

# Trade-Off Or Pecking Order: Evidence From South African Manufacturing, Mining, And Retail Firms

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## ABSTRACT

*This study tests the trade-off and pecking order hypotheses of corporate financing decisions and estimates the speed of adjustment toward target leverage using a cross-section of 42 manufacturing, 24 mining and 21 retail firms listed on the Johannesburg Stock Exchange (JSE) for the period 2000-2010. It uses the generalised least squares (GLS) random effects, maximum likelihood (ML) random effects, fixed effects, time series regression, Arellano and Bond (1991), Blundell and Bond (1998) and random effects Tobit estimators to fit the two versions of the partial adjustment models. The study finds that leverage is positively correlated to profitability and this supports the trade-off theory. The trade-off theory is further supported by the negative correlation on non-debt tax shields. Consistent with the pecking order theory, capital expenditure and growth rate are positively correlated to leverage while asset tangibility is inversely related to leverage. The negative correlation on financial distress and the positive correlation on dividends paid support both the pecking order and trade-off theories. These results are consistent with the view that the pecking order and trade-off theories are non-mutual exclusive in explaining the financing decisions of firms. The results also show that South African manufacturing, mining and retail firms do have target leverage ratios and the true speed of adjustment towards target leverage is 57.64% for book-to-debt ratio and 42.44% for market-to-debt ratio.*

**Keywords:** Trade-off Theory; Pecking Order Theory; Speed of Adjustment; Random Effects Tobit

## INTRODUCTION

### The Leading Capital Structure Theories

The relevance of capital structure decisions on firm valuation has been debated since the pioneering work of Modigliani and Miller (1958) where they proposed the capital structure irrelevance theory. Subsequent empirical research has proposed a number of theories that attempt to explain the financing behaviour of corporations. These include the trade-off theory, the pecking order theory, the agency cost theory, and the information asymmetry theories (the signalling and market timing theories).

According to Myers (1984), the two leading conditional theories of capital structure are the trade-off and pecking order theories and this is reflected in the volume of research work done across the globe to compare the two theories. The results of these empirical tests have been mixed, with some results supporting the trade-off while rejecting the pecking order theory and vice versa. Some results confirm that the two theories are non-mutually exclusive. For example, the empirical work done by Frank and Goyal (2003); Myers (1984); Shyam-Sunder and Myers (1999) and Tong and Green (2005) confirms the pecking order hypothesis as a good descriptor of corporate financing behaviour, but empirical tests done by Chang and Dasgupta (2009); Frank and Goyal (2009) and Leary

and Roberts (2010) conclude that firms follow the trade-off model of corporate financing. The recent studies by Graham and Harvey (2001) and Mukherjee and Mahakud (2012) showed that the two theories are complementary.

Furthermore, the concepts of target leverage and speed of adjustment towards target leverage have become very topical in modern capital structure research. The existence of leverage targets and speed of adjustment towards this target provides further evidence to the validity of the dynamic trade-off theory. A number of studies including those of Drobetz and Wanzenried (2006); Flannery and Rangan (2006) and Hovakimian and Li (2011) make use of the partial adjustment models to estimate the speed of target adjustment. The speed of adjustment derives from firm-specific factors with heterogeneity being persistent among firms (Elsas & Florysiak, 2011a).

These two leading theories were derived from tests done using firms from the US and continental Europe and most of the empirical work on testing their validity has also been based on data from these regions. Tong and Green (2005) concede that little testing work has been done using data from the developing countries firms despite some studies, for example Booth, Aivazian, Demircug-Kunt and Maksimovic (2001), showing that there is persistent heterogeneity in debt ratios across countries. According to De Jong, Kabir and Nguyen (2008), these differences mainly derive from heterogeneity in firm and industry-specific factors as well as country-specific determinants of capital structure.

The study applies the generalised least squares (GLS) random effects, maximum likelihood (ML) random effects, fixed effects, time series regression, Arellano and Bond (1991), Blundell and Bond (1998) and the random effects Tobit estimators on a sample of 42 manufacturing, 24 mining and 21 retail firms listed on the Johannesburg Stock Exchange (JSE) for the period 2000-2010. It uses two versions of the one-step partial adjustment models used by Drobetz and Wanzenried (2006) and Flannery and Rangan (2006) respectively. The study also uses two widely used measures of leverage, the book-to-debt (BDR) and the market-to-debt (MDR) ratios. The results of the study show that dividends paid, capital expenditure, firm growth and profitability are positively correlated with both BDR and MDR while asset tangibility, financial distress and non-debt tax shields are negatively correlated. Non-debt tax shields, firm growth rate and financial distress are significant determinants of BDR. The true speed of adjustment for the full sample, as predicted by the RE Tobit estimator, is 57.64% (0.81 years) for the BDR and 42.44% (1.25 years) for the MDR. The results confirm the non-mutual exclusiveness of the trade-off and pecking order theories. Lastly, both the correlation and speed of adjustment results are affected by the version of the partial adjustment model used, the dependent variable (BDR or MDR) and the estimator used.

### **Unique South African Circumstances and the Contribution of the Study**

The questions that arise are: Can these theories be applied to explain the corporate financing behaviour of firms in emerging markets, especially in South Africa? Does the speed of adjustment estimate for European firms provide the best estimate for South African firms? Is there heterogeneity in the speed of adjustment across sectors?

According to Gwatidzo and Ojah (2009) and Singh (1999), sub-Saharan African capital markets are less developed, inefficient, illiquid, small and thinly traded. The corporate bond market is virtually non-existent as governments normally crowd out the private firms in public debt markets. Furthermore, these countries have lower credit ratings which reflect poor macro-economic fundamentals and prospects, risks of social unrests, likelihood of governments to intervene in markets and less developed tax and legal systems with poor property rights. Finally, the firms in these countries are smaller, less diversified, have no or lower credit ratings and are highly susceptible to external shocks. This state of the capital and bonds markets coupled with the nature of the firms limits the variety of financing instruments available to the firms which in turn limits the firms' financing choices to basically equity and bank debt.

Although South Africa is the largest economy in Africa with it being the only African member of the elite Brazil, Russia, India, China and South Africa (BRICS) club and G20 countries, the effects of these institutional weaknesses are still persistent although to a lesser degree than its sub-Saharan African counterparts. Although the Johannesburg Stock Exchange (JSE) is the largest, most active and liquid Stock Exchange in Africa, its corporate bond market remains relatively very small, (World Federation of Exchanges, 2011). The bond market is dominated by government, state-owned, financial firms with very few non-financial firms. This implies that non-financial

firms rely on bank loans to meet their debt financing requirements. The findings of Gwatidzo and Ojah (2009) confirm that Sub-Saharan African firms use more short-term loans to finance their internal funds deficits. Unlike bonds, bank loans can be redeemed or restructured at a minimal cost and this can affect the firm's speed of adjustment towards the target leverage ratio. Furthermore, the structure of the South African corporate and dividends tax regime is different from that of the US and European countries. Lastly, South African firms are relatively smaller than the US and European firms used in most capital structure research work. For example, the mean firm size of the sample used in this study is 14.21 compared to 23.09 for the US sample used by Elsas and Florysiak (2011a). These institutional differences, which contrast those of developed countries, make South African firms unique and warrant separate studies of their financing patterns.

There are a very limited number of South African studies that have attempted to specifically test for the validity of these two theories and further estimate the target speed of adjustment. The main studies are those of De Vries and Erasmus (2012), Lemma and Negash (2011), Mans and Erasmus (2011), Negash (2001) and Ramjee and Gwatidzo (2012). These studies have a number of limitations and weaknesses. Firstly, all the studies except the Ramjee and Gwatidzo (2012) study which makes use of the system generalised method of moments (GMM), have shunned the use of modern, efficient and less biased panel data estimators such as the system GMM, the Arellano and Bond (1991) estimator, the Blundell and Bond (1998) estimator, random effects Tobit estimator, random effects and fixed effects estimators. Secondly, all the studies except that of Ramjee and Gwatidzo (2012) provide no estimate of the target speed of adjustment which has become an important test of the dynamic trade-off theory. Thirdly, the dependent and explanatory variables used are inconsistent with those used in modern capital structure research. Fourthly, the Ramjee and Gwatidzo (2012) study ignores the other version of the partial adjustment model. Lastly all the tests pool together non-financial firms across industries thus ignoring industry heterogeneity especially in estimating the speed of target adjustment.

This study, by focussing only on manufacturing, mining and retail firms listed on the JSE, addresses these shortcomings. The main contributions of the study, given the uniqueness of South African JSE-listed firms, are as follows. Firstly, it provides evidence on the determinants of dynamic capital structure of JSE-listed manufacturing, mining and retail firms. Secondly, the study provides evidence that the trade-off and pecking order theories are complimentary in explaining the financing behaviour of South African JSE-listed firms. Thirdly, the results of the study indicate that South African JSE-listed firms have a higher speed of adjustment than their counterparts from the developed countries. Fourthly, the results of the study confirm that the test results on the validity of the pecking order and trade-off theories are affected by the version of the partial adjustment model, the dependent variable and the estimator used. These factors also affect the results of the speed of target adjustment.

The remainder of the paper is structured as follows: the literature on the trade-off and pecking order theories and the speed of target adjustment is reviewed. This is followed by the research methodology, hypothesis, data and descriptive statistics followed by the results of the study. Lastly, conclusions are drawn and recommendations are made on the basis of the results of the study.

## **LITERATURE REVIEW**

### **The Trade-off and Pecking Order Theories**

The trade-off theory is a direct consequence of an extension of the work done by Modigliani and Miller (1963), as well as the work of traditional theorists. Kraus and Litzenberger (1973) formalised these ideas into the trade-off theory. According to the static trade-off theory, firms have an optimal debt-to-equity ratio. This ratio is reached when the marginal value of tax shields on additional debt is just offset by the increase in the present value of possible financial distress costs (Modigliani & Miller, 1963 and Myers, 2001). At optimal leverage, firm value is maximized and whilst the weighted average cost of capital (WACC) is minimized. The main benefit of debt, according to the trade-off theory, is the interest tax shield while the main cost is the increased risk of financial distress.

The pecking order theory was first proposed by Myers (1984) and further developed by Myers and Majluf (1984). The theory rejects the idea of target leverage, (Hovakimian, Opler & Titman, 2002). Myers and Majluf (1984) base their theory on the existence of asymmetric information. This information asymmetry in turn creates a

preference ranking on how firms raise additional funds to cover their internal funds deficits (Leary & Roberts, 2010). According to the pecking order theory, the main driver of leverage is the firm's internal funds deficit which is a function of the firm's capital expenditure, changes in working capital, dividends paid, current portion of long-term debt and cash flow from operations, (Shyam-Sunder & Myers, 1999). The size of the deficit determines the firm's external funds requirements and is a direct measure of the firm's financial slack. The theory asserts that firms place a premium value on creating, maintaining and maximising their financial flexibility which is viewed as a "real option" to the firm (Shivdasani & Zenner, 2005). Thus profitable firms have smaller or zero internal funds deficits and hence will have lower leverage ratios. The internal funds deficit is financed in a pecking order, with low risk debt being the first choice, then hybrid instruments and lastly equity (Tong & Green, 2005).

According to Ali Ahmed and Hisham (2009); Frank and Goyal (2003); Frank and Goyal (2009) and Harris and Raviv (1991); Rajan and Zingales (1995) and Tong and Green (2005), the optimal debt ratio is a function of the firm-specific characteristics which include asset tangibility, size, capital expenditure, financial distress costs, profitability, growth rate, non-debt tax shields, dividends paid, and earnings volatility. Empirical tests on trade-off and pecking order theories make use of these firm-specific factors to test the validity of each theory. These factors are also used in the estimation of the firm's target speed of adjustment.

### **The Determinants of Capital Structure**

#### *Firm Size, Asset Tangibility, Growth Rate, Profitability, Non-debt Tax Shields and Dividends Paid*

According to Barclay and Smith (2005), profitable firms tend to be large and mature with higher stocks of tangibles, and they have limited growth options and hence have lower capital expenditures. The firm's size has a direct impact on its stock of tangibles, growth options and growth rate, profitability and cash flow generation, and its credit rating (Talberg, Winge, Frydenberg & Westgaard, 2008). The stock of the firm's tangible assets is a direct measure of the collateral that the firm can offer to bondholders (Leland, 1994). Firms with higher stocks of tangibles offer lenders increased security, which in turn increases the firms' debt capacities and lowers their costs of debt (Giambona, Mello & Riddiough, 2009). These features of large firms combine to give them a higher credit rating, and this makes borrowing attractive to them. On the other hand, the low growth options reduce the firm's non-debt tax shields, which according to DeAngelo and Masulis (1980), are perfect substitutes for the interest tax shields.

The first problem that these firms face is that of higher corporate taxes which derive from their high profitability and low non-debt tax shields as they have lower capital expenditure. The trade-off theory contends that this problem can be resolved by increasing the firm's debt, which in turn increases the interest tax shield, thus lowering the corporate tax payable (Barclay & Smith, 2005). The firm can achieve this by substituting the internal excess equity with debt which is achieved by increasing dividends paid to shareholders and share buybacks. The increased debt interest charge reduces the firm's corporate tax bill while maximising its value through the increased debt interest tax shield. The trade-off theory therefore predicts a positive correlation between leverage and the variables asset tangibility, non-debt tax shields and dividends paid. It predicts a negative correlation between leverage and the variables firm profitability, growth rate and capital expenditure.

The pecking order theory takes a different view on the role of debt in large and mature firms. According to this theory, highly profitable firms should be less leveraged than less profitable firms, as they will have more internal funds available, and this lowers their financing deficits (Shyam-Sunder & Myers, 1999). As the firms are faced with lower capital expenditures and internal funds deficits, they can return some of the free cash flows to the investors in the form of dividends and/or share buybacks. The pecking order theory therefore predicts a negative correlation between leverage and the variables profitability and asset tangibility. Myers and Majluf (1984) used the inverse correlation between leverage and profitability as "*the most telling evidence against the trade-off theory*", (Mehrotra, Mikkelsen, & Partch, 2005). According to the pecking order theory, leverage is negatively correlated to both profitability and asset tangibility. It is positively correlated to dividends paid, capital expenditure and firm growth rate. The theory predicts no correlation with non-debt tax shields. The results of some empirical studies on the relationship between leverage and the variables asset tangibility, non-debt tax shields, growth rate size and profitability are shown in Table 1 below.

**Table 1.0: Selected Empirical Findings on the Correlation between Leverage and Firm-Specific Variables**

Study	Country	Tangibility	Non-debt tax shields	Growth rate	Size	Profitability
Chang & Dasgupta (2009)	USA	+		+	-	-
Frank & Goyal (2003)/	USA	+		-	+	-
Frank & Goyal (2009)	USA	+		-	+	-
Harris & Raviv (1991)	USA	+	+	+		-
Rajan & Zingales (1995)	G7 countries	+		-	+	-
Huang & Song (2006)	China	+	-	-	+	-
Tong & Green (2005)	China	+		-	+	-
Mukherjee & Mahakud (2012)	India	+	+	-	+	-
De Vries & Erasmus (2012)	South Africa	+		+		+
Ramjee & Gwatidzo (2012)	South Africa	+		+	+	-

Note: (-) depicts a negative correlation between leverage and the variable. (+) depicts a positive correlation between leverage and the factor. Blank cells indicate that the theory is either silent on the variable or there is some controversy

In all the studies, leverage is positively correlated to asset tangibility and this confirms the validity of the trade-off theory. The majority of the studies confirm a positive correlation between leverage and the variables firm size and non-debt tax shields. This relationship is consistent with the predictions of the trade-off theory. All the results except those of De Vries & Erasmus (2012) confirm a negative correlation between leverage and firm profitable and this confirms the validity of the pecking order theory. The results on growth rate are mixed with South African studies showing a positive correlation which is consistent with the predictions of the pecking order theory. Chinese and Indian studies confirm a negative correlation between leverage and firm growth rate and this validates the trade-off theory. In summary, there is evidence in support of both theories.

#### Financial Distress

The financial distress ratio is a direct measure of the firm's risk to default in its debt, and this ratio increases with the leverage ratio of the firm. This is one of the building blocks of the trade-off theory of corporate financing. Firms with higher leverage ratios face a higher probability of defaulting on their debt. The financial distress costs are real and they are significant. According to Altman (1984), these costs could be in excess of 20% of the firm's value, but they generally range between 11.0% and 17.0%. These costs decrease with firm size and increase with leverage. Both the trade-off and pecking order theories predict a negative correlation between leverage and financial distress. The findings of Eldomiaty (2007:36) and Lemma and Negash (2011) confirm this correlation.

#### The Dynamic Trade-off Theory and the Speed of Adjustment

Hovakimian *et al*, (2002) concede that the static trade off theory can be replaced by the more relevant dynamic trade-off theory which contends that, even if firms have target leverage ratios; these are rarely static. As the cost of deviating from the target is very small (about 0.5% of firm value), the observed leverage ratios fluctuate around the target within an acceptable range. If the ratios deviate from the target, they are brought back through the manipulation of financing means (Leland, 1994). This is a more realistic model than the traditional trade-off theory. Firm conditions change over time, and the debt ratios behave in a similar way. Firms would therefore have a dynamic target range debt ratio as opposed to a static ratio. Is this adjustment towards the target capital structure frictionless, and how frequently does it occur? At what speed do firms adjust their ratios towards the target?

If the adjustment process were frictionless, then firms would not deviate from their chosen targets as they will immediately correct any deviations. Capital markets are imperfect and firms do systematically deviate from their targets as they face firm-specific adjustment costs in the form of information asymmetries, transaction costs and opportunity costs of deviating from target leverage (Elsas and Florysiak, 2011a). The empirical work of Leary and Roberts (2005) points to the presence of these adjustment costs, and they argue that regardless of these adjustments costs, firms still actively rebalance their capital structures. On the contrary, Flannery and Rangan (2006) argued that due to the presence of adjustments costs, firms will partially and infrequently adjust their capital structures towards the target capital structure.

Leary and Roberts (2005) contend that in cases where the deviation from the target is small, it may be unprofitable to adjust the capital structure, and such deviations are therefore allowed to persist. This implies that the size of adjustment costs and the target deviation spread influence the speed of adjustment towards the target capital structure.

Further empirical work by Hovakimian and Li (2011) and Huang and Ritter (2009) confirm the relevance and validity of this partial adjustment model in estimating the speed of adjustment towards target leverage. The existence of the speed of adjustment presents further evidence that firms do have target capital structures which they want to maintain and supports the dynamic trade-off hypothesis. The models however do not tell us whether such a target is the theoretical optimal as advocated by the trade-off theory. The value and importance of this target is also questionable, as Hovakimian and Li (2011) established that it takes an average of ten years for a firm to fully adjust to its target ratio. This casts doubt on whether firms do prioritise maintaining a target capital structure. Table 2.0 below shows the speed of adjustment results from selected empirical studies. The results from these studies indicate that the speed is affected by country of origin, regression method used and the dependent variable used.

**Table 2: Results of Selected Empirical Tests on Target Adjustment Speeds**

Study and method used	Country of study	Speed of adjustment	Dependent Variable
Antoniou, Guney and Paudyal (2008) <i>2-step system GMM procedure</i>	UK, USA, France, Germany & Japan	32.00%	market value of equity
Flannery and Rangan (2006) <i>Fama and MacBeth (1973)</i>	USA	36.00%	market value of equity
Elsas and Florysiak (2011b) <i>DPF &amp; the Blundell and Bond(1998)</i>		26.30% & 25.60%	
Kayhan and Titman (2007) <i>Tobit, OLS and bootstrapping</i>	USA	8.00%	market value of equity
Hovakimian and Li (2011) <i>OLS and fixed effects methods</i>	USA	5.5-7.40%	book value of equity
Huang and Ritter (2009)	USA	21.00%	book value of equity
Mukherjee and Mahakud (2012) <i>system GMM procedure</i>	India	43.00%	book value of equity
Ramjee and Gwatidzo (2012) <i>system GMM procedure</i>	South Africa	65.00%	Total long-term debt

**Legend:** QMLE= quasi –maximum likelihood estimation; OLS= Ordinary least squares; GMM = generalised method of moment and DPF = the dynamic panel data with a fractional dependent variables estimator (it is equivalent to the random effects Tobit estimator).

## HYPOTHESIS, METHODOLOGY, DATA AND DESCRIPTIVE STATISTICS

The hypotheses for the correlations are derived from the preceding literature review section and are contained in Table 3 below.

**Table 3: Hypothesis H1-H7: Predicted Correlation between Leverage and Firm-Specific Variables**

Hypothesis No.	Variable	Theory Prediction	
		Trade-off	Pecking Order
H <sub>1</sub>	Dividend (DIV)	+	+
H <sub>2</sub>	Capital expenditure (CAPEX)	–	+
H <sub>3</sub>	Asset tangibility (ASSET)	+	–
H <sub>4</sub>	Non-debt tax shields (NDTS)	–	No prediction
H <sub>5</sub>	Growth rate (MTB)	–	+
H <sub>6</sub>	Financial distress (FDIST)	–	–
H <sub>7</sub>	Profitability (ROE)	+	–

+: means positive correlation between leverage and the variable

–: means negative correlation between leverage and the variable.

**H<sub>8</sub>: Speed of Adjustment towards Target Leverage**

Firms have leverage targets that they adjust to at a slow speed; the speed of target adjustment is reduced by market frictions resulting from information asymmetries, transaction and adjustment costs. This speed varies between economic sectors

**Methodology***The Leverage and Partial Adjustment Model Specification*

The target adjustment tests are discriminatory tests that determine whether firms follow the pecking order theory or the trade-off theory. The speed of adjustment is the telling factor between the two theories. If the speed of adjustment is zero, then firms have no leverage targets and therefore do not follow the trade-off theory. A speed of adjustment greater than zero implies that firms have leverage targets that they adjust towards and this supports the dynamic trade-off theory (Leary & Roberts, 2005). In a perfect market, firms would always maintain their target or optimal ratio, but in the imperfect market, firms will only partially adjust, as they face information asymmetries, transaction costs and adjustment costs. The partial adjustment model is used to determine both the correlation between leverage and the firm's variables and to estimate the firm's speed of adjustment towards its predetermined target leverage. According to Flannery and Rangan (2006) and Hovakimian and Li (2011), the target leverage of firm (*i*) at time *t*+1 is determined by a vector of firm-specific variables,  $X_{i,T}$ , that are related to the costs and benefits of financing security issuance. The firm's target leverage ( $LEV_{i,T+1}$ ) is thus defined as:

$$LEV_{i,T+1} = \alpha_i + \beta X_{i,T} + \varepsilon_{i,T+1} \quad (1)$$

This ratio varies across firms and industries, reflecting the heterogeneity in firm-specific variables, ( $X_{i,t}$ ) which are contained in Table 1 above. The target leverage ratio is best described as dynamic rather than static. The predicted target ratio can then be defined as:

$$LEV_{i,T+1}^* = \beta X_{i,t} \quad (2)$$

This assumes a perfect capital market, which implies that firms will always adjust frequently and fully towards their target ratios. But in practice, firms face information asymmetries, transaction costs and adjustment costs; they will therefore infrequently and partially adjust their capital structures towards their leverage ratios. For the trade-off hypothesis to hold,  $\beta \neq 0$ .

The leverage partial adjustment model is derived from the classical partial adjustment model and it is formalised as follows (Flannery & Rangan, 2006; Hovakimian & Li, 2011 and Elsas & Florysiak, 2011b):

$$LEV_{i,T+1} - LEV_{i,T} = \alpha + \lambda(LEV_{i,T+1}^* - LEV_{i,T}) + \varepsilon_{i,T+1} \quad (3)$$

Where  $\lambda$  is the speed of target adjustment. The speed of adjustment can be estimated by using the two-step method of first estimating the target leverage using equation 1 and substituting the results into equations 3, and then using a suitable estimator to get the speed of adjustment. The alternative method is to reduce the two-step process to a one-step process by substituting equation 2 into equations 3 to yield the reduced-form leverage partial adjustment model:

$$LEV_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)LEV_{i,T} + c_i + \varepsilon_{i,T+1} \quad (4)$$

Where  $c_i$  is the time-invariant unobserved variable (firm fixed effect) and  $\varepsilon_{i,T+1}$  is the error.

The other version of the one-step partial adjustment model used by Drobetz and Wanzenried (2006) is specified as:

$$LEV_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)LEV_{i,T-1} + c_i + \varepsilon_{i,T} \quad (5)$$

In theory, these models should all be equivalent, as they are all dynamic models, and they should yield the same results. This research project aimed to test for this equivalence in the models. The one-step dynamic partial adjustment models are specified as:

$$\begin{aligned}
 BDR_{i,T+1} &= \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots \dots \dots [Model 1] \\
 BDR_{i,T} &= \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)BDR_{i,T-1} + \varepsilon_{i,T} \dots \dots \dots [Model 2] \\
 MDR_{i,T+1} &= \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)MDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots \dots \dots [Model 3] \\
 MDR_{i,T} &= \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)MDR_{i,T-1} + \varepsilon_{i,T} \dots \dots \dots [Model 4]
 \end{aligned}$$

This research used all the four models to test for the correlation of the dependent variables with the both BDR and MDR and to estimate the firm’s speed of target adjustment.

*Testing Methodology*

Models 1 and 3 were the primary models and they were all estimated using the following estimators: GLS random effects; ML random effects; fixed effects; Time series; Arellano and Bond (1991); Blundell and Bond (1998) and the Random effects Tobit. Models 2 and 4 were supplementary model which the study used to test for the consistency of models 1 and 3 and they were estimated using only the Arellano and Bond (1991) and the Blundell and Bond (1998) estimators. According to Elsas and Florysiak (2011b), most of the estimators used in capital structure research are severely biased, because they ignore the fractional nature of the dependent variable. This research used the random effects Tobit estimator as the least biased estimator of the speed of adjustment. It is equivalent to the dynamic panel with a fractional dependent variable dynamic panel with a fractional dependent variable (DPF) estimator proposed by Elsas and Florysiak (2011b). The random effects Tobit estimator uses the single-step model and it censors debt ratios between 0 and 1. The fractional nature of the debt ratios makes the random effects Tobit models a more suitable estimator of the speed of adjustment for both samples. This censored model was specified as:

$$LEV_{i,T} = \begin{cases} 0 & \text{if } LEV_{i,T}^* \leq 0 \\ LEV_{i,T}^* & \text{if } 0 < LEV_{i,T}^* < 1 \\ 1 & \text{if } LEV_{i,T}^* \geq 1. \end{cases} \quad (6)$$

The time series estimator (the Prais-Winsten regression) was included to enable the determination of the panel’s Durbin-Watson’s statistic. The Stata 12 statistical package was used to test all the above models. This is a more suitable package as it can accommodate all the estimators and it has special options to deal with some statistical errors such as heteroskedasticity. The Gauss-Hermite quadrature integration option was used for the random effects Tobit estimator. The variance inflation factors (VIFs) were used to detect both multicollinearity and collinearity. Variables with VIFs greater than ten were identified through a test run and then eliminated from the models. The validity of the instruments was tested using the Sargan test with a null hypothesis that the over identifying restrictions are valid. The test indicates whether these instruments are independent of the residuals.

**Data**

All the financial data used in the research were drawn from the McGregor BFA database’s standardized financial statements. The foreign-currency denominated financial statements variables used in this research were translated into the Rand using the appropriate exchange rate. The sample consisted of 42 manufacturing, 24 mining and 21 retail firms with complete data for four or more consecutive years during 2000 to 2010. This research relies on ridge regression procedure to identify outliers and other influential data points.

**Descriptive Statistics**

The summary statistics of the full sample are presented in Table 4 below. The mean BDR ratio is 0.16 with a standard deviation of 0.229 while the mean MDR ratio is 0.14 with a lower standard deviation of 0.198. These ratios are lower than Compustat firm’s leverage ratios of 0.2783 (MDR) and 0.2485 (BDR) (Flannery & Rangan,



2006) and 0.2682 (MDR) and 0.2453 (BDR) (Elsas & Florysiak, 2011b). Actual dividends paid which represents dividends paid during the year has a mean of R676,357.3m. Capital expenditure which is defined as the sum of the firm’s capital expenditures on fixed assets, new investments and net investments in subsidiaries has a mean of R1,934,108m. Asset tangibility which is defined as fixed assets scaled up by total assets has a mean of 0.303. The sample average for the non-debt tax shields which are defined as the total depreciation charge scaled up by total assets is 0.081. Firm growth rate is defined as the market-to-book ratio and this has a mean of 1.62. The average for the financial distress ratio is 0.90. The proxy for financial distress is the De la Rey (1981) financial distress model ratio. Profitability which is approximated by profit after taxation scaled up by total owner’s equity has a mean of -1.80 with a very high standard deviation of 1,614.89.

**Table 4:** Sample Summary Statistics

The sample consists of 42 manufacturing, 24 mining and 21 retail firms with complete data for four or more consecutive years during 2000 to 2010. The total observations for the period are 954. Extreme outlier observations in all explanatory variables were identified through ridge regression and removed from the sample. The ridge procedure was not done for the depended variables, bdr, mdr and change in debt issued.

- Actual dividends paid (div\_t) (R'm):** the actual ordinary dividends and preference dividends paid during the year
- Capital expenditure (capex) (R'm):** the sum of the firm’s capital expenditures on fixed assets, new investments and net investments in subsidiaries
- Asset tangibility (asset):** the fixed assets scaled up by the total assets
- Firm size (size):** the natural logarithm of total assets
- Non-debt tax shields (ndts):** the depreciation charge scaled up by the total assets
- Firm growth rate (mtb):** the sum of the market equity, preferred shares and the total debt less the deferred taxes; this is scaled up by the total assets
- Financial distress (fdist):** the De la Rey (1981) financial distress model ratio
- Firm profitability (roe):** the profit after taxation scaled up by total owner’s equity
- Book-to-debt ratio (bdr):** the total debt scaled up by the total assets
- Market-to-debt ratio (mdr):** the total debt scaled up by the sum of the total debt and the firm market capitalisation

Variable	Obs.	Mean	SD	Min.	Max.
Actual dividends paid (div_t) (R'm)	954	676,357.3	2,784,357	-118	4.49e+07
Capital expenditure (capex) (R'm)	954	1,934,108	8,060,384	-1'314'627	1.06e+08
Asset tangibility (asset)	954	0.303	0.246	0	0.996
Non-debt tax shields (ndts)	954	0.081	0.081	0	0.475
Firm size (size)	954	14.21	2.14	8.13	20.12
Firm growth rate (mtb)	954	1.62	1.86	-0.109	28.92
Financial distress (fdist)	954	0.904	3.41	-31.31	44.76
Firm profitability (roe)	954	-1.80	1,614.89	-47,548.1	12,555.81
Book debt ratio (bdr)	954	0.164	0.229	0	2.74
Market debt ratio (mdr)	947	0.144	0.198	0	1
# Obs. Market-to-debt ratio =0	198 (20.75%)				
# Obs. Market-to-debt ratio =1	12 (1.27%)				
# Obs. Market-to-debt ratio >1	0 (0%)				
# Obs. Book-to-debt ratio = 0	205 (21.49%)				
# Obs. Book-to-debt ratio = 1	16 (1.68%)				
# Obs. Book-to-debt ratio > 1	3 (0.31%)				

**RESULTS**

The empirical findings of the tests for the validity of both the trade-off and pecking order theories and the target adjustment speed are discussed below. The results of the full sample are discussed first, followed by manufacturing, mining and lastly retail firms. The results relate to the regression models 1, 2, 3 and 4.

**Correlation Results: Models 1, 2, 3 and 4**

The correlation test results of models 1, 2, 3 and 4 are contained in Tables 5 and 6 below. The number of observations, R<sup>2</sup>, WaldChi2, Prob> Chi2 values together with the Durbin-Watson statistics are at the bottom of each

table and these confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 81.94 and Prob>Chi2 is 0.0000 for BDR and the test statistic's Chi2 is 183.40 and Prob>Chi2 is 0.0000 for MDR. This statistic soundly rejects the null hypothesis that the GLS random effects estimator is consistent ( $p < 0:05$ ) and confirms the fixed effects model as a more consistent estimator in both cases. The results of the GLS random effects model were excluded in the determination of the ultimate correlation of each variable. The Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond (1991) and Blundell and Bond (1998) models. In cases where the estimators give coefficients with different directions, the ultimate correlation is determined by the direction of the majority of the coefficients.

#### *Actual Dividends Paid*

The results for the models 1 and 3 confirm a positive correlation between leverage and dividends paid while the results of models 2 and 4 confirm a negative correlation. The results of model 3 are mixed, with the time series, Arellano and Bond (1991), Blundell and Bond (1998) and random effects Tobit estimators confirming a positive correlation while the ML random effects, fixed effects confirm a negative correlation. That is, dividends paid are positively correlated to leverage. Dividends paid are a weak predictor of both BDR and MDR. These findings are consistent with the predictions of both the trade-off and pecking order theories. Hypothesis 1 is thus accepted. These correlations are similar to those of Ali Ahmed and Hisham (2009), Kayhan and Titman (2007) and Shyam-Sunder and Myers (1999).

#### *Capital Expenditure*

In model 1, all the estimators show a weak positive correlation between leverage and capital expenditure. The results of model 2 are mixed while the results of model 4 confirm a significant positive correlation. The results of model 3 are mixed. The ML random effects, time series and random effects Tobit estimators show a positive correlation while the remainder of the estimators confirm a negative correlation. The net correlation is positive for both BDR and MDR. These findings are consistent with the predictions of the pecking order theory. Hypothesis 2 of the pecking order theory is thus accepted, thereby rejecting hypothesis 2 of the trade-off theory. For the South African manufacturing, mining and retail firms in this study, leverage increases with an increase in the firm's capital expenditure. Ali Ahmed and Hisham (2009); Kayhan and Titman (2007); and Shyam-Sunder and Myers (1999) found similar correlations between leverage and capital expenditure.

#### *Asset Tangibility*

All the results of models 1, 3 and 4 confirm a negative correlation between leverage and asset tangibility. The results of model 2 show a positive correlation. Asset tangibility is negatively correlated to both the BDR and the MDR. This correlation confirms the pecking order hypothesis while rejecting the trade-off hypothesis. Hypothesis 3 of the trade-off theory is therefore rejected and hypothesis 3 of the pecking order theory is accepted. This finding is consistent with the pecking order argument that firms with poor-quality assets voluntarily opt for higher leverage so as to reduce the agency costs resulting from managers consuming perquisites (Bessler, Drobetz & Kazemieh, 2011). The increased debt levels increase debt monitoring costs, as the bondholders effectively monitor managers so as to protect their investments. A number of past empirical studies notably those by De Vries and Erasmus (2012); Frank and Goyal (2009); Huang and Song (2006); Mukherjee and Mahakud (2012); Rajan and Zingales (1995) and Ramjee and Gwatidzo (2012) found similar results.

#### *Non-Debt Tax Shields*

The results of all estimators in all models confirm a negative correlation between leverage and non-debt tax shields. Non-debt tax shields are negatively correlated to both the BDR and the MDR, and they are significant predictors of the BDR. These results confirm the trade-off hypothesis. Hypothesis 4 is thus accepted. The findings of Ali Ahmed and Hisham (2009); Kayhan and Titman (2007) and Huang and Song (2006) confirmed similar results. The firms' leverages decrease with an increase in their non-debt tax shields. According to De Angelo and Masulis (1980), non-debt tax shields are perfect substitutes for debt interest tax shields. Thus firms with higher non-debt tax shields would have less of an appetite for debt, as the benefit of debt finance would already be captured by the non-debt tax shields.

*Firm Growth Rate*

All estimators in models 1 and 2 show a positive correlation between leverage and firm growth rate. The coefficients of most estimators are significant. The results of models 2 and 4 confirm a weak negative correlation with model 4 results being significant. Firm growth rate is positively correlated to leverage and it is a significant predictor of both BDR and MDR. These results reject the trade-off hypothesis while confirming the pecking order hypothesis. Hypothesis 5 of the trade-off theory is thus rejected while hypothesis 5 of the pecking order theory is accepted. Chang and Dasgupta (2009); De Vries and Erasmus (2012) and Ramjee and Gwatidzo (2012) found similar results which supports the pecking order theory. The results show that the firms' leverages are directly proportional to their growth rates. The implication is that firms finance their growth options via debt, as opposed to equity, and this financing behaviour is consistent with the pecking order theory of corporate financing.

*Financial Distress*

In model 1, all the estimators except the Arellano and Bond (1991) and the Blundell and Bond (1998) estimators confirm a negative correlation between financial distress and leverage. This negative correlation is also confirmed by all the results of models 2, 3 and 4 with most of the coefficients being significant making financial distress a strong predictor of both the BDR and the MDR. These results confirm the validity of both theories, and hypothesis 6 is thus accepted. Leverage decreases with an increase in financial distress. Distressed firms find it difficult to attract debt finance, as investors are unwilling to extend more credit, due to the increased default risk (Gilson, 1997). This decreases the firm's debt capacity while increasing the cost of borrowing. Distressed firms therefore rely more on equity financing, and hence the inverse relationship between financial distress and leverage.

*Firm Profitability*

All the results of models 1 and 3 show a positive correlation between leverage firm profitability. The results of models 2 and 4 confirm a negative correlation. Profitability is positively correlated to firm leverage. It is a significant predictor of the MDR. These results are consistent with the trade-off theory hypothesis 7. The results reject hypothesis 8 of the pecking order theory. According to the trade-off theory, profitable firms face increased tax payable and they can reduce this through the use of debt interest tax shields or non-debt tax shields (Shivdasani & Zenner, 2005). In the absence of non-debt tax shields, firms use interest tax shields, as the two are perfect substitutes (De Angelo & Masulis, 1980). De Vries and Erasmus (2012) found similar results.

In summary, the results show that non-debt tax shields, firm growth rate and financial distress are significant determinants of BDR in manufacturing, mining and retail firms. The strong predictors of MDR in these firms are firm growth rate, financial distress and firm profitability. Consistent with the findings of Mukherjee and Mahakud (2012), these results confirm the validity and non-mutual exclusiveness of the trade-off and pecking order theories. The correlation results indicate that both country-specific and firm specific factors play a role in the determination of corporate leverage.

In some cases, the estimators and the two dependent variables do not give similar correlations signs implying that the choice of an estimator and dependent variable may influence the factor correlation results. The version of the partial adjustment model used also affects the factor correlation results. In most cases, the results of models 1 and 2 are different and those of models 3 and 4 also differ. Thus the correlation results largely depend on the dependent variable used, the model fitted, and the choice of estimator.

**Empirical Findings: Speed of Adjustment**

All the estimators' lagged BDR and MDR coefficients are positive and significant at 1%, 5% and 10% for all the models. This indicates that firms have target leverages towards which they adjust over time. For models 1 and 2, the speed of adjustment varies between 38.70% (1.42 years) and 81.15% (0.42 years), with the average speed being 67.22% (0.67 years). This means that on average, 67.22% of the target deviation spread is covered in one year. On average, it takes 0.67 years for the firms to fully adjust to their desired targets, provided they maintain the same adjustment speed. The variation in speeds of adjustment is due to the bias of the estimators. In models 3 and 4, the

speeds of adjustment vary between 32.49% (1.76 years) and 70.46% (0.57 years), and there is an average speed of 54.95% (0.95 years). Thus the MDR regressions yield slower speeds of adjustment compared to the BDR. The true speed of adjustment for the full sample, as predicted by the RE Tobit estimator, is 57.64% (0.81 years) for the BDR and 42.44% (1.25 years) for the MDR.

These estimates are much higher than those for US and European studies contained in Table 2 above. The higher speed of target adjustment for South African firms implies that these firms reach their capital structure targets much faster than their counterparts from developed countries and this reflects the uniqueness of the firms as well as the country's institutional factors. According to Ramjee and Gwatidzo (2012), South African firms face lower adjustment costs than their European and US counterparts. The lower target adjustment costs reduce their target deviation spread, as they frequently adjust their capital structure. Gwatidzo and Ojah (2009) found that Sub-Saharan firms are unique in that they rely more on short-term bank loans to finance their internal funds deficits. They use less long-term loans and bonds compared to their US and European counterparts. The main advantage of bank loans as opposed to structured bonds is that they can be retired or restructured at a minimal cost. The use of short-term loans therefore further increases the firm's speed of target adjustment.

Table 5: BDR Regression Output and Speeds of Adjustment for Manufacturing, Mining and Retail Firms

Regression results for the partial adjustment models 1 and 2:

$$BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots \dots \dots [Model 1]; BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)BDR_{i,T-1} + \varepsilon_{i,T} \dots \dots \dots [Model 2]$$

Where  $\lambda$  is the adjustment speed on the lagged book-to-debt ratio (BDR),  $c_{i,T}$  is the time-invariant unobserved variable (firm fixed effect) and  $\varepsilon_{i,T+1}$  is an error term. Model 2 is only estimated using the Arellano and Bond (1991) estimator and the Blundell and Bond (1998) estimator. The variables determining the firm’s long-run target leverage and the speed of adjustment are: *div\_t; capex; asset; ndts; mtb; fdist and roe*, and these are defined in Table 4. T-statistics are reported in parentheses. The markings \*\*\*, \*\* and \* on coefficient estimates denote significant differences from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as:  $half - life = \log(0.5)/\log(1 - \lambda)$ . Model specifications are shown at the bottom of the table. In the ML Random Effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 81.94 and Prob>Chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano and Bond (1991) and Blundell and Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 1	ML Random Effects Model 1	Fixed Effects Model 1	Time Series Model 1	Arellano and Bond (1991)		Blundell and Bond (1998)		Random Effects Tobit Model 1
					Model 1	Model 2	Model 1	Model 2	
Actual dividends paid (div_t)	2.356e-09 (0.30)	4.227e-09 (1.00)	5.500e-09 (0.58)	2.526e-09 (0.41)	1.287e-08 (0.94)	-2.058e-09 (-0.65)	1.259e-08 (0.95)	-1.117e-09 (-0.33)	6.350e-09 (1.51)
Capital expenditure (capex)	8.357e-10 (0.35)	6.963e-10 (0.47)	5.712e-10 (0.32)	6.959e-10 (0.40)	2.511e-10 (0.17)	2.179e-09 (1.57)	-1.297e-10 (-0.08)	2.472e-09 (1.44)	1.594e-10 (0.11)
Asset tangibility (asset)	-0.030 (-0.98)	-0.045 (-1.17)	-0.075 (-1.06)	-0.029 (-1.17)	-0.276 (-1.12)	0.170 (0.93)	-0.116 (-0.68)	0.227 (1.36)	-0.060 (-1.35)
Non-debt tax shields (ndts)	-0.022 (-0.33)	-0.159 (-1.47)	-0.509* (-1.83)	0.011 (0.20)	-0.185 (-0.35)	-0.496** (-2.01)	-0.140 (-0.28)	-0.680** (-2.17)	-0.266** (-2.10)
Firm growth rate (mtb)	0.023*** (2.62)	0.026*** (7.17)	0.028** (2.32)	0.023** (2.06)	0.020** (2.17)	-0.013 (-1.10)	0.022** (2.52)	-0.012 (-0.95)	0.022*** (5.66)
Financial distress (fdist)	-0.008*** (-2.62)	-0.008*** (-4.23)	-0.007** (-2.450)	-0.009* (-1.73)	0.002 (0.56)	-0.008 (-1.20)	0.002 (0.59)	-0.008 (-1.19)	-0.006*** (-3.00)
Firm profitability (roe)	0.000 (1.27)	0.000** (2.36)	0.000 (1.10)	0.000 (1.04)	0.000 (1.04)	-0.000 (-0.30)	0.000 (1.02)	-0.000 (-0.40)	0.000** (2.21)
BDR Coefficient (1-λ) bdr/bdr_t1 L1	0.585*** (4.66)	0.393*** (10.08)	0.245** (2.16)	0.613*** (6.90)	0.212*** (2.80)	0.189** (2.24)	0.272*** (3.54)	0.276*** (3.89)	0.423*** (11.76)
Implied speed of adjustment (λ)	41.53%	60.72%	75.52%	38.70%	78.81%	81.15%	72.76%	72.44%	57.64%
Implied half-life	1.29 years	0.74 years	0.49 years	1.42 years	0.45 years	0.42 years	0.53 years	0.54 years	0.81 years
Obs.	865	865	865	774	685	772	774	861	865
R <sup>2</sup>	0.48	-	0.361	0.52	-	-	-	-	-
Wald Chi2	651.21	505.31	16.52	17.45	20.68	44.12	109.35	221.80	259.88
Prob > Chi2	0.00	0.00	0.00	0.00	0.008	0.00	0.00	0.00	0.00
Durbin-Watson	2.07	2.07	2.07	2.06		2.07	2.07	2.07	2.07
Sargan (df)					66.30 (44)	91.24 (44)	91.35 (43)	115.65	

Table 6: MDR Regression Output and Speeds of Adjustment for Manufacturing, Mining and Retail Firms

Regression results for the partial adjustment models 3 and 4:

$$MDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)MDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots \dots \dots [Model\ 3]; MDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1 - \lambda)MDR_{i,T-1} + \varepsilon_{i,T} \dots \dots \dots [Model\ 4]$$

Where  $\lambda$  is the adjustment speed on the lagged market-to-debt ratio (MDR),  $c_{i,T}$  is the time-invariant unobserved variable (firm fixed effect) and  $\varepsilon_{i,T+1}$  is an error term. Model 4 is only estimated using the Arellano and Bond (1991) estimator and the Blundell and Bond (1998) estimator. The variables determining the firm’s long-run target leverage and the speed of adjustment are: *div\_t*; *capex*; *asset*; *ndts*; *mtb*; *fdist* and *roe*, and these are defined in Table 4. T-statistics are reported in parentheses. The markings \*\*\*, \*\*and \* on coefficient estimates denote significant differences from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: *half – life* = log (0.5)/log (1 –  $\lambda$ ). Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 183.40 and Prob>Chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano and Bond (1991) and Blundell and Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 3	ML Random Effects Model 3	Fixed Effects Model 3	Time Series Model 3	Arellano and Bond (1991)		Blundell and Bond (1998)		Random Effects Tobit Model 3
					Model 3	Model 4	Model 3	Model 4	
Actual dividends paid (div_t)	-3.706e-10 (-0.18)	-1.775e-10 (-0.05)	-1.143e-10 (-0.06)	5.766e-11 (0.03)	2.268e-09 (0.83)	-2.113e-09 (-0.81)	2.901e-09 (1.06)	-1.273e-09 (-0.51)	7.542e-10 (0.19)
Capital expenditure (capex)	5.546e-10 (0.82)	4.025e-10 (0.34)	-3.030e-11 (-0.05)	3.573e-10 (0.45)	-3.882e-10 (-0.710)	2.338e-09*** (3.58)	-6.113e-10 (-0.80)	2.399e-09*** (2.88)	5.022e-10 (0.35)
Asset tangibility (asset)	-0.009 (-0.37)	-0.007 (-0.29)	-0.04 (-0.72)	-0.010 (-0.49)	-0.072 (-0.49)	-0.057 (-0.60)	-0.054 (-0.28)	-0.064 (-0.57)	-0.027 (-0.75)
Non-debt tax shields (ndts)	-0.020 (-0.34)	-0.065 (-0.86)	-0.482* (-1.80)	-0.011 (-0.18)	-0.499 (-1.13)	-0.027 (-0.06)	-0.582 (-1.15)	-0.223 (-0.61)	-0.124 (-1.14)
Firm growth rate (mtb)	0.004* (1.80)	0.004 (1.53)	0.006** (2.62)	0.004* (1.69)	0.011*** (2.82)	-0.023*** (-3.29)	0.009*** (2.61)	-0.025*** (-2.91)	0.008** (2.32)
Financial distress (fdist)	-0.006*** (-3.36)	-0.007*** (-4.44)	-0.007*** (-3.38)	-0.007*** (-3.22)	-0.003 (-1.27)	-0.007*** (-2.82)	-0.002 (-0.78)	-0.008*** (-3.12)	-0.007*** (-3.95)
Firm profitability (roe)	2.896e-06*** (3.54)	3.438e-06 (1.26)	4.385e-06*** (4.83)	2.883e-06 (1.11)	8.349e-06*** (9.16)	-5.426e-07 (-0.67)	8.901e-06*** (10.43)	-6.311e-07 (-0.72)	8.616e-06 (1.36)
MDR Coefficient (1- $\lambda$ ) mdr/mdr_t1 L1	0.653*** (12.67)	0.569*** (13.97)	0.379*** (4.35)	0.675*** (11.61)	0.352** (2.18)	0.295** (2.36)	0.407*** (2.69)	0.351*** (2.97)	0.576*** (13.73)
Implied speed of adjustment ( $\lambda$ )	34.66%	43.08%	62.09%	32.49%	64.85%	70.46%	59.28%	64.89%	42.44%
Implied half-life	1.63 years	1.23 years	0.71 years	1.76 years	0.66 years	0.57 years	0.77 years	0.66 years	1.25 years
Obs.	858	858	858	768	680	767	769	856	858
R <sup>2</sup>	0.49	-	0.389	0.50	-	-	-	-	-
Wald Chi2	-	553.87	91.00	29.63	151.03	83.04	203.52	50.74	252.25
Prob > Chi2	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durbin-Watson	1.99	1.99	1.99	2.08	1.99	1.99	1.99	1.99	1.99
Sargan (df)					150.13	-164.33	181.79	191.78 (53)	

## CONCLUSION

The objectives of the study were to test for the validity of the trade-off and pecking order theories in the context of South African manufacturing, mining and retail firms listed on the Johannesburg Stock Exchange. The study also sought to estimate the speed of target adjustment for the firms. The findings of this study can be summarised as follows. The unique contribution of this study to the capital structure literature can be summarised as follows. The most significant firm-specific predictors of leverage in manufacturing, mining and retail firms are non-debt tax shields, growth rate and financial distress. The correlation results on asset tangibility, capital expenditure and firm growth rate are consistent with the pecking order theory while the results on profitability, growth rate, non-debt tax shields confirm the validity of the trade-off theory. These firms have a positive speed of adjustment, which suggests the existence of target leverage. This is further evidence in support of the dynamic trade-off theory. The true speed of target adjustment for the sample is 57.64% (0.81 years) for the BDR and 42.44% (1.25 years) for the MDR. These speeds are much higher than those of European and US firms. The higher speeds indicate that South African firms adjust their capital structures more frequently than the European and US firms, as they face lower adjustment costs. The correlation and speed of adjustment towards target leverage results indicate that both country-specific and firm specific factors play a role in the determination of corporate leverage.

Finally the correlations and speed of target adjustment are both affected by the dependent variable used (BDR or MDR); the estimator used, the model fitted and the sector of the firm.

This study is limited to manufacturing, mining and retail firms listed on the Johannesburg Stock market. It excludes listed firms from other sectors as well as unlisted firms from all sectors. The results cannot therefore be generalized to all South African firms. The second limitation to this research is that it focussed only on firm-specific factors; it excluded the macroeconomic variables as additional predictors. Past research has however demonstrated that these variables are also significant predictors of both leverage and the firm's speed of adjustment. Future research on South African firms should include these as additional explanatory variables. Such an inclusion will improve the quality of the models.

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