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Dynamic Adjustment towards a Target Bank Capital Structure: South African Evidence

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Abstract: Banks financing decisions remain an enigma, increasingly attracting the attention of banking regulators and corporate finance scholars alike. This article sought to establish whether banks seek to achieve a target capital structure in their financing decision making and if so at what speed of adjustment (SOA) do they gravitate towards this target? Utilising a sample of 16 South African banks for the period 2006-2015, we employed panel data techniques to determine whether banks have a target capital structure that they quest for. A partial adjustment model was estimated using the LSDV with Kiviet (1995) correction estimator which controls for cross-sectional dependence and to determine the speed of adjustment towards this target. Robustness checks were also conducted to establish whether the SOA is dependent on the source of financing used. The results documented that South African banks have a target capital structure which they quest for, and adjust to this target at a SOA of 44% or a half-life of 2.4 years which is relatively faster to that of non-financial firms. These findings relegate capital regulations to be of secondary importance in the determination of bank capital structure. At worst bank capital regulations might not be binding at all.

Keywords: Banks; Firm level; Leverage; Speed of adjustment

JEL Classification: G01; G21; G32

1. Introduction

1.1.Background

The financing behaviour of banking firms is a concept that has not been explored extensively in corporate finance research. This has been premised on the notion that since banks are regulated entities, their financing decisions are an involuntarily one and regulation solely determines their capital structure choices. To further compound this conundrum, banks are peculiar firms in that they have an additional source of financing in the form of deposits, which other non-firms do not have recourse to. Arguably the bank fixed effects might have a bearing on their capital structure choices.

Capital structure research has continued unabated in the aftermath of Modigliani and Miller (1958 & 1963) seminal-works. Extant studies that have been conducted have demonstrated that capital structure does matter in enhancing firm value. Further studies that have been conducted in the last two decades demonstrate that firms seek to achieve optimality in their capital structure choices (see for instance; Shyam-Sunder & Myers, 1999; Barclay & Smith, 2005; Flannery & Rangan, 2008; Ramjee & Gwatidzo, 2012 amongst others). What is indisputable empirically is that firms seek to achieve a target capital structure. However, what is still subject to conjecture is how does this adjustment take effect? What is the true SOA? and what are the determinants of the SOA?

1.2. Research Gap

Notwithstanding that the research conducted on the existence of a target capital structure has been extensive, it has been mainly confined on examining the financing behaviour non-financial firms. With regard to the financing of banking firms, it has been demonstrated that banks make voluntary and

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involuntary capital structure decisions. The research in this area is still at a nascent stage. To the best knowledge of this researcher, Gropp and Heider (2010) were the first researchers to establish whether banks seek to achieve optimality in their capital structure choices. They established that banks are not dissimilar from non-financial firms in that they seek to achieve a target capital structure. However, they did not go as far as establishing how this adjustment can take place in different scenarios. Moreover, they did not seek to estimate the "true" speed of adjustment as they did not take regard of the interdependence and inherent spill-overs in bank financing.

1.3. Contribution of this Study

Against this backdrop the present study sought to establish whether banks quest for a target capital structure in their financing behaviour, which area has been under-explored. Secondly, the principal departure from Gropp and Heider (2010) and Moyo (2016) amongst others, is that this study employed a risk measure that directly captures credit risk, as opposed to the standard deviation of stock returns. Thirdly, this study estimated the true SOA by factoring in interdependence of banks in their financing behaviour. As such, the study corrected for cross sectional dependence in estimation by utilising the LSDV with Kiviet (1995) correction estimator which is a cross-sectional dependence consistent estimator. Lastly, this study sought to establish the dynamics of adjustment for a bank for the various sources of debt employed. To the best knowledge of the researcher this had not been tested empirically.

1.4. Organisation of the Paper

The remainder of paper is arranged as follows: the next section reviews the literature about capital structure. Section 3 presents the data and methodology. Section 4 presents the empirical findings and Section 5 concludes.

2. Review of Related Literature

The static trade-off theory has managers seeking optimal capital structure (Shyam-Sunder & Myers, 1999, p. 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, p. 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, p. 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.

The first strand of literature delves on the existence of a target capital structure. Amongst others, Elsas, Flannery and Garfinkel (2014, p. 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, p. 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, p. 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, Hovakimian and Tehranian (2004, p. 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, Opler and Titman (2001, p. 1) 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, p. 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.

The second strand of literature has sought to establish 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, Guney and Paudyal (2008, p. 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, p. 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, p. 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.

Ramjee and Gwatidzo (2012, p. 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, p. 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, p. 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.

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.

3. Data and Methodology

3.1. Sample Description and Data Sources

The population for this study comprised of South African banking institutions both listed and not listed on the Johannesburg Stock Exchange. All the banks with complete data sets for the ten-year period running from 2006 to 2015 were considered for this study. The Bureau van Dijk Bank Focus database was used to source the audited financial statements of the banks. There were 16 such banks.

3.2. The Dynamic Panel Data Model

A dynamic panel data model was specified to study the target leverage and determine the speed of adjustment towards the target level. The econometric analysis was conducted by employing Stata version 14 software. Extant studies have modelled the target capital structure by employing a partial adjustment framework. Amongst others, these include Flannery and Rangan (2006); Antoniou *et al* (2008); Mukherjee and Mahakud (2010); Ramjee and Gwatidzo (2012); Lemma and Negash (2014) and De Jonghe and Oztekin (2015). We take cue from such studies and specify a partial adjustment framework in order to determine whether there exists a target capital structure as follows:

$$Lev_{i,t}^{*} = \boldsymbol{x}_{i,t}'\boldsymbol{\beta} + \varphi_{i,t} \quad (1)$$

Where:

$Lev_{i,t}^{*}$ = target leverage (BLE, DEP or NON-DEP)

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

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

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

$$Lev_{i,t} - Lev_{i,t-1} = \delta(Lev_{i,t}^{*} - Lev_{i,t-1}), \text{ with } 0 < \delta < 1 \quad (2)$$

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, 2012, p. 58). If δ=1 the actual change in leverage is equal to the desired and the adjustment is transaction cost free. If δ=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, Eq. (1) into Eq. (2) yields the following:

$$Lev_{i,t} = (1-\delta)Lev_{i,t-1} + \boldsymbol{x}_{i,t}'\delta\boldsymbol{\beta} + \delta\varphi_{i,t} \quad (3)$$

The dynamic panel data model as specified in Eq. (3) 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. One way to alleviate this problem is to employ the generalised method of moments (GMM) estimators, namely the differenced-GMM (diff-GMM) and system-GMM (syst-GMM). As such to estimate the dynamic model, firstly, initial diagnostics were performed on the base pooled OLS, fixed effects and random effects models. Subsequently, both the diff-GMM and syst-GMM estimators were employed. The caveat was that the diff-GMM and syst-GMM estimators usually perform poorly for small samples and may not have been the most efficient estimators taking cognisance of the sample properties. As such, the LSDV with Kiviet (1995) correction estimators, which is a cross-sectional dependence and heteroscedasticity consistent estimator was employed in estimation. The diff-GMM and syst-GMM were also used in estimation for reference purposes.

3.3. Variable Definition

3.3.1. 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—which was defined as *one minus the ratio of book value of equity to book value of assets*[1]. This follows from Gropp and Heider (2010). Because

[1] $Since\ Total\ Assets = Total\ Liabilites + Equity$
$\rightarrow \frac{Total\ Assets}{Total\ Assets} = \frac{Total\ Liabilities}{Total\ Assets} + \frac{Equity}{Total\ Assets}$
$\rightarrow \frac{Total\ Liabilities}{Total\ Assets} = 1 - \frac{Equity}{Total\ Assets}$,

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 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.

3.3.2. 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 are reliably important and were considered for this study are size, growth, profitability, asset tangibility and risk. The dummy variables that were employed for this study were to capture the effects of the 2007-2009 financial crises as well as a dummy variable to capture one remaining firm level determinant of capital structure—dividends.

- **Size**

To measure size, we 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, Al-Najjar and Hussainey (2011); Antoniou et al. (2008); Booth, Aivazian, Demirgüç-Kunt and Maksimovic (2001); Frank and Goyal (2009); Mukherjee and Mahakud (2010) and Oztekin and Flannery (2012) amongst others. Other studies have employed the logarithm of sales or net sales to capture the effect of size (see for instance, Titman and Wessels (1988); Rajan and Zingales (1995) and Barclay and Smith (2005).

- **Growth**

We defined the growth variable as the annual growth rate of total assets. We took cue from Titman and Wessels (1988) and Anarfor (2015) amongst others, in defining growth as such. The reasoning is that the higher the growth rate, the higher the growth prospects of the company. The alternative definition which has also been used widely in empirical studies would have been to proxy growth prospects with the market-to-book value ratio (see amongst others, Booth et al, 2001; Frank & Goyal, 2009; Teixeira, Silva, Fernandes & Alves, 2014).

- **Asset tangibility**

In this study asset tangibility was 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. We were motivated to employ the fixed assets to total assets ratio as a proxy for asset tangibility as extant studies have utilised this measure. The empirical studies that have employed this measure include Rajan and Zingales (1995); Frank and Goyal (2009); Mukherjee and Mahakud (2010); Oztekin and Flannery (2012) and De Jonghe and Oztekin (2015) amongst others.

- **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 we employed the return on assets (ROA) measure as the proxy for profitability. Boot *et al* (2001) and Anarfor (2015) amongst others,

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

employ ROA as an indicator of profitability in similar studies. In the case of the banks this is defined as the return on average assets (ROAA).

- **Risk**

The proxy that we employed for risk measures bank credit risk. It was defined as the *ratio of impaired loans to gross loans*.

- **Dummy variables**

We employed two dummy variables in this study. The first one was the dummy variable (DIVIDEND) for dividends. It was defined as one, when a bank paid out a dividend and zero when the bank did not declare a dividend. The second dummy variable (GFC) was to capture the effects of the financial crises. It was defined as one for the years when the financial crisis occurred and zero otherwise.

4. Empirical Results

It is conceivable that banks also seek to achieve a target capital structure in their financing in a like fashion to 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 amongst the variables are considered in this section. Secondly, initial diagnostics were performed on the partial adjustment model estimated and a robust model was estimated and inferences drawn thereof. Robustness checks were conducted for the alternative definitions of leverage.

4.1. Correlation Matrix

The correlation matrix of book leverage and firm level determinants of capital structure with the inclusion of lagged book leverage is presented in Table 1. The lagged book leverage variable is highly correlated to the 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 are determined by past levels of leverage. The firm level determinants are correlated with the lagged dependent variable in the same manner as they are correlated with the book leverage variable. Suffice to highlight that a negative correlation exists between the lagged booked leverage variable and growth, risk, asset tangibility and profits. A positive relationship exists between the lagged book leverage variable and the size and dividend variables.

Table 1. Correlation Matrix

	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 (***) indicates 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= Return on Average Assets (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).

4.2. Diagnostic Tests 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 fixed effects and random effects model. The tests are reported in Table 2.

Table 2. Pre-estimation 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 *H₀* : $\alpha_1 = \alpha_2 = \cdots \alpha_{N-1} = 0$ *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 *H₀*: $\lambda_1 = \lambda_2 = \lambda_{n-1} = 0$ *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 *H₀*: $E(\mu_{it}\|X_{it}) = 0$ *H_A*: $E(\mu_{it}\|X_{it}) \neq 0$	m_3=44.30	p = 0.0000	Regressors not exogenous.
Heteroscedasticity *H₀*: $\delta_i^2 = \delta$ *for all i* *H₀*: $\delta_i^2 \neq \delta$ *for all i*	LM = 2206	p = 0.0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests *H₀*: $\rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) = 0$ *H_A*: $\rho_{ij} \neq \rho_{ji} = 0$			
Pesaran (2004) CD test:	CD = 2.428 (0.405)	p = 0.015	Cross sections are interdependent.

The diagnostics reveal that the fixed effects were valid and time effects invalid. Hence a one-way error component model was specified. Further, heteroskedasticity 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 1 as the lagged book leverage variable is highly correlated to the firm level determinants of capital structure. The endogeneity arises from the correlation of the independent variables 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 with the framework of Generalised Method of Moments. A one-step diff-GMM and one-step system-GMM estimators were 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 perform moderately for small datasets. At the second instance the LSDV with Kiviet (1995) correction estimator was employed. Judson and Owen (1999, p. 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 three estimators are reported. However, for interpretation purposes, the corrected LSDV results are used.

4.3. 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 3. The estimation results are consistent amongst the three estimators. The results indicate that South African banks have a target capital structure and adjust to this target at a rate of (1- δ) = 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 find for their sample of US and EU banks the speed of adjustment 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, p. 86) find that their adjustment speed is 22.7% with respect to the total debt ratio. This is lower in comparison to the banks.

Table 3. Panel regression results to determine target capital structure with book leverage as the dependent variable

	Difference-GMM (one-step)	System-GMM (one-step)	LSDV with Kiviet (1995) correction
Leverage (-1)	0.554***	0.524***	0.558***
	(3.88)	(3.97)	(7.98)
Growth	0.101***	0.067***	0.080***
	(4.36)	(3.00)	(35.86)
Profit	-0.706***	-1.045***	-0.677***
	(-5.62)	(-4.76)	(-47.86)
Asset Tangibility	-1.294***	-1.000	0.568
	(-2.28)	(-1.39)	(1.00)
Risk	0.257***	-0.016	0.211***
	(4.72)	(-0.19)	(8.47)
Size	0.007	0.001	0.013***
	(0.54)	(0.95)	(19.19)
Dividend	-0.011	0.021**	0.003
	(-1.00)	(2.09)	(0.46)
GFC	0.013	0.016**	0.013***
	(2.19)	(2.10)	(23.49)
AR(1) statistic	-1.75*	-1.17	
AR(2) statistic	0.846	0.965	
Sargan	7.12	27.9**	

(*)/(**) and (***) indicates 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, $\mathrm{Leverage}_{i,t-1}$ =lagged book 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 which embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term which also takes care of other explanatory variables that equally determines leverage but are not included in the model and δ = the speed of adjustment.

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, p. 61) contend that the adjustment costs for South African firms are lower than for those in developed economies. Makina and Negash (2005, p. 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.

4.4. Robustness Checks of Target Capital Structure

In this section we report on the robustness checks conducted on the specified model of target capital structure with the alternative definitions of the dependent variable employed. 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. Suffice to highlight that the same limitations that were identified when the book leverage was employed as the dependent variable were detected to be present. These are heteroskedasticity, cross-sectional dependence and Nickel bias. Consequently, estimation was done within the framework of estimators that mitigate these ills, namely the system-GMM and the LSDV with Kiviet (1995) correction estimators. The results of the estimation are documented in Table 4. The corrected LSDV estimator results are used to draw inferences.

Table 4. Robustness checks of the target capital structure estimation

	Deposit Leverage		**Non-Deposit Leverage**	
	System-GMM (one-step)	**LSDV with Kiviet (1995) correction**	**System-GMM (one-step)**	**LSDV with Kiviet (1995) correction**
Leverage (-1)	0.756***	0.659***	0.600***	0.310***
	(17.29)	(551.17)	(5.74)	(3.55)
Growth	0.004	0.017	0.092**	0.073***
	(0.17)	(0.92)	(2.58)	(8.75)
Profit	-1.511***	-1.442***	0.998**	1.031***
	(-3.37)	(-7.51)	(2.80)	(8.85)
Asset Tangibility	-0.173	1.692***	-0.518	-2.04***
	(-0.23)	(4.44)	(-0.63)	(-8.41)
Risk	-0.172*	0.428***	0.422***	-0.425***
	(-1.87)	(3.90)	(6.52)	(-3.08)
Size	-0.002**	0.014	0.003***	-0.011
	(-2.92)	(0.34)	(3.85)	(-0.31)
Dividend	0.017	0.015	0.003	-0.004
	(1.33)	(1.48)	(0.14)	(-0.32)
GFC	0.011	0.020	0.004	-0.005
	(1.68)	(0.83)	(0.30)	(-0.26)
AR(1) statistic	0.185		-1.19	
AR(2) statistic	0.290		0.93	
Sargan	107.65***		105.62***	
LM-statistic				

(*)/(**) and (***) indicates 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.

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

Where: the dependent variable = (non-)deposit leverage, $\text{Leverage}_{i,t-1}$ = 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 which embodies all the observable effects; $\varepsilon_{i,t}$ = composite error term which also takes care of other explanatory variables that equally determines leverage but are not included in the model and δ = the speed of adjustment.

The estimated results document evidence that South African banks seek target deposit leverage. The speed of adjustment towards target deposit leverage is (1- δ) =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 regards to total book leverage. It also demonstrates that the costs of adjustment with respect to deposits are relatively higher. We reason 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 is also consistency in estimation output of the target capital structure with non-deposit leverage as the dependent variable as presented in Table 4. Growth is 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. A negative and statistically significant result is 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 suggest 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 towards of (1- δ) =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. Conclusion

The present study sought to establish whether banks sought to achieve a target capital structure in their financing and if so, whether they adjust faster comparatively to non-financial firms. Unlike previous studies, this study employed panel data techniques that correct for cross-sectional dependence and heteroscedasticity to estimate the actual SOA. It was established that indeed South African banks have a target capital structure that they seek to achieve in their financing in a similar fashion to non-financial firms. However, they adjust at a faster pace 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. This "targeting" behaviour is inconsistent with the "regulatory view" of bank capital structure and at worst the bank capital regulations might not be binding at all.

When leverage was decomposed to its constituents, it was further demonstrated that 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.

6. References

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