

THE CAPITAL STRUCTURE PRACTICES OF LISTED FIRMS IN SOUTH AFRICA

Jason Kasozi*, Sam Ngwenya**

Abstract

This study investigates whether financial theory is aligned with financial practice by testing two conventionally recognised theories of capital structure choice, the trade-off theory and the pecking-order theory against the financing practices of listed firms on the Johannesburg Stock Exchange (JSE) during the period 1995-2005. Data were obtained from the McGregor database. The results indicated a unique, but significantly positive, correlation between debt financing and financial distress, and a significant negative correlation between debt financing and the collateral value of assets. These findings suggest that financial theory is not aligned with practice on firms listed on the JSE. This study attempts to contribute to efforts to align financial theory with practice, and to help future researchers advance or modify current theories.

Keywords: Financial distress, Capital structure, Trade-off theory, Pecking-order theory

*Lecturer, University of South Africa

E-mail: kasozjs@unisa.ac.za

**Senior Lecturer, University of South Africa

E-mail: ngwenms@unisa.ac.za

1. Introduction

The main body of financial literature suggests that the continuing evolution of corporate finance reveals some divergence between financial theory and practice (Nguyen and Ramachandran, 2006; Ross, 2005; Ryan and Ryan, 2002; Graham and Harvey, 2001). The discrepancies between financial theories and practices vary and are partly attributable to the legal underpinnings of finance as embodied in the differing laws and institutions of countries and to differences in the economy of different countries (Claessens and Laeven, 2006; Bancel and Mittoo, 2004). Locally, such differences are explained by the effect of emerging markets and their influence on the economic, social and legal patterns that significantly impact the development of countries' financial patterns (Bancel and Mittoo, 2004). According to Gilbert (2003) and Beaumont-Smith (1991), there is also a lack of knowledge about the applicability of a wide range of financial theories. As a result, firms in the developing world tend to ignore such theories because of their very complexity.

The credible scenarios explaining the divergence between financial theory and practice are mainly twofold. At one extreme, where financial practice tends to lag behind theory, some of the cited reasons include: a lack of knowledge about the applicability of a wide range of financial theories, which means that practitioners opt for simpler financial management theories rather than the more recent and

the more accurate, but presumably more administratively complex, theories (Gilbert, 2003; Beaumont-Smith, 1991). At the other extreme, theory lags behind practice, because firms modify it to suit their unique needs and circumstances (Bancel and Mittoo, 2004).

Although either of these extremes could conceivably be an appropriate approach given the unique circumstances of a business, a misalignment between theory and practice could be a cause for alarm when not validated by empirical evidence. For most firms, the corporate finance function supports the creation of shareholder wealth through the management of corporate growth strategies within a disciplined financial foundation that is based on the fundamental principles laid out in the financial literature (Asaf, 2004). It is therefore pertinent to expect financial practices to align closely with the principles spelt out in the literature.

The objective of this article is to examine the divide, if any, between capital structure theory and the financing practices of listed firms on the JSE by testing two conventionally recognised theories, the trade-off and the pecking-order theories of capital structure choice against the financing practices of these firms. The article also attempts to establish whether capital structure determinants, as set out in the literature based on empirical studies, are similar to those that influence the financing practices of listed firms on the JSE. The remainder of this article is organised as follows. In the next section, we present a

brief outline of the literature pertaining to capital structure choice, focusing on the documented trends in the financing approach according to trade-off and pecking-order theories. We also develop our study hypotheses. Section 3 briefly outlines the data and the methodology used to test these hypotheses. Section 4 discusses the empirical results, while section 5 contains the summary and outlines the recommendations of the study.

2. Relevant literature and hypotheses

The amount of firm debt relative to equity has significant implications for firm value, or its cost of capital, and this issue is far from being settled in either theory or practice (Ross, Westerfield, Jordan and Firer, 2001). Modigliani and Miller (1958) argued, purely on the basis of theory, that firm value was not influenced by the level of debt. Their findings were made under conditions that assumed a “frictionless” world. Studies conducted by Chen and Strange (2005), Fama and French (2002), Myers (2001) and others identified some shortcomings in this theory. Despite the observed shortcomings, there is little consensus from these studies about alternative theories to explain the financing behaviour of firms (Bancel and Mittoo, 2004). In this article we provide a brief account of the trends in capital structure theory and practice, placing particular emphasis on the two ways of thinking about capital structure, the trade-off theory and the pecking-order theory (Myers, and Shyam-Sunder, 1999).

2.1 The trade-off theory

This theory assumes that firms acquire optimal capital structures through a trade-off between the tax advantages of borrowed money and the costs of financial distress (Graham and Harvey 2001). The theory further suggests that firms select capital structures on the basis of the attributes that determine the costs and benefits associated with debt and equity financing. In so doing, they appear to maintain or revert to predetermined debt-to-equity ratios at which their firm value is maximised and/or their risk of default is minimised.

Graham and Harvey (2001) claim that firms target their debt ratios according to predictions based on this theory. Their findings were collaborated by both Fama and French (2002) and Myers, and Shyam-Sunder (1999) who found in their studies that firms engaged in target adjustment behaviour of their debt ratios. Studies conducted by Rajan and Zingales (1995), Hovakimian, Opler and Titman (2001) came up with mixed findings in support of this observation. However, according to Chen and Zhao (2004) and Frank and Goyal (2003), the ability of the trade-off model to explain financing behaviour is weak since, by comparison, firms' tax savings appear to be large in comparison with bankruptcy costs, which means

that firms are unlikely to reduce their debt levels if their bankruptcy risk is moderate or low.

Secondly, the trade-off theory predicts that more profitable firms should carry more debt since they have more profits to protect from taxation (Frank and Goyal, 2003). Highly profitable firms have a lower expected probability of bankruptcy, because they are more asset-intensive. They also possess the necessary collateral should they default on debt (Smart, Megginson and Gitman, 2007). Most empirical studies are in conflict with this observation, and conclude that firms that have particularly high profit levels actually carry less debt (Chen and Strange, 2005; Frank and Goyal, 2003; Myers, 2001). Nonetheless, the trade-off theory is still the “mainstream” capital structure theory, because it is regarded as a superior explanation for actual financing patterns when compared with other theories (Smart *et al.*, 2007).

2.2 The pecking-order theory

The pecking-order theory is an alternative theory put forward to explain the financing behaviour of firms. It has become popular owing to the inconsistencies associated with the trade-off theory. It argues that firms do not try to reach the “optimal” capital structure, as the trade-off theory claims, because management follows the line of least resistance and finances operations by means of the least costly form of financing (Arnold, 2005). According to Frank and Goyal (2003), this theory is influential because it fits naturally with certain facts relating to the way firms obtain and use external financing. It also explains certain financing patterns in firms that the trade-off theory fails to explain (Smart *et al.*, 2007; Myers, 1999).

Several financing habits of firms are taken into account in this theory. Firstly, firms prefer internal financing (retained earnings) to external financing, and information asymmetries are assumed to be relevant to external financing. Secondly, if a firm needs to obtain external financing, it would first issue the safest security (i.e. debt) before equity. Thirdly, once internally generated funds are exhausted, firms prioritise their financing options from safer to riskier debt (Frank and Goyal, 2003; Graham and Harvey, 2001; Myers and Shyam-Sunder, 1999; Samuels, Wilkes and Brayshaw, 1997). Loosely defined, according to this theory, capital structure decisions are driven by the firm's desire to finance new investments, preferably through the use of internally generated funds. Firms only turn to low-risk debt, or new equity, as a last resort.

In terms of this theory, there is no optimal capital structure that maximises the firm's value (Chen and Strange, 2005; Myers and Shyam-Sunder, 1999). The attraction of interest tax shields and the treatment of financial distress are therefore assumed to be of secondary importance, because debt ratios change

when there is an imbalance of internal cash flows net of dividends and real investment opportunities. Profitable firms work down to low debt ratios, while those whose viable investment opportunities exceed internally generated funds tend to borrow more and more (Myers and Shyam-Sunder, 1999).

The pecking order form of financing is also influenced by information asymmetries, a condition where investors make inferences about a firm's prospects on the basis of management's financing decisions (Brigham and Ehrhardt, 2003). A positive impact on the share price only occurs if management chooses to refinance with debt rather than equity, because the firm's prospects are then viewed as being good (i.e. by investors). Managers thus avoid the alternative scenario (a decline in the share price as a result of new equity issues) by maintaining a borrowing capacity or financial slack that consists of retained earnings and/or marketable securities.

Empirical evidence supporting this theory is inconclusive. Firstly, Myers and Shyam-Sunder (1999) found the pecking-order theory to be an excellent descriptor of corporate financing behaviour, especially for stable firms with tangible collateral. Their findings indicated that firms not only fund unanticipated cash needs with debt in the short run, but that management actually plans to finance all deficits with it (i.e. debt). However, Chen and Zhao (2005), and Frank and Goyal (2003) contradict this observation and conclude that net equity issues track the financing deficit more closely than do net debt issues. These conflicting observations are partly the result of the fact that different approaches are used to test for this form of financing behaviour, since no convincingly accurate model has yet been designed to fully explain it (Myers and Shyam-Sunder, 1999).

Recent studies conducted by Leary and Roberts (2005), and Chen and Zhao (2004) designed models that closely track financing behaviour using a time-series of aggregate debt-equity issues, while incorporating bankruptcy risk into the analysis. Nonetheless, arguments about the accurate testing of this financing behaviour continue (Leary and Roberts, 2005).

Our approach to the testing of financing behaviour entails isolating and incorporating into models factors that have been reliably assumed in empirical literature to predict these forms of financing behaviour (capital structure determinants). We then test the significance of the designed models against the following two hypotheses:

Hypothesis 1: There is no significant relationship between the financing behaviour of listed firms on the JSE and the trade-off theory.

Hypothesis 2: There is no significant relationship between the financing behaviour of listed firms on the JSE and the pecking-order theory.

The research hypotheses, H_1 and H_2 , are stated as the exact opposite of the null hypotheses, indicating that a significant relationship exists between the

financing behaviour of listed firms on the JSE and the trade-off theory or pecking-order theory.

3. Data, variables and methodology

3.1 Data

We obtained multi-industry standardised financial statement data of listed firms on the JSE from the Bureau of Financial Analysis (BFA McGregor) database. Our final sample was constructed from the entire population of 315 consistently listed firms during the period 1995-2005. We then went through this data to specifically exclude firms from the financial sector. The reason for this exclusion is that firms in the financial sector are determined by levels of deposits and financial regulation and are regarded as inappropriate for testing predictions of leverage models (Akhtar, 2005; Fama and French 2002). Foreign firms were also excluded since we suspected that their capital structures may be influenced by other factors when compared with their South African counterparts. We then excluded firms with incomplete data. This reduced our sample to 148 firms. The resulting sample was further reduced to 123 firms in order to account for the effect of outliers.

3.2 Variables

Dependent variable

The dependent variable used to measure capital structure is *leverage* (LEV), based on book values. This variable was regressed on a vector of explanatory variables. We adopted this variable from Chen and Strange (2005), and calculated it as the ratio of total book-value debt to the sum total of book-value debt and equity, or the ratio of total debt to total assets. This ratio differs, depending on whether book value measures or market value measures are used and also on whether all debt or only long-term debt is considered (Frank and Goyal, 2003).

Book value measures are readily available on most databases and, according to Frank and Goyal (2003), tend to account for what has already taken place, which is ideal for the purposes of this study. Furthermore, firms are likely to concern themselves about book value leverage, because bank loan covenants are written in terms of book value (Harvey, Lins and Roper, 2004). Our measure is common to many empirical studies, including those undertaken by Nguyen and Ramachandran (2006), Frank and Goyal, (2003) and Hovakimian *et al.* (2001). Most studies focus on a single measure of leverage, but it is frequently reported that crucial findings are robust to alternative definitions (Frank and Goyal, 2003). We use the market value measure of leverage only to test whether the findings are robust to both measures of leverage and to calculate this variable as the ratio of total debt to the sum total of debt and the market value of ordinary shares.

Explanatory variables

We measured *financial distress* (FDIST) using the JH de la Rey model, designed to mirror Altman's financial distress model, but customised for the South African market (see www.mcgregorbfa.com).

Using this model, the point of separation between financially failed and financially sound firms is zero, which means that the greater the bankruptcy risk experienced by firms, the closer they get to, or fall below, this value. We predicted a negative relationship between financial distress and the debt level in line with predictions of the trade-off theory (Frank and Goyal, 2003).

We measured the *size* (SIZE) of a firm using the natural logarithm of total assets and predicted that this would have a positive impact on leverage. The trade-off theory predicts that larger, more mature firms will use more debt (Frank and Goyal, 2003).

Various studies have shown that a firm's debt level is a decreasing function of the *volatility* (VOL) of its earnings (Smart *et al.*, 2007; Chen and Strange, 2005; Frank and Goyal, 2003). We adopted this measure from both Nguyen and Ramachandran (2006), and Reilly and Brown (2003). These authors measure volatility as the standard deviation of profit before tax scaled to the average annual earnings before tax. We predicted a negative relationship between this measure and the level of debt according to the predictions of the trade-off theory.

There is no consistent relationship between *profitability* (PROF) and total debt (Nguyen and Ramachandran, 2006; Frank and Goyal, 2003). The trade-off theory predicts that more profitable firms carry more debt (Fama and French, 2002). Smart *et al.* (2007) concur with this prediction. However, other studies, including those of Abor (2005), Frank and Goyal (2003), Fama and French (2002) and Rajan and Zingales (1995), have contradicted the finding and concluded that profitable firms maintain financial slack or retained earnings to avoid refinancing with debt, an argument that is consistent with the pecking-order theory. We measure book value profitability as the ratio of operating earnings to equity, following Abor (2005), and expect this measure to vary positively and negatively with debt for the trade-off and pecking-order theories respectively.

The trade-off theory predicts that *asset tangibility* (ASSET), or the collateral value of assets, is a positive determinant of leverage because firms with a high collateral value of assets often borrow at more favourable terms than those without (Rajan and Zingales, 1995). We adopted a measure from Nguyen and Ramachandran (2006) and Akhtar (2005), who measure this proxy as the ratio of fixed assets to total assets. We expected it to vary positively with leverage for both theories.

Growth (MTB), as measured using the market-to-book assets ratio, is negatively related to leverage because growth options depend largely on intangible rather than tangible assets (Smart *et al.*, 2007). The

trade-off theory predicts that a higher market-to-book assets ratio implies higher growth options and hence higher costs of financial distress (Frank and Goyal, 2003). We adopted a variable used by Rajan and Zingales (1995), who measure this proxy using the ratio of the market value of total assets to the book value of total assets. We predicted a negative relationship of this variable to leverage for both the trade-off and the pecking-order theories.

Non-debt tax shields (NDTS) act as a substitute for the interest deduction associated with debt financing (Frank and Goyal, 2003). Firms with unused depreciation allowances, tax loss carry forwards, investment tax credits and other tax credits, have less incentive to shelter corporate profits from income taxes by paying interest on borrowed funds (Smart *et al.*, 2007). This finding is consistent with the trade-off theory of capital structure. Akhtar (2005) and Fama and French (2002) measure this proxy as the ratio of the firm's annual depreciation expense to its total assets. We adopted a similar measure and expected it to vary negatively with leverage.

Dividends (DIY) are part of firms' financing deficit (Myers and Shyam-Sunder, 1999). It may therefore be expected that dividend-paying firms will use more debt. This observation was empirically proven by Fama and French (2002). They found a positive relationship between leverage and firm size, and between dividend payout and firm size. They concluded that dividend payments have a positive impact on leverage. We predicted a positive relationship between the cash dividend paid out and leverage to confirm financing behaviour according to the pecking-order theory.

Capital expenditure (CAPEX) represents outflows and directly increases the financing deficit as discussed in Myers and Shyam-Sunder (1999). Fama and French (2002), using a simple pecking-order model, came to the same conclusion. Our study follows suit and measures capital expenditure as the ratio of firms' annual capital expenditure to total assets. This measure was adopted from Frank and Goyal (2003).

Our study used a multiple regression approach to analyse the relationship between the dependent variable LEV and the several explanatory variables mentioned above. It should be mentioned as a caveat that we did not include certain extraneous variables or dummies because it was felt that they are difficult to quantify with any certainty. We believe this should not significantly influence the results since the variables we chose to incorporate into our models are regarded as being reliable predictors of financing behaviour. We believe that the overall statistical strength of these models should go some way towards explaining financing behaviour according to these theories.

The model used to test for the financing behaviour according to the trade-off theory is depicted by equation 1:

Equation (1)

$$LEV_{i,t} = \beta_0 + \beta_1 ASSET_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 FDIST_{i,t} + \beta_4 PROF_{i,t} + \beta_5 MTB_{i,t} + \beta_6 NDTs_{i,t} + \beta_7 VOL_{i,t} + \epsilon_{i,t}$$

Where β_1 - β_7 represents regression coefficients associated with each of the explanatory variables, β_0 is a constant, ϵ is an error term and the other variables are as discussed above.

The model used to test for financing behaviour according to the pecking-order theory is depicted by equation 2:

Equation (2)

$$LEV_{i,t} = \mu_0 + \mu_1 PROF_{i,t} + \mu_2 MTB_{i,t} + \mu_3 SIZE_{i,t} + \mu_4 CAPEX_{i,t} + \mu_5 DIY_{i,t} + \epsilon_{i,t}$$

Where μ_1 - μ_5 represents regression coefficients associated with each of the explanatory variables, μ_0 is a constant, ϵ is an error term and the other variables are as discussed above.

Methods of analysis

Our main method of analysis involved a standard multiple regression technique using the Statistical Package for Social Scientists (SPSS). We began by regressing all explanatory variables in a given model with the dependent variable, leverage (LEV). We then performed stepwise, backward and forward regressions to ensure a model fit. Our analysis was preceded by the exclusion of outliers using case-wise diagnostics and regression residual scatter plots.

We investigated and controlled for multicollinearity (the interdependency among explanatory variables), using a coefficients' table housing collinearity statistics (see Appendix A). Eight-year averages of the variables (1998-2005) were used to conduct the cross-sectional analysis, while data on all eleven years was used to conduct the time-series analysis. We used year averages to increase the efficiency of our measures, as suggested by Nguyen and Ramachandran (2006).

Prior to the main analysis, we used measures of central tendency and dispersion to detail a univariate description of our sample variables. We split the sample into the various industries containing a significant number of firms to examine the descriptive behaviour of debt and other capital structure determinants by industry. Finally, we conducted preliminary bivariate correlations using the Pearson product-moment coefficients table (see Appendix A). The final regression output is coupled with a summary of the analysis of variance (ANOVA) for the regression to test for robustness.

4. Empirical results and discussion

Firstly, we discuss the overall descriptive statistics of both dependent and explanatory variables. Next, we conduct empirical work to test our hypotheses according to the trade-off and pecking-order theories and lastly, we discuss the findings.

5.1 Descriptive statistics

Table 1 shows the results of the descriptive statistics of the dependent and explanatory variables

Table 1. Measures of location and spread among variables of the overall sample

Variable	Mean value	Standard deviation	Minimum value	Maximum value
Financial distress	2.38	5.99	0.122	41.51
Size	21.93	1.91	15.19	24.61
Volatility	0.34	3.60	-25.53	10.063
Profitability	0.30	4.14	-31.63	31.422
Asset type	0.29	0.226	0	0.9
Growth	1.045	0.050	1	1.263
NDTS	0.068	0.023	0	0.129
Leverage 1	0.616	0.788	0	8.579
Leverage 2	0.438	0.198	0	0.848
Dividends	123976.6	347010.7	0	2722475
Cap expenditure	0.0157	0.0478	0	0.387

Financial distress is measured using JH de la Rey's model. **Size** is measured using the natural logarithm of total assets. **Volatility** is measured using the coefficient of variation of profit before tax. **Profitability** is measured using the ratio of earnings before interest and tax to equity. **Asset type** is measured using the ratio of total fixed assets to the company's total assets. **Growth** is measured using the ratio of the market value of assets to the book value of assets. **NDTS** refers to Non-Debt-Tax-Shields (Ratio of total annual depreciation to total assets). **Leverage 1** refers to the book value leverage (ratio of total debt to book value of assets) while **Leverage 2** refers to the market value leverage (ratio and total debt to the market value of assets). **Dividends** are an average of the total annual amounts paid out by the company. **Cap expenditure** refers to capital expenditures (Ratio of capital expenditure to total assets).

According to the results shown in Table 1, firm size ranges from a minimum of 4 million rand to a maximum of almost 50 billion rand, with an average value of almost 3.5 billion among listed firms.

Earnings volatility, which measures business risk, indicated a higher variability and spread in the returns of JSE listed firms (34%) compared with 31% for listed firms on the Chinese Stock Exchange (Chen and Strange, 2005).

The average financial distress value (in k units) of listed firms was 2.38, with a large spread indicating variability across firms. However, according to the results shown in Table 1, none of the firms' registered average negative k values, which suggests that all the firms in the sample were financially sound during this period.

The average debt ratio is at 62% book value leverage and 44% market value leverage. These values are modest compared with Japanese firms (69% and 45%), German firms (73% and 60%) and French firms (73% and 60%) (Rajan and Zingales, 1995). The results were also modest when compared with certain countries within the developing economies, such as South Korea (73.4% and 64.3%) (Rajan and Zingales, 1995). However, the values were high when compared with firms from the United States (52% and 44%), China, (53.07% and 30.38%) and the United Kingdom (54% and 40%) (Chen and Strange, 2005).

The results on performance ratios revealed an average annual profitability of 30%, which is significantly high compared with Chinese firms at 2.38%, (Chen and Strange, 2005), and 5.6% for firms in the United States (Frank and Goyal, 2003). The average growth rate among firms was 4.5% year on year, with a maximum of 29%. On average, 29% of the asset structure of firms consisted of tangible assets, which is comparable to 34% for American and Canadian firms (Frank and Goyal, 2003) and 29% for Swedish firms (Örtqvist, Masli, Rahman and Selvarajah, 2006).

Although this value is significant when compared with 19.73% for Vietnamese firms (Nguyen and Ramachandran, 2006), it seems modest given that it supports high leverage levels, which suggests that the collateral value of assets may not be as strong a determinant of firms' capital structures as hypothesised. Similarly, evidence on the average annual capital expenditure for listed firms was modest (1.57%), indicating slow growth in tangible assets during this period. Our preliminary conclusion was that this value is plausible only for the overall sample, since higher growth in assets may have occurred in certain industries and not others.

An industry classification of these variables indicated distinguishing characteristics among firms in each industry (refer to the table in Appendix A). Firstly, capital-intensive or cyclical industries, such as general mining, construction and materials industries,

posted the highest book-leverage values (85% and 53%). However, the market value of leverage measures for the mining industry dropped substantially to 39%. The plausible explanation for this variation is the component nature of the market value of the equity included in calculating this variable (see Appendix A), which suggests that either firms in this industry consistently posted a higher average price in the value of their ordinary share or they issued a larger component of ordinary shares during the eight-year period.

The above observation is consistent with the way these industries performed in relation to other measures in the study. According to Appendix A, both industries posted the highest profitability (50.6% and 38.9%), thereby tentatively supporting the hypothesis that more profitable firms carry more debt (Frank and Goyal, 2003). These firms also had comparatively low levels of business risk when measured using the earnings volatility variable (40% and 54%), and exhibited relatively higher growth (4% and 6%) during the period under study.

The second important observation is that firms within the retail industry posted the lowest leverage values (41% book value leverage and 36% market value leverage). These firms exhibited the highest level of business risk (85%), indicated the lowest growth levels (2.27%) and had moderately low profitability (29.7%). The general expectation is that firms in this industry normally have stable sales, hence low business risk and high profitability, based upon the non-cyclical nature of their products and services (Smart *et al*, 2007). This was not the case here. Lastly, firms from the travel and leisure industry were the least profitable, given their relatively high business risk or greater variability in sales. This industry performed poorly on almost all measures, which suggests that it was the most unpredictable sector to invest in during this period.

5.2 Testing hypothesis 1 using the trade-off model

We tested hypothesis 1 with the aid of a series of multiple regression techniques. We used both t-tests and p-values to assess the overall significance of the trade-off model to explain the financing behaviour of listed firms. Our confidence levels are set at the 1% and 5% levels with one-tailed analysis. The model's collective significance in explaining financing behaviour at either of these levels would make it easier to reject the null hypothesis. Similarly, if the model lacks collective significance this would make it impossible to reject the null hypothesis. Table 2 reports on the results of the multiple regression analysis using the trade-off model.

Table 2. The regression output of leverage1 and the explanatory variables**Model Summary^b**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig. F Change
1	.711 ^a	.505	.475	.5711355	.000

a. Predictors: (Constant), Non-debt tax shields, Earnings volatility, Profitability, Financial distress, Size, Asset type, Growth

b. Dependent Variable: Leverage1

Table 2 presents the results obtained from the standard multiple regression analysis using the trade-off model. We entered all explanatory variables, which included the following: asset type, size, financial distress, profitability, market-to-book assets ratio, non-debt tax shields and volatility. We then assessed the impact each explanatory variable has on the dependent variable. The results revealed a statistically significant relationship at both the 1 and 5 percent levels, meaning that there is a linear relationship between debt and the variables in the model. The overall strength of this relationship measured using the multiple R statistics was 71.1%, while the R² value dropped to 50.5%, meaning that about 51% of the variance of the dependent variable was explained by the regression in the model. We then conducted the stepwise regression output to identify variables in the model that explain financing behaviour according to the trade-off theory. We considered the consecutive effects of all explanatory variables, namely: asset type, size, financial distress, profitability, market-to-book assets ratio, non-debt tax shields and volatility, using forward, backward and statistical selection procedures (Kerr, Hall and Kozub, 2002). Table 3 reports on the results of the stepwise regression of leverage 1 and the explanatory variables.

Table 3. The stepwise regression summary of leverage 1 and explanatory variables**Model Summary^b**

Model	R	R Square	Adjusted R Square	R Square Change	F Change	Sig. F Change
1	.695 ^a	.483	.479	.483	113.155	.000

a. Predictors: (Constant), Financial distress

b. Dependent Variable: Leverage1

The results of Table 3 revealed an overall strength of the relationship of 69.5% adjusted to 47.9%. These values were statistically significant at both the 1% and the 5% levels of significance, which indicated a correlation between the trade-off theory model and the financing behaviour of listed firms. However, only the variable financial distress met the default SPSS statistical criterion for inclusion in the model (p-value < 0.05). Using both t-tests and p-values of each variable's regression weight, we then examined the coefficients' output table in Appendix A

to investigate the relative importance of each explanatory variable in the regression. Consequently, financial distress was significantly positively correlated to leverage 1 (+0.695). When we squared this semi-partial correlation, we noted that this variable accounted for 45.97% of leverage 1 not explained by other explanatory variables. This means that, if one variable accounts for 45.97%, then the rest of the variables contributed an insignificant 4.53% (50.5% - 45.97%). The regression equation for this output was originally stated according to equation 3.

Equation (3):

$$LEV = 1.206 - 0.108 SIZE + 2.68 E-008 VOL - 0.003 PROF - 0.331 ASSET - 0.135 MTB + 3.467 NDTs + 0.093 FDIST.$$

However, in order to account for the only variable that had a significant impact on leverage 1, equation 3 was restated as reflected in equation 4.

Equation (4): Leverage 1 = 0.398 + 0.091FDIST

5.3 The target adjustment model

We applied an alternative test for investigating for financing behaviour according to the trade-off theory by using a target adjustment model. The trade-off theory predicts that managers seek to maintain the optimal capital structure and that, although random events deflect them away from it, they gradually work

back to the optimum (Myers and Shyam-Sunder, 1999). Using a time series of listed firms' debt ratios from 1995 to 2005¹⁶, we expected to see mean-reverting behaviour of these debt ratios towards a target debt ratio. The target debt ratio is measured as the average firm debt ratio over the relevant period (Myers 2001). The simplest form of the target adjustment model states that changes in the debt ratio are explained by deviations of the current debt ratio from the target; this relationship is depicted using equation 5 below (see also Myers, 2001)

$$\text{Equation (5): } \Delta D_{i,t} = a + b_{TA}(D_{i,t} - D_{i,t-1}) + \epsilon_{i,t}$$

Where:

$D_{i,t}$ is the target debt level of firm i at time t which was obtained by the historical mean debt ratio of the firm multiplied by the total capital; $(D_{i,t-1})$ is the debt ratio of the firm lagging one year; b_{TA} is the target adjustment coefficient; and a is the sample-wide coefficient. If b_{TA} is greater than zero, we would confirm adjustment towards a target according to Myers and Shyam-Sunder (1999), and reject our null hypothesis 1. If, however, b_{TA} is less than zero, we would not be able to reject this null hypothesis. The figure below shows a scatter plot of the target adjustment model. The regression equation for the model was $Y = 538, 227, 000 + 0.4619x$ and, since the target adjustment coefficient was positive, we confirmed mean reverting behaviour among the book-value debt ratios of JSE listed firms. Figure 1 depicts a scatter plot of the target adjustment model.

5.4 Statistical analysis using the pecking-order theory

We followed a similar approach to the one detailed above in investigating financing behaviour according to the pecking-order theory. Our preliminary analysis began with an examination of the coefficients' table housing collinearity statistics in order to identify and control for multicollinearity. This is depicted in Table 4.

Table 4 shows that both tolerance and the variance inflation factor (VIF) values (last two columns) were within normal bounds, suggesting that multicollinearity was not present among the explanatory variables used in this analysis (Glantz and Slinker, 2001). Further analysis helped us to identify the relative importance of each explanatory variable in relation to the dependent variable leverage 1. None of the explanatory variables showed any significant correlation with leverage 1. This was indicated by the

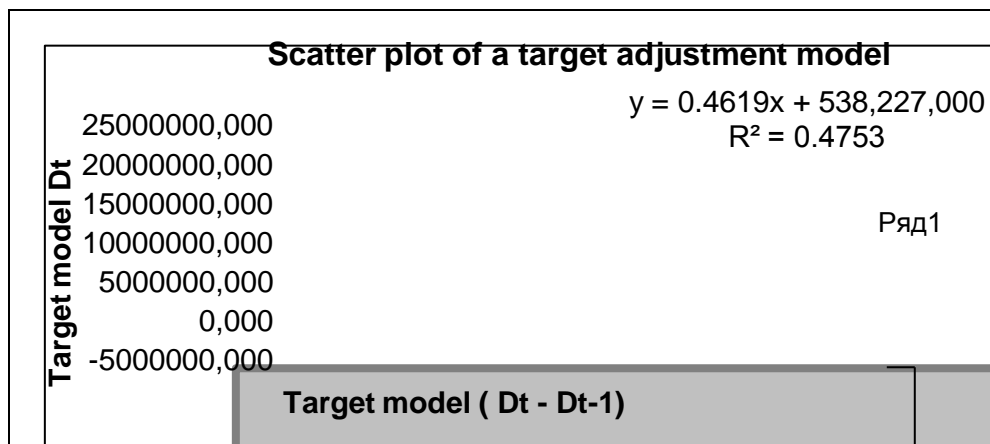
weak t-tests and p-values for each variable's regression weight (columns 5 and 6). The preliminary conclusion was that there is no significant relationship between leverage 1 and the explanatory variables given in the model.

To investigate this finding, we computed a Pearson product-moment correlation matrix between the explanatory variables and leverage 1 (see Appendix A). Evidence indicated that the model had no explanatory power regarding the financing behaviour of listed firms, since none of the explanatory variables had a significant relationship with the dependent variable leverage 1.

However, there was a significantly positive relationship between size and profitability on the one hand (at the 5% level), and size with dividends paid on the other (at the 1% level). This evidence seems to suggest that larger-sized firms are more profitable and have higher dividend payout ratios compared with smaller-sized firms, an observation similar to that reported by Fama and French (2002) although, according to these authors, this finding is consistent with both theories of capital structure choice. In the final analysis, we tested for the reliability of the model by computing the analysis of variance (ANOVA) for the regression output. The results of ANOVA are depicted in Table 5.

Since the ratio of the regression variance to the error variance (F-value of 0.525) was below the acceptable ratio of 1, we could not reject the null hypothesis, and concluded that there is no significant relationship between the financing behaviour of listed firms and the pecking-order theory as specified by our model. Further observations from the above table indicated that the p-value of 0.757 was greater than the acceptable 0.01 and 0.05 levels of significance (Hamburg and Young, 1994).

¹⁶ Although most studies have tested for target adjustment behaviour among firms over longer time periods, evidence of partial and total adjustment of firm debt ratios was found in this study. Flannery and Rangan (2006) found that firms act to close the gap between their current debt ratio and target debt ratio at a rate of more than 30% per year, implying that efforts to reach the target leverage could be achieved within a few years.

Figure1. Scatter plot of the target adjustment model**Table 4.** Correlation matrices between leverage 1 and explanatory variables

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.945	1.595		1.847	.067					
	Prof itability	.000	.018	.002	.021	.983	-.005	.002	.002	.942	1.061
	Growth	-1.884	1.442	-.120	-1.306	.194	-.128	-.120	-.119	.982	1.018
	Size	-.055	.094	-.058	-.584	.561	-.064	-.054	-.053	.859	1.164
	Expenditure paid	.612	1.531	.037	.400	.690	.043	.037	.037	.967	1.034
	Dividends paid	-5.7E-008	.000	-.025	-.263	.793	-.047	-.024	-.024	.921	1.086

a. Dependent Variable: Leverage1

Table 5. ANOVA summary for the pecking-order model regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.662	5	.332	.525	.757 ^a
	Residual	74.115	117	.633		
	Total	75.777	122			

a. Predictors: (Constant), Dividends paid, Profitability, Expenditure paid, Growth, Size

b. Dependent Variable: Leverage1

This indicated that there was no significant relationship between the weighted linear composite of the explanatory variables as specified by the model and the dependent variable, leverage 1. An insignificant F-value meant that we could not proceed with further analysis, since interpretation of these findings would mean that further prediction of the criterion variable by the model occurs purely by chance. We therefore did not perform any further analysis. We concluded that either listed firms did not exhibit this financing behaviour or that our model was misspecified and therefore had no correlation with the financing behaviour of listed firms.

6 Summary, limitations and conclusion

In this article we set out to determine whether finance theory is aligned with finance practice by testing two conventionally recognised theories of capital structure

choice, the trade-off theory and the pecking-order theory, against the financing practices of listed firms on the Johannesburg Stock Exchange (JSE) during the period 1995 to 2005. Firstly, the results of the static trade-off model exhibited both cross-sectional and time-series explanatory power for explaining the financing behaviour of listed firms, although such behaviour was not fully explained. Cross-sectional explanatory power was observed through the overall significance of the designed model, while time-series power was inferred using the target adjustment model in which firms' debt ratios indicated mean reverting behaviour towards an optimum debt ratio. We rejected the null hypothesis and concluded that, based on these findings; listed firms follow the trade-off theory of financing behaviour.

Secondly, tests on the pecking-order model, according to the data, had no statistical power. In view of the lack of significant results on all the

variables in the preliminary analyses, further analysis was not carried out. We therefore could not reject the null hypothesis that there is no significant relationship between the financing behaviour of listed firms and the pecking-order theory. We acknowledge that this model could have been mis-specified, which means that a more accurate model, which might produce conflicting results, needs to be formulated. We also realise that currently no empirical tests have produced an uncontested model to fully explain this financing behaviour (see Leary and Roberts, 2005; Frank and Goyal, 2003; and Myers and Shyam-Sunder, 2001).

Thirdly, the direct relationship between financial distress and debt during the period under study (1995-2005) indicated that firms issued debt irrespective of the risk that they might default on it and probably go bankrupt. Our finding is inconsistent with studies by Frank and Goyal (2003), and Graham and Harvey (2001), and challenges the argument that firms trade off the costs and benefits of debt financing against the fear of failing to meet their financial obligations as defined by the trade-off theory. Following Frank and Goyal (2003), we suspect that bankruptcy costs seemed minor compared with the tax advantages of using debt, so that a reduction in debt ratios, with increasing financial distress, was not justified by listed firms in our study. This seems a plausible explanation, given that none of our listed firms had average negative financial distress values during this period. We also attribute this trend, in part, to the stringent governance and compliance rules that govern listings on the JSE. We suspect that "regulated companies" will tend to carry more debt without the fear of defaulting on it (see Bancel and Mittoo, 2004; Harris and Raviv, 1991). It is also likely that our measures of debt and financial distress resulted in the observed outcome. Rajan and Zingales (1995) argue that this total debt measure tends to overstate the amount of debt and does not give a good indication of whether firms are at risk of default in the future. Similarly, our measure of financial distress was unique to this and not other, similar, studies.

Fourthly, a significant negative correlation between debt financing and the collateral value of assets (asset tangibility) exists, and this agrees with the findings of Nguyen and Ramachandran (2006), but is contrary to those of Frank and Goyal (2003) and Rajan and Zingales (1995), and the predictions of the trade-off theory. We conclude that asset tangibility is not a determinant of capital structure choice as directed by theory. Further studies are required to investigate the effect of asset intangibility (which was not tested in this study).

When we consider other variables, non-debt tax shields (NDTS) produce significantly negative and positive correlations with financial distress and profitability and with asset tangibility and growth options respectively. These variables are not significantly correlated with debt when the variables are included in the model(s). We therefore find no

empirical evidence to support the notion that they influence financing decisions. When we examine profitability, we infer a positive correlation between this variable and debt usage based on descriptive statistics. However, this finding was not confirmed statistically, since the negative correlation between leverage and profitability was too weak to support meaningful inference. None of the other variables in the model(s) showed any significant correlation with total debt.

The book value measure of total debt (leverage 1) had a stronger explanatory power to predict the financing behaviour of listed firms than the market value measure of total debt (leverage 2). Nonetheless, the results were not robust for both these measures and a further analysis of a recent data set is warranted.

Lastly, listed firms on the JSE had moderately high debt ratios compared with listed firms in China, the United States and the United Kingdom during the period under study. Comparative figures indicated that on average these firms registered a higher profitability than their counterparts. As far as industry is concerned, capital-intensive industries such as general mining and construction and materials issued the highest amount of book-value debt. Similarly, these industries posted the highest profitability during this period. We suspect that a trend of this nature may have been partly fuelled by the growth in infrastructure and comparatively lower interest rates evidenced during this period. The retail industry issued the lowest amount of debt, owing to the higher volatility of its sales. We couldn't find a rationale to explain why the travel and leisure/hospitality industry was the least profitable, and had moderately low debt levels and significant business risk during this period. We suspect, however, that this industry is still at its infancy and is characterised by a number of economic and social uncertainties.

The findings of this article reinforce the observation that there is a divergence between capital structure theory and practice, given that empirically-tested models and/or determinants of capital structure choice do not paint a clear picture that explains the financing behaviour of listed firms on the JSE. We assert that capital structure practices are a function of numerous country-specific, industry-specific, company-specific and global constraints, none of which is easy to quantify. These factors might explain the divergence in the observed financing practices between developed and developing economies.

We believe that, although our findings on the financing behaviour of listed firms are inconclusive, they serve to stimulate further research on the current capital structure trends among listed firms, especially during this period of global economic downturn. Our research also suggests some important implications for policy makers and fund providers regarding the reasons behind current capital structures or levels of debt among listed firms. Our finding is that the observed positive relationship between debt and

financial distress calls for a safer banking system and capital structures that are appropriate for differing levels of risk. Future research efforts should focus on testing recent data that were unavailable at the time of this study owing to the reporting time-lags in the databases. Future research should also focus on identifying more accurate means of testing either of these theories.

7 Limitations and further research

Our attempt to add to the existing knowledge of the capital structure practices of listed firms on the JSE is not entirely flawless. We believe it is possible that certain aspects of our methodology limited our findings. However, the following holds true:

For both theories, the variables used in the models were adopted from empirical literature and accurately calculated on the basis of empirical specifications (see Appendix). We chose the proxies commonly used in such studies. Secondly, conditions of multicollinearity and the treatment of outliers were appropriately controlled to help to qualify the findings. Thirdly, we followed the approach used by scholars who have advocated for total debt as their measure of the dependent variable. However, according to Rajan and Zingales (1995), total debt tends to over score the amount of leverage firms have, and this may have influenced our findings. Similarly, crucial results have been reported from alternative definitions of debt, such as the ratio of long-term debt or short-term debt to total assets (see Ortqvist *et al.*, 2006; Akhtar, 2005, Chen and Strange, 2005). In the same way, we did not consider other aspects of debt such as convertible securities or bond covenants that we believe could influence capital structure decisions and our findings. Future research should therefore focus on testing these alternative definitions.

In addition, our design of the models used was based purely on our discretion, influenced largely by other empirical designs and theoretical underpinnings. We acknowledge that it is possible that we misspecified our pecking-order model, thereby contradicting some of the expected outcomes. We also excluded certain extraneous variables and/or dummies from our analysis, because we found no satisfying empirical means by which to quantify them. That said, we believe these limitations did not have an adverse effect on the findings. Finally, we used several qualifying analytical techniques which included: bivariate regressions, correlation matrices, the regression output and the analysis of variance for the regression. These provided consistent results that allowed us to confirm that our findings are credible. Further research should therefore focus on correcting some, or all, of these limitations and should focus on more recent data (2005-2008) which, we hope, have now become available.

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Appendix A

Coefficients' table housing collinearity statistics

Model		Coefficients ^a									
		Unstandardised Coefficients		Standardised Coefficients		Correlations			Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.206	1.526		.790	.431					
	Financial distress	.093	.009	.710	10.337	.000	.695	.694	.678	.913	1.095
	Size	-.108	.070	-.113	-1.535	.128	-.064	-.142	-.101	.797	1.255
	Earning volatility	2.68E-00	.000	.024	.320	.749	-.055	.030	.021	.765	1.308
	Profitability	-.003	.013	-.014	-.198	.843	-.005	-.018	-.013	.906	1.104
	Asset type	-.331	.304	-.095	-1.088	.279	-.186	-.101	-.071	.563	1.775
	Growth	-.135	1.505	-.009	-.090	.929	-.128	-.008	-.006	.464	2.154
	Non-debt tax shields	3.467	3.033	.101	1.143	.255	-.130	.106	.075	.548	1.823

a. Dependent Variable: Leverage1

Coefficients' table for Leverage 1 and variables from the pecking-order model

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.945	1.595		1.847	.067					
	Profitability	.000	.018	.002	.021	.983	-.005	.002	.002	.942	1.061
	Growth	-1.884	1.442	-.120	-1.306	.194	-.128	-.120	-.119	.982	1.018
	Size	-.055	.094	-.058	-.584	.561	-.064	-.054	-.053	.859	1.164
	Expenditure paid	.612	1.531	.037	.400	.690	.043	.037	.037	.967	1.034
	Dividends paid	-5.7E-008	.000	-.025	-.263	.793	-.047	-.024	-.024	.921	1.086

a. Dependent Variable: Leverage1

Measures of location and spread among the variables per industry

Industry	Leverage 1			
	Mean	Standard Dev	Minimum	Maximum
General Mining	0.854	0.618	0.259	2.134
Construction and Materials	0.526	0.082	0.407	0.630
Food Producers	0.408	0.069	0.307	0.507
Travel and Leisure	0.488	0.136	0.311	0.714
General Retailers	0.411	0.063	0.328	0.509
Leverage 2				
General Mining	0.390	0.169	0.153	0.627
Construction and Materials	0.562	0.113	0.390	0.697
Food Producers	0.421	0.099	0.278	0.554
Travel and Leisure	0.433	0.181	0.201	0.704
General Retailers	0.356	0.108	0.209	0.509
Profitability				
General Mining	0.506	2.650	-1.264	19.92
Construction and Materials	0.389	0.704	-0.441	4.974
Food Producers	0.269	0.399	-1.686	1.970
Travel and Leisure	0.138	1.677	-12.97	3.093
General Retailers	0.297	0.182	-0.467	0.959
Earnings volatility				
General Mining	0.401	3.080	-3.870	6.510
Construction and Materials	0.544	2.070	-4.900	4.990
Food Producers	0.340	1.010	-2.230	1.660
Travel and Leisure	0.580	1.170	-2.060	1.900
General Retailers	0.850	0.803	0.290	3.850
Growth				
General Mining	1.0403	0.077	1.000	1.419
Construction and Materials	1.0614	0.049	1.000	1.238
Food Producers	1.0698	0.043	1.011	1.222
Travel and Leisure	1.0316	0.034	1.000	1.165
General Retailers	1.0227	0.020	1.000	1.116

Pearson product moment correlation of leverage 1 and variables used in the pecking-order model

Correlations

		Leverage1	Profitability	Growth	Size	Expenditure paid	Dividends paid
Leverage1	Pearson Correlation	1	-.005	-.128	-.064	.043	-.047
	Sig. (2-tailed)		.959	.158	.478	.637	.603
Profitability	Pearson Correlation	-.005	1	-.043	.224*	.022	-.010
	Sig. (2-tailed)	.959		.636	.013	.812	.914
Growth	Pearson Correlation	-.128	-.043	1	.046	-.102	.048
	Sig. (2-tailed)	.158	.636		.613	.264	.599
Size	Pearson Correlation	-.064	.224*	.046	1	.128	.262**
	Sig. (2-tailed)	.478	.013	.613		.159	.003
Expenditure paid	Pearson Correlation	.043	.022	-.102	.128	1	-.036
	Sig. (2-tailed)	.637	.812	.264	.159		.692
Dividends paid	Pearson Correlation	-.047	-.010	.048	.262**	-.036	1
	Sig. (2-tailed)	.603	.914	.599	.003	.692	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).