CAPITAL STRUCTURE AND DEBT MATURITY CHOICES FOR SOUTH AFRICAN FIRMS: EVIDENCE FROM A HIGHLY VARIABLE ECONOMIC ENVIRONMENT

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Abstract

This paper investigates the capital structure and debt maturity choices of a sample of South African listed industrial firms for the period 1989 to 2008. The South African economy provides the ideal backdrop for this study, since high levels of variation were observed for major economic indicators like growth in GDP, inflation, exchange rates and interest rates during the period under review. The study period also includes the transition to a democratically elected government in 1994 and the abolishment of international sanctions that resulted in sharp increases in levels of foreign direct investment. The results of the study indicate that the changing economic environment played an important role in the capital structure decisions made by firms, resulting in debt maturity choices favouring equity capital and short-term debt financing.

Keywords: *capital structure, debt maturity*

JEL codes: *G30, G32*

1. Introduction

Capital structure theory developed from the seminal work done by Modigliani and Miller (1958; 1963) and Miller (1977). Their studies, however, are based on a large number of restrictive assumptions. Examples of these assumptions include no tax (this assumption was relaxed in their second paper), perfect capital markets, no transaction costs, etc. Subsequent research on capital structure theory has focused on the effect that deviations from these assumptions have on a firm's capital structure. The results of these studies indicate that firm-specific factors may play an important role in a firm's capital structure. A number of studies also investigated the effect that economic variables may have on capital structures.

During the past 30 years the South African economy experienced relatively large deviations in economic variables. During the 1980's and early 1990's the country was also exposed to international sanctions. These economic sanctions resulted in limited foreign direct investment in the country. As a result, South African companies had to generate the majority of their capital requirements by using domestic capital sources. After the first democratic elections in 1994, the economic sanctions against the country were lifted, and a sharp increase in foreign direct investment occurred.

The objective of this study is therefore to evaluate the effect of changes in economic variables on the capital structures of a sample of listed industrial South African companies for the period 1989 to 2008. This period contains large variations in economic variables, and provides the ideal background to investigate their effect on capital structure. The study also includes the period where international sanctions against the country were lifted, resulting in the increase in foreign direct investment.

The remainder of this paper consists of four sections. The first section contains the background to the study. In the second section, the research method is described. After this, the empirical results are reported. The final section contains the conclusions, managerial implications, and recommendations for future research.

2. Background to the study

The majority of research on capital structure theory followed the groundbreaking work done by Modigliani and Miller. In the first of their papers (Modigliani and Miller, 1958) they provided a theory that indicates that a firm's value is not determined by the capital structure it implements. This theory was proved in their paper based on a large set of limiting assumptions. One of these assumptions was that there are no taxes, and was one of the major criticisms levied against the paper. In real live, interest payments are tax deductable, and the interest shield that a leveraged firm obtained results in a benefit for the company. Consequently, Modigliani and Miller adjusted their theory on capital structure to incorporate corporate taxes (Modigliani and Miller, 1963). Based on this theory, a company would benefit from including more debt capital in its capital structure. Another paper by Miller (1977) also incorporated personal taxes.

A large number of studies have since focused on the effect of relaxing some of the assumptions included in Modigliani and Miller's theories. Amongst others, the focus has been placed on the effect that industry differences have on capital structures (Balakrishnan

and Fox, 1993; Harris and Raviv, 1991; Brigham and Ehrhardt, 2001). Firm characteristics like size, profitability, liquidity and asset structure have also been considered (Chen and Hammes, 2004; Titman and Wessels, 1988; Myers, 1977; Harris and Raviv, 1991; Rajan and Zingales, 1995). The effect of country differences on capital structures have also been investigated (Chen and Strange, 2006; Rajan and Zingales, 1995;). Economic factors also appear to influence capital structure. Studies conducted by De Jong, Kabir and Nguyen (2008) and Fan, Titman and Twite (2008) indicate that certain economic factors explain a significant part of the variation in capital structures across countries. Based on the results of these studies, it appears that the economic environment in which a company operates could have an important influence on its capital structure.

During the past two decades the South African economy has experienced significant changes. The removal of economic sanctions since 1994 has resulted in a turnaround of the country's economy (Bhorat and Oosthuizen, 2005; Du Plessis and Smit, 2007). If foreign direct investment (FDI) is considered for the period 1989 to 2008, it can be seen that it increased from extremely low levels before 1994 to substantially higher current levels.

The question therefore arises what effect this highly variable and changing economic environment had on the capital structures of South African companies. More importantly, it is also necessary to investigate what effect the large increase in FDI had on the ways that companies finance their operations. The objective of this paper is therefore to investigate the capital structures of South African firms against this background.

3. Research method

3.1 Sample

This study focuses on the period 1989 to 2008. The reason why this period is investigated is that it contained significant changes in economic variables. During this time, the country also experienced pronounced changes with regard to foreign investment. For the purpose of the study a sample of firms listed on the Industrial Sector of the Johannesburg Securities Exchange (JSE) is compiled. This sample includes all firms listed at the end of the study period, as well as those that delisted during the period. The delisted firms are included in an attempt to reduce survivorship bias.

The data investigated in this study represents panel data, since data are obtained for different companies over different years. It was therefore decided to use a panel data analysis technique that will consider cross-section as well as time-series data. The TSCSREG function

in SAS was therefore applied to conduct multiple regressions on the data set. In order to ensure that this technique is applied efficiently, it was decided to include only those companies that had data available for at least five years. This resulted in a final sample of 312 companies (172 listed and 140 delisted) that yielded 4 035 firm-year observations (2 580 listed and 1 455 delisted).

3.2 Variables

3.2.1 Dependent variable

The dependent variable investigated in this study is capital structure, and it is quantified by determining a firm's book value of debt over market value of equity ratio.

3.2.2 Independent variables

In order to evaluate the effect of firm-specific factors on capital structure, certain firm-specific variables were included in the study. These included the maturity of debt (calculated as long-term debt over total debt), asset tangibility (fixed assets over total assets), profitability (quantified as the return on total assets), operating risk (the absolute value of the change in return on total assets), firm size (lognormal of sales), growth (market value of equity over book value of equity) and assets maturity (total assets over depreciation). The economic variables included were inflation (measured as the change in the consumer price index, CPI), growth (measured as the change in gross domestic product, GDP), the exchange rate (the rand / US $ exchange rate was used), the corporate tax rate, and foreign direct investment (expressed as a percentage of GDP).

3.3 Data

The data required to calculate the firm-specific variables included in the study were obtained from the McGregor BFA database (2009). This database contains standardized financial statements for both listed and delisted firms. Economic data were obtained from the South African Reserve Bank (SARB) Quarterly Bulletins.

4. Empirical results

4.1 Descriptive statistics

Table 1 contains the descriptive statistics of the dependent and independent variables included in the study.

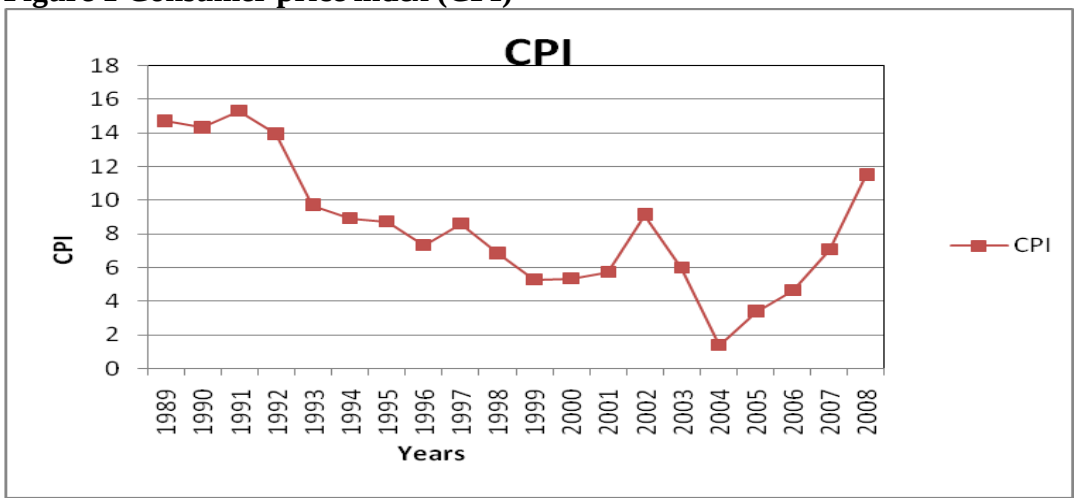
Table 1 Descriptive statistics

	MEAN	MEDIAN	STANDARD DEVIATION
DEPENDENT VARIABLE			
Leverage	0.188	0.124	0.199
FIRM-SPECIFIC VARIABLES			
Maturity	0.564	0.645	0.352
Tangible	0.275	0.247	0.194
Return on assets	0.061	0.078	0.282
Operating risk	0.101	0.032	0.344
Firm size	12.388	12.367	1.856
Market to Book equity	1.316	0.858	2.953
Asset maturity	3.524	1.889	6.119
ECONOMIC VARIABLES			
Inflation	0.095	0.087	0.035
GDP	0.019	0.024	0.019
Exchange rate	0.045	0.036	0.018
FDI / GDP	0.008	0.004	0.012
Tax	0.382	0.350	0.073

Perusal of Table 1 indicates that relatively large differences between mean and median values are observed for some of the firm-specific variables. Large standard deviations are also calculated for some of these variables. This could point towards the inclusion of outlier values. In the remainder of the study, non-parametric analysis will be conducted to reduce the effect of the outlier values.

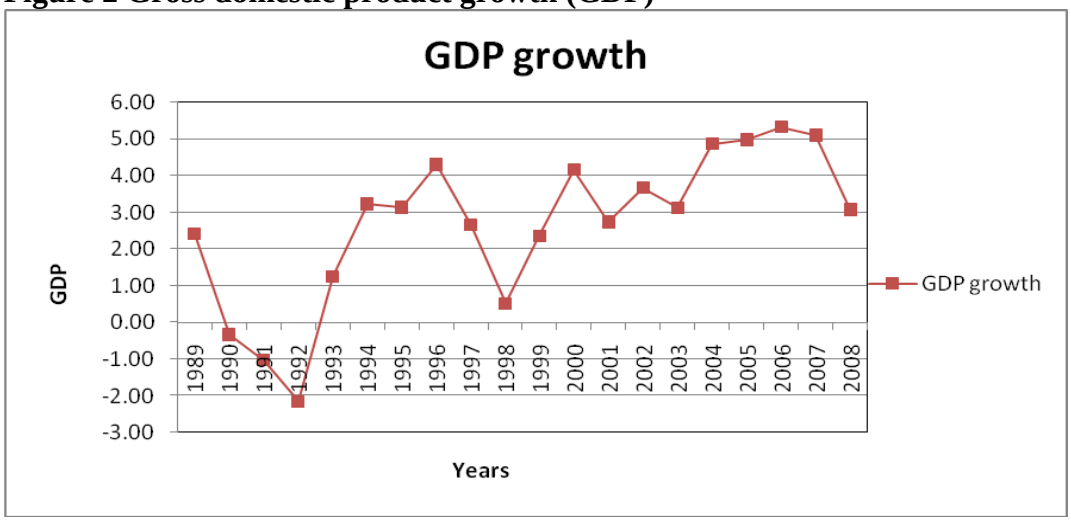
In order to evaluate the changes in the economic variables over time, the average values of the economic variables over the study period are plotted in Figure 1 to Figure 5.

Figure 1 Consumer price index (CPI)



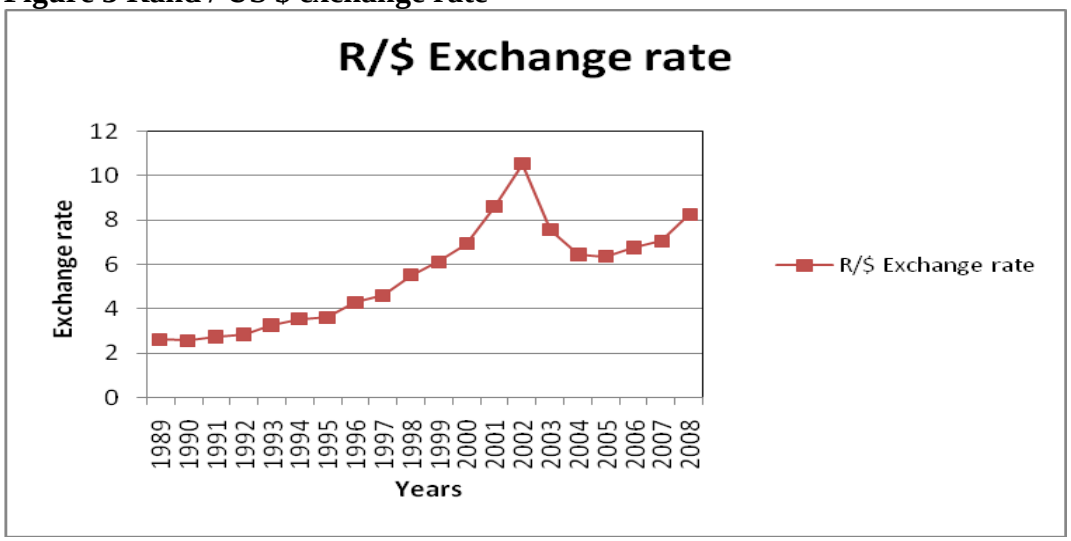
During the period 1989 to 2008 inflation levels in South Africa (as measured by the Consumer Price Index (CPI)) exhibited great variation. Inflation levels decreased from a high of 15.3 per cent during 1991 to a low of 1.4 per cent in 2004.

Figure 2 Gross domestic product growth (GDP)



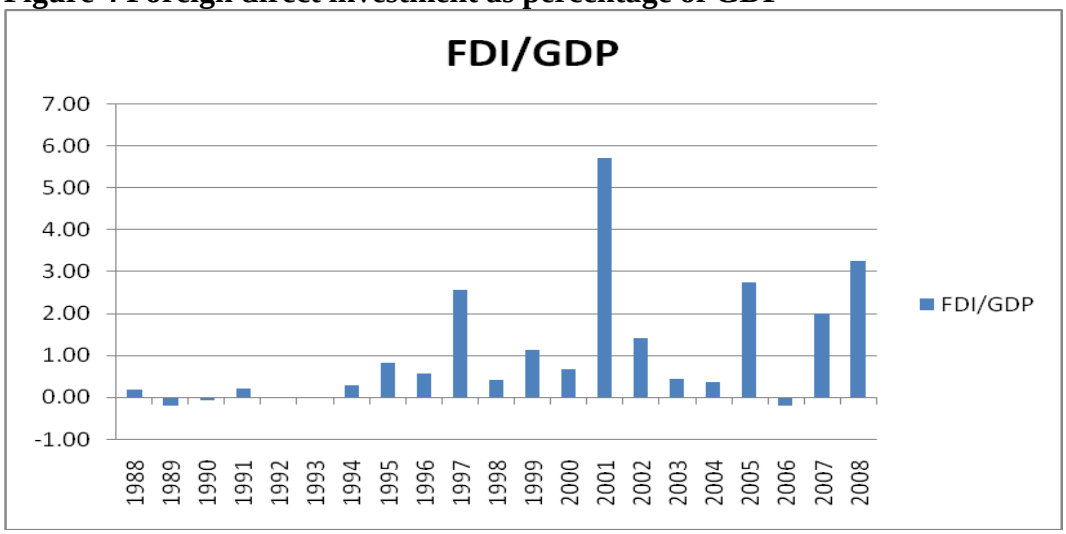
If the economic growth rate of South Africa (as measured by the growth in Gross Domestic Product (GDP)) is investigated, a highly variable situation is once again observed. During the years 1990 to 1992 negative economic growth is observed. This situation reversed over the next 16 years, with positive economic growth of 5.3 per cent achieved during 2006.

Figure 3 Rand / US $ exchange rate



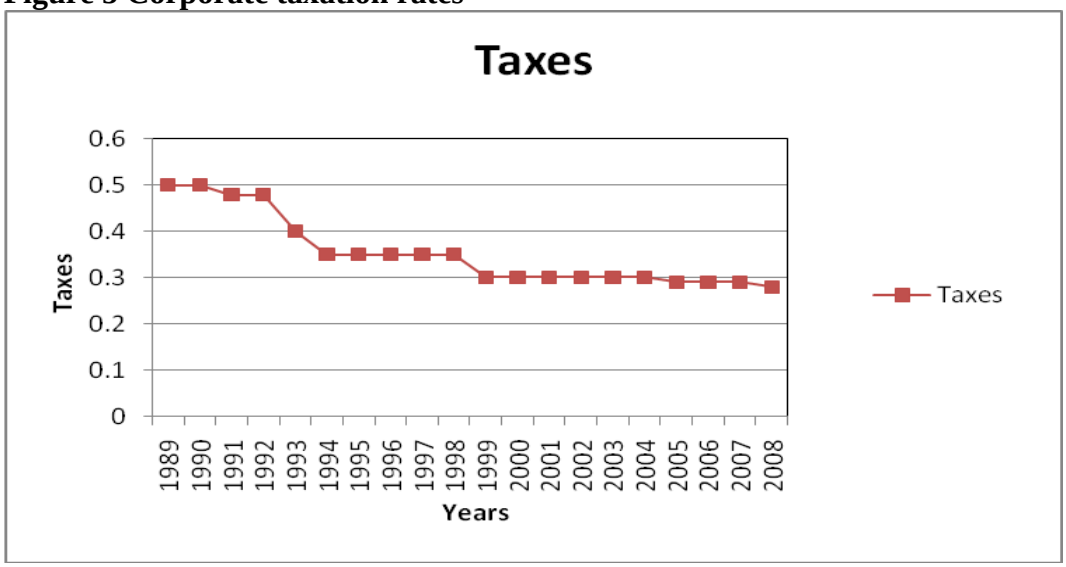
The South African exchange rate shows a steady decline over the period 1989 to 2002, decreasing from R2.62 / $ to R10.52 / $. After 2002, the exchange rate improved to levels around R8 / $.

Figure 4 Foreign direct investment as percentage of GDP



Before the first democratic general elections that took place in April 1994, South Africa had limited access to foreign capital. In reaction to the Government policy of Apartheid, most foreign governments imposed strict economic sanctions against South Africa, and very few international firms were prepared to invest in the country. After the elections, however, these sanctions were lifted, and South African firms were able to access foreign capital. The effect of this can be clearly seen in Figure 4.

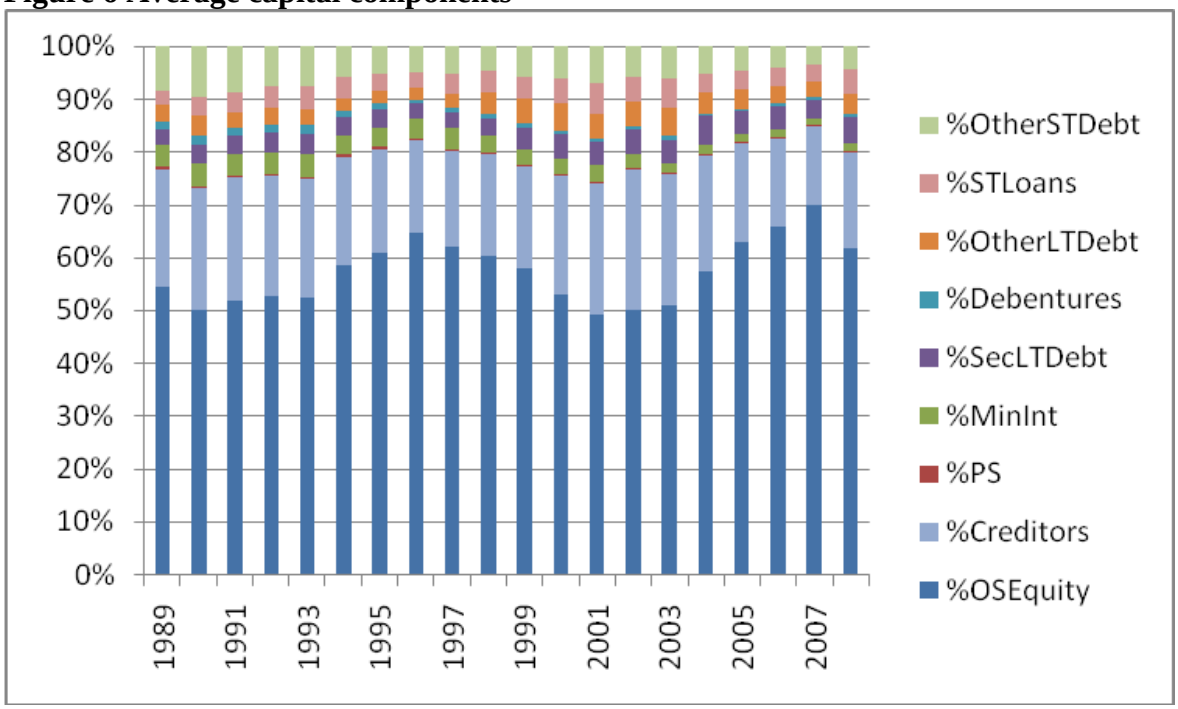
Figure 5 Corporate taxation rates



During the 20-year period 1989 to 2008 the corporate taxation rate in South Africa declined from a level of 50 per cent during 1989 to 28 per cent during 2008.

In order to investigate changes in capital structures, the average capital components over time are presented in Figure 6.

Figure 6 Average capital components



From Figure 6 it becomes clear that the majority of South African firms financed the bulk of their capital requirement by means of Ordinary Shareholders' equity and trade credit. Combined, an average of 75% to 85% of the total capital requirement is financed by these two capital forms. In most years, long-term debt capital contributes less than ten percent of the overall capital requirement.

4.2 Correlation analysis

The results of a Spearman correlation analysis are provided in Table 2:

Table 2 Spearman correlation coefficients

	Leverage	Maturity	Tangible	ROA	Operating Risk	Firm Size	Market to Book equity	Asset Maturity	Inflation	GDP	Exchange rate	FDI/GDP	Tax
Leverage	1.000												
Maturity	0.226	1.000											
Tangible	0.291	0.189	1.000										
ROA	-0.405	-0.013	-0.047	1.000									
Operating Risk	0.106	0.003	-0.055	-0.120	1.000								
Firm Size	0.017	0.087	0.187	0.123	-0.307	1.000							
Market to Book equity	-0.382	0.076	-0.017	0.449	-0.003	0.135	1.000						
Asset Maturity	0.279	0.192	0.925	-0.055	-0.099	0.206	-0.029	1.000					
Inflation	0.027	0.013	0.051	0.002	-0.118	-0.141	-0.132	0.090	1.000				
GDP	-0.057	0.012	-0.036	0.059	0.049	0.127	0.204	-0.063	-0.579	1.000			
Exchange rate	0.025	-0.004	-0.067	0.008	0.144	0.184	0.097	-0.113	-0.604	0.564	1.000		
FDI/GDP	-0.016	-0.019	-0.041	0.000	0.083	0.145	0.098	-0.063	-0.376	0.318	0.673	1.000	
Tax	0.004	-0.017	0.059	-0.049	-0.122	-0.200	-0.182	0.095	0.711	-0.702	-0.887	-0.629	1.000

In terms of the dependent variable, highly significant positive correlations are observed with debt maturity, asset tangibility, operating risk, and asset maturity. Negative statistically significant correlations are observed with return on assets, market-to-book equity, and growth in GDP.

One of the problems associated with correlation analysis is that it cannot be used to establish causation amongst the variables being investigated. Therefore, it cannot be stated that the change in one variable caused the change in another variable. The direction of the relationship is also indeterminate (Coldwell & Herbst, 2004:107-109; Levine, Stephan, Krehbiel and Berenson, 2008). Multivariate regression analyses are thus conducted to evaluate the nature of the relationships between the dependent and the independent variables.

4.3 Regression analysis

The results of a multivariate regression analysis that included both the firm-specific and economic variables as independent variables are provided in Table 3. Since this study wants to investigate the effect of the economic changes that resulted from the abolishment of international sanctions, the sample was also split into the period before 1994, and the period after 1994.

Table 3 Results from multivariate regression analysis

	ALL DATA	**BEFORE 1994**	**AFTER 1994**
Intercept	0.5803 (0.95)	4.7787 (0.55)	1.6909 (1.22)
Maturity	-0.0594 (-0.99)	0.0473 (3.23***)	-0.1228 (-1.46)
Tangible	0.1775 (1.55)	0.3491 (8.79***)	0.1922 (1.16)
ROA	-0.0274 (-0.66)	-0.2585 (-6.12***)	-0.0230 (-0.46)
Operating Risk	-0.0254 (-0.71)	0.1146 (2.94***)	-0.0347 (-0.80)
Firm Size	-0.0349 (-2.74***)	-0.0016 (-0.26)	-0.0487 (-2.64***)
Market to Book	-0.0139 (-2.22**)	0.0010 (0.64)	-0.0180 (-1.98**)
Asset Maturity	-0.0000 (-083)	-0.0006 (-10.10***)	-0.0000 (-0.58)
Inflation	0.7817 (0.44)	5.8672 (0.43)	1.1539 (0.53)
GDP	0.7502 (0.27)	-3.4463 (-0.61)	1.5281 (0.34)
Exchange rate	1.5610 (0.54)	-63.1802 (-0.56)	-0.5304 (-0.12)
FDI/GDP	0.3363 (0.12)	-48.4866 (-0.48)	0.5313 (0.16)
Tax rate	-0.2700 (-0.19)	-7.8315 (-0.50)	-2.8536 (-0.83)
Adjusted R^2	**0.0040**	**0.1533**	**0.0054**
Variance component for cross sections	0.1153	0.0373	0.2791
Variance component for times series	0.0155	0.0004	0.0204

Notes: *t*-Statistics are provided in parentheses. *** Significant at the 1% level ** Significant at the 5% level

Perusal of Table 3 indicates that a relatively low adjusted R^2 value of 0.004 is obtained for the regression conducted on the full sample. If the sample period is split into the period before and after 1994, however, a much higher adjusted R^2 value of 0.153 is observed for the regression based on the sample years before 1994. Based on the years after 1994, however, the adjusted R^2 value is relatively low again.

In terms of the regression coefficients obtained for the full sample, statistically significant values are observed for firm size and market-to-book equity. Both of these coefficients are negative, indicating a negative relationship between these variables and firm leverage. A similar pattern is observed for the regression based on the sub-sample focusing on the years after 1994.

Different results, however, are obtained if the period before 1994 is investigated. Statistically significant positive regression coefficients are observed for debt maturity, asset tangibility and operating risk, while significant negative coefficients are observed for profitability and asset maturity. It would appear that during these years, leverage was negatively related to profitability (this corresponds to proponents of the pecking order theory) and asset maturity (companies with older assets seemed to use less debt capital, probably because they needed less capital to replace assets). The positive relationship between leverage and debt maturity indicates that firms with more long-term debt capital in their capital structure, also used more debt in total. Asset tangibility could be seen as a proxy for the security that a company's assets could provide. The positive relationship with leverage could possibly be ascribed to these companies being able to obtain more debt capital than those who did not have large amounts of fixed assets that could be used for collateral. The positive relationship between operating risk and leverage indicates that more risky companies included more debt capital in their capital structures.

The period after 1994 included a number of pronounced economic changes. It was therefore decided to split this period into two sub-periods as well, to determine if different influences are experienced. Results from the regression analyses conducted on the two sub-periods 1995-2000 and 2001-2008 are provided in Table 4.

Table 4 Results from multivariate regression analysis conducted on the two sub-periods after 1994

	1995-2000	**2001-2008**
Intercept	0.4637 (0.72)	-9.9744 (-0.82)
Maturity	0.0579 (4.27***)	-0.3015 (-1.57)
Tangible	0.2800 (8.74***)	0.0628 (0.16)
ROA	-0.0762 (-4.13***)	-0.0289 (-0.38)
Operating Risk	-0.0606 (-3.24***)	-0.0713 (-1.06)
Firm Size	-0.0023 (-0.59)	-0.1112 (-2.44**)
Market to Book	-0.0139 (-5.71***)	-0.0214 (-1.38)
Asset Maturity	-0.0001 (-4.62***)	-0.0000 (-0.26)
Inflation	2.5268 (0.55)	16.0292 (1.25)
GDP	-0.8259 (-0.56)	20.7484 (1.06)
Exchange rate	2.4204 (0.61)	-24.351 (-1.05)
FDI/GDP	-1.8908 (-0.58)	6.0657 (0.78)
Tax rate	-1.8142 (-0.94)	40.3151 (0.96)
Adjusted R^2	**0.1273**	**0.0089**
Variance component for cross sections	0.0158	1.9751
Variance component for times series	0.0014	0.0675

Once again, a much larger adjusted R^2 value is observed for the first period (0.127 vs. 0.009). Some of the regression results correspond with those reported for the years 1989 to 1994. When considering the years 1995-2000, two major differences, however, are observed. The first difference concerns the sign obtained for operating risk. This sign changed from a positive one for the period before 1994, to a negative one for the years following 1994. This would appear to indicate that more risky firms used less debt capital in their capital structure. The second difference is observed for the market-to-book equity ratio. This variable was included to evaluate what effect a growth strategy has on a company's capital structure, and is highly significantly and negatively related to the dependent variable during the period 1995 to 2000. This seems to indicate that high growth companies used less debt capital in their capital structures during this period.

5. Conclusion

In this study, the effect of the changing economic environment experienced by South African industrial companies was investigated. The descriptive statistics indicated that these companies utilize ordinary shareholders' equity and short-term trade credit to finance the biggest portion of their total capital requirement. In order to evaluate if the abolishment of international sanctions resulted in changes in companies' capital structures, regression

analyses that focused on the data before and after 1994 were conducted. The results from these regression analyses indicate that differences did occur before and after 1994. More specifically, it was found that a positive relationship existed between leverage and debt maturity, asset tangibility and operating risk. Negative relationships were observed between the dependent variable and profitability and asset maturity. Two changes that occurred in the period following 1994 was that the nature of the relationship between leverage and operating risk changed, and that growth companies seemed to include less debt capital in their capital structure.

The results of this study therefore seem to indicate that differences occurred before and after 1994. During the last years of the study, less significant relationships between the independent variables and capital structure were observed. This is surprising, but could possibly be ascribed to the large number of changes that occurred during this period. Overall, it would appear that South African firms tend to be relatively conservative with regard to debt financing.

In future research, the focus should be placed on the effect of the current economic crisis on South African firms. Currently, these firms have managed to escape relatively unharmed, and this is mainly ascribed to their conservative capital structures and low levels of debt capital. Additional research should also be conducted to investigate what effect institutional investors played on the capital structures of companies during the period under review. In this study, the economic variables appeared not to have much influence on capital structures. It is possible, however, that changes in economic variables may take longer before they are reflected in a firm's capital structure. Future research should also focus on including a longer period of time to investigate if this is the case.

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