Determinants of Bank Capital Structure: Evidence from South Africa

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Abstract: The financing decisions of banks remain an enigma, increasingly attracting the attention of banking regulators and corporate finance scholars alike. Hitherto, banks have been excluded from extant studies of capital structure principally because it was reasoned that regulation was the overriding determinant of bank capital structure. Notwithstanding, there has been increasing empirical work to the contrary. This article reports on a study investigating the determinants of bank capital structure. Utilising a sample of 16 South African banks for the period 2006–2015, panel data techniques were employed and a fixed effects model estimated to test the relationship between bank leverage and the firm-level determinants of capital structure ("standard corporate finance view"). It was established that the financing behaviour of banks mirrors that of non-financial firms. Growth opportunities, risk and size variables were positively related to leverage. The profit and the global financial crisis variables were negatively related to leverage. The results therefore confirmed banks deleveraging during the 2007–2009 global financial crisis. It was also observed that bank financing behaviour conforms to the pecking order theory. These findings also lend credence to the "standard corporate finance view" of bank capital structure and negate the role of bank capital regulation. At worst, the capital regulations are ineffectual and not binding.

Keywords: bank; capital structure; firm level determinants; leverage; South Africa

JEL Classification: G01; G21; G32

1. Introduction

The financial well-being of banking institutions is a necessary condition for the attainment of financial stability of any economy. Banks perform the critical role of financial intermediation in an economy. Arguably, among other factors, the capital structure choices of banks determine their financial well-being. Notwithstanding, bank financing decisions are opaque and continue to attract the attention of banking regulators and corporate finance scholars alike. The study on which this article reports, attempted to disentangle the factors that determine a bank's capital structure.

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Capital structure theory is firmly founded upon the seminal works of Modigliani and Miller (1958, p. 268). They postulated 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 Modigliani and Miller's propositions will no longer hold. Modigliani and Miller (1963, p. 438) would later relax the proposition of perfect markets to incorporate 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.

In the real-word scenario, their propositions hardly hold and have subsequently been challenged by several scholars. It has been demonstrated through empirical studies that capital structure does matter. 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.[1]

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. Against this backdrop, the study reported on in this article sought to investigate the determinants of capital structure by specifically focusing on the banking sector in the context of South Africa. Previous studies on bank capital structure have focused on developed countries. The motivation for selecting South Africa as the focus of this study lay in its stage of development and the sophistication of its financial sector, notwithstanding that it is a developing country.

The significance of the study is mainly threefold. 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.[2] 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).

[1] See for instance (Berger, Herring & Szegö, 1995; DeMarzo & Duffie, 1995; Froot & Stein, 1998; Miller, 1995; Smith & Stulz, 1985).

[2] See for instance (Fama & French, 1998; Frank & Goyal, 2004; 2009; Graham & Harvey, 2001; Shyam-Sunder & Myers, 1999).

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.

Unlike some recent studies, this study factored into account the spill-over effects of bank financing.[1] Banking firms are dependent on one another for financing through their interactions in the interbank market. 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, regardless of size.

Thirdly, this research effort was conducted in the aftermath of the 2007–2009 global financial crisis (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 that has aimed to examine the impact of the GFC on firm leveraging.[2]

The remainder of article is arranged as follows: the next section reviews the related literature. Section 3 outlines the research methodology. Section 4 presents and discusses the research findings and Section 5 concludes.

2. Overview of Literature: Firm-level Determinants of Capital Structure

Frank and Goyal (2009) established that there are "reliably important" firm-level factors that have a bearing on firm leveraging. The firm-level factors that usually turn up in extant literature and have a demonstrable effect on the capital structure choices of firms include, among others, size, asset tangibility, profitability, growth opportunities, risk and dividend policy. 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.

[1] See for instance (Moyo, 2016).

[2] See for instance (Ariff & Hassan, 2008; Auret, Chipeta & Krishna, 2013; Harrison & Widjaja, 2014; Leitner & Stehrer, 2013; Morri & Artegiani, 2015; Zarebski & Dimovski, 2012; Zeitun, Temimi & Mimouni, 2017).

2.1. Size

It is expected that as firms grow, they become more profitable and also accumulate more tangible assets along their growth trajectory (Sibindi, 2016, p. 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 the 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, Guney & Paudyal, 2008, p. 64; Frank & Goyal, 2009, p. 8; Rajan & Zingales, 1995, p. 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.

The empirical evidence to support the positive leverage-firm size nexus prediction can be found in the studies by Antoniou et al. (2008, p. 73), Ahmed, Ahmed and Ahmed (2010, p. 9), Al-Najjar and Hussainey (2011, p. 334), Lim (2012, p. 197), Bartoloni (2013, p. 142) and Lemma and Negash (2014, p. 81), among other scholars. To the contrary, Titman and Wessels (1988, p. 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.

2.2. 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, p. 9). Further, according to Rajan and Zingales (1995, p. 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, p. 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, p. 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, p. 9) On the one hand, the positive firm leverage-asset tangibility prediction finds empirical support from Faulkender and Petersen (2006, p. 57) and Antoniou et al. (2008, p. 73), among other scholars. On the other hand, Bradley, Jarell and Kim (1984, p. 874), Ahmad and Abbas (2011, p. 208) and Al-Najjar and Hussainey (2011, p. 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. 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, p. 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 (1999, p. 221), Rajan and Zingales (1995, p. 1457), Booth, Aivazian, Demirgüç-Kunt and Maksimovic (2001, p. 117), Hovakimian, Opler and Titman (2001, p. 3), Faulkender and Petersen (2006, p. 57), Utrero-González (2007, p. 22), Antoniou et al. (2008, p. 67), Frank and Goyal (2009, p. 26), Ahmed et al. (2010, p. 10), Ahmad and Abbas (2011, p. 209), Al-Najjar and Hussainey (2011, p. 334) and Lemma and Negash (2014, p. 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, Hovakimian and Tehranian (2004, p. 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.

2.4. Growth

Frank and Goyal (2009, p. 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, p. 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 net present value 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, p. 1455), Hovakimian et al. (2001, p. 22), Barclay and Smith (2005, p. 13) and Antoniou et al. (2008, p. 86), among other studies. However, empirical support for the positive firm leverage-growth prediction is found in the studies by Ahmed et al. (2010, p. 10), Ahmad and Abbas (2011, p. 208) and Al-Najjar and Hussainey. (2011, p. 333)

2.5. 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, p. 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, p. 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, p. 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, p. 10) found a positive relationship between capital structure and risk of insurance companies. They contend that the debt ratio increases with the increase of the claim ratio of Pakistan insurance companies, while Al-Najjar and Hussainey (2011, p. 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.

2.6. 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, p. 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, p. 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.

3. Research Methodology

3.1. Sample Description and Data Sources

The population for this study comprised South African banking institutions both listed and not listed on the Johannesburg Stock Exchange. In the sampling frame all the banks that had complete data sets for the 10-year period running from 2006 to 2015 were considered. The Bureau van Dijk Bankscope database was used to source the audited financial statements of the banks. The banking sample comprised of 16 banks.

3.2. Variable Definition

The variables that were utilised in this study are described in this section.

- *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, which is defined as *one minus the ratio of book value of equity to book value of assets*. 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, authors rely on one measure of leverage. In the second strand, authors rely on two measures of

leverage, namely book leverage and market leverage. In the last strand of literature authors 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.

The major contestation has been whether to employ book leverage or market leverage, or both. Notwithstanding that the conundrum remains unresolved, studies that have 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 is employed.[1] 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 banks included banks that were not listed on the Johannesburg Stock Exchange, there was scant availability of market value data.

As banks have an additional source of financing, in the form of deposits, in this study leverage was decomposed to analyse the dynamics of deposit financing. The secondary measures of leverage employed 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, p. 605) Non-deposit leverage (NON-DEP) is the difference between book leverage and deposit leverage.

- *Independent variables*

The independent variables consisted of the firm-level determinants of capital structure as well as dummy variables. The firm-level determinants of capital structure that were considered for this study were size, growth, profitability, asset tangibility and risk. The proxies to capture these variables employed in this study are defined in Table 1. The dummy variables that were employed in this study were to capture the effects of the 2007–2009 GFC as well as a dummy variable to capture one of the remaining firm-level determinants of capital structure: dividends. The first one was the dummy variable (DIVIDEND) for dividends. It was defined as 1 when a bank paid out a dividend and 0 when the bank did not declare a dividend. The second dummy variable (GFC) was to capture the effects of the financial crisis. It was defined as 1 for the years when the financial crisis occurred and 0 otherwise.

[1] See for instance (Antoniou et al., 2008; Frank & Goyal, 2004; Gropp & Heider, 2010; Hovakimian et al., 2001; Rajan & Zingales, 1995; Titman & Wessels, 1988, among others).

Table 1. Proxies employed for the independent variables used in this study

Variable	Definition
Growth	*Annual growth rate of total assets*
Size	*Natural logarithm of total assets*
Profit	*Return on average assets (ROAA)*
Asset tangibility	*Ratio of fixed assets to total assets*
Risk	*Ratio of impaired loans to gross loans*

3.3. Empirical Model Specification and Estimation Techniques

To examine the relationship between leverage and its determinants, a static panel data model was specified. A battery of diagnostics tests was conducted to ensure that the estimated model was well specified and robust. The econometric analysis was conducted by employing Stata version 14 software.

To test the relationship between bank leverage and firm-level determinants of capital structure, a static panel data model was specified as follows:

$$Lev_{i,t} = \boldsymbol{x}'_{i,t}\boldsymbol{\beta} + \alpha_i + \varepsilon_{i,t} \quad (1)$$

Where:

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

$\boldsymbol{x}'_{i,t}$ = 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.

Equation (1) was estimated using the fixed effects (FE) with Driscoll and Kray (1998) standard errors estimator, which controls for cross-sectional dependence and heteroscedasticity. The pooled regression model and the random effects (RE) model were also estimated for comparison.

4. Empirical Results

4.1. Descriptive Statistics

In this section, the descriptive statistics of all the variables are presented. The trends of the variables over time are described in turn. The descriptive statistics of the variables are presented in Table 2. 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.

Table 2. 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	0.7602
Non-deposit leverage	0.1186	0.0907	0.1470	0.0071	0.7826
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

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 return of assets (ROA) of 1.9%. This is modest in comparison to non-financial firms. Ramjee and Gwatidzo (2012, p. 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 on any given year, 65% of the banks pay dividends.

South African banks are highly levered 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, p. 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, p. 593), who reported a median book leverage of 92.7% for the same sample of banks.

South African banks are highly levered in comparison to non-financial firms. Ramjee and Gwatidzo (2012, p. 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.

4.2. Bank Leverage and Firm-Level Determinants of Capital Structure

Having established the trends in key variables, this section reports on the analysis of the correlations among the key variables, after which the model was estimated. Robustness checks were performed to test whether the relationship between leverage and firm-level determinants is sensitive to the alternative definitions of leverage.

4.2.1. Correlation Analysis

The correlations of the book leverage variable and the firm-level determinants are reported in Table 3. Suffice to highlight that the correlations are in line with the predictions of the major capital structure theories. Book leverage is negatively correlated with the growth variable and the correlation is statistically significant at the 5% level of significance. This is consistent with the predictions of the trade-off theory. Book leverage is also inversely correlated with profit and the correlation is 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 is in line with the predictions of the trade-off theory.

Size is positively correlated with book leverage. This can also be justified in terms of the trade-off theory of capital structure. Large banks are highly levered compared to small banks, the motivation being that they will derive a higher debt interest tax shield.

Table 3. Correlation matrix

	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 tangibility	-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); 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).

Book leverage is positively related to deposit leverage. In fact, deposit leverage explains 63.8% variation in book leverage. Non-deposit leverage is negatively

correlated with deposit leverage and has about 84% explanatory power. The correlation is 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 is negatively associated to 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 is positively related to growth and the correlation is statistically highly significant. Deposit leverage is 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 is 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. Further, deposit leverage is 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 is 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. The first pattern that emerged was that the correlations involving deposit leverage moved and were of the same sign as those involving the book leverage variable. This demonstrates that deposit leverage and book leverage are highly correlated. Secondly, the correlations involving non-deposit leverage were of opposite sign to the ones involving the deposit leverage variable. Wherever the correlations are significant, they are of opposite sign. This further demonstrates the substitutability of non-deposit liabilities by deposit liabilities.

4.2.2. Panel Regression Results

The regression outputs for testing the relationship between bank leverage and firm-level determinants of capital structure are presented in Table 4. The pooled OLS and RE estimation results are reported 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, which controlled for heteroscedasticity and cross-sectional dependence.

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

	Pooled ordinary least squares (OLS)	*Random Effects*	*FE 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.

- *Leverage and profitability*

The estimation results confirm an inverse relationship between banks' book leverage and profitability. All three models predict a negative relationship between bank leverage and profitability (refer to Table 4). The FE model predicts that a 1% increase in a bank's profits will result in an 82.4% decrease in a bank's book leverage. This result is 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, p. 211), Gropp and Heider (2010, p. 598) and Jucá, De Sousa and Fishlow (2012, p. 23) also found an inverse relationship between firm leverage and profitability for their sample of financial firms.

- *Leverage and asset tangibility*

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 this study were inconclusive in this regard.

The pooled OLS regression predicts a negative and statistically significant relationship between book leverage and asset tangibility. Similarly, the RE estimator predicts a negative though statistically insignificant association between book leverage and asset tangibility. To the contrary, although statistically insignificant, the FE estimator predicts a negative relationship between the book leverage and the asset tangibility variables. Therefore, the results point to support of the pecking order theory, although not significant in all models despite the same sign.

- *Leverage and growth prospects*

The financing patterns of South African banking firms seem to be conforming to the pecking order theory's prediction. The prediction is that firms faced with growth prospects will observe a financial hierarchy in financing their operations. The presupposition is 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 predict a positive relationship between book leverage and growth. The FE and RE predictions are statistically significant at the 5% and 1% levels of significance, respectively. The FE model predicts 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, p. 10) and Al-Najjar and Hussainey (2011, p. 333), among other scholars who considered non-financial firms, as well as that of Ahmad and Abbas (2011, p. 211) and Teixeira, Silva, Fernandes and Alves (2014, p. 56), who studied financial firms.

- *Leverage and dividend payer*

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 company are good and that it is a going concern. This will make equity the favourable option. To the contrary, the pooled OLS estimator predicts a positive relationship, which is statistically significant. However, the RE and FE estimators predict an inverse relationship, although it is statistically insignificant at the 10% level of significance. Based on the FE estimators, which are the most appropriate, there is an inverse association between book leverage and dividends, although not significant.

- *Leverage and size*

A positive association exists between bank book leverage and size. This prediction is consistent among all three estimators, although the RE estimator reports a statistically insignificant result. The FE estimator predicts that a 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 the trade-off theory prediction that large firms should be highly levered 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, p. 598).

- *Leverage and credit risk*

This hypothesis was predicated 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 confirm a direct relationship between bank leverage and credit risk. The FE model predicts that a 1% increase in leverage will result in a 29.7% increase in book leverage. The relationship is statistically significant at the 1% level of significance.

- *Leverage and GFC*

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. Empirical support for this claim was found 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.

4.2.3. Robustness Tests of the Bank Leverage Variable

The robustness checks on the dependent variable are documented in Table 5.

Table 5. Robustness checks of the bank 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.

Suffice to highlight that the results are robust to the alternative definitions of the dependent variable. The results presented in Table 5 also demonstrate the effective substitution between deposit leverage and non-deposit leverage of banks. Whenever

the predicted coefficient between non-deposit leverage and the explanatory variable is statistically significant, it is oppositely signed to the predicted coefficient between deposit leverage and that explanatory variable. For instance, the coefficient of non-deposit leverage is positive when profit is the regressor as compared to the negative coefficient of deposit leverage when profit is the regressor.

5. Conclusion

This article reported on an examination of the determinants of bank capital structure and documents the empirical results of testing the hypotheses relating to the financing behaviour of South African banks. A static model was specified to estimate the relationship between bank leverage and firm-level determinants. The standard firm-level determinants of capital structure were found to offer significant explanatory power of the leverage variable. On the one hand, the growth opportunities, risk and size variables were found to be positively related to the leverage variable. On the other hand, a negative relationship was found to exist between profits and bank leverage. The results of the study also demonstrated that the financing behaviour of South African banks could be best explained in terms of the pecking order theory. The results also confirmed 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 could be said to mirror that of non-financial firms in many respects. The results of this study lend credence to the "standard corporate view" and relegate capital regulation to be of secondary importance in the determination of bank capital structure. As such it is imperative for South African monetary authorities to revise their capital regulations in order to make them effective.

6. References

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