DETERMINANTS OF CAPITAL STRUCTURE: A SOUTH AFRICAN STUDY

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Abstract

The effect of firm characteristics and economic factors on capital structures have been researched in many countries. Various South African studies have been conducted on this topic; however, limited research was found where both firm characteristics and economic factors were included in the same study. The majority of previous South African studies were also conducted prior to the demise of apartheid in 1994. This paper, therefore, focuses on the post-apartheid period from 1995 to 2008 and investigates the effect of firm characteristics and economic factors on the capital structure of listed industrial firms in South Africa. Empirical results indicate that these factors do affect capital structure and that asset structure and size are the two most dominant determinants.

Keywords: capital structure; firm characteristics; economic factors

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1. Introduction

Capital structures are one of the most debated topics in financial literature. The focal point of this debate revolves around the existence of an optimal capital structure. Ever since Modigliani and Miller's seminal paper in 1958, numerous theoretical and empirical studies have been conducted in an attempt to prove that an optimal capital structure does exist and that it does have an impact on firm value. Much of the further research focused on the relaxation of some of the restrictive assumptions made by them. Researchers included variables such as taxes, bankruptcy costs, industrial characteristics, ownership structure and agency costs (Harris and Raviv, 1990). The relaxation or removal of these assumptions indicated to researchers that capital structure decisions may affect firm value (Correia and Cramer, 2008:34). This is very important, since the overriding goal of almost all firms is to create value for their shareholders and to maximise the overall value of the firm (Brigham and Daves, 2004:5). This means that each firm's management team may be able to maximise the value of the firm by employing an optimal capital structure for that particular firm. This has led to the development of a number of capital structure theories. Excellent surveys on capital structure theories are provided by Myers (1984) and Harris and Raviv (1991). The reconciliation of theoretical and empirical studies in this area has resulted in two major theories of capital structure: the trade-off theory and the pecking order theory (Myers, 1984).

The trade-off theory states that there is an optimal capital structure that maximises the value of a firm. Therefore, management will set a target leverage ratio and then gradually move towards that. Researchers such as Jensen and Meckling (1976), Ross (1977), and Hart and Moore (1995) have demonstrated that firms select target leverage ratios based on a trade-off between the benefits and costs of increased leverage. Managers should therefore choose a combination between debt and equity that achieves a balance between the benefits of debt (tax savings) and the various costs associated with debt (financial distress costs and agency costs) (De Wet, 2006:4).

The pecking order theory, first introduced by Donaldson in 1967, differs from the trade-off theory in that there is no well-defined debt-equity ratio (Myers, 1984). The results from various studies concluded that firms prefer internal financing to external financing. This means that the order in which financing is obtained is firstly the use of retained earnings, then debt, then convertible debt and preference shares, while the issuing of new equity will be the last resort to obtain financing. Therefore, if external financing is required, firms will issue the safest security first (Myers, 1984:581).

Strong evidence has been found in favour of both the trade-off theory and the pecking order theory. The overall conclusion by various researchers such as Frank and Goyal (2000) and Fama and French (2002), is that these two competing theories should not be evaluated in isolation; they should be viewed as complementary. Although these theories exist, there are also many factors that determine the way in which

a firm raises capital, which consequently influences its capital structure (De Wet, 2006:15).

Prior research on the topic of leverage and factors affecting leverage has been conducted for different economies with different institutional backgrounds. The focus, however, was predominantly on data from developed countries (Rajan and Zingales, 1995; Booth, Aivazian, Demirgüc-Kunt and Maksimovic, 2001; Bevan and Danbolt, 2002; Hall, Hutchinson and Michaelas, 2004). The results from these studies are similar in the sense that leverage differs across countries. More recent empirical studies include data from developed and developing countries, to determine whether determinants of capital structures in developing countries were similar to those in developed countries. Studies conducted by Booth *et al.* (2001) and Fan, Titman and Twite (2008) reported that significant cross-country differences do exist which implies that factors specific to each country must play a vital role in financing decisions. This finding is supported by Smart, Megginson and Gitman (2004:415) who did an international survey on the financial leverage of firms. Seven developed countries and seven developing countries, including South Africa, were included in this survey. The results from their study indicated that leverage differs from country to country. The results, furthermore, indicated that leverage is different for countries within the developed country group, as well as for countries within the developing country group. These results indicate that the institutional background and economic environment of countries do have an effect on the leverage of firms.

Research, furthermore, indicate that capital structures differ from industry to industry, and that the debt-equity choice even varies between firms within the same industry. According to Thompson and Wright (1995), the variations in capital structure from country to country might be due to variations in the determinants of capital structure that operate at the firm level, rather than real differences between countries (Hall *et al.*, 2004). This is supported by Myers' (1984) argument that differences in capital structures between industries might be due to firm-specific attributes rather that industry differences. The majority of empirical works support the view that firm-specific factors dominate industry-specific factors with regard to capital structure decisions (Balakrishnan and Fox, 1993). Thus, in order to get to the core of capital structure decisions, it is vital to execute a further analysis of the firm itself.

The above-mentioned information implies that each firm should concentrate on its own unique characteristics when making capital structure decisions. Research done by Titman and Wessels (1988) and by Rajan and Zingales (1995) documented that leverage is related to firm-specific characteristics such as profitability, investment opportunities, tangibility of assets or volatility (Drobetz, Penza and Wanseried, 2007:2). Therefore, the combination between debt and equity that is decided upon must be aligned within the firm's specified objectives. This implies that firms have to determine a target capital structure according to their characteristics and the economic environment in which they operate.

2. Research problem

The effect of firm characteristics and economic factors on capital structures have been researched in various countries. Various South African studies have been conducted on the topic of capital structures, however, limited research have been found in which both firm characteristics and economic factors were included in the same study. The majority of the South African studies furthermore either focused on a specific industry on the Johannesburg Securities Exchange Limited (JSE) or the focus was predominantly on the theory of capital structure applied by South African firms. Most of the studies were also conducted for the period prior to the demise of apartheid in 1994, or just shortly thereafter. (Louw, 1983; Harry, 1990; Jordaan and Smit, 1993).

The fact that the majority of studies were conducted before 1994 is a very strong motivation for this particular study. Reflecting back on the past two decades, the South African economy has undergone significant changes since the demise of apartheid in 1994 (Bhorat and Oosthuizen, 2005:1). The removal of trade and financial sanctions along with a successful political transition contributed significantly to a turnaround in the performance of the South African economy since 1994 (Du Plessis and Smit, 2006:15). An improvement in growth performance in South Africa can be seen in the decade since 1994, particularly if compared to the previous ten years. Since the demise of apartheid in 1994 South Africa seems to enjoy a combination of stable output growth and low inflation (Du Plessis and Boshoff, 2007). Blanchard and Simon (2001) refer to this combination as the "great moderation". The "great moderation" of South Africa has been characterized by lower and stable inflation rates as well as interest rates, positive and sturdy GDP growth and fiscal deficits and debt (Du Plessis and Boshoff, 2007:5). Based on this statement, inflation, interest rate and economic growth are selected as economic factors to determine whether these factors have an effect on the capital structure of South African firms.

It is expected that these changes in the economy may also have a direct impact on the operations and characteristics of firms. Several firm characteristics have, therefore, also been identified for this study since most prior empirical studies reported that capital structures are affected by certain firm-specific attributes (Myers, 1984; Harris and Raviv, 1991; Rajan and Zingales, 1995). The predominant firm characteristics from prior research that are also included in this South African study are profitability, asset structure, liquidity, business risk, growth and

size. These firm characteristics are identified as important factors in both developed and developing countries.

The primary objective of this study is, therefore, to determine the effect of firm characteristics and economic factors on the capital structure of South African listed industrial firms. Based on this primary objective, the following hypotheses are formulated:

H_0: Capital structure is not affected by firm characteristics and economic factors.

H_A:Capital structure is affected by firm characteristics and economic factors.

Furthermore, the following secondary objective is formulated:

Compare the results of the firms that remained listed on the JSE to the results of those firms that delisted from the JSE during the selected period of 14 years.

3. Data

This study focuses specifically on the industrial sector of the JSE (Forestry and paper; Industrial metal; Chemicals; Consumer goods; Consumer services; Health care; Industrials; Oil and gas; Technology and Telecommunications). Firms included in the mining and financial sector are excluded from the study since their financial characteristics and use of leverage is different compared to firms in other sectors. Furthermore, firms that operate in these two sectors incorporate different types of business activities and their financial statements are different compared to other firms. This makes comparisons between firms more difficult. Also, focusing only on those firms that are listed at the end of the selected period would expose the study to survivorship bias. Survivorship bias is the result of a firm delisting from a stock exchange. This might often be due to financial failures or due to financial restructuring of firms. Carrying on with research which suffers from survivorship bias could result in inconsistent and untrustworthy results. In order to reduce survivorship bias it is necessary to also include those firms that delisted from the JSE during the selected study period. Both listed and delisted firms are, therefore, included in the study.

Firms, furthermore, have to provide financial data for a period of at least five years in order to be included in the study. This requirement is incorporated, since the data set contains cross-sectional and time-series dimensions. A period of at least five years is, therefore, required to obtain sufficient observations for the study. This also eliminates instability amongst firms in the industrial sector, thus, providing more reliable results. This requirement results in the exclusion of 163 firms, leaving the final census with a total of 280 firms.

To conclude, the census for this study includes all firms listed on the industrial sector of the JSE, as well as those firms that delisted from the JSE during the selected period. By incorporating the above-mentioned requirements, the final census includes a total of 280 firms (170 listed firms and 110 delisted firms), providing 2 684 complete observations for the firm characteristics and 14 complete observations for the economic factors. This study is conducted for a period of 14 years, covering 1995 to 2008.

4. Measurement of variables

Financial ratios are used as measurement instruments to define capital structure (the dependent variable), and the firm characteristics. The income statement, balance sheet and sundry data items are obtained from the financial statements of all the firms included in the study. An external database, McGregor BFA (2008) was used to gain access to these financial statements in a standardised format. The year-end share prices of all the firms included in the sample were also obtained from the McGregor BFA (2008) database.

Economic indicators are used as measurement instruments for the three economic factors (interest rate, inflation rate and economic growth) included in the study. These economic indicators are obtained from the South African Reserve Bank (SARB) website, INET-Bridge (2005) and Statistics South Africa (2006). Table 1 provides a summary of all the variables as well as the measurement instruments for each variable.

Table 1. Dependent variable and independent variables

IDENTIFIED	MEASURED
Dependent variable:	
Capital structure	Debt–equity ratio (DE_{MV})
Independent variables:	
A) Firm characteristics	
Profitability	Return on assets (ROA)
Asset structure	Fixed assets to total assets (FA/TA)
Liquidity	Current ratio (CR)
Business risk	Adjusted return on assets (adjusted ROA)
Growth	Market-to-book ratio (M/B ratio)
Size	Natural logarithm of sales (ln [sales])
B) Economic factors:	
Interest rate	Prime interest rate (PR)
Inflation	Change in the consumer price index (CPI%)
Economic growth	Change in the gross domestic product (GDP%)

Notes: * The abbreviations in the table will be used to describe the identified variables throughout the remainder of this study.

4.1 Dependent variable

The dependent variable for this study is capital structure. Different financial ratios can be used to measure the capital structure of a firm. Each of the possible measures could produce different results and could, thus, lead to different interpretations (Harris and Raviv, 1991). Furthermore, these measures of leverage can be based on book values or market values of equity. Both of these measures present their own strengths and weaknesses and various researchers have provided arguments for and against each of these measures (Modigliani and Miller, 1958; Thies and Klock, 1992; Mackay and Phillips, 2005; Drobetz *et al*., 2007). According to Modigliani and Miller (1958) market value better reflect the ownership between equity and debt holders and it represents the primary input into the weighted average cost of capital (WACC) calculations. Market value measures, furthermore, significantly explain stock returns and the variation in stock returns accounts for most of the leverage variation (Drobetz *et al*., 2007). Based on these arguments, it was decided to use the market value of equity to measure capital structure.

The measure used in this study to calculate the dependent variable is therefore calculated as follow:

$$DE_{MV} = \frac{\text{book value of total debt}}{\text{preference share capital} + \text{market value of ordinary equity} + \text{minority interest}}$$

where:

Total debt = long-term and short-term interest-bearing debt;
Market value of ordinary equity = market capitalisation (market price x number of issued ordinary shares).

4.2 Independent variables

The independent variables for this study are divided between six internal (firm characteristics) and three external (economic) factors.

4.2.1 Profitability

Profitability refers to the ability of a firm to generate earnings compared to its assets. This variable is measured by the ratio of return on assets and it is quantified as:

$$\textbf{ROA} = \frac{\text{EBIT}}{\text{total assets}}$$

where:

EBIT = earnings before interest and tax (including extraordinary items)
Total assets = non-current assets + current assets

4.2.2 Asset structure

The asset structure of a firm refers to the composition of its assets. This is defined as the ratio of the fixed assets divided by the total assets of the firm. The measure used to quantify asset structure is:

$$\textbf{FA/TA} = \frac{\text{fixed assets}}{\text{total assets}}$$

where:

Fixed assets = property, plant and equipment less depreciation

4.2.3 Liquidity

Liquidity refers to the ability of a firm to fulfil its short-term obligations, hence the ease with which its current assets can be converted into cash. In this study, the current ratio is used to calculate liquidity and it is given by:

$$\textbf{CR} = \frac{\text{current assets}}{\text{current liabilities}}$$

where:

Current assets = total stock + debtors + short-term loans + cash and bank + other current assets
Current liabilities = short-term borrowings + creditors + bank overdraft + provision for taxation + provision for dividends

4.2.4 Business risk

According to Ward (1993), business risk refers to the effects of uncertainties in the environment on the earning ability of a firm. An adjusted return on assets (excluding extraordinary items) is used to calculate the business risk of firms, since return on assets is affected by uncertainties in the business environment. The calculation is therefore given by:

$$\textbf{Adjusted ROA} = \frac{\text{operating profit} + \text{investment income}}{\text{total assets}}$$

4.2.5 Growth

The market-to-book ratio used by Rajan and Zingales (1995), Booth *et al.* (2001) and Cheng and Shiu

(2007), is applied in this study. The measure for growth is given by:

$$\textbf{M/B ratio} = \frac{\text{market value of equity}}{\text{book value of equity}}$$

where:

Market value of equity = preference share capital + market capitalisation of ordinary shares + minority interest

Book value of equity = ordinary share capital + preference share capital + distributable reserves + non-distributable reserves + minority interest

4.2.6 Size

The most commonly used measurements for firm size are based on annual sales and total asset values. According to Frank and Goyal (2004:17), the logarithm of sales has a more powerful effect on leverage than the logarithm of assets. Based on Frank and Goyal's (2004) argument, the measure used in this study to quantify size is:

ln (sales) = natural logarithm of sales revenue

4.2.7 Interest rate

Various interest rates are available for the different financial markets of the economy. The repo rate and the prime interest rate are well-known interest rates in South Africa. The repo rate represents the rate at which the private (sector) banks borrow funds from the South African Reserve Bank. The prime rate, on the other hand, is the rate at which the private banks lend funds to the public. In this study, the prime rate is used to measure interest rates in South Africa, since this rate represents the price that the firms in the study would most probably have to pay on borrowed funds. The interest rate is therefore given by:

PR = prime interest rate of South Africa

4.2.8 Inflation

The changes in the consumer price index (CPI) inflation rate of South Africa are used for this study, since the CPI is generally used by the South African Reserve Bank as a measure for the inflation rate in South Africa. For the remainder of this study, this variable is referred to as CPI%. It is given by:

CPI% = the change in the consumer price index

4.2.9 Economic growth

Changes in the growth domestic product (GDP) growth rate of the South African economy are used as a measure for economic growth. The economic growth rate is most conveniently measured by GDP and most prior empirical studies used this economic indicator as a measure for economic growth. This economic variable is:

GDP% = the change in the gross domestic product growth rate

5. Research methodology

Descriptive statistics and inferential statistics are required for this study. The various statistical tests together with the results from each test will be discussed in the following sections.

5.1 Descriptive statistics

Numerical descriptive measures were used to summarise the data. These measures provide a better understanding of the nature of the data which is very important for statistical inference. Knowing the nature of the data also indicates which further measures should be applied in inferential statistics. The descriptive measures used in this study include the mean, median, standard deviation, and tests for skewness and kurtosis. These measures are applied to the full data set, which includes both listed and delisted firms for the entire period under investigation. Table 2 provides the descriptive statistics of the variables.

Table 2. Descriptive statistics of the full data set (listed and delisted firms)

	Descriptive statistics									
	Depen-dent variable	Independent variables								
	DE_{MV}	ROA	FA/TA	CR	Adjusted ROA	M/B ratio	ln (sales)	PR	CPI%	GDP%
Mean	2.34	0.12	0.29	1.79	0.25	3.24	13.32	15.82	6.41	3.46
Median	0.63	0.14	0.24	1.44	0.22	1.60	13.37	15.17	5.80	3.12
Std Dev	19.50	0.74	0.22	2.46	0.92	20.03	2.23	3.54	2.33	1.29
Skewness	24.61	5.29	0.87	28.80	28.16	27.11	-0.57	0.31	-0.05	-0.55
Kurtosis	679.42	473.55	0.01	1155.2	996.18	854.27	0.94	-0.94	0.09	-0.10

The median DE_{MV} ratio is 0.63, indicating that firms have R0.63 of debt for every R1 of shareholders' funds. The assets are thus primarily financed through equity, which means that firms have more shareholders' equity available to meet their financial obligations. ROA, adjusted ROA and the M/B ratio show considerable variability with the following respective standard deviations: 0.74; 0.92 and 20.03. The most important deduction from the results of the descriptive measures, specifically the skewness and kurtosis values, is that the data set for this particular study is non-parametric. This is an important observation since the various methods of correlation analysis and regression analysis depend on the nature of the data.

5.2 Correlation analysis

Due to the fact that the data set contains non-parametric data, a Spearman Rank Order correlation analysis is firstly conducted to give an indication of the nature of the relationships between the various variables. Significance levels of 1%, 5% and 10% are considered to determine how significant the relationships between the dependent and the independent variables are. Table 3 provides a correlation matrix of the dependent and the independent variables.

Table 3. Correlation matrix for the full data set (listed and delisted firms)

	Correlation analysis									
	Depen-dent variable	Independent variables								
	DE_{MV}	ROA	FA/TA	CR	Adjusted ROA	M/B ratio	ln (sales)	PR	CPI%	GDP%
DE_{MV}	**1.000**									
ROA	-0.418*	**1.000**								
FA/TA	-0.009	-0.091*	**1.000**							
CR	-0.309*	0.107	-0.319*	**1.000**						
Adj ROA	-0.318*	0.764*	-0.069*	0.022	**1.000**					
M/B ratio	-0.629*	0.369*	-0.105*	-0.124*	0.329*	**1.000**				
ln (sales)	0.009	0.201*	0.086*	-0.146*	0.101*	0.175*	**1.000**			
PR	-0.072*	-0.057*	0.042	0.100*	-0.148*	-0.065*	-0.069*	**1.000**		
CPI%	0.003	0.007	0.020	0.021	-0.057*	-0.000	0.001	0.572*	**1.000**	
GDP%	0.070*	0.088*	-0.002	-0.068*	0.112*	0.194*	0.050	-0.642*	0.293*	**1.000**

* Significant at the 1% level

Based on the results provided in Table 3, six of the nine independent variables have a significant relationship with DE_{MV} at the 1% level of significance. The results indicate that the majority of independent variables have a significant relationship with DE_{MV} at the 1% level. There are, however, concerns with regard to correlation analysis, due to the large data set being used and the fact that it does not take panel data into consideration. Since a large data set may cause even weak relationships to be labeled as statistically significant, simple regression analyses are also conducted beyond the correlation analysis. This is done in order to provide a better indication of the strength of relationships between the dependent variable and each of the independent variables.

5.3 Simple regression analysis

It was mentioned that both listed and delisted firms were included in the census to reduce survivorship bias. Due to the inclusion of both listed and delisted firms, it was decided to divide the full data set into two sub-sets, namely a sub-set of listed firms and a sub-set of delisted firms. This was done to determine whether these two sub-sets provide different/contradicting results. Table 4 provides the following information:

- the identified independent variables;
- the R^2 values for each independent variable as reported by the simple regression analyses results for the full data set, the sub-set of listed firms and the sub-set of delisted firms;
- the sign of the relationships between each of the independent variables and DE_{MV}, as reported by the simple regression analyses results (based on the regression coefficients), and
- the statistical significance of each independent variable's relationship with DE_{MV}

Table 4. Summary of the simple regression analysis results for each of the independent variables

Independent Variables	*R^2 values*		
	Full data set	**Sub-set: listed firms**	**Sub-set: delisted firms**
	DE_{MV}	**DE_{MV}**	**DE_{MV}**
ROA	0.0002 (-)	0.0000 (-)	0.0013 (-)
FA/TA	0.0016**(-)	0.0034*** (-)	0.0007 (-)
CR	0.0006 (-)	0.0003 (-)	0.0039 (-)
Adjusted ROA	0.0000 (-)	0.0000 (-)	0.0004 (-)
M/B ratio	0.0001 (-)	0.0001 (-)	0.0013 (-)
ln (sales)	0.0016** (+)	0.0105*** (+)	0.0001 (-)
PR	0.0015** (-)	0.0018* (-)	0.0044* (-)
CPI%	0.0009 (-)	0.0014 (-)	0.0010 (-)
GDP%	0.0000 (+)	0.0002 (+)	0.0000 (-)

Notes:
The following regression equation is conducted: $DE_{MV} = b_0 + b_1X_i$; where X_i is one of the nine independent variables.

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level
(-) Indicates a negative relationship between DE_{MV} and a respective independent variable
(+) Indicates a positive relationship between DE_{MV} and a respective independent variable

The R^2 values provided in Table 4 are low. This indicates that the specific regression model explains very little of the variation in the dependent variable. The results for the full data set report that three of the nine independent variables (FA/TA; ln (sales); PR) have a significant relationship with DE_{MV} at the 5% level of significance. Differences can be observed between the results provided for the sub-set of listed firms and the sub-set of delisted firms. For the sub-set of listed firms, both FA/TA and ln (sales) report statistically significant relationships at the 1% level with DE_{MV}.

Based on the regression coefficients, FA/TA has a negative relationship with DE_{MV}. The result for this South African study is contradictory to what was initially expected and to the results reported for other countries (Friend and Lang, 1988; Wald, 1999; Frank and Goyal, 2004; Drobetz *et al*., 2007). This negative relationship states that the debt-capacity increases with the proportion of tangible assets in the balance sheet of a firm. The significant positive relationship between DE_{MV} and ln (sales) corresponds with various other international studies (Rajan and Zingales, 1999; Wald, 1999; Frank and Goyal, 2004; Barclay and Smith, 2005) and it implies that larger firms include more debt in their capital structures than their smaller counterparts.

The results, therefore, indicate that the asset structure and the size of listed firms may be important factors to consider when financing decisions are being made by the listed firms. This, however, is not the same for the sub-set of delisted firms. The only variable that indicates some significance to DE_{MV} is PR and this is only at the 10% level. An important difference between the two sub-sets of firms is the nature of the relationship between ln (sales) and DE_{MV}. The result for the sub-set of listed firms corresponds with the initial expectation of a positive relationship. The sub-set of delisted firms, however, reports a negative relationship. A negative relationship can best be explained in terms of information asymmetry. Larger firms have less information asymmetry, which results in their equity being more attractive to outside investors and the firms will, therefore, have more debt available. The result for ln (sales) may also indicate that the delisted firms included in the census may be smaller than the listed firms, which could result in their equity being less attractive to outside investors.

Another independent variable that reports different relationships for the two sub-sets is GDP%. The sub-set of listed firms reports a positive relationship between DE_{MV} and GDP%. Considering the positive and steady growth in the South African economy since 1995, a positive relationship was expected. This assumption was based on the expectation that demand for products and services increases with an increase in economic growth. If managers are equipped to manage these increases in sales, firms can expect an increase in profits, leaving the firm with more free cash flow. This will enable them to obtain more debt capital since they will be able to fulfill debt obligations. The sub-set of delisted firms, however, reports a negative relationship between DE_{MV} and GDP%. This might be due to the fact that managers may not have been equipped enough to adapt to the fast growth in the economy.

The R^2 values from the simple regression analysis may already indicate possible differences between the two sub-sets of firms. Even though the results from the simple regression analysis are weak, it still provides statistical evidence that firm characteristics and economic factors may be able to explain some of the variation in capital structure. It may, furthermore, be possible that the nine independent variables combined may explain more of the variation in DE_{MV} as opposed to being evaluated independently. Multiple regression analysis is conducted to determine how much of the variation in DE_{MV} can be explained by the variation in the independent variables.

5.4 Multiple regression analysis

Due to the use of a panel data set, the Time-Series Cross-Section analysis (TSCSREG procedure) is used to conduct multiple regression analysis through the software program SAS®. It was decided to lag all the variables in the data set with one period, including the DE_{MV} ratio of the previous year. The variables are lagged in order to determine whether the capital structure of a firm is also affected by the performance of the particular variables in the preceding year. The regression model, thus, includes the values of the current year (t) as well as the values of the preceding year ($t - 1$).

The following multiple regression equation is formulated to describe the relationship between the dependent variable and the nine independent variables.

$$DE_{MV} = b_0 + b_1DE_{MV;t-1} + b_2ROA_t + b_3ROA_{t-1} + b_4FA/TA_t + b_5FA/TA_{t-1} + b_6CR_t + b_7CR_{t-1} + b_8\text{Adjusted } ROA_t + b_9\text{Adjusted } ROA_{t-1} + b_{10}\text{M/B ratio}_t + b_{11}\text{M/B ratio}_{t-1} + b_{12}\ln(\text{sales})_t + b_{13}\ln(\text{sales})_{t-1} + b_{14}PR_t + b_{15}PR_{t-1} + b_{16}CPI\%_t + b_{17}CPI\%_{t-1} + b_{18}GDP\%_t + b_{19}GDP\%_{t-1}.$$

Table 5 provides the TSCSREG regression analysis results for the sub-set of listed firms as well as for the sub-set of delisted firms with the inclusion of one-year lag variables.

Table 5. TSCSREG regression analysis results for the sub-set of listed and the sub-set of delisted firms

Variable	*Sub-set of listed firms*		*Sub-set of delisted firms*	
	Regression coefficient	*p*-Value	Regression coefficient	*p*-Value
	DE_{MV}	DE_{MV}	DE_{MV}	DE_{MV}
Intercept	-3.021	0.6437	46.169	0.0152
$DE_{MV;t-1}$	0.909	0.0001***	0.469	0.0001***
ROA_t	6.132	0.0001***	-3.970	0.3376
ROA_{t-1}	-0.151	0.7730	2.639	0.5346
FA/TA_t	-6.575	0.0573*	1.697	0.9143
FA/TA_{t-1}	2.075	0.5479	-12.910	0.4150
CR_t	0.040	0.8564	-1.074	0.2216
CR_{t-1}	0.009	0.9193	-0.415	0.6305
Adjusted ROA_t	-0.484	0.0673*	5.396	0.3404
Adjusted ROA_{t-1}	-2.812	0.0127**	-3.813	0.4170
M/B ratio_t	-0.004	0.6975	-0.230	0.3848
M/B ratio_{t-1}	0.000	0.9801	-0.114	0.6355
$\ln(\text{sales})_t$	1.231	0.0472**	-1.493	0.5920
$\ln(\text{sales})_{t-1}$	-0.747	0.2204	0.580	0.8293
PR_t	-0.336	0.1602	-0.700	0.4393
PR_{t-1}	0.087	0.7317	-0.075	0.9072
$CPI\%_t$	0.023	0.9147	-0.514	0.6479
$CPI\%_{t-1}$	0.454	0.0908*	-0.588	0.6510
$GDP\%_t$	-0.178	0.7077	-2.060	0.0786*
$GDP\%_{t-1}$	-0.075	0.8819	0.709	0.6136
R^2	0.5386		0.0844	

Notes: The following regression equation is conducted: $DE_{MV} = b_0 + b_1DE_{Y;t-1} + b_2ROA_t + b_3ROA_{t-1} + b_4FA/TA_t + b_5FA/TA_{t-1} + b_6CR_t + b_7CR_{t-1} + b_8\text{Adjusted } ROA_t + b_9\text{Adjusted } ROA_{t-1} + b_{10}\text{M/B ratio}_t + b_{11}\text{M/B ratio}_{t-1} + b_{12}\ln(\text{sales})_t + b_{13}\ln(\text{sales})_{t-1} + b_{14}PR_t + b_{15}PR_{t-1} + b_{16}CPI\%_t + b_{17}CPI\%_{t-1} + b_{18}GDP\%_t + b_{19}GDP\%_{t-1}$.

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level

The R^2 values in Table 5 also convey that differences may exist between listed firms and those firms that were delisted from the JSE during the study period of 14 years. The results indicate that the sub-set of listed firms may be more interested in market value leverage, since the variation in the independent variables can explain 53.86% of the variation in DE_{MV} when one-year lag variables are included. The sub-set of delisted firms, however, reports a weaker result with a R^2 value of only 0.0844.

The results may indicate that market value may be a very important measure for listed firms. Investors are not only interested in the information from the financial statements, but also in the current performance and potential of firms. Investors can obtain this information by referring to the performance of a firm in preceding years. If a firm reports growth and shows potential, investors might be willing to pay more for the shares than its book value. The managers of these firms should, therefore, try to improve the financial performance of the firm in order to obtain the confidence of outside investors which may results in an increase in the market value of their equity. It may be possible that delisted firms may be more concerned with book value leverage if the firm is struggling financially or if they are in the process of financial restructuring. If investors can predict financial problems in a firm, they will most probably retract their capital from that particular investment. Investors will furthermore lose confidence in such a firm, which will consequently result in decreases in the market value of their equity,

causing the market value of equity to be lower than the book value of equity. This might explain why the multiple regression results are so much stronger for the sub-set of listed firms than the sub-set of delisted firms.

Another interesting observation is that for the sub-set of listed firms, more of the independent variables (ROA_t; adjusted ROA_t; adjusted ROA_{t-1}; ln $(sales)_t$; $CPI\%_{t-1}$) report significant relationships with DE_{MV} compared to the sub-set of delisted firms. Both sub-sets report that $DE_{MV;t-1}$ is significant at the 1% level. This may also be an indication that the capital structure of the preceding year may be very important in capital structure decisions and that it takes time for capital structures to adjust.

The results provided in Table 5, however, clearly illustrate that:

- the identified firm characteristics and economic factors can explain some of the variation in DE_{MV}. Therefore, these factors do affect the capital structure of South African listed industrial firms
- those firms that remain listed on the JSE report different results compared to those firms that delisted from the JSE during the study period of 14 years.

6. Conclusion and recommendations

The primary objective of this study was to determine the effect of firm characteristics and economic factors on the capital structures of listed industrial firms in South Africa. This study was conducted for a period of 14 years, covering 1995 to 2008. Based on prior research, six firm characteristics (profitability, asset structure, liquidity, business risk, growth and size) and three economic factors (interest rate, inflation and economic growth) were selected for the study. The descriptive statistics and correlation analysis were conducted on the full data set, containing both listed and delisted firms. For the simple and multiple regression analyses, the panel data set was divided between two sub-sets of firms, namely the sub-set of listed firms and the sub-set of delisted firms. This was done in order to determine if the results for those firms that remained listed on the JSE differ from the results of those firms that delisted during the selected period of 14 years.

The primary and the secondary objectives were achieved by the various statistical tests conducted. The results from the simple regression analysis indicate that most of the independent variables can explain some of the variation in DE_{MV} (even though the R^2 values are weak). The two most significant variables are asset structure (FA/TA) and ln (sales). These findings are important, since it seems that prior 1994 and post 1994 studies convey different significant variables for capital structures in South Africa. A study conducted by Jordaan, Hamman and Smit (1993) reports that profitability and operating leverage (similar to business risk) are the dominant determinants of capital structures of industrial firms. The results from this post 1994 study convey that size and asset structure are of the most dominant determinants of capital structures, specifically for listed firms.

The results from the multiple regression analyses indicate that the variables combined can explain even more of the variation in DE_{MV}. It, furthermore, indicates that the sub-set of listed firms report different results than the sub-set of delisted firms. It, thus, appears that one sub-set may be more affected by certain variables than the other, and vice versa. The results for the sub-set of listed firms indicate that the variation in the independent variables can explain almost 54% of the variation in DE_{MV}, compared to only 8% for the sub-set of delisted firms. This result may also indicate that listed firms focus more on market value leverage and it might be possible that the delisted firms may focus more on book value leverage. Due to the different results reported by the two sub-sets of firms, researchers should definitely be careful of survivorship bias in similar future studies.

7. Limitations and areas of future research

It is extremely difficult, if not impossible, to obtain financial data of those firms that are not listed on the JSE. Since private firms do not have a legal obligation to make their financial data available, the census for this study was limited to the inclusion of only publicly listed firms. Capital structure research on small and medium enterprises (SMEs) represent a gap in the South African financial literature, due to the difficulty of obtaining data from these enterprises. This may provide an opportunity for future research.

The six firm characteristics and three economic factors used in the study were identified based on previous empirical capital structure research. A vast set of variables may influence the capital structure decisions made by financial managers. It is, however, difficult to identify all these variables and include them in one study. This challenge, therefore, limited the study to the inclusion of only a few variables. More variables may, thus, be included in future studies to determine if other variables may also have an effect on the capital structure of firms in South Africa.

Lastly, it is evident from this study that the identified firm characteristics and economic factors have an effect on capital structures. The question now remains why this is so. A future research opportunity may be to obtain information from the financial managers themselves by means of personal interviews. This may give an indication of why these variables have an effect on capital structures and also which of these factors they consider when making financing decisions. It may also provide an indication

of whether they focus more on book values or market values.

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