions by the major theories of capital structure. The 'horse race' is usually between the pecking order theory and the trade-off theory. To reconcile the predictions, it is imperative to highlight that the aforementioned theories complement rather than substitute one another in explaining the financing behaviour of firms. This study relied mostly on the pecking order and trade-off theories in explaining the financing behaviour of financial firms.

Extant studies on capital structure have generally excluded financial firms from their analysis. This has been premised on the notion that financial firms have peculiar firm characteristics. For instance, in the context of banking institutions, the deposit-taking ability sets them apart from other non-financial firms. This ability to generate deposits lends them an extra source of finance. The second peculiar feature of banking firms is that they are subject to capital regulation, which could also have a bearing on their capital structure choices. The regulation of banking firms may promote or curtail the banks from operating at their desired target capital structure.

According to Ahmad and Abbas (2011: 201), following mandatory bank capital standard requirements, banks are involved in both voluntary and involuntary capital structure decisions. The standard view is that capital regulation constitutes an additional, overriding departure from the M&M irrelevance proposition. Subsequently, it has been proven by Gropp and Heider (2010) that there are similarities between the capital structures of banks and non-financial firms. Involuntary capital structure decisions are enforced on banks by regulatory authorities after deviating from the prescribed and adequacy capital requirements as directed by the regulators. Notwithstanding, there is a growing body of empirical studies that relegate capital regulation to be of secondary importance in the determination of capital structure. This study also established that banks keep buffer levels of capital. This is motivated by the need for financial slack so that they can borrow additional funds quickly and cheaply in the event of unexpected profitable investment opportunities (Berger *et al.*, 1995: 8). Buffer capital can also further act as a cushion, absorbing costly unexpected shocks, particularly if the financial distress costs from low capital, and the costs of accessing new capital quickly, are high (Jokipii & Milne, 2008: 1441).

This study established that the insurance sector also deviates from the M&M irrelevance proposition in the same fashion as the banking sector. This is principally because insurance companies are subject to capital regulation (solvency regulation) and also have available another peculiar source of funding in the form of premiums. Solvency regulation seeks to protect policyholders against the risk that insurers will not be able to meet their financial obligations. As such, the imperatives that the insurance companies

have to grapple with when they formulate their capital structure policies include paying regard to solvency and surplus requirements, among other issues.

7.2.2 Empirical insights on capital structure

A review of empirical studies on the existence of a target capital structure was conducted. Extant studies have been conducted in this regard (see, for instance, Elsas *et al.*, 2014: 1380; Flannery & Rangan, 2006: 471; Leary & Roberts, 2005: 2577; Mukherjee & Mahakud, 2010: 261; Öztekin & Flannery, 2012: 108). The majority of these studies confirm that firms will actively seek to achieve a target capital structure. There are a number of factors that might promote or deter firms from achieving this target. These are size, adjustment costs and the distance between the observed and target leverage.

This study established that extant studies conducted on capital structure policies of firms have sought to test the practical efficacy of the capital structure theories – the main 'contestants' being the pecking order theory and the trade-off theory. Further, these studies have sought to establish the firm-level determinants of capital structure. For instance, Titman and Wessels (1988: 2), employed a sample of manufacturing firms in the USA found on the Compustat database for the period 1974–1982. Their results suggest that firms with unique or specialised products have relatively low debt ratios.

Rajan and Zingales (1995: 1421) investigated the determinants of capital structure choice by analysing the financing decisions of public firms in the major industrialised countries. They found that at an aggregate level, firm leverage is fairly similar across the G7 countries. In addition, they found that factors identified by previous studies as correlated in the cross-section with firm leverage in the United States, are similarly correlated in other countries as well. Particularly, they found that profitability and market-to-book value have a negative impact on capital structure, whereas asset tangibility and firm size have a positive effect on capital structure.

The two 'contestant' theories of capital structure (pecking order theory and trade-off theory) were pitied against each other by Shyam-Sunder and Myers (1999: 221). They examined the financing behaviour of 157 US firms listed on the Compustat database (excluding financial firms and regulated utilities) for the period 1971–1989. They found that a simple pecking order model explains much more of the time-series variance in actual debt ratios than a target adjustment model based on the static trade-off theory.

This study examined the financing behaviour of firms in both developed and developing countries. It was established that the firm financing behaviour in the developing countries can be best explained in terms of either the trade-off or perking order theories.

The empirical evidence in support of the buffer capital view has been mixed. In support, Gambacorta and Mistrulli (2004: 443), among other scholars, found evidence that for all kinds of banks, the buffer capital has always been much greater than zero. They reason that this is consistent with the hypothesis that capital is difficult to adjust and that banks create a cushion against contingencies. Koziol and Lawrenz (2009: 871) also found evidence that banks do not hold the minimum capital, but have voluntary capital buffers. To the contrary, Teixeira *et al.* (2014: 56), among others scholars, failed to find evidence in support of the buffer view.

This study also established that standard non-financial firms' determinants of capital structure are reliably important in explaining bank capital structure. The studies that have been conducted in the recent past that corroborated this fact include that of Teixeira *et al.* (2014), Jucá *et al.* (2012), Ahmad and Abbas (2011) and Gropp and Heider (2010).

Similarly, with regard to the capital structure of insurance companies, there is growing empirical work that demonstrates that the financing of insurers mirrors that of financial firms. For example, Ahmed and Shabbir (2014: 172) tested the pecking order theory by employing the financial data of insurance companies of Pakistan over a five-year period from 2007 to 2011. Their empirical results indicated that size, profitability, liquidity, tangibility and risk are important determinants of the capital structure of insurance companies of Pakistan. Cheng and Weiss (2012: 14) conducted tests of the trade-off

and pecking order theories within the US property-liability insurance industry. Their results demonstrate that the trade-off theory dominates the pecking order theory for property-liability insurers.

7.3   SUMMARY OF RESULTS

7.3.1   Summary of methodological approaches

This study lent itself to panel data techniques. The main benefits that accrue for employing panel data techniques are that they combine both time-series and cross-sectional analyses and that the degrees of freedom increase in tandem. Panel data also control for heterogeneity, which was essential in this analysis. The principal departure of this study from other similar studies on capital structure is that to ensure that the estimated results were reliable, a battery of diagnostic tests were conducted on the estimated model.

Firstly, the applied Chow test was conducted on the pooled model to discern whether FE were valid. In all of the specifications this test came out positive, further lending credence to the notion that South African banks and insurance companies are heterogeneous in their respective panels. As such, the pooled OLS model became inconsistent in estimation. Secondly, the study tested for time (period) effects. In the event that these were detected, time dummies were added on the model. Time effects were detected to be present. These time effects include interest rates and changes in regulations, all which have an impact on the leverage decision. Thirdly, the Breusch-Pagan (1980) LM test was conducted to establish whether RE were present. If RE were detected, the Hausman (1978) specification test was employed to discern which estimator to use between the RE and FE estimators.

Fourthly, the modified Wald test was utilised to test for group-wise heteroscedasticity. It was found to be present in most cases; if not corrected for, it could have led to the standard errors being biased. Lastly, tests were conducted for cross-sectional dependence using the Pesaran (2004) CD test as well as the Frees (1995) test. It was

established to be present in nearly all cases. It is imperative to highlight that this is one of tests that has been excluded most in previous studies on capital structures of financial firms. Cross-sectional dependence emanates from banking and insurance companies depending on one another for funding. On the one hand, banks rely on one another for funding through their activities in the interbank market. On the other hand, insurers for instance rely on one another through their interactions in the reinsurance market. As such, it became imperative for this study to employ estimators that correct for these attributes.

Static panel data models were specified to test the standard corporate finance view, the regulatory view of capital structure for both banks and insurance companies as well as the buffer view of bank capital structure. The FE with Driscoll and Kray (1998) standard errors estimator, which controls for cross-sectional dependence and heteroscedasticity, was utilised to estimate the models.

To study whether financial firms seek a target capital structure in their financing, dynamic models were specified for banks and insurance companies respectively. The one-step diff-GMM, one-step syst-GMM, LSDV with Kiviet (1995) correction and FGLS (Parks-Kmenta) estimators were employed to estimate the model. Depending on the characteristics of the data set, either the LSDV with Kiviet (1995) correction or the FGLS (Parks-Kmenta) estimators, which are heteroscedasticity and cross-sectional dependence-consistent, were used to estimate the dynamic model.

7.3.2 Summary of empirical findings

7.3.2.1 The standard corporate finance view of financial firm capital structure

The results of this study demonstrate that the financing behaviour of financial firms mirrors that of non-financial firms. This corroborates the findings of Gropp and Heider (2010), Ahmad and Abbas (2011) and Jucá *et al.* (2012), among other scholars. The 'standard corporate finance view' of bank capital structure was tested. Strong evidence was found in support of this school of thought, as the standard firm-level determinants

of capital structure offered significant explanatory power in terms of the leverage variable. On the one hand, the growth opportunities, risk and size variables were found to be positively related to leverage. On the other hand, a negative relationship was found to exist between profits and bank leverage. This demonstrates that the financing behaviour of South African banks is consistent with the pecking order theory.

Similarly, for the insurance sector, strong evidence was found that validates the hypothesis that the firm-level determinants of capital structure have a predictive power in insurer leveraging. On the one hand, the growth, size, asset tangibility and reinsurance variables were found to be positively related to leverage. On the other hand, a negative relationship was found to exist between profits and insurer leverage. The findings also demonstrate that the pecking order theory can be relied upon the most in explaining the capital structure of South African insurance companies.

The salient feature of the estimated results of the banking sector and insurance sector is that they bear striking uniformity. As such, this study validates the generalisation that the financing behaviour of financial firms mirrors that of non-financial firms.

The other significance of the 'standard corporate finance view' finding is that it relegates capital regulation to be of secondary importance in the determination of the capital structure of financial firms.

7.3.2.2 The regulatory view of financial firm capital structure

This study also examined the efficacy of capital regulation of financial firms. Gropp and Heider (2010) and De Haan and Kakes (2010) provide evidence that capital regulation is not binding for banks and insurance companies respectively. In the first instance, to test the 'regulatory view' of bank capital, the Tier 1 capital ratio was regressed on the firm-level determinants of capital structure. Very weak support was found in favour of this hypothesis. Some of the firm-level determinants of capital structure offered explanatory power in terms of the regulatory variable. Had it been than regulation solely determined bank capital structure, the explanatory power of the firm-level factors should have been curtailed. Moreover, when a dynamic model was estimated to establish whether banks seek to achieve a target capital structure in their financing, it was

demonstrated that indeed banks have a target capital structure which they quest for. This behaviour is inconsistent with banks seeking to observe the minimum regulatory requirement. This finding demonstrates that at the worst case, bank capital regulation is not binding and may be ineffectual. This could be attributable to bank individual effects. As such, it could be prudent for monetary authorities to consider instituting some variant of bank-specific capital regulations as opposed to sector-wide (one-size-fits-all) capital regulations.

In the second instance, for the panel of insurance companies, the interaction between the solvency regulatory variable and the firm-level determinants of capital structure was examined. It was established that the firm-level determinants of capital structure moderately predict the solvency ratio. On the one hand, the profit variable was found to be positively related to the solvency variable. The result is consistent with the notion that highly profitable insurance firms are holding more capital. This is consistent with the prediction that highly profitable insurance companies have high capitalisation. On the other hand, the reinsurance and size variables were found to be negatively related to the solvency ratio. Because the firm-level determinants offer explanatory power in terms of the solvency variable, it implies that insurance companies are conforming to solvency levels attributable to their own characteristics and that solvency regulation might not be binding. Noteworthy is that there is a move towards a risk-based capital standard with the implementation of the SAM regime, namely to determine the solvency requirements of South African insurers expected to be finalised in 2017.

7.3.2.3 The buffer view of bank capital structure

The 'buffer view' of bank capital was also tested in this study. There is growing strand of empirical studies that have been undertaken and suggest that banks keep buffer (excess) levels of capital (refer to, among other studies, that of Berger *et al.*, 1995; Berger *et al.*, 2008; Besanko & Kanatas, 1996; Gropp & Heider, 2010 and Moyo, 2016). The view being tested was whether banks stock capital in excess of the regulatory minimum. Moderate support was found in favour of this hypothesis. It was demonstrated that South African banks keep capital in excess of the minimum regulatory requirement. When the buffer capital variable was regressed on the firm-level determinants of capital

structure, it was found that estimated results were consistent with the predictions of the buffer view. Specifically, the dividends variable was positively related to buffer capital, while size and risk were negatively related to buffer capital. This further diminishes the regulatory view of bank capital.

The implication of this finding is that South African banks are financial sound. Notwithstanding, it would be prudent for regulatory authorities to expedite the institution of deposit-protection insurance to increase the safety nets available for depositors.

7.3.2.4 Target capital structure and speed of adjustment

This study also sought to establish whether financial firms seek a target capital structure in their financing behaviour. Unlike previous studies on financial firm capital structure, this study estimated the true speed of adjustment by utilising FGLS (Parks-Kmenta) and LSDV with Kiviet (1995) correction estimators, which are most suitable to estimate capital structure partial adjustment models in the presence of heteroscedasticity and cross-sectional dependence. For the banking panel, it was demonstrated that banks have a target capital structure that they seek to achieve in their financing and adjust towards this target faster compared to non-financial firms. It was found that the speed of adjustment of South African banks is 44% (half-life of 2.3 years) with respect to total debt. Further, the speed with which South African banks adjust to attain their target level is comparable to that of banks in the developed world and is reflective of low adjustment costs. When leverage was decomposed, it was further demonstrated that banks adjust faster to cover their non-deposit leverage gap as compared to covering their deposit leverage gap. South African banks are inclined to use long-term debt as an instrument of adjustment before they turn to deposits. It could be that adjustment costs are lower for long-term debt compared to that of deposits.

Similarly, for the insurance panel, it was established that insurance companies have a target capital structure which they quest for. South African insurance companies adjust at a lower rate comparable to the banking sector. They adjust at a rate of 21% (half-life of 4.76 years). This could be attributable to the heterogeneity of the balance sheets of

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the banking and insurance panels. In essence, the profile of their liabilities is different from one another.

This finding is also inconsistent with capital regulation being of first-order importance in the determination of the capital structure of financial firms. It also leads to the generalisation that financial firms seek to achieve optimality in their financing behaviour in the same manner as non-financial firms.

7.3.2.5   The impact of business cycles on financial firm capital structure

The impact of the 2007–2009 GFC was severe on most economies of the world. The study sought to establish how the financing behaviour of the financial sector was impacted during this period. The results of this study revealed that banks deleveraged during the 2007–2009 GFC. Therefore, banks scaled down on debt. Bank lending was constrained during this period. To the contrary, insurance companies took more debt capital during the 2007–2009 GFC. This was occasioned by the fall of premium volumes during this period. As such, the profitability of insurance was curtailed.

7.4   CONTRIBUTION OF THE STUDY

The study contributes to the body of knowledge in five major ways. Firstly, it adds to the literature on capital structure of financial firms, which area has not been extensively and conclusively studied. Using a different environment, it validates the 'standard corporate finance view' of capital structure as has been observed in the few studies on financial firms. Secondly, it validates the 'buffer view' of capital structures of financial firms, which has taken prominence since the last GFC. Thirdly, it did not find compelling evidence in support of the 'regulatory view' of capital structures of financial firms and this relegates regulation to be of secondary importance in financial firm financing decisions. Fourthly, the study recognises that banks and insurance companies are fundamentally different with regard to capital structure and regulation and so warrant separate treatment in studies. This is in contrast with recent studies that do not recognise the heterogeneity of the two types of firms (see, for instance, Moyo, 2016). Fifthly, this study complements the existing studies that have sought to examine the impact of business cycles/financial crises on the financing behaviour by focusing on financial firms. Confirming the

fundamental differences between banks and insurance companies, the study observed that financial crises have a negative impact on capital structures of banks (meaning that they deleverage during crises). In contrast, financial crises have a positive impact on capital structures of insurance companies (meaning, unlike banks, they leverage during crises).

7.5   DIRECTIONS FOR FUTURE RESEARCH

This study has opened areas of research in a number of ways. Firstly, as this study only focused on the financing behaviour of South African banks and insurance companies, future studies could also extend the analysis to include other sectors of the financial sector, such as asset-management firms, medical aid schemes and pension funds. Moreover, such a study could be extended to be a panel study covering other developing countries.

Secondly, this study was undertaken during a transition period when Basel III and SAM capital regulation standards were being implemented. Future studies could examine the impact of the implementation of these capital standards on the financing patterns of banks and insurance companies respectively. It could be that in future, the capital regulations will become binding.

Thirdly, this study occurred at a time when South Africa's credit rating was downgraded. This could impact the credit rating of the financial institutions themselves. This will increase the cost of capital for financial firms. As such, future studies could explore the relationship between credit rating and the capital structures of financial firms.

Fourthly, further research could be done to unravel the relationship between bank lending and business cycles/GFC in the context of South Africa. Alternatively, another research pathway would be to investigate the impact of the implementation of the NCA and bank lending in South Africa.

Fifthly, attendant to the institution of the twin-peaks regulatory framework in South Africa is the issue of cost. For instance, in the insurance industry they have to grapple with the

instituted market conduct requirement of 'Treating our Customers Fairly' as well as compliance with the FAIS Act, among other legislation. Arguably, the cost of compliance with these regulatory requirements will cascade down to the capital structure of insurance companies. As such, future studies could seek to examine whether the implementation of the twin-peaks regulatory model had an effect on insurer capital structure.

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APPENDICES

Appendix A: Sample of banks

	Name of bank	Specialisation	Total assets in 2015 (R'mil)	Net income in 2015 (R'mil)	World rank	Country rank
1	ABSA Bank Limited	Commercial bank	936 141	10,047	350	3
2	African Bank Limited	Commercial bank	50 679	(7 212)	2 430	8
3	Albaraka Bank Limited	Islamic bank	4 814	40	7 456	18
4	Bidvest Bank Limited	Investment bank	6 201	263	6 800	17
5	First Rand Bank Limited	Commercial bank	851 200	12 750	270	2
6	GBS Mutual Bank	Commercial bank	1 085	8	12 726	24
7	Grindrod Bank Limited	Commercial bank	9 256	105	5 441	12
8	Habib Overseas Bank Limited	Commercial bank	1 207	16	12 284	23
9	HBZ Bank Limited	Commercial bank	2 475	38	8 253	19
10	Investec Bank Limited	Investment bank	332 706	3 128	682	5
11	Mercantile Bank Limited	Commercial bank	9 640	140	6 206	15
12	Nedbank Limited	Commercial bank	319 135	757	377	4
13	Real People Investments Holdings Pty. Limited	Investment bank	3 755	(333)	8 506	20
14	Sasfin Bank Limited	Commercial bank	8 429	137	5 861	14
15	South African Bank of Athens Limited	Commercial bank	2 284	(58)	10 084	21
16	Standard Bank of South Africa Limited	Commercial bank	1 276 953	12 479	266	1

Appendix B: Sample of insurance companies

	Name of insurance company	Specialisation
1	African Reinsurance Corporation	Reinsurance company
2	AIG South Africa Limited	Short-term insurance company
3	Allianz Insurance Limited	Short-term insurance company
4	Clientele Limited	Long-term insurance company
5	Credit Guarantee Insurance Corporation of Africa Limited	Short-term insurance company
6	Discovery Life Limited	Long-term insurance company
7	Export Credit Insurance Corporation of South Africa Limited	Short-term insurance company
8	Federated Employers Mutual Assurance Company Limited	Short-term insurance company
9	General Re Africa Limited	Reinsurance
10	Guardrisk Insurance Company Limited	Short-term insurance company
11	HDI-GERLING Insurance of South Africa	Short-term insurance company
12	Hollard Insurance Company Limited	Short-term insurance company
13	Hollard Life Assurance Company Limited	Long-term insurance company
14	Liberty Holdings Limited	Long-term insurance company
15	Lion of Africa Insurance Company Limited	Short-term insurance company
16	Munich Reinsurance Company of Africa Limited	Reinsurance
17	New National Assurance Company Limited	Short-term insurance company
18	Old Mutual Life Assurance Company Limited	Long-term insurance company
19	Professional Provident Society	Long-term insurance company
20	Regent Insurance Company Limited	Short-term insurance company
21	Regent Life Assurance Company Limited	Long-term insurance company
22	Renasa Insurance Company Limited	Short-term insurance company
23	Sanlam Life Insurance Limited	Long-term insurance company
24	Santam Limited	Short-term insurance company
25	Sasria Limited	Short-term insurance company
26	Zurich Insurance Company South Africa Limited	Short-term insurance company

Appendix C: Diagnostic tests to select a robust model with non-deposit leverage employed as the dependent variable

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0 : \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A: : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	F = 43.17	$F_{(0.01,14,128)} = 2.224$	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	F = 0.62	$F_{(0.01,9,120)} = 2.559$	Time effects are invalid. The error term takes a one-way error component form.
Breusch-Pagan (1980) LM test for random effects $H_0: \delta_\mu^2 = 0$ $H_A: \delta_\mu^2 \neq 0$	LM = 60.8	p = 0.0000	There is significant difference in variance across the entities. RE are present.
Hausman (1978) specification test $H_0: E(\mu_{it}|X_{it}) = 0$ $H_A: E(\mu_{it}|X_{it}) \neq 0$	$m_3 = 64.81$	p = 0.0000	Regressors not exogenous. Hence the FE specification is valid.
Heteroscedasticity $H_0: \delta_i^2 = \delta$ *for all i* $H_0: \delta_i^2 \neq \delta$ *for all i*	LM = 7187	p = 0.0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$			
Pesaran (2004) CD test:	CD = -1.134 (0.342)	p = 0.2566	Cross-sections are independent.

Appendix D: Diagnostic tests to select a robust model with deposit leverage employed as the dependent variable

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0 : \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	F = 38.57	$F_{(0.01,14,128)} = 2.224$	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	F = 1.52	$F_{(0.01,9,120)} = 2.559$	Time effects are invalid. The error term takes a one-way error component form.
Breusch-Pagan (1980) LM test for random effects $H_0: \delta_\mu^2 = 0$ $H_A: \delta_\mu^2 \neq 0$	LM = 24.43	$\chi^2_{(14)} = 29.14$	There is no significant difference in variance across the entities. RE are absent.
Hausman (1978) specification test $H_0: E(\mu_{it}|X_{it}) = 0$ $H_A: E(\mu_{it}|X_{it}) \neq 0$	$m_3 = 83.5$	$\chi^2_{(6)} = 0.873$	Regressors not exogenous. Hence the FE specification is valid.
Heteroscedasticity $H_0: \delta_i^2 = \delta$ *for all i* $H_0: \delta_i^2 \neq \delta$ *for all i*	LM = 27309	$\chi^2_{(15)} = 30.58$	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$			
Pesaran (2004) CD test:	CD = 0.500 (0.374)	p = 0.6171	Cross-sections are independent.

Appendix E: Panel regression results with non-deposit leverage as the dependent variable

	Pooled OLS	Random Effects	Fixed Effects
Growth	0.170***	0.085**	0.060**
	(3.03)	(2.20)	(2.51)
Profit	2.165***	1.425***	0.970**
	(4.44)	(3.67)	(2.69)
Asset	-1.049	-0.753	-0.786
	(-1.86)	(-0.90)	(-0.62)
Risk	1.415***	-0.053	- 0.555***
	(3.61)	(-0.67)	(-9.00)
Size	0.005***	0.006**	0.003
	(3.60)	(2.41)	(0.29)
Dividend	0.036*	0.003	-0.001
	(1.91)	(0.11)	(-0.01)
GFC	0.008	0.005	0.006
	(0.50)	(0.53)	(0.53)
Constant	-0.075	0.015	0.078
	(-3.24)	(0.33)	(0.47)
R-squared	0.5045	0.5021	0.5670
F-statistic			37.01***
LM-statistic		610.07***	

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The t-statistics for the pooled and FE model as well as the z-statistics for the RE model are reported in parentheses.

The table above shows the results of estimating the following regression for the sample of 16 South African banks for the period 2006–2015.

$$Leverage_{i,t} = x'_{i,t}\beta + \alpha_i + \varepsilon_{i,t}$$

where the dependent variable = non-deposit leverage; $x'_{i,t}$ = a vector of explanatory variables (size, profitability, growth, asset tangibility dividend, risk and GFC) for bank i at time t; β = a vector of slope parameters; α_i= group-specific constant term that embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model.

Appendix F: Panel regression results with deposit leverage as the dependent Variable

	Pooled OLS	Random Effects	Fixed Effects
Growth	-0.113	-0.027	0.026
	(-1.62)	(-0.52)	(1.16)
Profit	-4.601***	-2.878***	-1.601**
	(-6.98)	(-8.86)	(-3.85)
Asset	-1.989*	-1.243	0.888
	(-1.77)	(-0.62)	(0.67)
Risk	-1.672***	-0.089	0.946***
	(-3.75)	(-1.04	(9.47)
Size	-0.003*	-0.003	0.019
	(-1.80)	(-0.73)	(0.73)
Dividend	0.021	0.004	-0.012
	(0.99)	(0.14)	(-0.55)
GFC	0.024	0.013	0.010
	(1.20)	(0.90)	(0.92)
Constant	0.957***	0.85***	0.527
	(35.29)	(13.32)	(1.74)
Adjusted R^2	0.5934		0.6841
F-statistic			76.34***
LM-statistic		244.27***	

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The t-statistics for the pooled and FE model as well as the z-statistics for the RE model are reported in parentheses.

The table above shows the results of estimating the following regression for the sample of 16 South African banks for the period 2006–2015.

$$Leverage_{i,t} = \pmb{x}'_{i,t}\pmb{\beta} + \alpha_i + \varepsilon_{i,t}$$

where the dependent variable = book leverage; $\pmb{x}'_{i,t}$ = a vector of explanatory variables (size, profitability, growth, asset tangibility, dividend, risk and GFC) for bank *i* at time t; β = a vector of slope parameters; α_i= group-specific constant term that embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term that also takes care of other explanatory variables that equally determine leverage but were not included in the model.

Appendix G: Correlation matrix of buffer capital and the main variables used in this study

	Buffer capital	Growth	Profit	Asset	Risk	Size	Dividend
Buffer capital	1.000						
Growth	-0.068	1.000					
Profit	0.284***	0.411***	1.000				
Asset	0.157**	0.131	0.261***	1.000			
Risk	-0.001	0.047	-0.178**	0.123	1.000		
Size	-0.284***	-0.127	-0.209***	-0.027	-0.004	1.000	
Dividend	0.052	-0.069	0.002	-0.143*	-0.196**	0.188**	1.000

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The variables are defined as follows:
buffer capital = Tier 1 regulatory capital ratio – prescribed Tier 1 regulatory capital ratio; growth = growth rate of total assets; profit = ROAA; asset tangibility = fixed assets / total assets; risk = impaired loans / gross loans; size = natural logarithm of total assets; dividend = dummy variable = (1 when dividend is paid and 0 when dividend is not paid).

Appendix H: Diagnostic tests with buffer capital employed as the dependent variable

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0 : \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	$F = 9.55$	$F_{(0.01,15,137)} = 4.142$	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	$F = 0.62$	$F_{(0.01,9,129)} = 2.548$	Time effects are invalid. The error term takes a one-way error component form.
Breusch-Pagan (1980) LM test for random effects $H_0: \delta_\mu{}^2 = 0$ $H_A: \delta_\mu{}^2 \neq 0$	$LM = 12.23$	$\chi^2{}_{(15)} = 5.23$	There is significant difference in variance across the entities. RE are present.
Hausman (1978) specification test $H_0: E(\mu_{it}|X_{it}) = 0$ $H_A: E(\mu_{it}|X_{it}) \neq 0$	$m_3 = 70.17$	$\chi^2{}_{(6)} = 0.873$	Regressors not exogenous. Hence the FE specification is valid.
Heteroscedasticity $H_0: \delta_i{}^2 = \delta$ *for all i* $H_0: \delta_i{}^2 \neq \delta$ *for all i*	$LM = 2768.28$	$\chi^2{}_{(16)} = 31.99$	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$			
(i) **Pesaran (2004) CD test:**	$CD = 2.847$ (0.430)	$p = 0.0044$	Cross-sections are interdependent.
(ii) **Frees (2004) test:**	$FRE = 1.620$	$Q_{(0.01)} = 0.5198$	Cross-sections are interdependent.

Appendix I: Correlational analysis of Tier 1 capital and the firm-level explanatory variables

	Tier 1 capital	Growth	Profit	Asset	Risk	Size	Dividend
Tier 1 capital	1.000						
Growth	-0.055	1.000					
Profit	0.301***	0.411***	1.000				
Asset	0.164**	0.131*	0.261***	1.000			
Risk	-0.007	0.047	-0.178**	0.123	1.000		
Size	-0.287***	-0.127	-0.209***	-0.027	-0.004	1.000	
Dividend	0.059	-0.069	0.002	-0.143*	-0.196**	0.188**	1.000

(*) / (**) and (***) indicate the (10%), (5%) and (1%) level of significance respectively. The variables are defined as follows:
Tier 1 capital = Tier 1 regulatory capital ratio; growth = growth rate of total assets; profit = ROAA; asset tangibility = fixed assets / total assets; risk = impaired loans / gross loans; size = natural logarithm of total assets; dividend = dummy variable = (1 when dividend is paid and 0 when dividend is not paid).

Appendix J: Diagnostic tests to estimate a robust model with Tier 1 capital ratio employed as the dependent variable

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0 : \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A: : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	F = 9.75	$F_{(0.01,15,137)} = 4.142$	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	F = 0.50	$F_{(0.01,9,129)} = 2.548$	Time effects are invalid. The error term takes a one-way error component form.
Breusch-Pagan (1980) LM test for random effects $H_0: \delta_\mu^2 = 0$ $H_A: \delta_\mu^2 \neq 0$	LM = 11.75	$\chi^2_{(15)} = 5.23$	There is significant difference in variance across the entities. RE are present.
Hausman (1978) specification test $H_0: E(\mu_{it}\|X_{it}) = 0$ $H_A: E(\mu_{it}\|X_{it}) \neq 0$	$m_3 = 70.72$	$\chi^2_{(6)} = 0.873$	Regressors not exogenous. Hence the FE specification is valid.
Heteroscedasticity $H_0: \delta_i^2 = \delta$ *for all i* $H_0: \delta_i^2 \neq \delta$ *for all i*	LM = 8842.4	$\chi^2_{(16)} = 31.99$	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$			
(iii) **Pesaran (2004) CD test:**	CD = 2.316 (0.407)	p = 0.0205	Cross-sections are interdependent.
(iv) **Frees (2004) test:**	FRE = 1.255	$Q_{(0.01)} = 0.5198$	Cross-sections are interdependent.

Appendix K: Diagnostic tests to estimate target capital structure with book leverage as the dependent variable

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0: \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A:: \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	$F = 5.08$	$F_{(0.01,15,137)} = 2.192$	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	$F = 1.51$	$F_{(0.01,8,113)} = 2.673$	Time effects are invalid. The error term takes a one-way error component form.
Hausman (1978) specification test $H_0: E(\mu_{it}|X_{it}) = 0$ $H_A: E(\mu_{it}|X_{it}) \neq 0$	$m_3 = 44.30$	$p = 0.0000$	Regressors not exogenous.
Heteroscedasticity $H_0: \delta_i^2 = \delta$ for all i $H_0: \delta_i^2 \neq \delta$ for all i	$LM = 2206$	$p = 0.0000$	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$			
Pesaran (2004) CD test:	$CD = 2.428$ (0.405)	$p = 0.015$	Cross-sections are interdependent.

Appendix L: Diagnostic tests to estimate a target capital structure with deposit leverage employed as the dependent variable

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0 : \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A : : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	F = 2.89	$F_{(0.01,15,137)} = 2.245$	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	F = 1.14	$F_{(0.01,8,105)} = 2.685$	Time effects are invalid. The error term takes a one-way error component form.
Hausman (1978) specification test $H_0: E(\mu_{it}|X_{it}) = 0$ $H_A: E(\mu_{it}|X_{it}) \neq 0$	$m_3 = 30.15$	p = 0.0001	Regressors not exogenous.
Heteroscedasticity $H_0: \delta_i^2 = \delta$ *for all i* $H_0: \delta_i^2 \neq \delta$ *for all i*	LM = 288.12	p = 0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$			
Pesaran (2004) CD test:	CD = 0.243 (0.405)	p = 0.8080	Cross-sections are independent.

Appendix M: Diagnostic tests of target capital structure estimation with non-deposit leverage employed as the dependent variable.

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0 : \alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ $H_A : : \alpha_1 \neq \alpha_2 \neq \cdots \alpha_{N-1} \neq 0$	F = 4.80	$F_{(0.01,15,137)} = 2.245$	Cross-sectional specific effects are valid.
Joint validity of time effects $H_0: \lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ $H_A: \lambda_1 \neq \lambda_2 \neq \cdots \lambda_{n-1} \neq 0$	F = 0.76	$F_{(0.01,8,113)} = 2.685$	Time effects are invalid. The error term takes a one-way error component form.
Hausman (1978) specification test $H_0: \mathrm{E}(\mu_{it}|X_{it}) = 0$ $H_A: \mathrm{E}(\mu_{it}|X_{it}) \neq 0$	$m_3 = 85.69$	p = 0.000	Regressors not exogenous.
Heteroscedasticity $H_0: \delta_i^2 = \delta$ *for all i* $H_0: \delta_i^2 \neq \delta$ *for all i*	LM = 1310	p = 0.000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H_0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ $H_A: \rho_{ij} \neq \rho_{ji} = 0$			
Pesaran (2004) CD test:	CD = -0.881 (0.347)	p = 0.378	Cross-sections are independent.