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**AN INVESTIGATION OF THE DETERMINANTS OF FIRM'S CAPITAL
STRUCTURE:
THE CASE OF INDUSTRIAL FIRMS LISTED ON THE JSE SECURITIES
EXCHANGE**

**Presented to
the Faculty of Commerce
University of Cape Town**

**In Partial Fulfillment
of the Requirements for the Degree of
Master of Commerce in Financial Management**

**By
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DECLARATION

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution by, and quotations from the work, or works of other people have been attributed, and have been cited and referenced.

Signed by candidate

Biniam M. Ghirmatsion

Signature __

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Abstract

Most of the evidence on the determinants of capital structure is derived from the developed countries with advanced securities markets. Very little has been written about capital structure in developing countries. Thus, as noted by Drobetz and Fix (2003), the academic literature has not been very helpful in providing clear guidance on practical issues of capital structure. This paper investigates the determinants of capital structure in South Africa, a developing country with a well-developed capital market institution, the JSE. The sample constitutes 119 industrial firms each year from 1997-2002. Using a multiple regression model, size and tangibility have a positive effect on financial leverage, with the exception of the negative impact of tangibility when financial leverage is measured grossly with all liabilities. With this exception, the results on size and tangibility support the trade-off theory of capital structure. Profitability and firm's age have a negative impact on financial leverage which is consistent with the pecking order theory. The proxies for business risk and growth opportunities indicate mixed results which depend on how financial leverage is computed. In the dynamics of the determinants of capital structure, most of the factors have shown an insignificant increased impact on financial leverage, except for the proxy of profitability which has shown a decreased impact on most of the measures over the years of study. The increased debt level and decreased profitability during the sample years suggest that firms shift to debt finance due to insufficient retained earnings. Finally, the pooled data evidence suggests that financial leverage differs across industry groups.

CHAPTER ONE

BACKGROUND AND OVERVIEW OF THE STUDY

Introduction

Capital structure is the way firm's capital is divided into debt and equity finances so as to maximize the value of the firm. Deciding on an appropriate capital structure is critical for any business organization for two main reasons. First, the decision should maximize the returns to the firm's shareholders. Second, the decision should provide the firm with financial flexibility to survive in a competitive environment.

The M-M (Miller and Modigliani) capital structure irrelevance theorem, based on unrealistic assumptions, is the cornerstone of modern capital structure concept. These two financial economists originated the concept of capital structure in 1958, arguing that financial policy is irrelevant, for which they awarded the Nobel Prize. Their argument contributed to the thinking on modern capital structure because further researchers continued with efforts directed at relaxing those assumptions considering many firm's specific factors. As a result other theories have been developed which better explain firm's financial structure. Particularly, the tax shield advantage, the existence of cost of distress and bankruptcy, information asymmetries between managers and outsiders, conflicts between equityholders and firm managers, and conflicts between equityholders and debtholders are key drivers for modern capital structure theories. In turn, these issues are interrelated with individual firm specific factors such as tangibility of assets, firm size, exposure to operational risk, financial performance, growth opportunities, management attitude towards risky investments, tax rate, etc. Since the fundamental propositions of each of the models of capital structure were made, researchers in the area of finance have endeavored to find an association between those firm specific factors and financial leverage structure of firms in diverse situations¹. This too is the major objective of this paper.

¹ Across developed and developing countries or stock markets with differing institutional factors.

1.1 Rationale for the Study

Corporate finance literature abounds with empirical studies examining the nature and determinants of corporate financial structure. However these studies are focused on developed countries such as the U.S where the theory of capital structure was pioneered. There are also very few cross-country studies on the determinants of capital structure. The well-known studies are Rajan and Zingales (1995) for the developed (G-7) countries and Booth et al (2001) for the developing countries. Booth et al included developing countries from various continents including Zimbabwe from Africa. These developing countries have a developing capital market institution. The reason why these authors did not include the South African firms could be because South Africa has equity and public debt markets that are unusually large relative to the size of the economy even by developed country standards (Malherbe and Lawless 2001). Demircuc-Kunt and Maksimovic (1996) confirmed that the South African stock market is grouped with the most developed stock markets in the world, measured by size and liquidity of stock market. Thus, this study is aimed at analyzing the determinants of capital structure in a developing country with a well-developed capital market institution, the JSE Securities Exchange.

Mixed empirical results regarding the determinants of capital structure led Myers (1984, 575) to conclude that “our theories don’t seem to explain actual financing behaviour, and it seems presumptuous to advise firms on capital structure when we are so far from explaining actual decisions.” This statement might imply that financing decisions lack objective supporting theories and are hence highly dependent on subjective judgments, which might account for potential corporate failures. Yet, as noted by Drobetz and Fix (2003), the academic literature has not been very helpful in providing clear guidance on practical issues. Most of the studies reviewed focus on the correlation of the determinants with financial leverage and not on the change of the correlation over time. It is also important to know the pattern of firm’s financing across industry groups. Harris and Raviv (1991) in their review of capital structure noted that it is generally accepted that firms in a given industry will have similar leverage ratios while leverage ratios vary

across industries. However, as the studies use different measures to classify the firms into industry groups, the significance of the effect is not clear.

As the Booth et al's (2001) findings suggested, some insights from modern finance theory are portable across countries, but much remains to be done to understand the impact of different institutional features on capital structure choices. This makes it difficult for financial managers to set their capital structure in such a manner so as to pursue their corporate goals, such as maximizing the value of a firm. On the other hand, investors seek security for their investment to yield a return in making their investment decision. Investors face a lack of information and awareness of how firm's capital structure choice is made. For example, Malherbe and Lawless (2001), noted that South African corporates are under leveraged and South African Banks are facing pressure to price corporate loans correctly.

1.2 Objectives of the Study

This research investigates the determinants of capital structure in South African firms listed on the JSE with the following objectives:

- To investigate factors that influence the financing behaviour of JSE listed firms.
- To explore the changes in the influence of the determinants over time. The results of the dynamics in the determinants indicate to what extent the effect of the factors on debt level has been increasing or decreasing.
- To relate the financing behaviour of the JSE listed firms to the theories of capital structure. This objective is aimed at exploring which of the theories of capital structure are able to explain the firm's financial structure.
- To examine the significance of inter-industry capital structure differences in the JSE listed firms.

1.3 Significance of the Study

The study contributes for the following purposes:

- The findings of the study would contribute towards filling a gap in the literature, by considering whether the factors of financial leverage that are relevant in the developed countries are also relevant in the developing countries. Furthermore, the study highlights which of the theories of capital structure can best explain the financing behaviour of a developed stock market in a developing country.
- The study provides information for South African lending institutions, on what factors are relevant and need attention, in pricing loans to their clients.
- The study is also relevant for financial managers in that it explores the factors which can help them decide on how and to what extent they can create financial flexibility for future investment opportunities while at the same time maximizing the value of the firm by using debt finance.
- Research which is limited in scope and depth has been conducted with regard to the determinants of financial leverage in South African. This research could provide a base for further research in this regard.

1.4 Organization of the Study

Chapter one introduces the background and discusses rationale for the study, the problem statement with four main critical questions, the significance of the paper and how the study is organized.

Chapter two has two main sections. The first section presents the theoretical background of capital structure and in particular the four main theories of capital structure. The second section presents the empirical findings from previous studies on the determinants of financial leverage including the importance of industrial classification on financial leverage determination.

Chapter three presents the methodological aspects of the study, mainly the instruments of analysis, the development of hypotheses, the measurement of financial leverage and the determinants, source of data and data treatments.

Chapter four presents the analysis of the study. The findings and the discussion of the findings in the cross-sectional, pooled cross-sectional, and dynamics of the determinants of capital structure analysis are contained in different sections of this chapter.

Chapter five presents an analysis of whether the theories of capital structure can explain the behaviour of South African firms' capital structure based on the results of the study. The chapter also presents an analysis of inter-industry capital structure differences and a comparison of the findings with other studies.

Chapter six presents a summary of the findings and the conclusions of the study and recommendations for further research.

CHAPTER TWO

THE THEORETICAL AND EMPIRICAL LITERATURE REVIEW

Introduction

Capital structure is the way in which a firm's capital is divided into debt and equity finances so as to maximize the value of the firm. The value of a firm is the present value of its expected future free cash flows, discounted at its weighted average cost of capital (WACC). Computationally, changes in capital structure affect the WACC by changing the percentage composition, risk, and cost of each type of capital. Changes in capital structure can also affect the cash flows, by influencing managers in their capital budgeting decisions and also by altering the potential costs associated with bankruptcy and financial distress. Thus, capital structure affects both cash flows and WACC, and thus stock prices. This, however, is not existent in the first capital structure (M-M irrelevance) theory based on unrealistic assumptions. This is explained in the subsequent sections of this chapter.

This chapter has two main sections. The first section presents the four principal theoretical models of capital structure. In this section, since the focus of this paper is not to test the theories of capital structure, no specific model is developed for this purpose. Rather, here, the paper focuses on the fundamental overview of the theories and their predictions. The second section presents a detailed empirical literature review of the determinants of corporate capital structure.

2.1 Theories of Capital Structure

2.1.1 The M-M Irrelevance Theory

Two financial economists, Franco Modigliani and Merton Miller, developed this theory in 1958, for which they received the Nobel Prize. Their argument was that firms cannot create value by mixing debt capital with the equity capital, *No Magic in Leverage Theorem* (Proposition I), Modigliani and Miller (1958). The emergence of this theory that capital structure is irrelevant, served as a starting point to search for the factors that influence the financing strategies of firms. Many researchers in the field focused their effort on gaining the insights into capital structure and developed theories of optimal capital structure (Myers 1984). Most of the theories explained in the following sections focus on relaxing the assumptions of the M-M capital structure irrelevance theory.

2.1.2 The Trade-off Theory

This theory of capital structure is the continuation of the M-M capital structure irrelevance theory. It is a continuation in the sense that it relaxes the primary assumptions of the model. The first one is that taxes do exist, according to the correction made by Modigliani and Miller (1963). The second one is that capital markets are not perfect, that is, costs of bankruptcy and financial distress do exist (Stiglitz 1972, Kraus and Litzenberger 1973, Titman 1984). Generally, this theory suggests that there are two competing factors to trade-off. These are the advantages and disadvantages of debt.

Taxes - Adding debt to the capital structure of a firm benefits the firm through the tax shield created by interest paid, because interest is tax deductible. This increases the after tax cash flow available to equity shareholders. Therefore, the usage of debt in the firm's capital structure increases the firm's value by the present value of the interest tax shield (Modigliani and Miller 1963). This is the general story about debt and tax, however the magnitude of the gain differs according to the marginal tax rate of a firm. DeAngelo and Masulis (1980) and Myers (1984) demonstrated this concept that, firms with a vast amount of depreciation, investment tax credits, and tax loss carried forward, enjoy only a

very low tax shield advantage of debt. Thus, as non-interest tax shields increase the interest-tax shield decreases, resulting in low debt usage.

Financial Distress/ Bankruptcy costs - After Modigliani and Miller (1963) showed the advantage of debt through tax-shield, a line of research emerged on financial distress and bankruptcy. An increase in debt induces an increased probability of distress and eventually liquidation (Kraus and Litzenberger 1973). Financial distress occurs before the firm becomes bankrupt. Costs of financial distress are the losses associated with decisions affected by a firm being in financial distress and not because of the actual default. The ability to default makes the debt less valuable because in such circumstances financial distress becomes more costly due to transaction costs, the underinvestment problem, the opportunity costs associated with managing the crisis, and the defection of employees, customers and suppliers.

The bankruptcy costs refer to the value lost if default occurs. The value lost in the administration of the bankruptcy process (legal fees and management time) are also expenditures paid directly out of pocket. Titman (1984) argued that bankruptcy costs are relatively small compared to the market value of the firm. However, they could be substantial for small firms (Andrade and Kaplan 1998).

Agency Costs - These costs emerge due to the conflicts of interest between groups, namely, conflicts between equityholders and firm managers, and conflicts between equityholders and debtholders. Such conflicts raise costs and can be mitigated by increasing or decreasing the level of the firm's debt. These issues are discussed in detail in 2.1.4.

To summarize, the optimal capital structure depends on the trade-off of the above benefits and costs of debt finance.

Predictions of the model:

- The trade-off model predicts more profitable firms have more debt because higher profitability decreases the expected costs of distress and allows firms to increase their tax benefits by increasing debt. As costs of debt increase sharply, firms should use less debt.
- Financial distress and bankruptcy costs are higher for high growth firms and firms with a high intangible assets base, so these firms are expected to have a lower debt leverage ratio to avoid the possibility of financial distress. On the other hand, firms with more tangible assets are expected to have higher financial leverage, because they use the assets as collateral and can take more debt.
- Risky firms should borrow less because they do have the greater possibility of default on any given package of debt claims. While safe or stable firms are expected to borrow more until the expected costs of financial distress offset the tax advantage of borrowing.
- Large firms are believed to have a diversified holding. In this case, they can absorb more financial distress than the small firms can. Hence, diversified firms are predicted to have higher financial leverage than small and undiversified firms.

2.1.3 The Pecking Order Theory

As cited in Myers (1984, 581), Donaldson stated: "Management strongly favoured internal generation as a source of new funds even to the exclusion of external funds except for occasional unavoidable 'bulges' in the need of funds." However, the theory is formally developed by Myers (1984), based on the premise that the managers of a firm know more about the firm than outsiders; i.e., there is **information asymmetry** between investors and the managers².

² Relaxing the M-M assumption that investors and managers have the same information.

This theory has two dimensions. First, the preference of managers for internal source of finance to create financial flexibility, thereby no good investment opportunities will be passed up (to avoid the under investment problem). According to the pecking order theory (POT), in such circumstances managers can issue external sources of finance starting with the safest (debt) to the most risky (external equity) in terms of their effect on information costs. This being the priority ranking of the sources of finance, management faces the signaling effect, both positive and negative. Second, it is most probable that managers will issue equity when it is overpriced rather than underpriced. This is because, as Myers and Majluf (1984) pointed out, maximizing the “intrinsic” value of the firm’s existing shares is one of the primary objectives of most managers. If the firm’s finance requirements need external financing, managers issue debt if they believe that firm’s equity is underpriced and issue equity if they believe that firm’s equity is overpriced. Therefore, when the firm sells the overvalued equity, it sends some information that the management privately has. Consequently, the market takes into account this signal (information signal) and the price (market value of equity) falls³. This led Myers and Mailuf (1984) to argue that capital structure is designed to mitigate distortions in the investment decisions caused by information asymmetries⁴. If firms are required to finance new projects by issuing equity, underpricing may be so severe that new investors capture more than the net present value of the new project, which would result in a net loss to existing shareholders. In this case the project will be rejected even if its net present value is positive. This leads to the underinvestment problem. Therefore, the theory argues that this is the main cause for firms to prefer the second level of pecking order financing source, i.e., debt. Hence, equity, under any firm’s economic condition, becomes the last resort.

In contrast to the trade-off theory, there is no optimal capital structure ratio in the pecking order theory. The focus is on the current financing decision and the financial leverage

³ The positive signaling of debt and equity issuance is contrary to this model. For example, higher debt leverage signalling (Ross 1977) indicates high quality firms (e.g. high future cash flows), which is the opposite of the pecking order theory prediction.

⁴ The survey finding by Graham and Harvey (2000) indicated that firms avoid equity when they perceive that it is undervalued, consistent with the POT. However, this is not consistent with the POT’s concept that informationally-induced equity undervaluation causes firms to avoid equity financing.

ratio is a function of operating performance. In this theory, the top and bottom ranks in the financing choices are retained earnings and equity issuance respectively. Thus, a firm's capital structure reflects the accumulation of past finance requirements (Myers 1984).

Predictions of the model:

- The model predicts that firms that are more profitable would be expected to have lower financial leverage, because they do not need external funds and are more expensive. Less profitable firms have more financial leverage because they do not have sufficient internally generated funds and because debt has lower flotation costs and information costs than equity.
- High-growth firms are often thought of as firms with large information asymmetries. Myers and Majluf (1984) stated that asymmetric information creates costs such as the possibility that the firm will choose not to issue equity, and pass up positive net present value investments. This cost adds up to the obvious cost of external finance: administrative, underwriting costs and underpricing of the new securities. Therefore, according to the pecking order theory, financing behaviour is driven by adverse selection costs, which leads to higher financial leverage⁵. This prediction is based on the assumption that high-growth firms require a large amount of external financing, as internally generated funds are not sufficient to finance the positive net present value opportunities.
- Large and old firms have sustainable accumulated profits and simply do not need external finances to the extent that the young firms do. Thus these firms are expected to have low debt ratio. A contradictory prediction is that small firms usually tend to follow the pecking order theory and exhibit lower financial leverage ratio because they face difficulty in accessing external financing sources

⁵ Securities with lower information costs should be issued first, before the firm issues securities with higher information costs, Myers (1984).

(Byoun and Rhim 2003). Thus small firms, mainly, use retained earnings as their finance sources.

2.1.4 The Agency Theory

Jensen and Meckling (1976) integrated the agency theory into the finance literature when they identified two types of conflict. These are conflicts between shareholders and managers (later developed to the free cash flow hypothesis by Jensen 1986), and conflicts between debtholders and equityholders.

Conflicts between shareholders and managers (Free Cash Flow Hypothesis) –

The free cash flow hypothesis originated from the interest conflicts of shareholders and managers. Free cash flow is the cash in excess of the funds required to finance all positive net present value projects. Firms with substantial free cash flow face conflicts of interest between stockholders and managers. While stockholders want managers to maximize the value of their stocks, managers might have personal agendas and derive utility from consuming perks, such as corporate jets, plush offices, building “empires,” etc. Managers also tend to value investments even if the investments are not shareholder-value maximizing since managers gain prestige from being the managers of big firms. This behaviour is known as empire building or the overinvestment problem in the literature and is an agency cost. This is according to Jensen and Meckling (1976), because managers hold less than 100% of the residual claims they do not capture the entire gain from the profit enhancement activities while they bear the entire cost of these activities. As a result, managers invest the excess cash in negative net present value projects wasting the shareholders money. Jensen (1986) argued that companies that largely consist of assets-in-place and that produce stable operating cash flow can add value by increasing financial leverage to discipline financial managers.

Managers, instead, can use the free cash flow to increase the payout for shareholders or to buy-back stock (stock repurchase). If managers fail to do so, then, shareholders should introduce a mechanism of increasing financial leverage to address the free cash flow

problem⁶. This is because debt commits the firm to pay cash for interest and principal amounts, which reduces the amount of free cash available to managers to act inefficiently (Jensen, 1986). This mitigation constitutes the non-tax benefit of debt financing, reducing the agency cost of free cash flows.

Conflicts between shareholders and bondholders - The first agency problem between shareholders and bondholders arises because, after the bondholders invest their money in a fixed rate security, the shareholders have incentives to exploit bondholders (increase investment in risky projects, increase payouts, etc) that may lower the value of debts. Furthermore, as the ultimate responsibility of managers is to the shareholders, the investments made by managers are likely to maximize the wealth of shareholders rather than the total value of the firm. In this case, managers tend to accept risky negative present value investments in which the projects' negative present values consist of a decrease in the value of debt and a small increase in the value of equity. This is known as the **overinvestment** problem, and pushes the optimal capital structure towards equity.

Consequently, the above behaviours of the shareholders create problems for the firm itself. As the bond investors would seek compensation (a premium payment) for the expropriation potential by shareholders this makes raising debt finance expensive. Therefore, shareholders bear the additional cost when debt is issued if the debtholders correctly anticipate equityholders' future behaviour. Thus, shareholders face the opportunity costs of not being able to issue debt in addition to the lost tax-shield benefit of debt. This effect, generally known as the **asset substitution** effect, is an agency cost of debt financing (this refers to the cost of shareholders' incentive).

In contrast, **underinvestment** (Myers 1977) is another agency problem between shareholders and bondholders caused by the tendency of managers to avoid positive net present value investments. The value increase from these investments may consist of an increase in the value of debts and a small decrease in the value of equity. According to

⁶ The review of studies in Harris and Raviv (1991) proposed increasing the manager's shareholding in the firm as another mechanism to reduce this inefficiency.

Brealey and Myers (2000), cited in Drobetz and Fix (2003), underinvestment problems affect all firms with leverage, but are most pronounced for highly financial leveraged firms in financial distress. This occurs because, as the probability of default increases, the debtholders gain from new value adding projects. Furthermore, underinvestment problems are more severe for firms whose value is primarily derived from investment or growth opportunities. As with the overinvestment problem, the underinvestment problem also pushes the optimal capital structure towards equity. The opportunity costs of losing safe positive net present values created by the underinvestment problem constitute the agency cost of debt financing.

Predictions of the model:

As stated in Harris and Raviv (1991), since lenders can observe a firm's default history, it is possible for a firm to build a reputation for having only safe projects by not defaulting.

- Thus, older, mature (age of a firm), and large firms (size of a firm), with tangible assets (tangibility) in place find it optimal to choose safe projects. These firms do not engage in asset substitution problems so as not to lose the reputation they have gained. This avoids the agency cost of debt financing and creates capacity for more debt at a lower cost than otherwise. Therefore, such firms are predicted to have high financial leverage. On the contrary, young firms with many growth opportunities may choose riskier projects. If they survive without default they will eventually switch to the safe projects, but until then, their cost of debt is higher. Hence they are expected to have low financial leverage.
- The free cash flow hypothesis supports the above predictions. Firms with more tangible assets and which produce stable cash operating cash flow, are expected to use more debt to reduce the agency cost of free cash flow. Therefore, such firms are predicted to be more levered with debt finance. The contradictory prediction is that if the market for corporate control is inefficient, managers use retained earnings to avoid the cash flow hypothesis. Thus, profitable companies show lower financial leverage.

2.2 Review of Empirical Evidence on Determinants of Capital Structure

The models developed to analyze the determinants of capital structure commonly use explanatory variables whose predicted influence on the financial leverage is drawn from the theories of capital structure. For this purpose, the three principal theories of modern capital structure, namely trade-off theory, pecking order theory, and agency theory were explained in the previous section of this chapter.

This study is conducted on firms listed on the JSE, one of the most developed stock markets in the world (Demirguc-Kunt and Maksimovic 1996), but located in a developing country. This situation presents difficulties in choosing relevant studies to review as a basis for comparison. Despite this situation, Booth et al (2001) found that variables that are relevant in the developed countries are also relevant in the developing countries, despite the profound differences in the institutional factors across these developing countries. The authors concluded that, in general, debt ratios in developing countries seem to be affected in the same way and by the same type of variables that are significant in the developed countries. There are, however, systematic differences in the way these ratios are affected by the country factors, such as GDP growth rates, inflation rates, and the development of capital markets. This led Booth et al (2001) to argue that knowing these factors helps predict the financial structure of a firm better than knowing only its nationality. Therefore, based on the above conclusions, it would be insightful for the literature review to consider relevant papers from developing and developed countries.

Depending on the objective of the analysis, the factors included in the empirical studies of the determinants of capital structure vary from single to many. Those found in the literature include the following: business risk, size, asset composition, profitability, growth opportunities, industry classification, age of the firm, operating cycle, entrepreneur's risk tolerance, inflation and general economic conditions, non-debt tax shield, liquidity, stock liquidity, cash flow etc. As argued by Harris and Raviv (1991), the choice of explanatory variables is also fraught with difficulty. This study concentrates on business risk, size, asset composition, profitability, growth opportunities, age of the

firm, and industry classification variables. The reasons for selecting these variables are: (i) these factors are the most commonly contained determinants of financial structure in the prior literature (e.g., Heshmati 2001); (ii) particularly, some of these variables have been included in similar previous studies of JSE listed companies; (iii) some of the other factors excluded from the study, however, seem less relevant to corporate capital structure policies. The review of the literature on the selected factors follows.

2.2.1 Business Risk

Business risk is one of the factors commonly found in the studies of the determinants of capital structure. Most of the authors develop the relationship between business risk and financial leverage based on the trade-off theory — the more volatile the income, the higher the probability of default. Hence, the expected relationship is negative.

However, the empirical findings are inconclusive and mixed. Banerjee et al (2000), Barbosa and Moraes (2002), Drobetz and Fix (2003), Jong and Dijk (2002) reported a negative relationship between the measurements of business risk and financial leverage. Furthermore, the study on developing countries by Booth et al (2001) reported this relationship for six out of the ten countries they included in their study. Taub (1975), cited in Barbosa and Moraes (2000), reported that his uncertainty variable was consistently negative but attained significance when depreciation was excluded from earnings for the calculation of variability of past operating earnings.

In contrast, it is often no surprising to obtain the opposite relationship. The study by Booth et al (2001) documented this relationship for the remaining four out of ten countries. These authors used variability of return on assets (ROA) as a measure of business risk. This measure is similar but not exactly the same as the most commonly used measure — variability of income. A recent study by Gaud et al (2003) implemented a very different measure by adding the sign of the difference between the profitability of the firm and the average profitability to the square difference between the firm's profitability. These authors found a positive association between the measure of business risk and capital structure.

Some researchers also found no significant relationship between business risk and financial leverage. For example Hirota (1998) for Japanese firms. The study on Swedish micro and small firms by Heshmati (2001) also evidenced that the effect of business risk on capital structure of these firms is insignificant. In their view the finding may be consistent with the observation that credit providers to micro and small firms are more concerned with a collateral based lending criterion rather than an income based criterion. Using fixed assets/total assets, Dukhi (2000) found insignificant relationship for two out of three years' correlation. However, his sample constituted only large firms.

2.2.2 Size of Firm

The effect of size on financial leverage is ambiguous. Titman and Wessels (1998) argued that, direct bankruptcy costs being fixed, they constitute a smaller proportion of firm value as the latter increases. Moreover, as explained in the previous section, generally large firms are believed to be more diversified and face a lower cost of bankruptcy. Both these arguments suggest that larger firms can get more debt than smaller firms can. Accordingly, empirical research studies such as Shuetrim et al (1993), Booth et al (2001), Hirota (1998), Barbosa and Moraes(2002) and Rajan and Zingales (1995) confirmed the positive effect of size on financial leverage. Banerjee et al (2000) also documented support for this argument using Log of TA in the UK, but not in the USA. Devic and Krstic's (2002) reasoning for the positive relation is different. Their reasoning is that larger firms are more able to develop strong relationships with creditors, which enables them to obtain funds under more favourable conditions, compared with smaller firms. They argued that in an economy going through the process of economic transition from a centrally planned to a fully operating market economy, relationship-based finance is dominant in explaining the relationship between size and financial leverage. The study by Gaud et al (2003) found a positive relationship with financial leverage, but the effect of size was not significant when leverage is computed with long-term debt only. According to these authors one of the possible explanations for this finding is that the development of financial markets has pushed large firms to search for better credit conditions. This implies that, as firms grow in size, they shift from bank sources of finance to other sources such as the bond market. As a result, there has been a tendency

for banks to grant more loans to small and medium firms. This idea also received support from Bevan and Danbolt (2000) who studied the effects of factors on the detailed components of debt measurements. Their findings indicated a weakening link between size and long-term bank borrowing and the strengthening relationship between size and long-term securitized debt. They also found negative association with short-term debt, which lead them to conclude that small firms, that may have difficulty in obtaining long-term debt, appear to compensate by more short-term debt. The important aspect of these findings is a clear warning that the proxy of leverage must be employed and interpreted carefully, particularly in the investigation of the determinants of financial structure.

On the other hand, there are also studies that indicated the inverse relationship. The most surprising findings in this regard are Banerjee et al (2000), Rajan and Zingales (1995) who found a negative relationship in the USA and Germany respectively. These findings are uncommon, particularly in the developed countries⁷. Heshmati (2001) also found this relationship when using the dynamic model and argued that Swedish small and medium enterprises use debt for their initial growth but, for their subsequent growth, they use their own internal finance. Furthermore, according to the Graham and Harvey (2000) survey results, more small firms than large firms indicated that they use debt in the situation of insufficient internal funds, which is consistent with the POT. This suggests a strong connection between size and profitability.

Finally, studies that found an insignificant relationship between size and financial leverage include Dukhi (2000), Heshmati (2001) when the static model is used, and Drobetz and Fix (2003). In the South African case, Dukhi (2000) using total assets as proxy for size concluded that the effect of size as a determinant of capital structure is not significant. He argued that companies listed on the JSE are all large; hence, his sample did not contain small companies. His findings suggested that firms in the same industry have insignificant size differences among themselves, as his study was conducted in the retail sector only.

⁷However, it is noteworthy to mention Booth's et al (2001) conclusion that although some of the insights from modern finance theory are portable across countries, much remains to be done to understand the impact of different institutional features on capital structure.

2.2.3 Tangibility

Most of the empirical findings suggested that the tangibility of assets represents the effect of the collateral value of assets on the firm's financial structure. This is because tangible assets carry more certainty about value and in the event of bankruptcy are easier to cash in, (Heshmati, 2001). Gaul et al (2003), Drobetz and Fix (2003), Shuetrim et al (1993), Rajan and Zingales (1995), Jong and Dijk (2002), Hirota (1998), Banerjee et al (2000) are some of the authors who evidenced the positive relationship between assets tangibility and financial leverage. The effect of tangibility on financial leverage seems highly sensitive to the methodology, particularly the measure of financial leverage. Devic and Krstic's (2001) findings supported this relationship in Hungary only when the market value of equity is used in the computation of leverage while, in Polish companies, the relationship is still positive when short-term liabilities other than debt are excluded.

On the contrary, the negative effect of tangibility on financial structure has also been evidenced by authors such as Banerjee et al (2000). This finding refers to USA firms, where the theory of capital structure was started to explain the financing behaviour of firms. Bevan and Danbolt (2000) and Jordaan et al (1993) also found a negative relationship. These findings, however, are not in conflict with the concept in capital structure, financing long-term assets with long-term debts, because the negative relationship changed to significantly positive when only long-term debt is used. Booth et al (2001) also found a negative relationship in Brazil, India, Pakistan, and Turkey. Other findings indicated that tangibility tends to be associated with decreases in the total debt ratio, but with increases in the long-term ratio. This implies that a firm with more tangible assets will use more long-term debt but, that overall, its debt ratio goes down. This is consistent with the traditional matching approach that long-term assets should be financed with long-term liabilities and with the observation that less can be borrowed against long-term assets than against short-term assets.

An insignificant relationship has also been observed by some authors. Voulgaris et al (2003) reported an insignificant relationship in Greek manufacturing firms. Their finding is interesting because the effect of fixed assets on financial leverage was insignificant for larger enterprises. Rajan and Zingales (1995) also found an insignificant association with

book leverage (in Italian firms) and market leverage (in France and Canada) in the G-7. Furthermore, Berger and Udell (1994) showed that firms with a close relationship with creditors need to provide less collateral. They argue that the relationship substitutes for physical collateral.

2.2.4 Profitability

Of the independent variables reviewed, profitability showed the most consistent relationship with financial leverage as expected by the pecking order theory. This implies that a firm with higher profitability has lower target financial leverage. The negative relationship is consistent with Myers' (1984) notion that, in general, firms prefer internal to external sources of finance. Hirota (1998), Bevan and Danbolt (2000), Banerjee et al (2000), Barbosa and Moraes (2002), Gual et al (2003), Strebulaev (2003) and Drobetz and Fix (2003) are some of the authors who found a strong negative relationship between profitability and financial leverage. In Bevan and Danbolt's (2000) study, profitability was the most explanatory factor of financial leverage; however the impact was decreasing over time. This relationship did not change regardless of the computation of financial structure with book or market value of equity. Booth et al (2001), for ten developing countries, Rajan and Zingales (1995), for G-7 countries, also arrived at similar findings, except for Zimbabwe and Germany, in each of the studies, respectively. Furthermore, the parameter estimate of profitability in Heshmati (2001) indicated that financial leverage ratios among Swedish micro and small firms are highly and negatively sensitive to changes in profitability.

Despite Bevan and Danbolt's (2000) findings above, the comparative study of Polish and Hungarian firms by Devic and Krstic (2001) produced contradicting results, although the relationship is still negative. Polish firms exhibited this relationship only when book value of equity is used in the computation of financial leverage, while Hungarian firms exhibited the negative relationship only when market value of equity is used in the formula. In the South African case, Dukhi (2000), found a negative effect of profitability on financial leverage, but only for some of the years for which the study was conducted.

2.2.5 Growth Opportunities

Empirical evidence seems evenly distributed among negative, positive and no relationship results. The negative sign of the relationship confirms the hypothesis that firms with growth opportunities are associated with less financial leverage. Among all the factors studied in Drobetz and Fix (2003), the relationship between investment opportunities and leverage was the strongest and the most reliable. Likewise, Heshmati (2001) confirmed a highly significant negative relationship as predicted by the agency theory. This is a validation of Rajan and Zingale's (1995) argument that, due to the underinvestment problem, firms expecting high future growth use a greater amount of equity finance. Other studies such as those of Hirota (1998) and Devic and Krstic (2001) also supported the negative relationship. Gaud et al (2003) also observed a negative relationship between growth and financial leverage when market values are used, but this changed to a positive relationship when book values are used in the computation of leverage.

In contrast, there is in the literature, an equal demonstration of the existence of a positive relationship. Shuetrim et al (1993) and Barbosa and Moraes (2002) found a positive relationship by using past growth in real assets as a proxy for future growth, and argued that this is consistent with the view that rapid growth exhausts firms' internal fund reserves. As a result firms' dependence on debt increases, as debt is the next least expensive source of funds. An additional explanation is that creditors lend to firms with growth opportunities in anticipation of higher future cash flows. However, this view is contrary to the arguments in the agency theory literature that suggest that rapidly growing firms are not able to use their growth potential as collateral against which debt can be secured. Other study in developing countries by Booth et al (2001) supported the positive relationship, except in South Korea and Pakistan. Voulgaris et al (2003) using the same measure for growth opportunities as in Shuetrim et al (1993), confirmed a positive effect on total debt for both large and small enterprises. The effect, however, turned out to be insignificant on long-term or short term debt, separately. In addition to the positive relationship evidence, Bevan and Danbolt (2000) documented a decreasing impact on financial leverage.

In the South African case, the effect of growth on financial leverage is inconclusive. By using sales and EBIT growth as a measurement for growth opportunities, Jordaan et al (1993), cited in Dukhi (2000) found both positive and negative results. Positive and negative relationships were confirmed in four and five sectors respectively. Furthermore, Dukhi (2000), using similar variables, did not show a consistent relationship over the years, in which the study was conducted. Uliana (1993) confirmed a negative relationship for the sample of companies listed on the JSE, from another perspective, in examining whether lasting value can also be achieved through financial policies adopted.

As indicated in some of the studies above, it is also not uncommon to find no correlation for growth opportunities as a determinant of capital structure. Banerjee et al (2000) found insignificant relationships in the UK firms, although, the relationship was positive in the USA firms which indicates that debt is available to finance growth to a much greater extent in the USA than in the UK.

2.2.6 Age of the firm

Of the explanatory variables included in this study, age of a firm is the one for which there is very limited empirical evidence as a determinant of capital structure. Likewise, the direction of the relationship is not clear. Wedig et al (1988) and Petersen and Rajan (1994) reported a significant negative association between age and debt ratio. This indicates that the longer a firm survives in business, the more internally generated profits it can accumulate and subsequently use this to replace debt financing (Diamond 1989). On the contrary, Heshmati (2001) found a significant positive association between age and capital structure, which is consistent with the expectation that reputation formation takes time and provides improved incentives to borrowers. In the absence of reputation, firms have incentives to select excessively risky projects. Barbosa and Moraes (2002) also reported a positive relationship with the industry leverage but not with the firm's leverage.

2.2.7 The Importance of Industry Classification to Capital Structure

The basis of industries' formation or/and the specific characteristics of industries are used to study the impact of industry classification on financial leverage. The review of the literature pointed out some possible forces (acting through the industry) to be represented by the industry classification as a determinant of capital structure. Studies cited in Barbosa and Moraes (2003) argued that firms in the same industry may have similar debt ratios because they possess similar business risk, technology, liquidity requirements, type of collateral intrinsic in assets, asset composition, overall level of profitability, growth rate, industry specific institutional arrangements, tax allowances, labour intensity, etc. According to Remmers et al (1974) most studies categorize the sample of firms in their study by business risk or volatility of cash flows assuming that the same industry faces the same environmental and economic conditions and, therefore, firms tend to cluster with respect to variance of earnings and sales. Sharpe (1994) showed that the employment of firms with high financial leverage does vary more significantly with the business cycle. Barbosa and Moraes (2003) also documented a significant relationship between industry classification and financial leverage. However, this study was conducted by dividing the sample into three groups only.

Generally the factors which are assumed similar for the firms in the same industry also constitute firm specific factors. In their review of the capital structure, Harris and Raviv (1991) noted that it is generally accepted that firms in a given industry will have similar leverage ratios while leverage ratios vary across industries. However, Phillips and Mackay (2002), and Bradley, Jarrell and Kim (1984) reported that industry fixed effects are less important than firm fixed effects in understanding the variation in firm financial structure⁸. Despite this finding that most financial structure variation is firm specific, Phillips and Mackay (2002) further observed that a large number of firms remain in the same financial leverage industry-quintile over time and their analysis revealed that firms do take into account other firms' financial structure within their industry. Hence, it seems clear that, as a particular study increases the number of factors (independent variables) to

⁸ Bradley, Jarrell and Kim (1984) reported that firm volatility, non-debt tax shields, advertising and R&D expenses, explain 23.6% of the variation in capital structure. Industry dummy variables add only 10.1% additional explanatory power.

be correlated with capital structure of a firm, the industry specific effects on financial leverage decreases to an exact relationship. This may be consistent with Heshmati's (2001), and Drobetz and Fix's (2003) results that included six independent variables and in which the industry dummy was never significant in all the regressions. Therefore, a study on industry classification as a determinant of financial leverage provides a more general conclusion than firm specific factors and financial leverage. Das and Roy (2001) included industry classes and size factors and reported that the nature of the industry seems to dominate in explaining the variation in capital structure. This is because the factors, collectively, explained by the industry grouping, play important roles.

In order to control any industry-specific effects (factors mentioned above) that may not be captured by the variables included in the regression, all the authors have treated the industry classes as a dummy variable.

In summary, the more significant relationship is associated either with the usage of a small number of independent variables or the small number of dummies. The more independent variables and dummy variables are employed, the less significant is the relationship observed between industry and capital structure.

Summary

The first section of the chapter discusses four theories of capital structure: namely, the M-M irrelevance, trade-off, pecking order, and the agency theories. The discussion on the M-M irrelevance is provided, however, not because it is intended that the paper will use its predictions, but mainly because it is the foundation of the other theories. In 1958, Modigliani and Miller, presented a seminal paper showing that, subject to some conditions, the impact of financial structure on the value of the firms is irrelevant. Since then, the literature on capital structure has been expanded by many theoretical and empirical contributions. Much emphasis has been placed on relaxing the assumptions made by M-M, in particular by taking into account corporate taxes (Modigliani and Miller 1963), personal taxes (Miller 1977), bankruptcy and financial distress cost (Stiglitz 1972, Kraus and Litzenberger 1973, Titman 1984), and agency costs (Jensen and

Meckling 1976, Myers 1977), and information asymmetries (Myers 1984). The literature demonstrated that, once the restrictive assumptions are relaxed, firms are able to alter their discounted stream of expected cash flows by varying financial leverage.

Previous empirical research on the determinants of capital structure has documented mixed and inconclusive results, although, in majority of the cases, the results support the predicted relationship between the proposed determinants and firm's financial leverage. In general, the differences in the results derive mainly from the methodological differences. First, the authors use different measurements for **financial leverage**. Second, different authors use different base variables for their independent variables, **the determinants of financial leverage**. In this regard, for example, Rajan and Zingales (1995) reached different conclusions from most of the conclusions arrived at by other researchers about leverage in the G-7 countries. According to these authors, their conclusion differs from others, principally because they have used more detailed measures and more comparable calculations of leverage.

This study contributes to the field of corporate finance by investigating the issues of capital structure on the JSE listed firms with a view to the following objectives. First, to investigate factors that influence the financing behaviour of JSE listed firms. Previous studies on this topic are very limited in their type and coverage in the South African context. The capital structure of these firms has not been dealt with before to the extent that this paper does. Second, to explore the changes in the influence of the determinants over time. The results of the dynamics in the determinants indicate to what extent the impact of the factors on debt level has been increased or decreased. Third, to relate the financing behaviour of the JSE listed firms to the theories of capital structure to assess whether the theories can explain the way in which JSE listed firms finance their business. Fourth, debt level in each industry group will be compared to examine if financial leverage is significantly different across industry groups.

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

This chapter has five sections. The first section discusses the model and the main assumptions of the model used to investigate the effects of the determinants of capital structure on firms' financial leverage. Thereafter, the assumptions and delimitations, hypothesis development, and measurements of financial leverage and explanatory factors are presented in sections two, three, and four respectively. Finally, the chapter presents the sources of data for the study. A summary is presented at the end of the chapter.

3.1 Instruments of Analysis

This study applies a *multiple regression model* to test the significance of the six selected determinants of corporate capital structure. The dependent variable is leverage, whereas the independent variables are: business risk, size, asset composition, profitability, growth opportunities, and age of the firm. Industry classification is used as a dummy variable in the regression model.

The multiple linear regression model relying on the method of ordinary least squares (OLS) is chosen to explore the correlation between the proposed determinants of corporate capital structure and financial leverage⁹. The estimated regression model can be presented as follows:

$$Y_{i,t} = \alpha + \beta_{i1}BRISK_{it} + \beta_{i2}SIZE_{it} + \beta_{i3}TANG_{it} + \beta_{i4}PROF_{it} + \beta_{i5}GROPP_{it} + \beta_{i6}AGE_{it} + \text{Industrial dummies} + \varepsilon_i \quad (1)$$

Where $Y_{i,t}$ = firm's financial leverage for sample years.

⁹ A review of previous empirical research revealed that the multiple linear regression model is the model predominantly used to investigate the relationship between leverage and the factors correlated with leverage.

β_{i1-6} = firm's regression coefficient of six independent variables, namely BRISK, SIZE, TANG, PROF, GROPP, and AGE.

T= refers to the time period of the cross-sectional regression

ε = error term

A detailed description of all the variables in equation (1) and other clarifying definitions are presented in Table 3.1. The model also includes industrial dummies to control for industry specific effects on capital structure. The entire data is classified into six industry groups. The Cyclical Services (CS) with the largest number of firms in the industry group is selected as a base variable. Thus, five (six less one) industrial dummy variables are included in the regression model.

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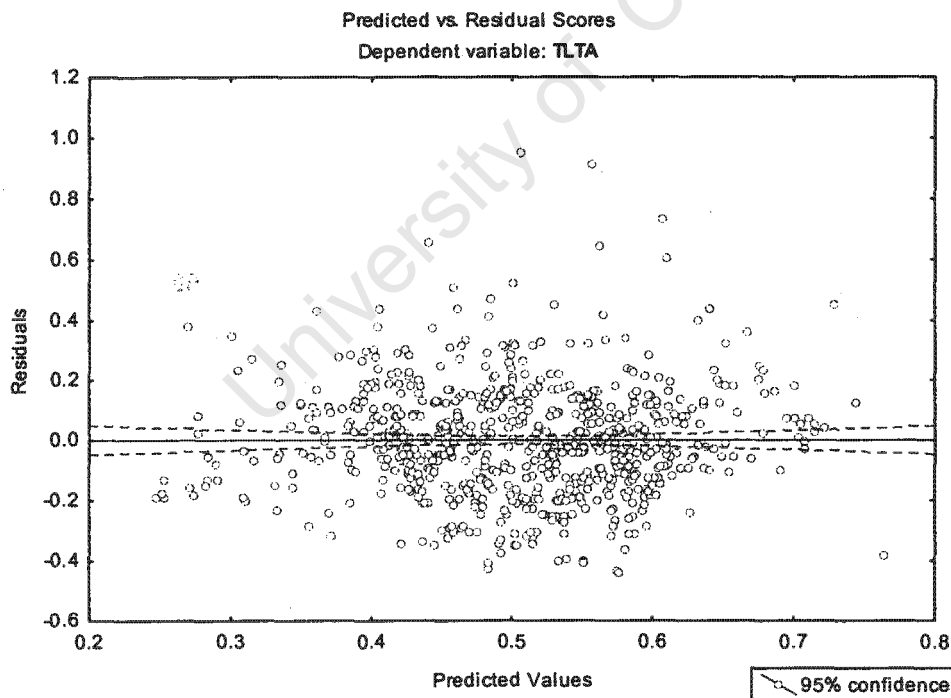
Table 3.1: Definitions of Dependent and Independent variables

Variables	Definition
financial leverage	The dependent variable: Four measures of financial leverage are applied.
TLTA	TLTA is the ratio of total liabilities divided by total assets where total assets include all operating assets and non-operating assets of the firm.
TDTA	Total debt divided by total assets is used where total assets are defined as above. In this measure total assets include assets that are off-set against non-debt liabilities.
TDTAB	TDTAB is the ratio of total debt to total assets where total assets is the sum of the book value of debt and equity.
TDTAM	TDTAM is the ratio of total debt to total assets where the total assets are measured by book value of debt plus market value of equity.
Independent Variables	
BRISK	Variability of EBIT.
SIZE	Natural log of sales
TANG	Fixed assets/Total assets where total assets include current assets, tangible assets, intangible assets and long-term investments.
PROF	EBIT/TA where total assets does not include non-operating assets (long-term investments).
GROPP	Market-to-book value of equity.
AGE	Number of years since incorporation, considering the year of incorporation as a full year.
TD	Long term plus short-term interest bearing debts only.
BOOK VALUE OF EQUITY	Total assets less total liabilities, preferred stock, minority holding and intangible assets OR from the Equity and Liabilities section, total owners' interest less preferred stock, minority holding, intangible assets and costs of subsidiaries.

OLS regression works with basic assumptions of **autocorrelation**, **heteroscedasticity**, and **multicollinearity**. The Durbin-Watson test is used to detect the existence of autocorrelation in the regression. The Durbin-Watson (DW) statistic ranges from 0 to 4. With values well above 2 indicate obvious negative autocorrelation, values well below 2 indicate obvious positive autocorrelation. The results of the DW statistic show that there is no autocorrelation in the regression. The DW statistic values for the cross-sectional and pooled data are very close to ± 2 ¹⁰.

A scatter plot of the residuals against the predicted values is one of the many tools used to check for the violations of the no heteroscedasticity assumption. For example, observing the pattern of the plot as shown below in graph 3.1, the graph does not seem to suggest that the error terms have non-constant variances.

Graph 3.1: Predicted vs. Residual Scores



¹⁰ The lower and upper values of DW-statistic were found from Clint Cummins, TSP International by email.

Another assumption of the multiple linear regression model is that there is no multicollinearity among the explanatory variables included in the model. A formal method that is widely used to detect multicollinearity is by means of "Variance Inflation Factor (VIF)." The Variance Inflation Factor measures how much the variance of the estimated regression coefficients are increased over the case of no correlation among the explanatory variables. As a rule of thumb, a VIF of 5.0 is a critical value. If no two explanatory variables are correlated, then all the VIFs will be 1. Using this method the highest VIF for the explanatory variables in this study is 1.28 for SIZE. Thus, according to VIF values multicollinearity is not present between explanatory variables in the regression. Furthermore, correlation matrices which show the degree of correlation between each pair of variables reveal that multicollinearity is not a problem in the regression. The highest association between the independent variables is found between proxies for size and profitability, 27.9%. Another result, very close to this result, is 27.5% which is the relationship between the proxies for size and age. A summary of these tests is presented in Table A1 of the Appendix. Although the above results are based on the six year pooled data and, one way to reduce the impact of collinearity is to increase sample size, the same procedure is applied for yearly cross-sectional analysis.

Method of addressing each Critical Question

Analysis of the Explanatory Factors on firm level:

In this study, cross-sectional and pooled cross-sectional time-series data of each variable by firm are used for the cross-sectional regression and pooled cross-sectional regression analysis to investigate the effect of the factors on firms' financial leverage. The cross-sectional analysis presents the effect of each of the explanatory variables on capital structure in a particular year. Furthermore, the six-year pooled data is also used to investigate the effects of these explanatory variables on financial leverage using a large sample size. The original multiple regression model, presented in the previous section, is used for this analysis.

Dynamics of the Determinants of Capital structure:

The time-series analysis section explores the dynamics in the determinants of capital structure by utilizing interactive annual dummy variables in the regression model. The focus of this portion of the study is on the changes in the influence of the various capital structure determinants over time. Doing so identifies the increase or decrease in the importance of the explanatory variables in the study from 1997 and the consecutive years. This is important because, as is clearly seen in the literature, some of the factors are already recognized as determinants, but not the degree of their influence over time. For this analysis the original regression model is modified as follows for each determinant factor:

$$Y_i = \alpha + \beta_{i1}BRISK_i + \beta_{i2}SIZE_i + \beta_{i3}TANG_i + \beta_{i4}PROF_i + \beta_{i5}GROPP_i + \beta_{i6}AGE_i + \pi_{it}BRISK_i*YEAR_{it} + \varepsilon_i \quad (2)$$

$$Y_i = \alpha + \beta_{i1}BRISK_i + \beta_{i2}SIZE_i + \beta_{i3}TANG_i + \beta_{i4}PROF_i + \beta_{i5}GROPP_i + \beta_{i6}AGE_i + \pi_{it}SIZE_i*YEAR_{it} + \varepsilon_i \quad (3)$$

$$Y_i = \alpha + \beta_{i1}BRISK_i + \beta_{i2}SIZE_i + \beta_{i3}TANG_i + \beta_{i4}PROF_i + \beta_{i5}GROPP_i + \beta_{i6}AGE_i + \pi_{it}TANG_i*YEAR_{it} + \varepsilon_i \quad (4)$$

$$Y_i = \alpha + \beta_{i1}BRISK_i + \beta_{i2}SIZE_i + \beta_{i3}TANG_i + \beta_{i4}PROF_i + \beta_{i5}GROPP_i + \beta_{i6}AGE_i + \pi_{it}PROF_i*YEAR_{it} + \varepsilon_i \quad (5)$$

$$Y_i = \alpha + \beta_{i1}BRISK_i + \beta_{i2}SIZE_i + \beta_{i3}TANG_i + \beta_{i4}PROF_i + \beta_{i5}GROPP_i + \beta_{i6}AGE_i + \pi_{it}GROPP_i*YEAR_{it} + \varepsilon_i \quad (6)$$

$$Y_i = \alpha + \beta_{i1}BRISK_i + \beta_{i2}SIZE_i + \beta_{i3}TANG_i + \beta_{i4}PROF_i + \beta_{i5}GROPP_i + \beta_{i6}AGE_i + \pi_{it}AGE_i*YEAR_{it} + \varepsilon_i \quad (7)$$

Inter-industry differences of financial leverage:

According to the JSE classification the entire sample is stratified into six industry groups. These groups are then tested by their mean-industry financial leverage ratio to demonstrate whether significant differences exist across industries in terms of the degree of financial leverage. One way parametric analysis of variance (ANOVA) is applied in this study. However, although ANOVA is robust to departure from normality, the

generality of the results is extended by performing a nonparametric Kruskal-Wallis test on the same leverage ratio. The F-statistic demonstrates significant differences when any two (or more) industry means are different. Analysis can also be drawn from the regression results.

The extent to which theories of capital structure explain the financing behaviour of South African firms:

Finally, the results of the relationship between the leverage and the determinant factors will depict/imply whether the theories of capital structure can explain the capital structure choice of the South African firms. Thus, to do this, the results of the multiple regression are compared with the summary predictions of each theory presented in Table 3.2, under 3.3 'Hypotheses Development'.

3.2 Assumptions and Delimitations

Assumptions in the study:

- This study has not dealt with preferred stock. However, the denominator is total assets. So the study assumes that the existence of preferred stock in the firm's capital does not affect results of the study (see also footnote 12 on page 35).
- In this paper, debt is assumed at book value.
- The financing behaviour of the sample in the study is assumed to be representative of the entire JSE listed industrial sector

Delimitation of the Study:

- The study deals only with the industrial sectors listed on the JSE. It does not deal with the financial and mining companies.
- The study includes companies with six-year full available data and therefore sampling bias might exist. Companies that have been listed, delisted, taken-over, or merged during the six-year period are not dealt with in the study.
- The South African stock market is grouped among the "developed stock markets in the world" but is located in a developing country.

- The study does not attempt to evaluate the appropriateness of the firm's capital structure.

3.3 Hypotheses Development

First, the study predicts the effects of the determinants on financial leverage in the industrial firms listed on the JSE as follows:

Business Risk - measured by variability of EBIT is negatively (trade-off theory) related to financial leverage because the more volatile the income, the higher the probability of default which might lead to financial distress and bankruptcy. As a result firms borrow less and gain less interest tax shield. While safe or stable firms are expected to borrow more until the expected costs of financial distress offsets the tax advantage of borrowing.

Size of Firm - measured by LOG of SALES is positively (trade-off theory) related to financial leverage. Titman and Wessels (1998) argue that direct bankruptcy costs being fixed constitute a smaller proportion of firm value as the latter increases. In addition, generally large firms are better able to diversify and face a lower cost of bankruptcy. Both these arguments suggest that larger firms can get more debt than smaller firms.

Tangibility - measured by ratio of FA/TA is positively (trade-off theory) associated with financial leverage. Moral hazard is reduced when firms issue debt secured by physical assets. This is because tangible assets carry more certainty about value and, in the event of bankruptcy, are easier to cash in. Thus, firms with more tangible assets are expected to have higher financial leverage, because they use the assets as collateral to take more debt.

Profitability - measured by EBIT/ TA is negatively (pecking order theory) associated with financial leverage. The pecking order theory model predicts that firms that are more profitable would be expected to have lower financial leverage because a higher level of profitability offsets the need for external finance and external funds are more expensive. As a result firms prefer internally generated funds. On the other hand, less profitable

firms have a higher financial leverage ratio because they do not have sufficient internally generated funds and debt has lower flotation costs and information costs than equity.

Growth Opportunities - measured by MARKET-TO-BOOK value of equity is negatively (agency theory) associated with financial leverage. In line with agency theory of debt, conflicts between equityholders and bondholders raises agency costs of debt-underinvestment and risk shifting (also known as asset substitution) which should lead growth firms to lower debt levels.

Age of the Firm - is measured by number of years since incorporation. Based on agency theory, it is argued that firms build a reputation by not defaulting in their operating history. Thus, mature (age) firms find it optimal to choose safe projects and these firms do not engage in asset substitution problems to avoid losing their built reputation. This avoids the agency cost of debt financing and creates capacity for more debt at a lower cost than otherwise.

Table 3.2 shows the prediction of each of the theories with respect to the selected explanatory variables for this study.

Table 3.2: Summary of predictions of the theories

Explanatory variables	Theories of capital structure		
	Trade-off theory	Pecking order theory	Agency theory
BRISK	-VE	?	-VE
SIZE	+VE	-VE	+VE
TANG	+VE	?	+VE
PROF	+VE	-VE	+VE -VE
GROPP	-VE	+VE	-VE
AGE	+VE	-VE	+VE

The *second* major hypothesis demonstrates whether significant differences exist across industries in terms of the degree of financial leverage. The null hypothesis to be tested in this section is, H_0 *Firms in different industries have the same capital structure.*

3.4 Variable Definition

3.4.1 Financial Leverage

Financial leverage is measured in different ways by different authors¹¹. Brigham and Daves (2002) defined financial leverage as the extent to which fixed income securities (debt and preferred stock) are used in a firm's capital structure. Despite this definition, the core point of capital structure deals with the notion that the introduction of debt to the firm's capital increases value through interest tax shield. Hence, first, as the payment for preferred stock is not tax deductible, and second, due to a lack of theories with regard to preferred stock (the issue of preferred stock is rarely dealt with in the literature), preferred stock is not dealt with in this study¹².

There are two major yet unresolved problems concerning the measurements of financial leverage. The first problem concerns what total debt should include in the formula for calculating financial leverage. Rajan and Zingales (1995) applied four alternative definitions of leverage, which are described as the cleanest approach in the literature in Drobetz and Fix (2003) and also adopted the same framework in their research study. The *first* definition is the very general concept of leverage given by the ratio of total (non-equity) liabilities to total assets. This measure includes items like accounts payable which are used for transaction purposes rather than financing. Total liabilities also include other liabilities like pension liabilities. The inclusion of all these items leads to overstatement of financial risk. Hence, it does not provide a good indication of whether the firm is at

¹¹ For a comprehensive review refer to Barbosa and Moraes (2003)

¹² Most of the literature reviewed is silent on the preference share as part of leverage. Some of the reasons may be (1) for simplicity purposes, (2) insignificance in the financial structure, (3) different arguments regarding its treatment as debt or equity, based on the fact that it yields fixed payment without tax shield benefit and it does not carry the same risk as equity.

risk of default in the near future. Therefore, this measure is only appropriate in the case of liquidation. The *second* measure is the ratio of debt (both short term and long term) to total assets. This measure focuses on the interest-bearing debts and excludes all other types of liabilities. Some of the non-interest bearing liabilities which might be issued based on total assets are ignored in this measure. For example, an increase in the gross amount of trade credit is reflected in a reduction of this measure. Rajan and Zingales (1995) suggested that it is appropriate to use a measure of leverage unaffected by the gross level of trade credit. This is because the level of accounts payable and accounts receivable may jointly differ across industries. The *third* measure is the ratio of total debt to net assets, where net assets are total assets less accounts payable and other current liabilities. This measure is not affected by working capital management to a larger extent. However, it is influenced by factors that are not related to financing such as assets held against pension liabilities which may decrease the financial leverage ratio. The *final* definition is the ratio of debt to capital, where capital is defined as total debt plus equity. This measure looks at the capital employed and thus the effect of past financing decisions is probably best represented by this measure (Rajan and Zingales 1995).

The second major problem is whether market value or book value of debt and equity should be used as the correct measure of financial structure (Rajan and Zingales 1995). Arguments have been made in favour of book value against market value and vice versa. Proponents of book value argue that most of the theoretical predictions apply to book leverage (Fama and French 2000). Most firms do not rebalance their target ratio in response to market equity movements (Graham and Harvey 2001), and using book value is relatively easy and accurate, as it is difficult to get the market value of equity for unlisted companies and of debt when it is not competitively priced. On the other hand, proponents of market value argue that it is the market value that reflects the real value of a firm.

This study, considers applying four measurements of financial leverage. *First*, the narrow measures of financial leverage which more appropriately reflect the *financing* strategy of firms are used. These are represented by total debt (TD= long term plus short term debt)

divided by total assets (where total assets is defined as total debt plus equity). Generally debt is assumed at book value, while the study works with both measures of book and market value for equity. The market value of equity will be calculated using the share price and adjusted number of ordinary shares on the balance sheet date. The other alternative measures are gross measures of leverage, total debt (TD) divided by total assets (TA) and total liabilities (TL) divided by total assets (TA). Here, total assets refer to the total operating and non-operating assets of the firm. Total assets, rather than net assets, is used because it may be more probable that firms issue short-term borrowings based on the capacity created by short-term assets rather than long-term assets only.

3.4.2 Factors Explaining Firm's Capital Structure

The review of the literature assured that the major determinants of capital structure are commonly contained in most of this literature. However, depending on the objective of the analysis/study the factors vary from single to many. Therefore, this study selects the factors from different studies to capture a comprehensive understanding of the factors explaining the financial leverage. The selected factors are presented hereafter.

Business Risk - Generally, business risk matters because investors need to know whether the company's going concern is under question, and as a result, it will not be able to pay its debts as these become due. Thus, lenders need to assess the company's exposure to factors (such as demand variability, sales price variability, input costs variability, operating leverage etc) which could affect the operating earnings of the company. Therefore, business risk is measured by earnings variability. Heshmati (2001) used variance of operating income. Booth et al (2001) and Banerjee et al (2000) used the same measure divided by total assets. Borbosa and Moraes (2003), after presenting a comprehensive review of the literature on business risk, used variability of sales as a proxy for business risk. These authors seemed to prefer EBIT (which they described as the most accepted measure of business risk) but had difficulty obtaining this figure for the very small firms on which they conducted their research.

This study chooses to use variability of EBIT for its obvious importance as this figure represents the residual of the effects of the sales and operating costs. These are the two main parameters which influence the earnings volatility of a company. In addition, EBIT is chosen as it represents the income available for interest payment and is independent of financing effects. Thus, variability of EBIT represents the operating risk and not financial risk. In the analysis the absolute values are used because we are interested in the size of variation and not direction.

Size - Sales and total assets are the most commonly reported measures of size. Hirota (1998), Bevan and Danbolt (2000), Manos et al (2001), Booth et al (2001), Devic and Krstic (2001), and Drobetz and Fix (2003) are among the authors who used sales as a measure of their variable basis for size. Other authors, as cited in Barbosa and Moraes (2003), such as Roden and Lewellen (1995), Barclay and Smith (1996) and Kim et al (1998) have made the choice of assets as their sole variable or one of their basis variables for deriving the measure of size. Banerjee et al (2000) and Shuetrim (1993) also used logarithm of total assets. Others such as Heshmati (2001), and Barbosa and Moraes (2003) used employment level to test the effect of size on the firm's capital structure. Employment level as a measure of size may be appropriate for very small firms (Barbosa and Moraes 2003).

In this study, natural logarithm of sales is used, because this is the most commonly used measure of size. Besides, the asset measurements are subject to accounting problems. For example, managers may attempt to keep their reported size of assets as small as possible using different techniques such as inappropriate operating lease contracts to manipulate the performance measurement techniques.

Tangibility - Different authors have used different measures for the concepts of collateral value of assets. However, the majority of the authors have worked with the ratio of fixed assets to total assets as the sole variable or one of the proxies for the asset structure explanatory variable. Hirota (1998), Bevan and Danbolt (2000), Heshmati (2001), Banerjee et al (2001), Devic and Krstic (2001), Barbosa and Moraes (2003), and Drobetz

and Fix (2003) are some of the researchers who used fixed assets to total assets. Authors such as Rajan and Zingales (1995) and Barbosa and Moraes (2003) reported averaging their explanatory variable to reduce noise and to account for slow adjustments. Booth et al (2001) used total assets minus current assets, and then divided by total assets. Manos et al (2001) looked at asset composition from its intangibility point of view and they used the ratio of R&D plus advertising expenditure to sales.

This study uses the ratio of fixed assets to total assets as the appropriate measure of tangibility of assets in a firm.

Profitability - The variables used as proxies for profitability vary among the reviewed papers. Earnings available for common stockholders, EBIT, EBT, EBIT less non-operating income, cash flow, etc are examples of variables used as the numerators in calculating profitability. For the denominator, the most commonly used are common equity, total assets, net fixed assets plus working capital, and sales. Previous researchers have used a combination of the above variables because there is no clear single variable to measure profitability. Booth et al (2001), Gual et al (2003) used EBIT to total assets to show the effect of profitability on financial leverage. Heshmati (2001) and Banerjee et al (2001) used the ratio of net income to total assets. Devic and Krstic (2001) used earnings before interest, tax and depreciation to net assets.

This paper uses EBIT to total assets as a measure for profitability. The EBIT line item from firms' income statement is used because total assets in the denominator is defined as operating assets only. EBIT is the most common measurement of profit used in the analysis of firms' performance.

Growth Opportunities - The review of the literature revealed that sales, total assets, earnings, market to book equity, and price to book value are the most commonly used variables to generate the measure of growth. Titman and Wessels (1998) used total assets, Manos et al (2001) used price to book ratio, Drobetz and Fix (2003) used book to market

equity, and Barbosa and Moraes (2003) used employment level as a basis variable to measure growth opportunities for very small firms.

In this paper, growth opportunities are measured by the ratio of market-to-book value of equity because market price might best reflect investors' expectation of future cash flows. The others are measures of the past and may not reflect future growth. Employment level is not appropriate to represent the firm's future growth as the companies differ in their capital and labour intensiveness.

Age of the firm - Very few researchers included age of a firm as a determinant of financial leverage. As a result, there are limited measures used for age of the firms. Taub (1975) cited by Barbosa and Moraes (2003), dealt with period of solvency, which is equivalent to age if the enterprise has never experienced bankruptcy or a financial compromise settled for less than 100% of creditors' claims. Barbosa and Moraes (2003) defined age as the number of years from foundation to the time that the study took place.

In this study, age is measured directly, that is number of years since incorporation until the last year of the financial statement used for the data, will be used as a proxy for age of the firm.

Industry Classification - Depending on their objective/focus, studies on the effect of industry classification on firm's financial leverage differ to the extent that some of them use broad classification of firm groups while others use detailed classification. For example, Aggarwal (1981) cited in Barbosa and Moraes (2003) worked with thirty-eight different classes. Barbosa and Moraes (2003) classified their sample firms into three groups.

In this study, the six major industry groups are used, namely, basic industries, cyclical consumer goods, cyclical services, general industrials, non-cyclical consumer goods, and non-cyclical services. These industry groups included in the multiple regression model as

dummy variables. Table 3.3 shows the number of sample firms classified in each industry group.

Table 3.3: Number of sample firms classified into major industry groups

Industry Type	Codes for the purpose of the study	Number of firms in each industry
Basic Industries	BI	21
Cyclical Consumer Goods	CCG	14
Cyclical Services	CS	47
General industries	GI	15
Non-Cyclical Consumer Goods	NCCG	19
Non-Cyclical Services	NCS	3
<i>Total</i>		119

3.5 Sources of Data

The dataset for this study is derived from McGregor BFA and contains balance sheet and income statement information for all industrial companies from 1997 to 2002. Share prices and adjusted number of ordinary shares are also derived from the same database. Age of the firms is extracted from Profile's JSE Handbook. The study excludes the financial and mining companies because they are subjected to specific rules, regulations and accounting practices. Thus, their leverage is strongly affected by exogenous factors not included in the model specified for this study.

In the industrials, to avoid any possible sampling bias, the study targets all the companies for the analysis. The industrial sector contains 198 firms to form a population for the study. However, the study limits the sample to those firms with available information for the entire six-year period. Of the total 198 firms, those with full six-year data constitute the sample for the study and are reduced to 127 firms. The lists of firms that could not be included were either taken over, merged, delisted or listed during the years from 1997 to 2002. Furthermore, eight firms are excluded from the sample due to the measurement of

the independent variables used in the study. Of these eight firms, seven had zero sales (a proxy for size) and one firm had zero growth due to missing year-end share price. Consequently, the number of observations in each year is 119 firms.

While the data set was relatively healthy, some outliers are identified. In the first place the existence of outliers has been checked by the scatter plotting of residuals vs. deleted residuals. Then outliers in the data were identified using standard residuals for dependent variables and Cook's Distance and Mahalanobis Distance for independent variables. Cook's Distance (greater than 1) is applied to uncover extreme outlier/s that has/have impact on the regression model. Mahalanobis distance is also most commonly used as a multivariate outlier statistic¹³. At this stage the analysis (with and without outliers) depicted that the effect of outliers was evident on the significance effect of the GROPP variable on the different measurements of financial leverage. The sign of the effect of growth opportunities on the financial leverage measurements changes significantly with removal of outliers. So, as rule of thumb, firms exceeding 3 times the standard deviation of the observations are identified as outliers in the dependent variables and are excluded from the analysis. Outliers in the independent variables were also detected by Mahalanobis distance statistic. However, the removal of outliers, in the independent variables, directly from the sample data has shown a pattern of removing the effect of industry classification indicating that companies from the same industry seem to be outliers consistently. Particularly, this had the consequence of excluding 100% of the firms from non-cyclical services. Therefore, the sample data was grouped for each year by major industry classifications and then the Mahalanobis distance statistic was applied to detect the real outliers in the data from the industry. This also presented another problem because the industry classification effect should not come as a result of the removal of the outliers from the base industry. Finally, the study used the standard residual greater than 3 and Cook's Distance statistic greater than 1¹⁴. The introduction of industrial dummies can also mitigate the violation of the normality assumption. Furthermore, BRISK and GROPP variables are also transformed appropriately to ensure

¹³ Each case's M-distance is compared to the critical value of chi-square table at $df=11$ and $\alpha=0.001$ which is 31.26.

¹⁴The procedures used are explained in chapter four in detail.

that the results of the study are reliable¹⁵. Thus, it is appropriate to use parametric statistics analysis because nonparametric methods are most appropriate when the sample sizes are small. When the data set is large (e.g., sample size greater than 100) it often makes little sense to use nonparametric statistics at all, (Statistica Electronic Manual). For the detailed procedure used to make the results reliable refer to 4.1 'Empirical Procedures' in the next chapter.

Summary

The first section of this chapter presented the multiple regression model used to investigate the effects of the determinants of capital structure of firms' financial leverage. This model works under the basic assumptions of **autocorrelation**, **heteroscedasticity**, and **multicollinearity**. Different methods are applied to test these assumptions. Thereafter, an explanation was provided as to how each of the critical questions in the study is analyzed. In the second section, the study posed some general assumptions and delimitations. The third section presented the hypothesis developed for each determinant of financial leverage in relation to the respective appropriate theories of capital structure based on the discussion in the previous chapter (literature review). The fourth section dealt with the measurements of financial leverage and explanatory factors. Two major problems in the measurement of firm's financial leverage are discussed which led the study to consider the effects of the determinants on four different measurements financial leverage. Finally, the chapter presents the sources of data for the study. The procedures used to examine whether the data set is healthy to apply parametric statistical tests and why nonparametric statistical tests are not appropriate are also presented in this section. Descriptive statistics of the different measurements of financial leverage and the determinants of financial leverage for the selected years of study will be presented in the next chapter along with the analysis of the study.

¹⁵1) BRISK is transformed into a natural logarithm after adding the smallest value of BRISK to the original values in the year. 2) GROPP is transformed into the square root after adding the smallest value of GROPP in the overall years' observation to the values in the year.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

Introduction

This chapter has six main sections. The first section reveals the empirical procedures used for testing the validity of the data in the study. Section two presents the summary of descriptive statistics of the different measurements of financial leverage and the determinants of capital structure. Section three presents the results on variation of financial leverage explained by the determinants. Section four, contains the discussion of the results of the determinants of capital structure for cross-sectional analysis. Section five presents the pooled regression analysis of each of the determinants. Section six analyzes the change of the influence in the determinants of financial leverage over time. A summary is also presented at the end of the chapter.

4.1 Empirical Procedures

As explained in the previous chapter, the study used the multiple regression model to test the hypotheses developed on the relationship between firm's financial leverage and the factors that determine the financial leverage. Based on the raw data, the results for some of the determinants are not consistent, particularly the proxy for growth opportunities. Hence, the exclusion of extreme outliers was necessary, after which the results of all the determinants improved. To avoid further sampling bias outliers were removed only from their respective years. Consequently, the sample size varies from one year to another.

Several procedures were executed to investigate the effects of the determinants of capital structure on the four measurements of financial leverage applied in this study. Briefly, the procedures followed were:

- Assess the regression results on raw data with and without industrial dummies.
- Check assumptions of the model - as explained in the previous chapter all the major assumptions of the model are not violated, except normality for some of the

variables in some of the sample years. For example, in 1997, only the proxy for growth opportunities has some cases which lie outside the normal distribution.

- Remove outliers in the dependent variables with a standardized residual greater than 3. Two to four firms/cases are removed each year from the analysis. The procedure indicated that some of the firms are found to be outliers in more than one year. Thus, in total eleven firms are excluded from the analysis using this technique.
- Check normality of the data for each of the variables and assess the regression results. At this stage, though the normality of the data and regression results were improved, there was still a need to search for outliers. This is because some of the explanatory variables still violate the normality assumption and the coefficients of some of the variables, particularly the proxy for growth opportunities and business risk, were not stable. A scatter plot of residuals and deleted residuals, after the exclusion of the above outliers, revealed that all the residuals are on or very close to the straight line.
- The next step was to detect outliers which influence the results of the regression model. Cook's Distance (d) is applied and if any of the cases produce a Cook's distance greater than 1 it is excluded from the regression model. The Cook's values identify individual companies that unduly influence the outcome. One to two outlier firms/cases per year were identified. In total, seven firms were detected, two of which were already excluded by the standard residual.
- Again, check for normality and assess the regression results. The removal of outliers by Cook's Distance results in an improved estimation of the regression model. This is evidenced by the changes in the R-square and the beta coefficients of the determinants included in the model.
- Alternatively, outliers in the explanatory variables are detected by Mahalanobis Distance (MD). MD is most commonly used as a multivariate outlier statistic. Based on this method, the MD for each individual firms is computed and compared to the critical value of 22.46, (chi-square, $DF = 6$ and $\alpha = 0.001$). In total, nine firms are detected, six of which are already excluded by the previous techniques.

- Check for normality and assess the results of the regression model. The regression results at this stage revealed good results for some of the years but not for all. In fact, in some of the years the significance level of the effects of the determinants has been lost. In addition, the coefficient of the industrial dummies in the model indicated that the removal of outliers caused the signs of the coefficients to change. This happened simply because the base industry (cyclical services) is an industry in which outliers are found as this industry comprises a larger number of firms than the others.

Conclusion - Based on the above procedures the best way to deal with the data is to transform the data for the proxies of growth opportunities and business risk, then include the outlier firms identified by Mahalanobis Distance statistic in the analysis. In fact, outliers should be removed *if* there is reason to believe that other variables not in the model explain why the outlier cases are unusual (Garson 2002). Garson (2002) further outlined, that alternatively, outliers may suggest that additional explanatory variables need to be brought into the model. Thus, from the results of the procedures used in detecting outlier cases and the results of the regression model at different levels of excluding outlier cases, it seems that industry classification could be a missing variable. Accordingly, the introduction of industrial dummies might resolve the doubt more appropriately. The introduction of industrial dummies can also mitigate the violation of the normality assumption. Thus, it is appropriate to use parametric statistics analysis. Otherwise, nonparametric methods are most appropriate when the sample sizes are small. When the data set is large (e.g., sample size greater than 100) it often makes little sense to use nonparametric statistics at all, (Statistica Electronic Manual). Despite this, the nonparametric Spearman rank order correlation was used as an alternative method to investigate the effects of the determinants. However, the results are not reported because most of the results are similar, with some exceptions, such as the coefficients of BRISK indicate a positive relationship with all the measures of financial leverage. Tables B7 and B8 of the Appendix contain the Spearman rank order correlation results for the cross-sectional and pooled analysis respectively.

This study applies the standard regression procedure to investigate the effects of the determinants of capital structure. Taking into consideration the number of variables used in this study (four dependent, six independent, and five independent dummy variables) and the sample periods, it is complex to use the stepwise multiple regressions. Besides, the stepwise regression is appropriate for purposes of pure prediction, and not for theory testing, (Garson, 2002). Therefore, the study ran forty-eight standard regressions for the cross-sectional analyses. The explanatory factors are regressed with four dependent variables for six cross-sectional analyses with and without industrial dummy variables. Then, the study executed four regressions for the pooled data. Furthermore, an additional twenty-four regressions are used to examine the dynamics in the determinants of capital structure. Thus, the study used 78 (in total) standard regression results for the analysis.

4.2 Descriptive Statistics

The descriptive statistic of each variable should be interpreted bearing in mind that those firms with a standard residual greater than 3 and Cook's Distance greater than 1 are excluded from the analysis.

In Table 4.1, the four rows for each variable represent the mean, median, minimum and maximum values of each dependent and explanatory variable in the data set of this study. TLTA represents the higher financial leverage measure, followed by TDTAB, TDTAM, and TDTA respectively. In most of the sample years the average of the measurements of financial leverage indicates an increase in each year. For example, when financial leverage is measured by total liabilities to total assets the average increased from 46%, in 1997 to 54% and 52% in 2001 and 2002 respectively. The increase is significant in 2001 and 2002 compared to 1997. The trend is almost the same when the measurement includes only debt components. However, as the increase is large for TLTA, this might suggest that JSE listed firms placed more emphasis on trade credit than debt finance during the sample periods. The increase in non-debt credit could be due to the transaction process costs associated with the increase of sales in each year. TDTAM has shown a significant increase over the years except in 1998. In 1997, the average debt ratio, when market equity is used in the denominator, was 14.18%, and increased each year to almost

double in 2001. Then this average diminished to 21.45% in 2002. Taking into consideration the change in debt components shown above, it seems clear that the significant change in TDTAM comes from the decrease in market values of equity. This can be confirmed by the decrease in the proxy of growth opportunities, market-to-book value of equity.

The average statistic for some of the determinants of capital structure also show the same trend but seem more stable with some of the determinants. The average variability of EBIT (transformed) shows a drastic increase from 4.00 in 1997 to 4.17 in 1998 and continues to increase steadily to 4.36 in 2002. The average size of firms measured by log of sales indicates a consistent increase from 5.80 in 1997 to 6.00 in 2002. The most stable variable over time is the fixed asset to total asset ratio, tangibility, on which the change over the years is meaningless, with the maximum average ratio of 31.75% in 1999 and the minimum of 29.3% in 2002. The profitability ratio shows a consistent decline over time from 11.11% in 1997 to 8.69% in 2001, and then the ratio improved to 13.53% in 2002. The transformed proxy for growth opportunities indicates an average of 11.00 in 1997 and 11.06 in 2002¹⁶. It is noteworthy that, before outliers are excluded from the analysis, the maximum value for growth opportunities (market-to-book value of equity) was 1453.12 while the average for each sample year ranges between 2.00 and 4.00. This extreme outlier is detected by applying Cook's Distance statistic. The average age of a firm in the study is indicated at 44-years in 1997, with the minimum of zero age and the maximum of 112. The average is consistent over the years because one year for each firm in each consecutive sample year is added.

¹⁶ See footnote no. 15 in chapter three. (GROPP is transformed into the square root, after adding the smallest value of GROPP in the overall years' observation to the values in the year.)

Table 4.1: Descriptive Statistics- Measurements of Financial Leverage and the Determinants of Financial Leverage: Mean, Median, Minimum and Maximum in Columns respectively

	1997	1998	1999	2000	2001	2002
TLTA						
<i>Mean</i>	0.4585	0.4456	0.4845	0.4970	0.5416	0.5206
<i>Median</i>	0.4463	0.4552	0.4964	0.5094	0.5684	0.5398
<i>Min</i>	0.0541	0.0552	0.0751	0.0701	0.0752	0.0461
<i>Max</i>	1.0964	0.8139	0.9102	0.9034	1.1814	0.9196
TDTA						
<i>Mean</i>	0.1187	0.1194	0.1342	0.1398	0.1588	0.1368
<i>Median</i>	0.0914	0.0969	0.1045	0.1023	0.1072	0.0968
<i>Min</i>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<i>Max</i>	0.6563	0.4719	0.5109	0.6055	0.6010	0.5413
TDTAB						
<i>Mean</i>	0.2071	0.1920	0.2294	0.2423	0.3799	0.2558
<i>Median</i>	0.1674	0.1706	0.1997	0.2105	0.2351	0.1988
<i>Min</i>	0.0000	0.0000	0.0000	0.0000	-3.2640	0.0000
<i>Max</i>	1.1824	0.5860	1.0711	0.8257	7.3301	1.5074
TDTAM						
<i>Mean</i>	0.1418	0.1851	0.2256	0.2553	0.2765	0.2145
<i>Median</i>	0.0861	0.1000	0.1524	0.1787	0.2266	0.1619
<i>Min</i>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<i>Max</i>	0.5698	0.8452	0.8203	0.9111	0.9285	0.7608
BRISK						
<i>Mean</i>	4.0064	4.1760	4.2679	4.2610	4.2843	4.3663
<i>Median</i>	4.0888	4.3169	4.2875	4.3097	4.4070	4.4790
<i>Min</i>	0.7782	1.8865	1.0792	1.5051	1.4624	0.3010
<i>Max</i>	5.7102	6.2653	5.9883	6.0864	6.1031	6.2700
SIZE						
<i>Mean</i>	5.8038	5.8574	5.9263	5.9651	6.0018	5.9987
<i>Median</i>	5.8886	5.9387	5.9953	6.0418	6.0832	6.1994
<i>Min</i>	3.2162	3.7568	3.7024	3.7147	3.7075	1.9542
<i>Max</i>	7.5675	7.5495	7.4616	7.5459	7.5518	7.6340
TANG						
<i>Mean</i>	0.3145	0.3089	0.3175	0.3133	0.3098	0.2929
<i>Median</i>	0.2695	0.2608	0.2835	0.2777	0.2645	0.2581
<i>Min</i>	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
<i>Max</i>	0.9342	0.9164	0.8982	0.8526	0.9475	0.8551
PROF						
<i>Mean</i>	0.1111	0.1065	0.0909	0.0960	0.0869	0.1353
<i>Median</i>	0.1043	0.1130	0.0981	0.0937	0.0992	0.1144
<i>Min</i>	-0.1229	-0.1772	-0.6419	-0.2534	-0.7548	-1.5334
<i>Max</i>	0.3353	0.2615	0.3387	0.3405	0.3683	2.3488

Continued: Table 4.1

GROPP						
<i>Mean</i>	11.0033	10.9854	10.9497	10.9981	10.9418	11.0652
<i>Median</i>	10.9873	10.9488	10.9303	10.9336	10.9300	10.9424
<i>Min</i>	8.7773	10.8940	8.6392	10.8922	9.9501	10.8440
<i>Max</i>	12.3107	11.3003	11.8332	12.8085	11.8759	15.1537
AGE						
<i>Mean</i>	44	46	46	47	47	48
<i>Median</i>	42	44	44	45	46	47
<i>Min</i>	0	1	2	3	4	5
<i>Max</i>	112	113	114	115	116	117
OBS	115	114	115	115	115	113

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4.3 Empirical Results

4.3.1 Results on Variation of Financial Leverage explained by the Determinants

As shown in Table 4.2, the variations of firm's financial leverage that can be explained by the determinants depend on how financial structure is computed. In most of the specifications, the determinants have explained financial leverage when measured with TLTA, to a greater proportion than the other measurements. In 1997, almost 26% of the variation in a firm's financial leverage (TLTA) can be explained by the selected determinants plus industrial classifications. However, the explained variation decreased in 1998, 1999 and 2000 compared to 1997, while the explained variation increased in 2001 and 2002 to 31% and 38% respectively.

The second measure of financial leverage is TDTA. The variation in this measure that can be explained by the determinants included in the model is 21% in 1997. In general the explained variation has increased in the consecutive years, when the highest increase appeared in 2001 at 28.4% followed by 28.1% in 2002.

The third and fourth measures of financial leverage are TDTAB and TDTAM. The second most explained variation of the financial leverage in 1997 is TDTAM, close to 23%, followed by TDTA at 21%. The explained variation in TDTAM has increased dramatically to 41.5% in 1998. This percentage, however, was not sustainable and decreased to 17.7% in 1999. As can be seen from table 4.1, the explained variation was stable for 2000 and 2001 at 24.1% and 25.7% respectively. The extent of the determination deteriorated to 16.6% in 2002. If we closely observe the R^2 values in Table 4.2, the determinants do not explain financial leverage when book value of equity is used in the denominator. So the evidence from this study suggests that book value of equity is not an appropriate measure in capital structure computations.

Table 4.2: Explanatory power of the Determinants of Capital Structure to the four measurements of Financial Leverage, before and after introducing Industrial Dummies: R^2 and (Adjusted R^2).

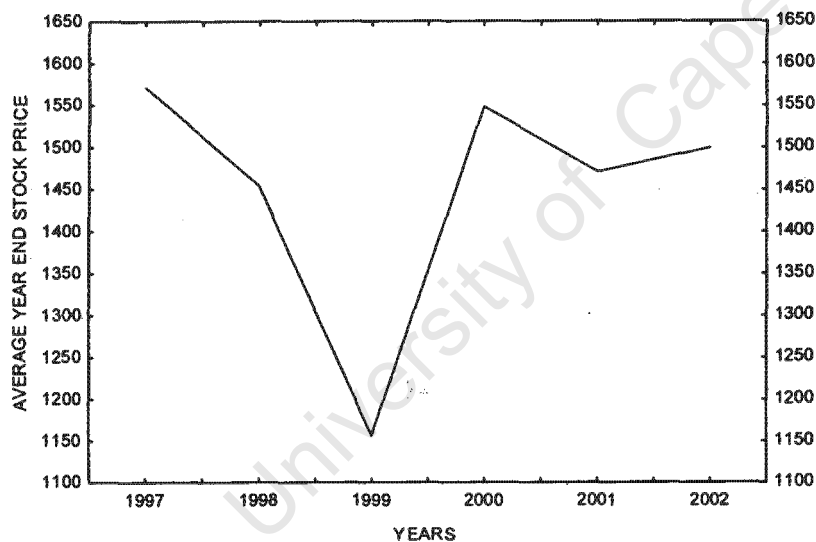
	TLTA		TDTA		TDTAB		TDTAM		OBS
	Before Industry Dummies	With industry Dummies	Before Industry Dummies	With industry Dummies	Before Industry Dummies	With industry Dummies	Before Industry Dummies	With industry Dummies	
1997	0.2005 (0.1560)	0.2592 (0.1801)	0.1734 (0.1275)	0.2092 (0.1248)	0.0853 (0.0344)	0.1071 (0.0118)	0.1494 (0.1022)	0.2254 (0.1426)	115
1998	0.1630 (0.1160)	0.2136 (0.1288)	0.1819 (0.1361)	0.2087 (0.1234)	0.1036 (0.0533)	0.1210 (0.0262)	0.3997 (0.3661)	0.4150 (0.3520)	114
1999	0.1976 (0.1530)	0.2374 (0.1560)	0.2123 (0.1685)	0.2540 (0.1743)	0.1576 (0.1108)	0.1899 (0.1034)	0.1154 (0.0663)	0.1770 (0.0891)	115
2000	0.1925 (0.1477)	0.2140 (0.1301)	0.1776 (0.1319)	0.2320 (0.1499)	0.1433 (0.0957)	0.1959 (0.1101)	0.1904 (0.1455)	0.2410 (0.1600)	115
2001	0.2695 (0.2289)	0.3194 (0.2467)	0.2582 (0.2170)	0.2844 (0.2080)	0.1063 (0.0567)	0.1117 (0.0168)	0.2102 (0.1663)	0.2568 (0.1774)	115
2002	0.3498 (0.3130)	0.3837 (0.3166)	0.2685 (0.2271)	0.2808 (0.2025)	0.2367 (0.1935)	0.2670 (0.1905)	0.1368 (0.0880)	0.1660 (0.0752)	113

Note: values in brackets are adjusted R^2 .

To summarize, the variation that can be explained by the selected firm specific determinants and industrial classification effects improves for all the measures of financial leverage except for TDTAM, from 1997 to 2002. However, it is important to see the pattern of the explained variation in the years between these two sample years. Generally, the explained variation is more stable when financial leverage is measured with TLTA and TDTA, indicating that these are the most appropriate ratios to consider in relation to the firm specific factors studied in this paper. The volatility of the explained

variation in TDTAM over the years can be attributed to the stock price volatility in those years, (Graph 4.1). Although the increase or decrease in the average stock prices is not consistent with the increase and decrease in the R^2 over the years, it can be clearly seen in graph 4.1, that the decreased explanatory power (R^2) of the determinants is associated with the lower stock price in 1999. The lower the stock price, the more TDTAM becomes closer to TDTAB, a measure which is weakly associated with the determinants in this study. This is confirmed by the average values of the two measures, 22.56% for TDTAM and 22.94% for TDTAB, (Table 4.1 in the previous section). So for TDTAM to be a good measure of financial leverage to be explained by the determinants, the stock price must be significantly higher than the book value.

Graph 4.1: Average year end stock price in SA currency (in cents)



4.3.2 Cross-Sectional Evidence on the Determinants of Capital

Structure

In this section the relationship of each determinant of financial leverage to the various measurements of financial leverage is presented. Effects of the results are indicated at the significance level of 1%, 5%, and 10% for the sample years. The reported results are at the 5% level of significance. Tables 4.3-4.8, presented at the end of this section contain the cross-sectional regression results. The analysis is done both with and without industrial dummies. The latter is not reported because the results are similar (for results of regression summary with and without industrial dummies for all sample periods refer to Appendix, Tables B1-B6).

In the process of investigating the effects of the factors on financial leverage the study found that, the regression models specifications rarely makes sense when book value of equity is used. This suggests that book value of equity should not be applied in measuring JSE listed firms' financial structure.

Business Risk

The study found mixed relationships between the proxy for business risk and measurements of financial leverage.

- The only significant relationship is found in 2001, when financial leverage is measured with market value of equity, which is a negative effect.
- When financial leverage is measured with all liabilities the relationship is insignificantly negative in all the sample years except in 1997.
- When financial leverage is measured by TDTA, the relationship is insignificantly positive in all the sample years.
- When financial leverage is computed with book value of equity, TDTAB, the relationship is insignificantly positive in 1997, 2000, 2001 and 2002, while insignificantly negative in the other two years.

So, based on the cross-sectional analysis, the relationship between business risk and financial leverage is inconclusive. Detailed discussion is provided in the pooled cross-sectional analysis in the next section.

Size of the Firm

In line with the predictions of the study, regardless of how financial leverage is defined, the relationship between financial leverage and size of firms is positive and with many significant coefficients. The regression results show insignificant negative relationships in very few cases (in 3 out of 24 regressions).

- The relationship with TLTA is positive and significant in all the years except 1997. Firm size was the most highly determinant factor of TLTA in all years in which it was significant. The insignificant effect in 1997 was due to the inclusion of industrial dummies in the model suggesting that size difference exists between industry groups. Thus, the few negative relationships (reported above) and the lost significance effect in 1997 could be attributed to the measure of the variable in the non-cyclical services industry because this industry uses more non-debt liabilities and has large annual sales¹⁷.
- When financial leverage is measured by TDTA the significant relationships reduced to about half of the coefficients in later years. This result is similar when book and market values of equity are used in the computations of financial leverage, except that the significant effects appeared in different years.

The consistently positive relationship is contrary to the findings from other studies in South Africa (Jordaan 1993, Dukhi 2000). This may not be surprising, given that these authors ignored the assumptions of multiple regression, in particular the removal of outliers which influences the outcome of the regression model. Besides the focus of Dukhi's (2000) study was in the retail sector only.

¹⁷ Outliers have not been considered for the non-cyclical services because this consists of three firms only.

Tangibility

Regardless of the direction of the relationship, the most stable evidence is found between the association of tangibility and various measures of financial leverage.

- Contrary to the study's prediction, a strongly negative and stable correlation is found over the sample years between tangibility of assets and financial leverage when defined as gross liabilities including non-debt items, TLTA. This suggests that firms with a high fixed asset ratio carry less liability. The negative correlation shows that, this measure of financial leverage does not consider the collateral use of fixed assets. This is in line with the approach that long-term assets should be financed with long-term liabilities.
- However, in support of the prediction in this study, the above negative sign turned significantly positive when financial leverage excludes non-debt liabilities and insignificantly positive for TDTAB in three sample periods. In most of the regressions tangibility has been the strongest determinant factor of debt finance. For example, in 1998, the coefficient (*beta*) of TANG was 0.45. This is consistent with the view that fixed assets are used as collateral for issuing debt. This suggests that, unlike the non-debt liabilities which are usually dealt with in the working capital management and secured by current assets, debt finance requires security of physical assets.

Profitability

The regression results indicated that the relationship between firm's performance measured by profitability and financial leverage is mixed.

- Consistent negative association is found with TLTA and TDTAM in all the sample years with about half of the regressions indicating a significant effect.
- The mixed association is for TDTA and TDTAB. The positive association with TDTA appears in four cross-sectional regressions while the positive association with TDTAB appeared in two years only. However, none of the positive coefficients are significant.

As in most of the results, the negative correlation, which is consistent with the prediction of the study, suggests that JSE listed firms use their accumulated profit to finance their operation and only look for debt if the profit of the firm is insufficient. Further discussion of this is provided in the pooled cross-sectional analysis. The investigation of the dynamic effect of profitability on financial leverage (discussed later) also presents an important finding that the relationship is decreasing.

Growth Opportunities

The proxy for growth opportunities, market-to-book values of equity, is the most sensitive measure among the determinants of capital structure included in this study. For example, in 1997, the relationship between GROPP and all measures of financial leverage is significantly negative. Surprisingly, in 2002, this relationship turned into positive and is significant for all the financial leverage measurements except for TDTAM for which the direction of the relationship remained the same, negative and also significant.

- The only consistent negative effect is found for TDTAM and the effect is significant in four out of six cross-sectional regressions.
- With the other measures the relationship is mixed with the significant negative coefficients greater than the positive ones.

Therefore, although in general the relationship is mixed, the proxy for growth opportunities is undoubtedly an important factor of financial leverage computed with market value of equity.

Age of the Firm

The direction of the relationship between age and financial leverage in the JSE listed firms is contrary to the prediction of the study.

- Firms' age is negatively associated with all measurements of financial leverage in all of the sample years. However, only few significant relationships exist when financial leverage is measured at an aggregate level including non-debt liabilities (TLTA).

The findings are consistent with the argument that age of the firm is associated with the accumulation of profit and maturity. In such situations, firms avoid external finance. This indicates that the longer a firm survives in business, the more internally generated profits it can accumulate and subsequently use to replace debt financing (Diamond 1989).

Industry Classification

The industry groups used in this study mainly measure the effect of cyclicity of business operations. All the regressions of the cross-sectional analysis have been executed including five additional industrial dummy variables. The coefficients of the industry dummy variables represent the difference between being *cyclical services (CS)* and not being in the cyclical services. So the base industry for interpretation of the coefficients of the industrial dummies is the CS.

- The effect of industry classification on firms' financial leverage is not evidenced in any of the sample years. None of the industry dummy variables shows a significant relationship at the 5% level of significance except for NCCG with TDTA and CCG with TDTAM in 1999, BI with TDTA in 2000.

Table 4.3: Cross-Sectional Analysis of Measurements of Financial Leverage, 1997.

	TLTA	TDTA	TDTAB	TDTAM
BRISK	0.1141	0.2256*	0.2483*	-0.0811
SIZE	0.1638	-0.0962	-0.0986	0.1110
TANG	-0.2869***	0.2340**	0.0610	0.3167***
PROF	-0.0338	0.1511	0.0884	-0.2402**
GROPP	-0.2524***	-0.3000***	-0.2287**	-0.1682*
AGE	-0.2035**	-0.0293	-0.0797	-0.0410
BI	0.1694*	-0.1432	-0.0808	0.0038
CCG	0.0628	-0.0633	-0.0046	0.1978**
GI	0.0539	-0.0923	-0.0948	0.0733
NCCG	-0.0870	-0.2069**	-0.1489	-0.1422
NCS	0.1520*	-0.0300	0.012941	-0.1207
R2	0.2592	0.2092	0.1071	0.2254
Adj. R ²	0.1801	0.1248	0.01178	0.1426
OBS	115	115	115	115

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table 4.4: Cross-Sectional Analysis of Measurements of Financial Leverage, 1998.

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.2722*	0.0362	-0.0827	-0.1417
SIZE	0.5111***	0.1391	0.2192	0.2514*
TANG	-0.0813	0.4518***	0.3527***	0.3495***
PROF	-0.0336	0.0110	-0.0138	-0.2174**
GROPP	0.0415	-0.0281	0.0347	-0.3763***
AGE	-0.1682*	-0.0675	-0.0822	-0.0519
BI	0.1662	-0.1480	-0.0893	-0.0171
CCG	0.0746	0.0419	0.0571	0.0957
GI	0.0840	0.0203	0.0620	-0.0092
NCCG	-0.0437	-0.0949	-0.0573	-0.0799
NCS	0.1487	-0.0493	-0.0044	-0.0231
R2	0.2136	0.2087	0.1210	0.4150
Adj. R ²	0.1288	0.1234	0.0262	0.3519
OBS	114	114	114	114

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table 4.5: Cross-Sectional Analysis of Measurements of Financial Leverage, 1999.

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.1867	0.1120	-0.0511	-0.0413
SIZE	0.5432***	0.1789	0.3196**	0.1375
TANG	-0.1067	0.4400***	0.2656**	0.3195***
PROF	-0.1515	0.0708	0.0347	-0.1088
GROPP	-0.0524	0.0272	-0.1928**	-0.0991
AGE	-0.1012	-0.0556	-0.0362	-0.0664
BI	0.0249	-0.1835*	-0.1516	-0.0239
CCG	0.0276	0.0329	0.0079	0.1805*
GI	-0.0488	-0.0904	-0.1308	-0.0788
NCCG	-0.1525	-0.1074	-0.1099	-0.0414
NCS	0.1092	-0.1061	-0.0359	-0.1543
R2	0.2374	0.2540	0.1899	0.1770
Adj. R ²	0.1560	0.1743	0.1034	0.0891
OBS	115	115	115	115

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table 4.6: Cross-Sectional Analysis of Measurements of Financial Leverage, 2000.

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.1470	0.1966	0.0543	0.1027
SIZE	0.4770***	0.0777	0.2321	-0.0241
TANG	-0.1522	0.3846***	0.2021**	0.2655***
PROF	-0.2418**	-0.0821	-0.1977	-0.2498**
GROPP	0.0993	0.1154	0.2530**	-0.1979**
AGE	-0.1429	-0.0523	0.0035	-0.1029
BI	0.0663	-0.2027**	-0.1387	-0.0863
CCG	0.0670	0.0024	-0.0260	0.1187
GI	-0.0485	-0.0836	-0.1442	-0.1117
NCCG	-0.0840	-0.1067	-0.1182	-0.0940
NCS	0.0401	-0.1657*	-0.1871*	-0.1288
R2	0.2140	0.2320	0.1959	0.2410
Adj. R ²	0.1301	0.1499	0.1101	0.1600
OBS	115	115	115	115

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table 4.7: Cross-Sectional Analysis of Measurements of Financial Leverage, 2001.

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.1442	0.0292	0.0038	-0.2730**
SIZE	0.5224***	0.3024**	0.2394	0.3399**
TANG	-0.0625	0.4174***	-0.0402	0.3432***
PROF	-0.2566***	0.0025	-0.2162**	-0.2055**
GROPP	-0.3091***	-0.3077***	-0.1486	-0.2532**
AGE	-0.2038**	-0.0580	-0.1727*	-0.0126
BI	0.1473	-0.1119	-0.0465	-0.1197
CCG	0.1346	0.0328	0.0377	0.0999
GI	0.0975	-0.0589	-0.0445	-0.0960
NCCG	-0.0426	-0.1269	-0.0270	-0.1527
NCS	0.1712*	0.0417	0.0014	-0.0725
R2	0.3194	0.2844	0.1117	0.2568
Adj.R ²	0.2467	0.2080	0.0168	0.1774
OBS	115	115	115	115

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table 4.8: Cross-Sectional Analysis of Measurements of Financial Leverage, 2002.

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.2044*	0.1271	0.0672	-0.1946
SIZE	0.6186***	0.2399**	0.3225***	0.2932**
TANG	-0.2221**	0.3398***	0.1388	0.2400**
PROF	-0.1372	-0.1387	-0.1749*	-0.0812
GROPP	0.1514*	0.2095**	0.2565***	-0.1920**
AGE	-0.1255	0.0005	-0.0149	-0.0147
BI	0.1279	-0.1103	-0.1256	-0.1261
CCG	0.0599	0.0191	-0.0710	0.0795
GI	0.0658	-0.0251	-0.0873	-0.0636
NCCG	-0.0626	-0.0566	-0.1213	-0.0562
NCS	0.1117	0.0098	0.0880	-0.0859
R2	0.3837	0.2844	0.2670	0.1660
Adj. R ²	0.3166	0.2080	0.1905	0.0752
OBS	113	113	113	113

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

4.3.3 Pooled Cross-Sectional Analysis of the Determinants

The main aim of this section is to present an analysis of the impact of the determinants on firm's financial leverage using a large sample size. To do so, the data of the sample years are simply pooled as a single cross-sectional data set. The pooled time series data still allows the use of industrial dummies. As will be explained in the next section, dynamics of the determinants of capital structure, the pooled data also allows for the use of annual dummy variables to represent each firm in each year as an independent variable.

The results from this analysis indicated that more of the explanatory variables show significant relationship than the yearly cross-sectional analysis. First, as the sample size increases the data for each variable becomes normally distributed. Second, as the sample size increases the tolerance level becomes wide and the degrees of freedom become large. The significance level is also pronounced for the industrial dummies. This is because, if the relationship between two variables is relatively small, then there is no way to identify such a relation in a study unless the research sample is correspondingly large (Elementary Concepts in Statistics 1984-2003). This seems true with the results in the regression model of this study. Some of the industrial dummies represent very few companies compared with the *base* industrial dummy. The total number of valid observations for this analysis is 696, after removing eighteen outlier firms which are detected through the procedures outlined at the beginning of the chapter. The analysis reports the effects of the determinants one by one when the model is specified to include the industrial dummy variables. Summary of the pooled time series cross-sectional results are presented in Table 4.9, while Tables 4.9.1-4.9.4 contain the regression summary for each measure of financial leverage.

Business risk

Evidence from the pooled data shows that the effect of business risk on financial leverage is mixed. The results depend on the exact definition of financial leverage. As expected, the correlation coefficients of the proxy for business risk indicate that business risk is negatively correlated with TLTA and TDTAM, with significant coefficient ($p = 0.02$) for TLTA only. This suggests that firms on the JSE with high operating risk (volatile EBIT)

do not get non-debt liabilities as a source of finance as easily as those with low volatility of EBIT or operating risk. Alternatively, companies with high operating risk try to control total risk by limiting financial risk. This is consistent with the findings in Banerjee et al (2000), Barbosa and Moraes (2002), Jong and Dijk (2002), Drobetz and Fix (2003) and some of the findings in the developing countries (Booth et al 2001). On the contrary and opposite to the expectation of this study, the relationship with TDTA and TDTAB is positive. Although, only for TDTA is the regression coefficient significant. This suggests that firms with volatile EBIT use more debt finance than firms with stable EBIT. One of the reasons could be due to the possible effect of higher operating risk on investors' perception; in turn, firms do not want to issue equity at the reduced share price. The reduced share price could be the result of investors having lost confidence in the firm's soundness. Computationally, the higher the operating risk, the lower the share price and the higher TDTAM is expected. However, the negative insignificant ($p = 0.11$) relationship in this study might be due to the decrease in market price being less than the increase in debt.

Size of the Firm

In the pooled data, regardless of the how financial leverage is measured, the effect of size as a determinant factor of financial leverage is positive and the coefficients are strongly significant. The significance effect is more pronounced when financial leverage is measured by TLTA, followed by TDTA. Size is the strongest determinant of TLTA with a beta coefficient of 0.46 ($p = 0.0000$). This pronounced correlation could be due to the association of the proxy of size (log of sales) and the fact that a large portion of TLTA comes from trade credit which supports the day-to-day financing of the firm's operation, particularly, the amount of sales. This suggests that size of firm acts as an inverse proxy for financial distress and bankruptcy because various costs of debt are moderated by a firm's size. The positive impact of size on financial leverage is consistent with the results of many studies (Shuetrim et al 1993, Hirota 1998, Banerjee et al 2000 (in the UK but not in the USA), Barbosa and Moraes 2001, and Booth et al 2001, Gaud et al 2003, Drobetz and Fix 2003).

In the South African case, Dukhi (2000), using total assets as proxy for size, concluded that the effect of size as a determinant of capital structure is not significant. He argued that his sample did not contain small companies because companies listed on the JSE are all large. However, since his study was conducted in the retail sector, his argument is not generalizable to all JSE listed firms. Also, Jordaan et al (1993) found mixed effects of size among sectors. The consistent and positive relationship in the current study could be attributed to the empirical procedures used in this study.

Tangibility

Evidence from the pooled data revealed that the effect of tangibility on the various measures of financial leverage is stable and similar with the cross-sectional regression reported in the previous section. The correlation of tangibility and TLTA is negative and strongly significant. This is contrary to the study's expectation but not altogether surprising because TLTA is a measure of financial leverage that contains short-term liabilities (non-debt). Similar relationships are also found by Banerjee et al (2000) in USA firms, Barbosa and Moraes (2002) in Brazil and in some other developing countries by Booth et al (2001). However, in line with this study's expectation, for the other measurements of financial leverage, except TDTAB, the relationships are positive and strongly significant. Tangibility is the strongest determinant of TDTA with a beta coefficient of 0.37 ($p = 0.0000$). This supports the predicted hypothesis of the trade-off theory that debt (not total liabilities) capacity increases with the proportion of physical assets on the balance sheet. As with firm's size, this is consistent with the view that various costs of debt finance may be moderated by the collateral values of assets. Firms with high collateral value of assets have access to debt at a lower premium. This result is similar to those reported in previous studies (Banerjee et al 2000, Heshmati 2001, Heshmati 2001, Jong and Dijk 2002, Gaud et al 2003, Drobetz and Fix 2003).

Profitability

As predicted in the study, evidence from the pooled data revealed that the effect of profitability to all the measures of financial leverage is negative. The regression coefficients on profitability are significant for all the measurements, except for TDTA.

The negative correlations suggest that JSE listed firms use their accumulated profit to finance their operations and only look for debt if the performance of the firm does not yield sufficient funds. This negative relationship is consistent with the pecking order theory (Myers 1984) that, in general, firms prefer internally generated sources of funds than externally available funds. This finding is consistent with previous findings (Hirota 1998, Heshmati 2001, Booth et al 2001, Gaud et al 2003, Drobetz and Fix 2003 and Banerjee et al 2000).

The findings on profitability might raise another important question whether the negative relationship with debt level is derived from the positive equity signaling. It can be argued that since share price is a reflection of confidence by investors in the company's soundness, companies with higher profitability tend to have higher share prices. In this situation, firms may jump to external equity finance¹⁸. Thus, if companies on the JSE are following this concept, the prediction is no longer consistent with pecking order theory (POT). Rather, it can be explained by positive equity signaling which is contrary to the POT (refer to footnote no.3 in chapter two).

Growth Opportunities

The regression results from the pooled data show that the effect of growth opportunities on financial leverage is mixed. The results depend on how financial leverage is measured. The only significant correlation is found between GROPP and TDTAM, which is a negative association as predicted in the study. This suggests that JSE listed firms with high market-to-book ratios have significantly lower financial leverage than those firms with low market-to-book ratios. This finding is consistent with the findings from Swiss firms in Drobetz and Fix (2003). The correlation with TLTA is also negative but highly insignificant ($p = 0.91$). By using sales and EBIT growth as a measurement for growth opportunities Jordaan et al (1993), cited in Dukhi (2000) found both positive and negative results in different sectors.

¹⁸ Pecking order financing preferences are retained earnings, debt and external equity.

Contrary to the expectation, however, the relationship with TDTA and TDTAB is turned to insignificantly positive. The positive relationship between GROPP and financial leverage in the JSE listed firms is consistent with the view that rapid growth exhausts firms' internal fund reserves and debt (next least expensive source of funds) is used to finance growth. Another possible explanation for the positive relationship is that the low growth firms could be in financial distress and banks are reluctant to release funds for those firms. Another reason could be that the low growth firms could be mature firms which do not need external funds, and this leads them to employ more of equity finance. By using sales and EBIT growth as a measurement for growth opportunities Jordaan et al (1993), found both positive and negative results in different sectors.

The overall finding on GROPP is similar to Gaul et al (2003), they observe a negative relationship between GROPP and financial leverage when market values are used, and a positive relation when leverage is computed with book values.

Age of the firm

Contrary to the study's expectation, the results from the pooled data revealed that the relationship between age of the firm and its financial structure is negative. The regression results indicate that the proxy for age of the firm is negatively related with all the measurements of financial leverage and the relationships are significant for all, except when financial leverage is defined with equity at market value. The findings are consistent with the argument that age of the firm is associated with the accumulation of profit and maturity. In such circumstances, firms do not need or prefer external finance. This indicates that the longer a firm survives in business, the more internally generated profits it can accumulate and subsequently use this to replace debt financing (Diamond 1989). Despite limited research on firm's age, the negative association between firm's age and financial leverage in the JSE listed firms is consistent with other findings (Wedig et al 1988, and Petersen and Rajan 1994).

Industry Classification

The coefficients of BI indicate that firms in BI tend to have significantly higher TLTA, but lower in the other measures of financial leverage. This suggests that firms in the BI use higher non-debt liabilities than firms in the CS and vice versa. In general, firms in CCG use higher financial leverage and this is significantly higher when financial leverage is measured with TLTA and TDTAM. The coefficients of GI suggest that firms in GI have insignificantly higher TDTA and lower other measures. This indicates that firms in this group use more non-debt liabilities than CS and vice versa. The coefficient of the fourth industrial dummy indicates that firms in NCCG tend to have lower financial leverage than CS with significantly lower TDTA and TDTAM measures. Finally, firms in NCS have significantly higher TLTA and significantly lower TDTA and TDTAM than firms in CS. So, in general, financial leverage measured with TLTA, TDTA, and TDTAM differs across industry groups, while the TDTAB measure does not.

Table 4.9: Pooled Cross-Sectional Analysis of Measurements of Financial Leverage, from 1997-2002.

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.1191**	0.1318**	0.0100	-0.0853
SIZE	0.4598***	0.1718***	0.1841***	0.1671***
TANG	-0.1449***	0.3752***	0.0482	0.3054***
PROF	-0.1349***	-0.0280	-0.0814**	-0.1352***
GROPP	-0.0038	0.0141	0.0051	-0.1656***
AGE	-0.1557***	-0.0738**	-0.1392***	-0.0324
BI	0.1151***	-0.1509***	-0.0486	-0.0493
CCG	0.1012***	0.0401	0.0501	0.1449***
GI	0.0414	-0.0496	-0.0392	-0.0606
NCCG	-0.0641*	-0.0990**	-0.0354	-0.0875**
NCS	0.1028***	-0.0716**	-0.0182	-0.1194***
R²	0.2244	0.1960	0.0478	0.1746
Adjusted R²	0.2120	0.1830	0.0325	0.1612
OBS	696	696	696	696

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table 4.9.1

Regression Summary for Dependent Variable: TLTA R= .47374398 R ² = .22443336 Adjusted R ² = .21196079 F(11,684)=17.994 p<0.0000 Std.Error of estimate: 0.16782						
696	Beta	Std.Err.	B	Std.Err.	t(684)	p-level
Intercept			0.086368	0.138164	0.62511	0.532106
BRISK	-0.119061**	0.050969	-0.024536	0.010504	-2.33593	0.019783
SIZE	0.459829***	0.052488	0.102786	0.011733	8.76060	0.000000
TANG	-0.144932***	0.037175	-0.129177	0.033134	-3.89867	0.000106
PROF	-0.134892***	0.035685	-0.165652	0.043822	-3.78012	0.000170
GROPP	-0.003829	0.034065	-0.001312	0.011671	-0.11241	0.910530
AGE	-0.155704***	0.035933	-0.001007	0.000232	-4.33313	0.000017
BI	0.115054***	0.037812	0.056448	0.018552	3.04275	0.002434
CCG	0.101195***	0.037389	0.059298	0.021909	2.70652	0.006969
GI	0.041352	0.036990	0.023738	0.021235	1.11791	0.264000
NCCG	-0.064088*	0.038060	-0.033190	0.019710	-1.68388	0.092660
NCS	0.102778***	0.035515	0.119151	0.041173	2.89394	0.003926

Table 4.9.2

Regression Summary for Dependent Variable: TDTA R= .44266386 R ² = .19595129 Adjusted R ² = .18302068 F(11,684)=15.154 p<0.0000 Std.Error of estimate: .11028						
696	Beta	Std.Err.	B	Std.Err.	t(684)	p-level
Intercept			-0.154297	0.090787	-1.69955	0.089671
BRISK	0.131835**	0.051897	0.017533	0.006902	2.54032	0.011295
SIZE	0.171831***	0.053443	0.024788	0.007710	3.21519	0.001365
TANG	0.375202***	0.037851	0.215817	0.021772	9.91254	0.000000
PROF	-0.027955	0.036334	-0.022155	0.028795	-0.76938	0.441936
GROPP	0.014077	0.034685	0.003113	0.007669	0.40586	0.684973
AGE	-0.073757**	0.036587	-0.000308	0.000153	-2.01593	0.044198
BI	-0.150913***	0.038500	-0.047783	0.012190	-3.91978	0.000098
CCG	0.040090	0.038070	0.015160	0.014397	1.05306	0.292686
GI	-0.049569	0.037663	-0.018364	0.013953	-1.31610	0.188582
NCCG	-0.099021**	0.038752	-0.033094	0.012952	-2.55523	0.010827
NCS	-0.071635**	0.036161	-0.053595	0.027055	-1.98100	0.047991

Table 4.9.3

Regression Summary for Dependent Variable: TDTAB R= .21870230 R ² = .04783070 Adjusted R ² = .03251803 F(11,684)=3.1236 p<.00040 Std.Error of estimate: .37921						
696	Beta	Std.Err.	B	Std.Err.	t(684)	p-level
Intercept			-0.215372	0.312194	-0.68987	0.490512
BRISK	0.009882	0.056475	0.004153	0.023734	0.17498	0.861144
SIZE	0.184107***	0.058158	0.083925	0.026511	3.16562	0.001616
TANG	0.048158	0.041190	0.087533	0.074869	1.16916	0.242748
PROF	-0.081381**	0.039539	-0.203805	0.099020	-2.05822	0.039947
GROPP	0.005171	0.037745	0.003613	0.026372	0.13700	0.891069
AGE	-0.139240***	0.039815	-0.001837	0.000525	-3.49718	0.000501
BI	-0.048600	0.041897	-0.048626	0.041919	-1.15999	0.246459
CCG	0.050102	0.041428	0.059871	0.049506	1.20937	0.226939
GI	-0.039217	0.040986	-0.045911	0.047982	-0.95685	0.338983
NCCG	-0.035382	0.042171	-0.037367	0.044537	-0.83901	0.401755
NCS	-0.018181	0.039351	-0.042982	0.093034	-0.46201	0.644222

Table 4.9.4

Regression Summary for Dependent Variable: TDTAM R= .41789758 R ² = .17463839 Adjusted R ² = .16118805 F(11,684)=12.984 p<0.0000 Std.Error of estimate: .19819						
696	Beta	Std.Err.	B	Std.Err.	t(675)	p-level
Intercept			1.380691	0.304955	4.52753	0.000007
BRISK	-0.085344	0.052990	-0.020245	0.012570	-1.61055	0.107745
SIZE	0.167107***	0.054555	0.042656	0.013926	3.06309	0.002278
TANG	0.305359****	0.038516	0.312664	0.039438	7.92806	0.000000
PROF	-0.135200***	0.037108	-0.189319	0.051961	-3.64345	0.000290
GROPP	-0.165588***	0.035971	-0.126110	0.027395	-4.60343	0.000005
AGE	-0.032448	0.037357	-0.000241	0.000278	-0.86858	0.385384
BI	-0.049336	0.039072	-0.027739	0.021968	-1.26270	0.207134
CCG	0.144900***	0.038790	0.098220	0.026294	3.73546	0.000203
GI	-0.060623	0.038319	-0.040016	0.025294	-1.58206	0.114104
NCCG	-0.087528**	0.039452	-0.051804	0.023350	-2.21856	0.026848
NCS	-0.119441***	0.037386	-0.157502	0.049299	-3.19481	0.001464

4.3.4 Dynamics on the Determinants of the Capital Structure

In this section the changes in the influence of the determinants of the financial structure over time are investigated. This can be done by modifying the regression model to include the interactive annual dummy variables, because the pooled time series cross-sectional data allows for the use of the annual dummy variables. Thus the change in the impact of the determinants on financial leverage is examined by interacting each independent variable with each annual dummy variable¹⁹. In this case, six regression models are specified where each independent variable is interacted with each annual dummy variable. For example, the first regression with interactive dummy variables involves the multiplication of each of the annual dummy variables (98, 99, 00, 01, and 02) with the first explanatory variable, which represents the BRISK of each firm. Such a multiplication generates a new set of variables BRISK*98 - BRISK*02. The same procedure is employed for the other determinants. The sample year of 1997 is used as a base to interpret the coefficients of the interactive annual dummies.

Business Risk

Positive and insignificant interactive dummy coefficients associated with TLTA for the first four years indicate that the strength of the correlation improved from 1997. The increase in the effect reached a highly significant level in 2002. The change in the influence of business risk on TDTA has also increased from 1997; with the peak of this increase occurring in 2001. As discussed in the cross-sectional analysis, the weak correlation between BRISK and TDTAB, has diminished further in 1998, and reaches almost no relationship with the highly significant decline in 2001. With regard to the change in the effect on TDTAM, the correlation strengthened significantly in 1998 and 2002 from 1997, while the effect declined in 1999 and 2000. Table 4.11 shows the regression coefficients of the interactive annual dummies (only variables of interest in this sub topic are reported in the table).

¹⁹ Bevan and Danbolt (2000) and Bloch and Voola (2002) used the same technique to analyze the dynamics in the explanatory variables.

Table 4.11: Analysis of Annual (Time) Interactions with the BRISK, 1997-2002

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.139389***	0.103082*	0.018221	-0.136893**
BRISK*98	0.006308	0.017168	-0.004387	0.076879**
BRISK*99	0.035167	0.003407	0.025629	-0.010711
BRISK*00	0.001869	0.027462	0.015891	-0.033483
BRISK*01	0.037427	0.091001**	-0.247732***	0.053652
BRISK*02	0.147298***	0.042409	0.071977*	0.117910***

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively.

Size of the firm

The positive and insignificant interactive dummy coefficients in all the measurements of financial leverage except TDTAM indicate that the effect of firm size on financial leverage is increasing and stable. The results on the interactive dummy coefficients are less supportive (inconsistent) with TDTAM which declined in 1999 and 2000, while it improved in 1998, 2001 and 2002. Table 4.12 shows the regression coefficients of the interactive annual dummies (only variables of interest in this sub topic are reported in the table).

Table 4.12: Analysis of Annual (Time) Interactions with the SIZE, 1997-2002

	TLTA	TDTA	TDTAB	TDTAM
SIZE	0.484056***	0.126117**	0.144232**	0.133328**
SIZE*98	0.037381	0.017340	0.008494	0.015815
SIZE*99	0.060014	0.056363	0.035528	-0.006216
SIZE*00	0.033609	0.043451	0.030533	-0.058114
SIZE*01	0.054718	0.097123*	0.085420	0.003253
SIZE*02	0.118369*	0.094836*	0.081234	0.059767

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively.

Tangibility

As shown in Table 4.13, in most of the regressions for the sign of the interactive dummy coefficients are positive. These positive signs indicate that the relationship between tangibility of assets in the firm and financial leverage improved over time from 1997. There is evidence that suggests that the effect on TLTA and TDTAB declined in 2002 and 2001 respectively. The coefficients of the interactive dummy variables are stronger for TDTA followed by TDTAM that indicates that the correlation between tangibility of assets of the firm and TDTA and TDTAM became stronger than in 1997. This suggests that firms' utilization of the collateral value of tangible assets as well as the lenders trust in the tangible assets has improved. Table 4.13 shows the regression coefficients of the interactive annual dummies (only variables of interest in this sub topic are reported in the table).

Table 4.13: Analysis of Annual (Time) Interactions with the TANG, 1997-2002

	TLTA	TDTA	TDTAB	TDTAM
TANG	-0.175597***	0.329663***	0.022911	0.262798***
TANG*98	0.047889	0.056594	0.026934	0.077809
TANG*99	0.036079	0.081512	0.030439	0.049981
TANG*00	0.020847	0.082763*	0.029412	0.051985
TANG*01	0.018148	0.090870*	-0.085561	0.050970
TANG*02	-0.021729	0.062002	0.020167	0.017421

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively.

Profitability

Though insignificant, the effect of profitability as a determinant of TDTA and TDTAB diminished from 1997. The evidence on the TLTA also suggests that the effect has diminished in 1999, 2000, and 2001, while it has increased in 1998 and 2002. The results on the interactive dummy coefficients are inconsistent with TDTAM, which declined in 1998 and 2000, while it improved in 1999, 2001 and 2002, with the dynamic significant shift occurring in 2002. Table 4.14 shows the regression coefficients of the interactive annual dummies (only variables of interest in this sub topic are reported in the table).

Table 4.14: Analysis of Annual (Time) Interactions with the PROF, 1997-2002

	TLTA	TDTA	TDTAB	TDTAM
PROF	-0.141427***	0.000599	-0.090292**	-0.129252***
PROF*98	0.002834	-0.058975	-0.017509	-0.026218
PROF*99	-0.010623	-0.047763	-0.002361	0.060761
PROF*00	-0.051164	-0.072771	-0.027119	-0.040040
PROF*01	-0.071293	-0.090974	-0.178527**	0.025833
PROF*02	0.098877	-0.236686*	-0.016086	0.285468**

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively.

Growth Opportunities

As shown in Table 4.15, the effect of growth opportunities of the firm on financial leverage measured by TLTA, TDTA, and TDTAB improved from 1997 and the dynamic result emerged with a positive and significant level for TLTA in 2000 and 2002, for TDTA in 1999, 2000, and 2002. An exceptional result found in 2001, which suggests that the relationship declined significantly regardless of the measurements of financial leverage. The effect of growth opportunities as a determinant of TDTAM declined over all the years from 1997, with the strongest significant evidence of the decline in 1998, 2000 and 2001. Table 4.15 shows the regression coefficients of the interactive annual dummies (only variables of interest in this sub topic are reported in the table).

Table 4.15: Analysis of Annual (Time) Interactions with the GROPP, 1997-2002

	TLTA	TDTA	TDTAB	TDTAM
GROPP	-0.006009	0.010531	0.000956	-0.171507***
GROPP*98	0.069266*	0.037588	0.024325	-0.121028**
GROPP*99	0.054073	0.091151**	0.003281	-0.033599
GROPP*00	0.086933**	0.115859***	0.057216	-0.093188**
GROPP*01	-0.082530**	-0.085139**	-0.147669***	-0.155028***
GROPP*02	0.209883***	0.259159***	0.118784	-0.011607

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively.

Age of the Firm

The study finds no evidence of a significant shift in the relationship between age of the firm and the measurements of financial leverage from 1997 to 2002. The change in the effect of age of the firm on financial leverage measured by TLTA, TDTA and TDTAB are positive and insignificant. This indicates that the change is stable over time. With regard to financial leverage measured by TDTAM, the change in the influence of the age of the firm is inconsistent, it declined in 1999 and 2000, while the relationship improved in 1998, 2001 and 2002. For all the measurements of financial leverage none of the interactive dummy coefficients are significant. Table 4.15 shows the regression coefficients of the interactive annual dummies (only variables of interest in this sub topic are reported in the table).

Table 4.16: Analysis of Annual (Time) Interactions with the AGE, 1997-2002

	TLTA	TDTA	TDTAB	TDTAM
AGE	-0.169787***	-0.064314*	-0.087323**	-0.048594
AGE*98	0.027244	0.002033	0.006587	0.004218
AGE*99	0.058829	0.008476	0.016964	-0.016846
AGE*00	0.036983	0.012462	0.027988	-0.042258
AGE*01	0.017981	0.017747	-0.095391*	0.000340
AGE*02	0.066990	0.032654	0.039515	0.019535*

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively.

Summary

The study uses different techniques to detect outliers in the data set. Further the study uses transformation (for some of the variables) techniques to normalize the data to reliably allow the use of the parametric statistics.

The descriptive statistics reveal that, in most of the sample years, the average of the measurements of financial leverage indicates an increase each year. TLTA represents higher financial leverage measure, followed by TDTAB, TDTAM, and TDTA respectively.

The variation that can be explained by the selected firm specific determinants and industrial classification effects improves for all the measures of financial leverage except for TDTAM, from 1997 to 2002. However, it is important to see the pattern of the explained variation in the years between these two sample years. Generally, the explained variation is more stable when financial leverage is measured with TLTA and TDTA, indicating that these are the most appropriate ratios to consider in relation to the firm specific factors studied in this paper.

The cross-sectional evidence shows that the proxies for size (positive), tangibility (positive) and age (negative) have shown consistent results for all the measures of financial leverage, except that tangibility is negatively significantly associated with TLTA. The effects of the proxies for business risk, profitability and growth opportunities on financial leverage depend on how financial leverage is computed. The results from pooled data indicate that most of the variables become significant determinants of financial leverage and profitability is negatively correlated with all the measures of financial leverage. Size and tangibility are found to be the strongest determinants of TLTA and TDTA respectively. In the dynamics of the determinants of capital structure, most of the factors have shown an insignificant increased impact on financial leverage, except the proxy for profitability which has shown a decreased impact in most of the measures.

CHAPTER FIVE

THE FINDINGS vs. THEORIES OF CAPITAL STRUCTURE AND INTER-INDUSTRY DIFFERENCES OF FINANCIAL LEVERAGE

Introduction

This chapter has three sections. The first section, analyzes whether the theories of capital structure can explain the behaviour of South African firms' capital structure based on the results of the study. Section two presents the comparison of inter-industry capital structure for the six-industry groups. Finally, the chapter provides a comparison of the findings with other studies.

5.1 Do the Theories of Capital Structure Explain the behaviour of South African Firm's Capital Structure?

This section is very important because all the results of the findings (in the previous chapter) can be summarized briefly here. It is observed that some of the theories are capable of explaining the financing behaviour of JSE listed firms to the extent that those theories can explain the behaviour of capital structure in other countries. This validates the notion that capital structure theories are portable across countries (Rajan and Zingales 1995, Booth et al 2001). The predicted effects of the determinants were based on the strongest views and results in the literature.

Trade-off theory - The study predicted three of the determinants using the arguments in this theory. Risky firms should borrow less because they do have the greater possibility of default on any given package of debt claims. While safe or stable firms are expected to borrow more until the expected costs of financial distress offsets the tax advantage of borrowing. In this study, business risk is negatively correlated with TLTA and TDTAM, while the relationship with TDTA and TDTAB is positive. Therefore, the result seems

inconclusive because the direction of relationship depends on how financial structure is computed.

Regardless of the how financial leverage is measured (defined) the effect of size as a determinant factor of financial leverage is positive and the coefficients are strongly significant. This is consistent with the view of trade-off theory that large firms are believed to have diversified holdings and they can absorb more financial distress than the small firms can. Hence, this creates capacity to borrow more debt and gain an interest tax shield advantage.

The third determinant predicted, using this theory, is tangibility of assets. The relationship between tangibility and financial leverage, except when computed with total liabilities is consistent with the trade-off theory. This supports the predicted hypothesis of the trade-off theory that debt capacity increases with the proportion of physical assets on the balance sheet. In other words, firms with high quality collateral assets can borrow more debt, because the presence of collateral assets creates debt capacity reserve by reducing financial distress and the probability of bankruptcy. However, the correlation of tangibility and TLTA is negative and strongly significant.

Pecking Order Theory - The relationship between profitability and level of debt assures that JSE listed firms follow the pecking order theory's view that firms prefer internal to external sources of funds. The fact that the coefficients are stronger when financial leverage is measured with TLTA and TDTAM highlights important points. First, as profitability of the firm increases the firm pays its suppliers with cash. Second, provided that profitable firms exhibit high share price and equity is the last resort of finance in this theory, the finding validates the concept that profitable firms use their accumulated retained earnings and not external equity. In addition, the finding indicates that the relationship is decreasing. This is in line with the observation that profitability was decreasing during the sample years which led firms to look for external finance. This could be the reason why an increase in the use of debt in the sample years was observed as well.

Agency Theory - The study uses agency theory to predict the effect of two of the determinants on financial leverage, growth opportunities and age of the firm. The study expects a negative relationship between financial leverage and growth opportunities, while a positive relation is expected with age of the firm. In line with the study's expectation, the proxy for growth opportunities is negatively correlated with financial leverage when measured with TLTA and TDTAM, but not with the other measures.

The correlation with age is negative which is contrary to the study's prediction. The prediction was made with the view that firms build their reputation over time and bankers trust this reputation to make loans. In other words, the longer the company existed the better the reputation it would have built. This is consistent with Harris and Raviv (1991) observation that lenders take note of a firm's default history. This avoids the agency cost of debt financing and creates capacity for more debt at a lower cost than otherwise. However, this is not the case with the JSE listed firms. So it is possible to argue that firms' age is closely related to the accumulation of reserves through retained earnings and these firms prefer to use their internal reserves than debt, this view is consistent with pecking order theory.

5.2 Comparison of Inter-industry Capital Structure²⁰

The previous chapter shows the effects of the determinants on financial leverage, including the industrial dummies, to account for the industrial classification effects. The coefficients of the industrial dummy variables are interpreted as each coefficient represents a higher or lower debt level in that industry compared to the cyclical services

²⁰ BI includes: Chemicals Construction and Building Materials Forestry and Paper Steel and Other Metals;
CCG includes: Automobiles and Parts, Household Goods and Textiles;
CS includes: General Retailers, Leisure and Hotels, Media and Entertainment, Support Services and transport;
GI includes: Diversified Industrials, Electronic and Electrical Equipment and Engineering and Machinery;
NCCG includes: Beverages, Food Producers and Processors, Health, and Pharmaceuticals and Biotechnology;
NCS includes: Food and Drug Retailers, and Telecommunication Services.

(base variable). In the cross sectional regression, 1997-2002, none of the coefficients of the industrial dummy variables are significant, except in few instances. Significant debt level differences between industries existed in 1997 for TDTA and TDTAM, and again for TDTA in 2000. Thus, most of the cross sectional evidence does not reject the null hypotheses that firms in different industries have the same financial structure. When the pooled data is considered, the result turned to significant financial leverage differences among industries for all measures except when financial leverage is computed with book value of equity (see Table 4.9). In this instance, the null hypothesis is rejected indicating that financial leverage differs across industries.

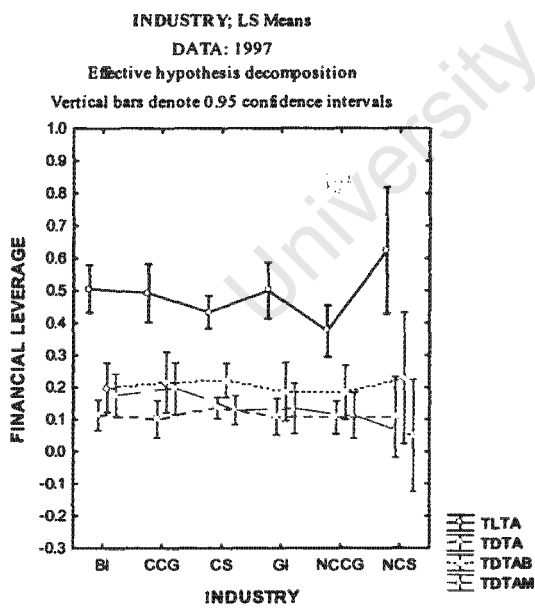
Another method to examine whether significant financial leverage differences exist across industries is to use the one way parametric analysis of variance (ANOVA). First one needs to test the null hypothesis that all the means are the same. For this to be false, only one mean would need to differ from the rest. The results of this analysis indicate that the null hypothesis is not rejected, suggesting that the average financial leverage does not differ across industries. This could be because some of the industries consist of too few firms to exhibit the financial leverage differences among industries. This can be confirmed with the results in the pooled data. Consistent with the evidence in the regression, the one way ANOVA test (on the pooled data) rejected the null hypothesis, with the exception of the findings for TDTAB which do not differ across industries, (see Table 5.1 with F-ratios and P-values for each of the measures in each year and pooled data). Furthermore, Graphs 5.1-5.7 clearly show if one or more means of each industry group differ from each other at 5% level of significance. Only Graph 5.7 shows significant difference in the means between industry groups for TLTA, TDTA and TDTAM.

Table 5.1: ANOVA Univariate Results for each measure of financial leverage.

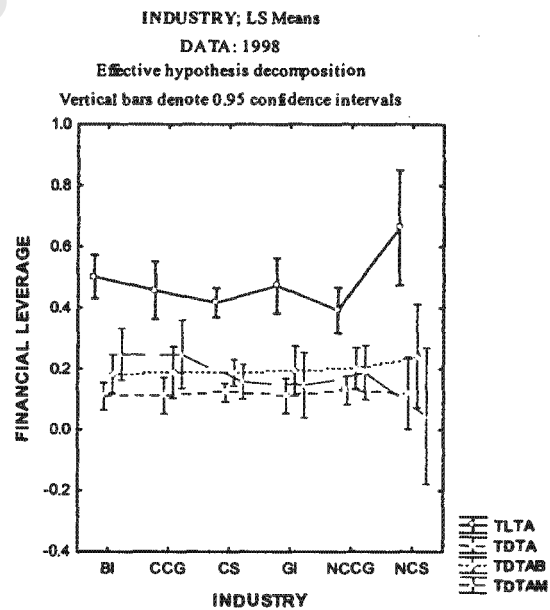
	Deg. Of Freedom	TLTA		TDTA		TDTAB		TDTAM	
		F-ratio	P-value	F-ratio	P-value	F-ratio	P-value	F-ratio	P-value
1997	(5, 109)	2.2369	0.0557*	0.3848	0.8583	0.1855	0.9675	1.0111	0.4148
1998	(5, 108)	2.2975	0.0501*	0.1126	0.9894	0.1079	0.9904	1.2739	0.2805
1999	(5, 109)	1.7270	0.1344	0.8827	0.4954	0.7592	0.5811	1.6500	0.1529
2000	(5, 109)	1.2763	0.2794	0.9334	0.4624	0.7591	0.5812	1.4594	0.2091
2001	(5, 109)	1.7829	0.1223	0.6661	0.6499	0.4061	0.8437	2.2146	0.0579*
2002	(5, 107)	2.0661	0.0753*	0.4806	0.7900	0.6220	0.6833	0.5791	0.7159
1997-2002	(5, 681)	10.044***	0.0000	2.5627**	0.0261	0.6978	0.6253	6.1575***	0.0000

Note: ***, **, * refer to 0.1%, 5% and 10% level of significance respectively.

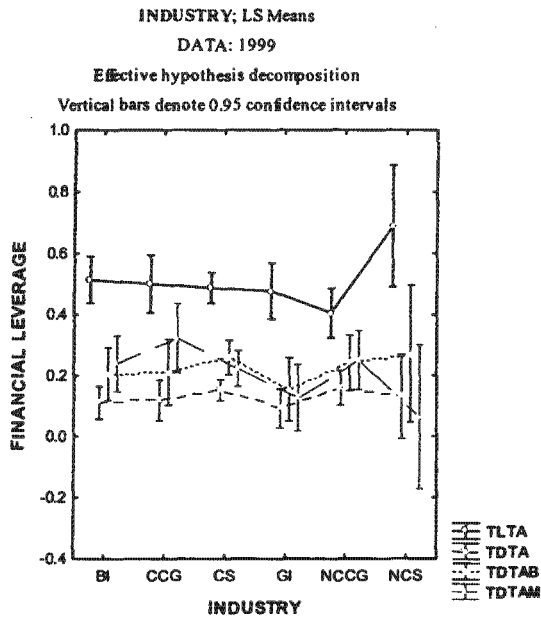
Graph 5.1:



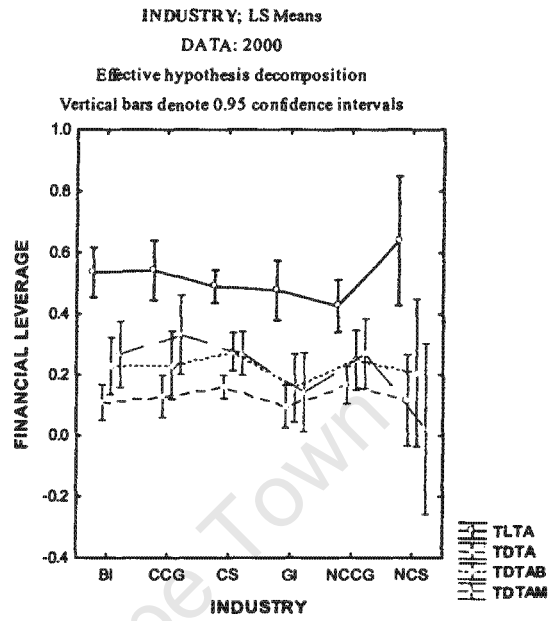
Graph 5.2:



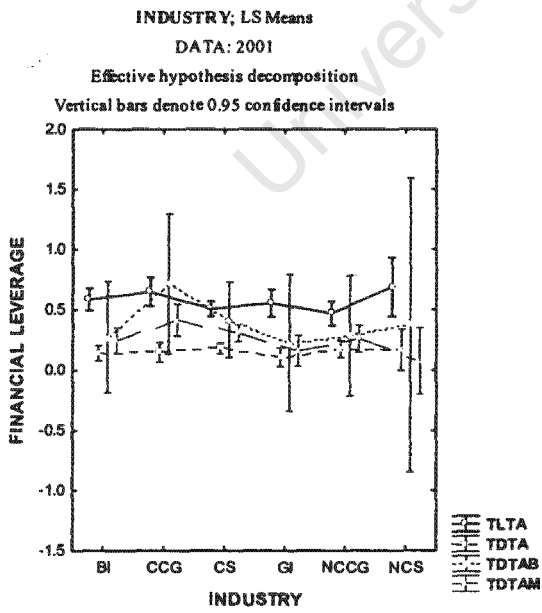
Graph 5.3:



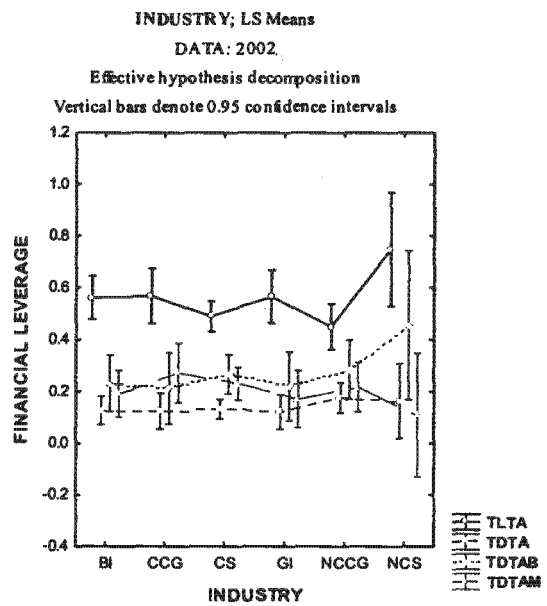
Graph 5.4:



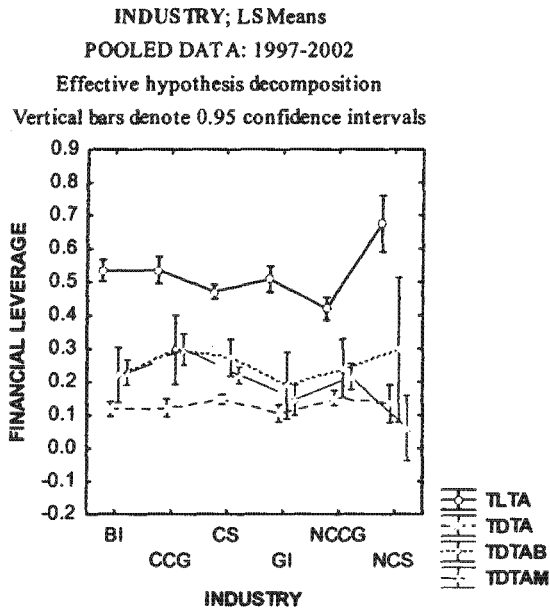
Graph 5.5:



Graph 5.6



Graph 5.7:



The generality of the results is extended by the nonparametric Kruskal-Wallis test on the same financial leverage ratios to examine if debt levels across industries are significantly different from each other. The Kruskal-Wallis test is basically an analysis of variance performed on ranks. The results are similar to those achieved by one way parametric analysis of variance (ANOVA). The results of the Kruskal-Wallis test in the cross sectional data are not significant at all. When the data is pooled, however, the test is highly significant for TLTA ($p = 0.000$) and TDTAM ($p = 0.000$) but not for the others (see Table 5.2)²¹. Thus, debt levels of the different industrial groups are significantly different from each other when financial leverage is computed with TLTA and TDTAM. When the Kruskal-Wallis test is used, TDTA difference across the different industries, which was significant in the parametric ANOVA, lost its significance (compare Table 5.1 and 5.2).

²¹ The Kruskal-Wallis test reported in this table is based on the pooled data, while the cross sectional Kruskal-Wallis tests are prepared but not reported here.

Table 5.2: Kruskal-Wallis ANOVA by Ranks

		Valid N	Sum of Ranks			
			TLTA	TDTA	TDTAB	TDTAM
BI		124	48270.00	40059.00	42014.00	45082.00
CCG		79	30631.00	26774.50	27608.50	31518.50
CS		272	88051.00	96474.00	94076.00	92114.00
GI		84	30269.00	25790.50	26420.50	25193.50
NCCG		110	29332.00	40982.00	38803.00	38745.00
NCS		18	9775.00	6248.00	7406.00	3675.00
Kruskal- Wallis test:	H(5,N=687)		48.51442***	7.420021	4.314283	20.73415***
	P		0.0000	0.1912	0.5051	0.0009

Note: *** refers to 0.1% level of significance.

5.3 Comparison of the Findings on the Determinants with International Studies

This section presents the comparison of the findings in the JSE listed firms with some international studies. It is important to give a picture of where South African firms' financing behaviour fits. Despite methodological differences, this comparison will provide insightful information on how the determinants of capital structure explain JSE listed firm's financial leverage in relation to firms from other countries²². The countries selected for comparison are derived from the papers reviewed in chapter two of this study. The similarities in the findings between countries may be exhibited by common attributes such as the development of the stock market, development of the country's economy, institutional factors, individual investor's behaviour, attitudes of managers towards financing techniques etc.

Generally, the development of the South African stock market plays a greater role among other institutional factors than the country's development, in predicting financing behaviour of a firm. This is consistent with the conclusion reached by Booth et al (2001),

²² Main methodological differences with some of the studies exist in measurement of the variables and model specifications.

knowing the institutional factors helps predict the financial structure of a firm better than knowing only its nationality. The following points could be drawn from findings in the South African firms and cross-country studies by Rajan and Zingales (1995) and Booth et al (2001):

- Booth et al (2001) found profitability to be the strongest determinant of financial structure in the developing countries and that the relationship was stronger than the findings in Rajan and Zingales (1995)²³ for the developed countries. In the South African firms the relationship is significantly negative (for most of the financial leverage measurements) but was not the strongest in any of the specifications. One main reason for the stronger relationship between profitability and financial leverage could be the ownership structure in developing countries is family based, so they do not like disclosure of information that comes with debt. Thus when the firm's profit is sufficient to meet the financing needs, financial leverage tends to be lower.
- With some exceptions in those other studies, the findings in Booth et al (2001) and Rajan and Zingales (1995) send an important message. GROPP is negatively (Rajan and Zingales, 1995) and positively (Booth et al, 2001) correlated with financial leverage in the developed countries and developing countries (in eight out of ten countries) respectively. In the South African case, the negative and significant result is attained when market value of equity is used in the computation of debt level. For the other measures the relationships are mixed and insignificant.
- Most of the findings on BRISK indicate that the correlation with debt level is negative. Booth et al (2001) found the positive findings for four out of ten countries. The weaker and positive relationship could be because the lenders in the developing countries emphasize collateral rather than income based lending

²³The negative relationship (in Rajan and Zingales 1995) was significant in three and four countries when book and market value of equity are used in the computation of debt level respectively.

approach. The finding in this study is mixed and it is difficult to reach a conclusion.

- Generally the overall findings are similar with the other determinants, SIZE and TANG.

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Table 5.3: Selected findings of the effects of the determinants on financial leverage

AUTHOR/S	BR	SIZE	TANG	PROF	GROP	AGE
Gaud et al (2003) Swiss, 106 firms, 1991-2000	Positive.	Positive.	Positive.	Negative.	Positive.	
Banerjee et al (2000) Optimal leverage, UK 1990-1996, and USA 1989-1996,	Negative (in both).	Positive in UK, surprisingly negative in USA.	Positive in UK, surprisingly negative in USA.	Negative (in both).	Positive (in both).	
Barbosa and Moraes (2002) Brasil, very small enterprises.	Negative.	Positive.	Negative.	Negative.	Positive.	Positive (industry age)
Drobetz and Fix (2003) Swiss, 124 firms, 1997-2001.	Negative	positive (But not significant)	positive	negative	negative (strongest and most reliable relationship)	
Bevan and Danbolt (2000) UK, 1054 firms, 1991-1997		Positive with LTD, negative with STD.	Positive with LTD, negative with total debt ratio.	Negative, the strongest.	positive	
Shuetrim, Lowe and Morling (1993), Australia 209 firms, 1973-1991.		Positive.	Positive.		Positive.	
Heshmati, Almas (2001), Swedish micro and small firms 1993/4-1997/8, 2261 firms	Negative.	Negative	Positive.	Negative, the strongest.	Negative.	Positive.

<p>Booth et al (2001), ten developing countries: India, Pakistan, Thailand, Malaysia, Turkey, Zimbabwe, Mexico, Brazil, Jordan, Korea, 1980-1990.</p>	<p>Negative for 6 countries, positive for 4 countries.</p>	<p>Generally positive for many of the countries.</p>	<p>Negative in Brazil, India, Pakistan, and Turkey.</p>	<p>Negative, the strongest. Except for Zimbabwe. Developing –small</p>	<p>Positive, except for South Korea and Pakistan.</p>	
<p>Rajan and Zingales (1995), G-7, US, Japan, Germany, France, Italy, the U.K., and Canada, 1987-1991.</p>		<p>Positive, except in Germany.</p>	<p>Positive in all countries.</p>	<p>Negative, except in Germany.</p>	<p>Negative in all countries.</p>	
<p>Voulgaris, Asteriou, and Agiomirgianakis (1989-1996) Greek manufacturing firms</p>		<p>Positive.</p>	<p>Positive.</p>	<p>Positive.</p>	<p>Positive.</p>	
<p>Hirota, Shin'ichi (1998)</p>	<p>Not significant</p>	<p>Positive.</p>	<p>Positive.</p>	<p>Positive.</p>	<p>Negative.</p>	

Summary

In most of the specifications, the findings on the determinants are consistent with hypothesized predictions in accordance with the theories of capital structure; except for age of the firm for which the prediction was positive while the finding is negative. Size, tangibility and business risk are predicted by trade-off theory. Profitability is predicted by pecking order theory and growth opportunities and firm's age by the agency theory. The pooled data analysis indicates that significant inter-industry capital structure differences exist in the JSE listed industrial sectors. Finally, the overall findings of the determinants compared with international studies indicates that the development of the South African stock market plays a greater role among other institutional factors than the country's development, in predicting the financing behaviour of firms.

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CHAPTER SIX

SUMMARY AND CONCLUSION

6.1 Summary

This empirical study had four main objectives. First, to investigate factors that influence the financing behaviour of JSE listed firms. Previous studies are limited in their type and coverage. The capital structure of these firms has not been dealt with before to the extent that this paper does. Second, to explore the changes in the influence of the determinants over time by modifying the regression model to include the interactive annual dummy variables. The results of the dynamics in the determinants indicate to what extent the effect of the factors on debt level has been increasing or decreasing. Third, to identify or relate the financing behaviour of the JSE listed firms to the theories of capital structure. Fourth, to compare debt level in each industry group to examine whether financial leverage is significantly different across industry groups.

The results of the multiple regression model indicate that the relationship between the determinants and financial leverage are consistent with the majority of the previous studies. The variation that can be explained by the selected firm specific determinants and industrial classification effects improves for all the measures of financial leverage except for TDTAM, from 1997 to 2002. However, it is important to see the pattern of the explained variation in the years between these two sample years. The variations of firm's financial leverage that can be explained by the determinants depend on how financial structure is computed. In most of the specifications, the determinants have explained financial leverage when measured with TLTA, to a greater proportion than to the other measurements. One exception to this occurred in 1998 when debt was measured with market value of equity which is explained 41.5% of the variation. The next highest variation in financial leverage that can be explained by the determinants is 38% for TLTA in 2002. The determinants did not explain financial leverage when book value of

equity is used in the denominator. Therefore, the evidence from this study suggests that book value of equity is not an appropriate measure in capital structure computations.

Generally, the cross-sectional findings on the determinants can be summarized as follows:

- The cross-sectional evidence indicates that the proxies for size (positive), tangibility (positive) and age (negative) have shown consistent results for all the measures of financial leverage, except that tangibility is negatively associated with TLTA.
- The effects of the proxies for business risk, profitability and growth opportunities on financial leverage depend on how financial leverage is computed. The signs of the coefficients for the proxy of business risk are not consistent over years with few significant results.

As the pooled data is considered, the study finds the same result as in the cross sectional analysis, except that profitability is now negatively correlated with all the measures of financial leverage and the significant effect increased for all the determinants.

- Size and tangibility are positively associated with financial leverage while profitability and age are negatively associated. The finding on tangibility is negative when debt ratios are calculated with all liabilities. The results on business risk and growth opportunities are still mixed, depending on how financial leverage is defined.
- Unlike the cross sectional regression in which some of the industry groups consist of few firms, the evidence from the pooled data also indicates that significant financial leverage differences appear across industry groups. The one way ANOVA and Kruskal-Wallis test also support this finding and reject the null hypothesis.

In the dynamics of the determinants of capital structure, most of the factors have shown an insignificantly increased impact on financial leverage, except the proxy for profitability which has shown a decreased impact on most of the measures.

Finally, analysis of the correlations indicates that the findings are consistent with the hypothesized predictions of the theories of capital structure; except for age of the firm for which the prediction was positive while the finding is negative. Size, tangibility and business risk are predicted by trade-off theory. Profitability is predicted by pecking order theory, while growth opportunities and firm's age are predicted by the agency theory.

6.2 Conclusions

While the level of gearing in the JSE listed firms depends on how financial structure is defined, financial leverage has been consistently increasing during the sample years.

The view that various costs of debt finance are moderated by firm's size and tangibility is consistent with the findings in the JSE listed firms. Similarly, large firms and firms with high collateral value of assets have access to debt at a lower premium. This supports the predicted hypothesis of the trade-off theory. The effect of size on financial leverage is pronounced when debt is defined grossly including total debt. The findings on tangibility highlights the potential danger of basing the analysis of capital structure determinants on overly aggregate measures of gearing

On the JSE, more profitable firms have lower debt ratios which support the pecking order theory. Hence, firms prefer internal to external sources of funds. This is confirmed by the findings that firm's age is negatively related to financial leverage. As a firm's age increases the need for external debt decreases because firms use their accumulated profit to finance their investment opportunities.

Business risk and growth opportunities as determinants of financial leverage did not come out with consistent results. However, in general, the results indicate that firms with

high business risk have lower financial leverage when measured with total liabilities, while firms with higher growth opportunities are found to be less financially leveraged when market value of equity is considered.

The financing behaviour is similar to that in other studies and to a greater extent, it is valid that, theories of capital structure are portable across different countries (Booth et al 2001). Generally, the financing behaviour of JSE listed firms can be explained by the trade-off and pecking order theories and not by agency theory.

Further research

The current study investigated the effects and dynamics of the determinants of capital structure in the JSE listed industrial sectors. Further the study examined the inter-industry comparison of financial leverage. Thus, it is proposed that further research could focus on:

- Similar research on the determinants of financial leverage for the non-industrial sectors and unlisted South African firms.
- Extending the current research with tax related determinants of financial leverage.
- Comparative studies on the determinants on financial leverage with other countries. This might contribute to enhancing the comparative knowledge available to local and foreign investors.

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Appendix

Table A1: Matrices Correlation of the Dependent and Independent variables of the pooled data

	BRISK	SIZE	TANG	PROF	GROPP	AGE	TLTA	TDTA	TDTAB	VIF
BRISK										1.0822
SIZE	0.1334									1.2822
TANG	0.0169	-0.0529								1.2069
PROF	0.2233	0.2787	-0.0662							1.1694
GROPP	0.0273	0.0507	-0.0115	0.0602						1.0125
AGE	0.0664	0.2755	-0.0009	-0.0184	-0.0110					1.1547
TLTA	0.0225	0.2487	-0.1974	-0.1117	-0.0278	-0.0950				
TDTA	-0.0072	0.1370	0.2622	-0.0297	-0.0148	-0.0399	0.4560			
TDTAB	-0.0353	0.0574	0.0104	0.0651	0.0125	-0.0235	0.0242	0.0845		
TDTAM	-0.0876	-0.0505	0.2314	-0.3156	-0.1063	-0.0565	0.4130	0.6696	0.0582	

Table B1: Cross-Sectional Analysis of Measurements of Financial Leverage before and after industrial dummies, 1997

	TLTA	TDTA	TDTAB	TDTAM
BRISK	0.0725	0.1622	0.1922	-0.1087
SIZE	0.2496**	-0.0841	-0.0768	0.0897
TANG	-0.2964***	0.1927**	0.0355	0.2246**
PROF	-0.0717	0.1764*	0.0985	-0.2124**
GROPP	-0.2454***	-0.2877***	-0.2137**	-0.1661*
AGE	-0.2304**	-0.0366	-0.0979	-0.0638
R²	0.2004	0.1734	0.0852	0.1494
BRISK	0.1141	0.2256*	0.2483*	-0.0811
SIZE	0.1638	-0.0962	-0.0986	0.1110
TANG	-0.2869***	0.2340**	0.0610	0.3167***
PROF	-0.0338	0.1511	0.0884	-0.2402**
GROPP	-0.2524***	-0.3000***	-0.2287**	-0.1682*
AGE	-0.2035**	-0.0293	-0.0797	-0.0410
BI	0.1694*	-0.1432	-0.0808	0.0038
CCG	0.0628	-0.0633	-0.0046	0.1978**
GI	0.0539	-0.0923	-0.0948	0.0733
NCCG	-0.0870	-0.2069**	-0.1489	-0.1422
NCS	0.1520*	-0.0300	0.012941	-0.1207
R²	0.2592	0.2092	0.1071	0.2254
Adj. R²	0.1801	0.1248	0.01178	0.1426
OBS	115	115	115	115

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table B2: Cross-Sectional Analysis of Measurements of Financial Leverage before and after industrial dummies, 1998

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.3123**	0.0640	-0.0648	-0.1528
SIZE	0.5923***	0.0753	0.1821	0.2303*
TANG	-0.0883	0.3855***	0.2965***	0.3060***
PROF	-0.0602	0.0307	-0.0014	-0.2126***
GROPP	0.0520	-0.0428	0.0233	-0.4044***
AGE	-0.1819*	-0.0754	-0.0912	-0.0627
R ²	0.1629	0.1819	0.1036	0.3997
BRISK	-0.2722*	0.0362	-0.0827	-0.1417
SIZE	0.5111***	0.1391	0.2192	0.2514*
TANG	-0.0813	0.4518***	0.3527***	0.3495***
PROF	-0.0336	0.0110	-0.0138	-0.2174**
GROPP	0.0415	-0.0281	0.0347	-0.3763***
AGE	-0.1682*	-0.0675	-0.0822	-0.0519
BI	0.1662	-0.1480	-0.0893	-0.0171
CCG	0.0746	0.0419	0.0571	0.0957
GI	0.0840	0.0203	0.0620	-0.0092
NCCG	-0.0437	-0.0949	-0.0573	-0.0799
NCS	0.1487	-0.0493	-0.0044	-0.0231
R ²	0.2136	0.2087	0.1210	0.4150
Adj. R ²	0.1288	0.1234	0.0262	0.3519
OBS	114	114	114	114

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table B3: Cross-Sectional Analysis of Measurements of Financial Leverage before and after industrial dummies, 1999

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.1899	0.1536	-0.0262	-0.0337
SIZE	0.5709***	0.0932	0.2732*	0.0612
TANG	-0.1378	0.388096***	0.2385***	0.2750***
PROF	-0.1804*	0.0887	0.0417	-0.1285
GROPP	-0.0397	0.0023	-0.2067**	-0.1315
AGE	-0.1292	-0.0716	-0.0596	-0.0801
R²	0.1976	0.2123	0.1576	0.1154
BRISK	-0.1867	0.1120	-0.0511	-0.0413
SIZE	0.5432***	0.1789	0.3196**	0.1375
TANG	-0.1067	0.4400***	0.2656**	0.3195***
PROF	-0.1515	0.0708	0.0347	-0.1088
GROPP	-0.0524	0.0272	-0.1928**	-0.0991
AGE	-0.1012	-0.0556	-0.0362	-0.0664
BI	0.0249	-0.1835*	-0.1516	-0.0239
CCG	0.0276	0.0329	0.0079	0.1805*
GI	-0.0488	-0.0904	-0.1308	-0.0788
NCCG	-0.1525	-0.1074	-0.1099	-0.0414
NCS	0.1092	-0.1061	-0.0359	-0.1543
R²	0.2374	0.2540	0.1899	0.1770
Adj. R²	0.1560	0.1743	0.1034	0.0891
OBS	115	115	115	115

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table B4: Cross-Sectional Analysis of Measurements of Financial Leverage before and after industrial dummies, 2000

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.1436	0.1599	0.0298	0.0754
SIZE	0.4784***	0.0413	0.1946	-0.0653
TANG	-0.1767**	0.3471***	0.1829**	0.2228**
PROF	-0.2665***	-0.0397	-0.1723*	-0.2397**
GROPP	0.1210	0.1051	0.2335**	-0.1899**
AGE	-0.1599*	-0.0527	0.0083	-0.1200
R²	0.1926	0.1776	0.1433	0.1904
BRISK	-0.1470	0.1966	0.0543	0.1027
SIZE	0.4770***	0.0777	0.2321	-0.0241
TANG	-0.1522	0.3846***	0.2021**	0.2655***
PROF	-0.2418**	-0.0821	-0.1977	-0.2498**
GROPP	0.0993	0.1154	0.2530**	-0.1979**
AGE	-0.1429	-0.0523	0.0035	-0.1029
BI	0.0663	-0.2027**	-0.1387	-0.0863
CCG	0.0670	0.0024	-0.0260	0.1187
GI	-0.0485	-0.0836	-0.1442	-0.1117
NCCG	-0.0840	-0.1067	-0.1182	-0.0940
NCS	0.0401	-0.1657*	-0.1871*	-0.1288
R²	0.2140	0.2320	0.1959	0.2410
Adj. R²	0.1301	0.1499	0.1101	0.1600
OBS	115	115	115	115

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table B5: Cross-Sectional Analysis of Measurements of Financial Leverage before and after industrial dummies, 2001

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.1942	0.0110	-0.0144	-0.3189**
SIZE	0.5947***	0.3200**	0.2494	0.3515**
TANG	-0.1020	0.3844***	-0.0436	0.3057***
PROF	-0.3077***	-0.0209	-0.2298**	-0.2463***
GROPP	-0.2200**	-0.2845***	-0.1523	-0.2778***
AGE	-0.2121**	-0.0810	-0.1856*	-0.0340
R²	0.2695	0.2582	0.1063	0.2102
BRISK	-0.1442	0.0292	0.0038	-0.2730**
SIZE	0.5224***	0.3024**	0.2394	0.3399**
TANG	-0.0625	0.4174***	-0.0402	0.3432***
PROF	-0.2566***	0.0025	-0.2162**	-0.2055**
GROPP	-0.3091***	-0.3077***	-0.1486	-0.2532**
AGE	-0.2038**	-0.0580	-0.1727*	-0.0126
BI	0.1473	-0.1119	-0.0465	-0.1197
CCG	0.1346	0.0328	0.0377	0.0999
GI	0.0975	-0.0589	-0.0445	-0.0960
NCCG	-0.0426	-0.1269	-0.0270	-0.1527
NCS	0.1712*	0.0417	0.0014	-0.0725
R²	0.3194	0.2844	0.1117	0.2568
Adj.R²	0.2467	0.2080	0.0168	0.1774
OBS	115	115	115	115

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table B6: Cross-Sectional Analysis of Measurements of Financial Leverage before and after industrial dummies, 2002

	TLTA	TDTA	TDTAB	TDTAM
BRISK	-0.1997*	0.1125	0.0665	-0.2408
SIZE	0.6578***	0.2407**	0.3326***	0.2843**
TANG	-0.2544***	0.3135***	0.1176	0.2140**
PROF	-0.1598*	-0.1274	-0.1506	-0.0693
GROPP	0.1500*	0.2179**	0.2693***	-0.1891**
AGE	-0.1321	-0.0231	-0.0491	-0.0357
R²	0.3498	0.2685	0.2367	0.1368
BRISK	-0.2044*	0.1271	0.0672	-0.1946
SIZE	0.6186***	0.2399**	0.3225***	0.2932**
TANG	-0.2221**	0.3398***	0.1388	0.2400**
PROF	-0.1372	-0.1387	-0.1749*	-0.0812
GROPP	0.1514*	0.2095**	0.2565***	-0.1920**
AGE	-0.1255	0.0005	-0.0149	-0.0147
BI	0.1279	-0.1103	-0.1256	-0.1261
CCG	0.0599	0.0191	-0.0710	0.0795
GI	0.0658	-0.0251	-0.0873	-0.0636
NCCG	-0.0626	-0.0566	-0.1213	-0.0562
NCS	0.1117	0.0098	0.0880	-0.0859
R²	0.3837	0.2844	0.2670	0.1660
Adj. R²	0.3166	0.2080	0.1905	0.0752
OBS	113	113	113	113

*, ** and *** significant at the 10, 5 and 1 percent level of significance respectively. TLTA is the ratio of total liability divided by total assets where total assets include all operating assets and non-operating assets of the firm. TDTA refers to total debt (long-term plus short-term debt) divided by total assets, where the total assets are defined as above. TDTAB is the ratio of total debt (long-term plus short-term debt) to total assets where total assets is the sum of the book value of debt and equity. TDTAM is the ratio of total debt (long-term plus short-term debt) to total assets where the total assets are measured by book value of debt plus market value of equity.

Table B7: Nonparametric Spearman Rank Order Correlations – cross-sectional
 MD pairwise deleted, Marked correlations are significant at $p < .05000$

	BRISK	SIZE	TANG	PROF	GROPP	AGE	BI	CCG	GI	NCCG	NCS	OBS
<i>1997</i>												
TLTA	0.0198	0.1273	-0.2239	-0.0640	0.0343	-0.1166	0.1040	0.0699	0.0973	-0.1756	0.1311	119
TDTA	0.1333	0.0487	0.2330	0.0309	-0.1014	-0.0734	-0.0314	-0.0551	-0.0759	0.0147	-0.0094	119
TDTAB	0.0955	0.0326	0.1250	-0.0384	-0.0392	-0.1098	-0.0205	-0.0224	-0.0398	-0.0174	0.0390	119
TDTAM	-0.0623	-0.0194	0.3101	-0.2544	-0.5202	-0.0812	0.0847	0.0847	-0.0251	0.0254	-0.0858	119
<i>1998</i>												
TLTA	0.0276	0.2232	-0.0825	-0.0508	0.0013	-0.0695	0.1206	0.0949	0.1128	-0.1603	0.1654	119
TDTA	0.1711	0.1305	0.3230	-0.0119	-0.1513	-0.1093	-0.0712	0.0664	0.0151	0.0407	0.0031	119
TDTAB	0.1122	0.1093	0.2401	-0.0533	-0.0628	-0.1320	-0.0494	0.0634	0.0689	-0.0033	0.0546	119
TDTAM	0.0308	0.0766	0.3858	-0.2562	-0.5719	-0.0293	0.1206	0.1082	0.0365	0.0441	-0.1342	119
<i>1999</i>												
TLTA	0.1390	0.2606	-0.1320	-0.0545	0.0777	-0.0554	0.0558	0.0516	0.0022	-0.1423	0.1685	119
TDTA	0.2406	0.1891	0.3767	0.0433	-0.0666	-0.0530	-0.0764	0.0137	-0.0943	0.1349	0.0047	119
TDTAB	0.1918	0.1999	0.2846	0.0261	-0.0224	-0.0306	-0.0456	0.0372	-0.1084	0.0895	0.0624	119
TDTAM	0.0814	0.0167	0.2992	-0.2559	-0.5127	-0.0136	0.0616	0.0896	-0.1084	0.0781	-0.1248	119
<i>2000</i>												
TLTA	0.1421	0.1799	-0.1266	-0.1241	0.0163	-0.1161	-0.0757	0.0623	-0.0177	-0.1336	0.1342	119
TDTA	0.2554	0.2011	0.3227	0.0633	-0.1020	-0.0376	-0.0764	-0.0163	-0.0752	0.0892	-0.0484	119
TDTAB	0.2288	0.1934	0.2405	-0.0128	-0.0365	-0.0216	-0.0148	-0.0011	-0.0951	0.0297	-0.0312	119
TDTAM	-0.0691	-0.1052	0.2473	-0.3226	-0.5577	-0.0487	0.0257	0.0953	-0.1017	0.0377	-0.1717	119
<i>2001</i>												
TLTA	0.0342	0.1580	-0.1716	-0.1907	-0.1506	-0.1062	0.1007	0.1496	0.0258	-0.1610	0.1404	119
TDTA	0.2472	0.2741	0.3393	-0.0018	-0.2294	0.0190	-0.0629	-0.0046	-0.0789	0.0073	0.0125	119
TDTAB	0.1725	0.2381	0.1756	-0.1216	-0.0935	-0.0466	0.1222	0.0478	-0.0671	-0.0120	0.0499	119
TDTAM	-0.1090	-0.0177	0.2050	-0.3729	-0.5978	0.0195	-0.0276	0.1154	-0.1209	-0.0608	-0.1264	119
<i>2002</i>												
TLTA	0.1958	0.2767	-0.1771	-0.1025	0.1888	-0.1124	0.0449	0.0881	0.0848	-0.2198	0.1941	119
TDTA	0.3431	0.3139	0.3445	-0.1511	-0.1148	0.0417	-0.0690	-0.0159	-0.0103	0.0597	0.0923	119
TDTAB	0.3126	0.3128	0.2104	-0.1694	0.0400	-0.0475	-0.0536	0.0046	0.0000	-0.0024	0.1738	119
TDTAM	0.0890	0.1028	0.2613	-0.3461	-0.4977	-0.0218	-0.0632	0.0494	-0.0509	-0.0181	-0.0652	119

Table B8: Nonparametric Spearman Rank Order Correlations - pooled.

MD pairwise deleted Marked correlations are significant at $p < .05000$

	BRISK	SIZE	TANG	PROF	GROPP	AGE	BI	CCG	GI	NCCG	NCS	OBS
TLTA	0.1252	0.2253	-0.1442	-0.0915	0.0073	-0.0897	0.0803	0.0897	0.0528	-0.1639	0.1593	714
TDTA	0.2437	0.2022	0.3233	-0.0064	-0.1333	-0.035	-0.0644	0.0029	-0.0495	0.0556	0.0068	714
TDTAB	0.1999	0.1898	0.2160	-0.0630	-0.0443	-0.0645	-0.0268	0.0255	-0.0401	0.0170	0.0587	714
TDTAM	0.0237	0.0262	0.2795	-0.3049	-0.5545	-0.0109	0.0340	0.0852	-0.0561	0.0108	-0.1129	714

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Table C1: List of Companies Included in the Final Analysis

	FIRMS	MRK	INDUSTRY	Comment
1	A E C I	Chemicals	BI	
2	AFROX	Chemicals	BI	
3	SPANJAARD	Chemicals	BI	
4	BASREAD	Construction and Building Materials	BI	
5	CASHBIL	Construction and Building Materials	BI	
6	CEMENCO	Construction and Building Materials	BI	
7	CERAMIC	Construction and Building Materials	BI	
8	CONCOR	Construction and Building Materials	BI	
9	DORBYL	Construction and Building Materials	BI	
10	ELBGROUP	Construction and Building Materials	BI	
11	GROUP-5	Construction and Building Materials	BI	
12	ITLTILE	Construction and Building Materials	BI	
13	M&R-HLD	Construction and Building Materials	BI	
14	MASNITE	Construction and Building Materials	BI	
15	PPC	Construction and Building Materials	BI	
16	WBHO	Construction and Building Materials	BI	
17	COPI	Forestry and Paper	BI	
18	SAPPI	Forestry and Paper	BI	Outlier in 2000
19	YORKCOR	Forestry and Paper	BI	
20	HIVELD	Steel and Other Metals	BI	
21	ISCOR	Steel and Other Metals	BI	Outlier in 1999
22	CMH	Automobiles and Parts	CCG	
23	MCCAR	Automobiles and Parts	CCG	Outlier in 1998
24	METAIR	Automobiles and Parts	CCG	
25	TIWHEEL	Automobiles and Parts	CCG	
26	VALAUTO	Automobiles and Parts	CCG	
27	VALCAR	Automobiles and Parts	CCG	
28	ADONIS	Household Goods and Textiles	CCG	
29	ANBEECO	Household Goods and Textiles	CCG	
30	GLODINA	Household Goods and Textiles	CCG	

31	NUWORLD	Household Goods and Textiles	CCG	
32	PALS	Household Goods and Textiles	CCG	
33	RICHEMONT	Household Goods and Textiles	CCG	Outlier in 1998, 1999, and 2001
34	SEARDEL	Household Goods and Textiles	CCG	
35	VENTEL	Household Goods and Textiles	CCG	Outlier in 2002
36	AF-&-OVER	General Retailers	CS	
37	BEARMAN	General Retailers	CS	
38	BRANDCO	General Retailers	CS	
39	EDCON	General Retailers	CS	
40	ELLERINE	General Retailers	CS	
41	FASHAF	General Retailers	CS	Outlier in 2001 and 2002
42	FOSCHNI	General Retailers	CS	
43	INMINS	General Retailers	CS	
44	JDGROUP	General Retailers	CS	
45	LA-GROUP	General Retailers	CS	
46	MATHOMO	General Retailers	CS	
47	METCASH	General Retailers	CS	
48	MR PRICE	General Retailers	CS	
49	NICTUS	General Retailers	CS	
50	NUCLICKS	General Retailers	CS	
51	RELYANT	General Retailers	CS	Outlier in 2002
52	REX-TRUE	General Retailers	CS	
53	WINHOLD	General Retailers	CS	
54	WOOLTRU	General Retailers	CS	
55	ADMIRAL	Leisure and Hotels	CS	
56	CITYLDG	Leisure and Hotels	CS	
57	CULINAN	Leisure and Hotels	CS	
58	DON	Leisure and Hotels	CS	
59	KERSAF	Leisure and Hotels	CS	
60	MORIBO	Leisure and Hotels	CS	
61	SISA	Leisure and Hotels	CS	
62	CAXTON	Media and Entertainment	CS	
63	JOHNCOM	Media and Entertainment	CS	
64	JOHNNIC	Media and Entertainment	CS	Outlier in 2002
65	KGMEDIA	Media and Entertainment	CS	
66	MNET-SS	Media and Entertainment	CS	
67	NASPERS	Media and Entertainment	CS	
68	PRIME	Media and Entertainment	CS	Outlier in 1997, 1998, and 2000.
69	SASANI	Media and Entertainment	CS	
70	ADCORP	Support Services	CS	
71	ALEXWYT	Support Services	CS	

72	BIDVEST	Support Services	CS	
73	BOWCALF	Support Services	CS	
74	NAMPAK	Support Services	CS	
75	TRNPACO	Support Services	CS	
76	CARGO	Transport	CS	
77	GRINDROD	Transport	CS	Outlier in 1997
78	MOBILE	Transport	CS	
79	PUTCO	Transport	CS	
80	SUPRGRP	Transport	CS	
81	TRENCOR	Transport	CS	Outlier in 1997 and 2002.
82	UNITRAN	Transport	CS	
83	BARWORLD	Diversified Industrials	GI	
84	IMPERIAL	Diversified Industrials	GI	
85	MT-EAGLE	Diversified Industrials	GI	
86	ALTECH	Electronic and Electrical Equipment	GI	
87	ALTRON	Electronic and Electrical Equipment	GI	
88	CONTROL	Electronic and Electrical Equipment	GI	
89	DELTA	Electronic and Electrical Equipment	GI	
90	GRINTEK	Electronic and Electrical Equipment	GI	
91	JASCO	Electronic and Electrical Equipment	GI	
92	PASDEC	Electronic and Electrical Equipment	GI	Outlier in 1998, 19 99, 2000, 2001 and 2002.
93	REUNERT	Electronic and Electrical Equipment	GI	
94	BELL	Engineering and Machinery	GI	Outlier in 1998
95	HOWDEN	Engineering and Machinery	GI	
96	HUDACO	Engineering and Machinery	GI	
97	INVICTA	Engineering and Machinery	GI	
98	ABI	Beverages	NCCG	
99	DISTELL	Beverages	NCCG	
100	SAB	Beverages	NCCG	Outlier in 2001
101	A-V-I	Food Producers and Processors	NCCG	
102	CONAFEX	Food Producers and Processors	NCCG	
103	CROOKES	Food Producers and Processors	NCCG	
104	ILLOVO	Food Producers and Processors	NCCG	
105	KOLOSUS	Food Producers and Processors	NCCG	Outlier in 1997

106	NAMSEA	Food Producers and Processors	NCCG	
107	OCEANA	Food Producers and Processors	NCCG	
108	RAINBOW	Food Producers and Processors	NCCG	
109	SOVFOOD	Food Producers and Processors	NCCG	
110	TIGBRANDS	Food Producers and Processors	NCCG	
111	TONGAAT	Food Producers and Processors	NCCG	
112	WBHOLD	Food Producers and Processors	NCCG	
113	AHEALTH	Health	NCCG	
114	FORIM	Health	NCCG	
115	MEDCLIN	Health	NCCG	
116	ASPEN	Pharmaceuticals and Biotechnology	NCCG	Outlier 1999 and 2000.
117	PICKNPAY	Food and Drug Retailers	NCS	
118	SHOPRIT	Food and Drug Retailers	NCS	
119	MTN GROUP	Telecommunication Services	NCS	