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THE CAPITAL STRUCTURE OF LISTED FIRMS AND DECLINING MARKET CONDITIONS

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The pace of change within the global competitive environment of business has accelerated. South African businesses increasingly have to adapt to remain competitive within transforming business environments. They need to strategically reposition themselves to survive and remain relevant. Strategic change may alter an organisation in a number of important dimensions. In order to implement such change, certain success factors need to be understood.
This research draws on five case studies of large scale change initiatives that have been carried out in South African organisations. The purpose of this qualitative research was to ascertain, through in-depth interviews and organisational case studies, the critical factors that led to the successful execution of those transformations. The research involved interviews with senior individuals in the organisations who have been directly and intricately involved with the specific strategic change programmes.

THE FINDINGS HIGHLIGHT A NUMBER OF CRITICAL SUCCESS FACTORS IN CHANGE MANAGEMENT THAT LEAD TO STRATEGIC TRANSFORMATION. VARIANCES BETWEEN THE RESULTS FROM THE CASE STUDIES AND THE SEMINAL ARTICLE BY KOTTER (1995) ARE UNDERLINED. A MODEL FOR THE EXECUTION OF STRATEGIC CHANGE IS OFFERED. THE MODEL REFLECTS THAT, IN ADDITION TO THE FACTORS OUTLINED BY KOTTER (1995), THE IMPLEMENTATION OF STRATEGIC TRANSFORMATION REQUIRES LEADERS WITH SPECIFIC LEADERSHIP CHARACTERISTICS, WHO ARE CAPABLE OF ENGAGING WITH THE HUMAN PSYCHOLOGICAL DIMENSION OF PEOPLE THROUGH CHANGE. SUCCESSFUL IMPLEMENTATION ALSO REQUIRES A MANAGEMENT APPROACH THAT ENCOMPASSES PROJECT MANAGEMENT DISCIPLINES, APPROPRIATE RESOURCE ALLOCATION AND NON-PROGRAMMATIC EMPOWERMENT AT THE DECISION INTERFACE BETWEEN THE ORGANISATION AND ITS EXTERNAL ENVIRONMENT.

THE CAPITAL STRUCTURE OF LISTED FIRMS AND DECLINING MARKET CONDITIONS

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A project report submitted to the faculty of Commerce, Law and Management, University of Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Masters in Business Administration.

March 2005

ABSTRACT

The objective of this study was to determine the effects of a declining market trend or bear period on the capital structure of companies listed on the JSE between 1999 and 2003. A significant finding using nonparametric statistical analysis, was that the sector debt-equity ratios had remained unchanged over the bear period.

However, once companies were divided into categories defined by return on investment (ROI), cost of debt, price-to-book ratio and the net operating profit after tax (NOPAT), some changes in capital structure were apparent. Firstly, for companies with an ROI greater than the cost of debt and a price-to-book ratio greater than the median it was found that the overall debt to equity ratios of these firms had remained unchanged. However, as the definition of debt included both interest and non-interest bearing liabilities, the increased use of debt as a proportion of total liabilities was confirmed through additional hypothesis testing. This suggested that companies with a price-to-book ratio greater than the median derived increased benefit from the tax shield and engaged in value maximising behaviour. Companies that had an ROI greater than the cost of debt and a price-to-book ratio less than the median maintained their debt-equity ratios and did not increase the proportion of interest- bearing to total liabilities.

Companies with a cost of debt less than the return on investment, implying reduced profitability, were classified further into those with a positive and a negative NOPAT. For firms with a positive NOPAT it was found that these firms resorted to increased debt funding and the greater use of short term liabilities in particular. This finding was regarded as consistent with the behaviour of less profitable firms that tended to resort to increased levels of debt financing to maintain

financial flexibility, although this finding may have been independent of the economic cycle.

Lastly, companies with a cost of debt less than ROI and a negative NOPAT were found to have significantly increased their debt-equity ratios as compared to before the bear period. As the levels of debt remained unchanged, however, the increased debt-equity ratios were shown to be a direct result of cumulative retained losses, which had eroded shareholders' equity.

Overall, the findings did not support the active management of capital structure, which would have entailed the retiring of debt during bear periods yielding a decrease in debt-equity ratios. The results did seem to show evidence of consistent financial policy, particularly for companies with a return on investment greater than the cost of debt.

DECLARATION

I, Hans Jőrg Schollenberger, declare that this project report is my own, unaided work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree in this or any other university.

……

Hans Jőrg Schollenberger

Johannesburg, March 2005

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1. INTRODUCTION

1.1 Background to the Problem

The capital structure of companies has been the subject of a significant body of research with the theoretical foundation being laid by Modigliani and Miller (1958) with their now famous propositions. The interest in the capital structure of companies, which represents the proportion of debt to equity funding employed by a firm, is related to the fact that an optimal capital structure maximises the value of the company. When taking into account the effects of the tax shield, the proportions of debt and equity directly affect the Weighted Average Cost of Capital (WACC) of a firm, which in turn affects the rate at which future cash flows are discounted and hence impacts on the valuation of the firm. It is for this reason that Ross, Westerfield, Jordan and Firer (2001:440) contended that: "a particular debt/equity ratio represents the *optimal capital structure* if it results in the lowest possible WACC". Brigham and Daves (2001) summarised that the increase in the value of a firm subject to corporate tax was solely due to the tax deductibility of interest payments, which lowered both the cost of debt and the equity risk premium by (1-T), where T was the company tax rate. Miller (1977) in his presidential address at the annual meeting of the American Finance Association showed that the gain from leverage was not only dependent on the corporate tax rate at (1-T) but was, in fact, tempered by the effects of personal tax both in relation to income tax rates on stock returns and the income tax rate applicable to returns on bonds.

Recent work by several researchers including Myers (1984) and Flath & Knoeber (1980) supported the existence of an optimal capital structure to the point where departures from the optimal debt-equity ratio were perceived negatively by the market as found by Castanias (1983) and Giner & Rivente (2001). The market capitalisation of a share may thus remain sub-optimal if the firm does not pursue a capital structure, which is considered appropriate by the market. Empirical research carried out by Dzamba (2003) showed that concerns about future earnings and cash-flow volatility were amongst the most

significant in the decision to issue debt. For firms in an industry sector experiencing reduced profitability under declining market conditions, Guzhva and Pagiavlas (2003:1) advocated the active management of liabilities as a means of improving profitability and reducing bankruptcies.

However, since debt is regarded as the cheapest source of capital, the retiring of debt out of concern for earnings volatility in a bear market period does not equate to maximising firm value, which is achieved through minimising the weighted average cost of capital. In the study undertaken, changes in capital structure under bear or declining trend market conditions were examined for the case of firms listed on the JSE Securities Exchange South Africa over the period of 1999 to 2003.

1.2 Introduction to the Research Problem

The research aimed to establish whether JSE listed firms (which were broadly divided into four classes depending on outlook and financial returns) had significantly adjusted their actual capital structure in relation to the target debt-equity ratio over the past four years in response to declining trend (Reilly and Brown, 2003) or bear market conditions. For the purpose of determining the duration and timing of declining trend conditions of the respective sectors of the JSE, average monthly share price returns for each sector over the past four years were determined and trends analysed.

In order to establish whether significant changes related to capital structure had occurred, the research problem was divided into the following subproblems. The first subproblem dealt with determining whether the average debt-equity ratios of respective JSE sectors following declining trend market conditions over an eighteen month period had significantly changed. Following this, the research sample was divided into companies according to four different attributes. This was done according to profitability as reflected by the net operating profit after tax (NOPAT), the return on investment (ROI), the cost of debt Kd and the price-to-book ratio for each share. The combination of the respective attributes was reflected in four of the five subproblems.

Subproblem 1:

The first subproblem dealt with identifying the relationship between prolonged declining trend periods and changes in capital structure of specific sectors of the JSE. This was carried out by testing for significant changes in the average sector debt-equity ratio before and after prolonged declining trend markets. In the absence of a clear definition of a sector-specific declining market trend, a declining trend market for the purpose of the research was defined as a set of 18 consecutive monthly returns, for which the average sector return decreased by at least 1.9% per month and for which the regression model for monthly declines against time yielded a coefficient of determination (r^2) of at least 0.7. The comparison of debt-equity ratios before and after the declining trend

period was then undertaken for firms comprising each of the sectors found to have been subject to a declining trend period.

Subproblem 2:

This subproblem dealt with changes in the debt-equity ratios of companies with the cost of debt greater than the return on investment and a negative NOPAT. This subproblem aimed to identify changes in capital structure of companies that showed returns lower than the cost of debt and that were therefore accruing losses. If the level of debt funding had remained unchanged for these companies, the debt-equity ratio was likely to have increased as cumulative losses would have eroded retained earnings and therefore shareholders' equity. (This assumed that no significant equity was raised by the issuing of shares during the bear period, although this was considered less likely by Baker and Wurgler (2002) who found that firms tended to issue equity instead of debt when the market value was high.)

Companies that fell into this category were classified as destroying value as the cost of borrowing exceeded returns generated. These companies were also often in financial distress and were likely to be characterised by high debt-equity ratios as borne out by Guzhva and Pagiavlas (2003). For comparison to the target debt-equity ratio, the historical firm specific capital structure prior to the declining market trend, was used as proxy for the optimum capital structure. (As indicated by Gatward and Sharp (2001) empirical researchers have used the firms' debt-equity ratios averaged over three to five years as proxy for the optimal debt-equity ratio.) The significance and direction of capital structure adjustments was determined by *Hypothesis* testing.

Subproblem 3:

This subproblem dealt with changes in debt-equity ratios of companies with cost of debt greater than the return on investment and a positive NOPAT. Companies that fell into this category were classified as destroying value as the

cost of borrowing exceeded returns generated. However, operating profits were maintained and could be distributed or added to retained earnings. This subproblem established whether companies for reasons such as concern for future earnings volatility, as suggested by empirical research carried out by Dzamba (2003), or for the case of firms with non-trivial bankruptcy costs and high earnings volatility as researched by Bradley, Jarrell and Kim (1984) reduced firm leverage. Retiring debt, however, would diminish the effect of the tax shield and is likely to increase the WACC of companies. Evaluating the effects of bear market conditions on the debt-equity ratios of such companies again included a comparison to the historical debt-equity ratio as proxy for the optimal target capital structure of this subsection of the research population.

Subproblem 4

This subproblem dealt with companies for which the cost of debt was less than ROI and the price-to-book ratio greater than the median for the sector. In contrast to companies included in subproblems 2 and 3, companies in this category created value for their shareholders as the ROI exceeded the cost of debt. This subproblem therfore dealt with the case of more profitable companies that generated positive returns and had a positive economic outlook. These companies often manage to expand even in declining markets due to focusing on positive net present value (NPV) projects. Such companies tend to be rewarded by the market, which would be reflected by a price-to-book ratio greater than the median. This subproblem evaluated whether companies that had a comparatively positive outlook expanded their use of debt financing and increased their leverage even during a prolonged bear market period.

Subproblem 5

This subproblem dealt with companies with the cost of debt less than ROI and price-to-book ratio less than the median for the sector. These firms thus created value and maintained positive returns but were rated lower or even underpriced by the market. This may, for example, have been as a result of a poorer economic outlook in the short term or different factors related to company

structure. Their relatively lower price-to-book ratio could also have reflected reduced earnings resulting in a lower market valuation. Castanias (1983) postulated that a shift in the distribution of earnings that increases the probability of bankruptcy would induce a firm to hold less debt. These companies may have primarily been concerned with profitability and earnings volatility into the future, particularly if they did not posess highly positive NPV projects. Based on empirical evidence found by Guzhva and Pagiavlas (2003) companies should retire debt during bear market conditions as a means to retain financial flexibility and decrease the likelihood of bankruptcy. However, retiring debt as the cheaper source of capital would both increase the WACC of the company and also lower its economic value added (EVA).

1.3 Purpose of the Research

Recent bear market conditions, which have affected both the South African and global bourses, may have led to changes in the actual capital structure of companies due to, for example, changes in interest rates as found by Louw (1983) and decreasing profitability of many companies. As Eriotis, Frangouli and Ventoura-Neokosmides (2002) pointed out, borrowed capital caused fixed expenses that required a minimum level of profitability for the repayment of interest charges. Bradley, Jarrell and Kim (1984) showed that firm leverage ratios were negatively related to earnings volatility if bankruptcy costs were non-trivial. It was the aim of this study to establish firstly whether South African listed companies had, in fact, made adjustments to their capital structure in response to bear market conditions, and secondly in which direction the adjustments had taken place. As capital structure impacts on firm value, the choice of an appropriate capital structure remains one of the most important decisions that financial executives have to make.

The rationale of the study was to determine which capital structure adjustments under bear market conditions were made and whether these adjustments were undertaken to lower the weighted average cost of capital and maximising firm value. Moreover, the research aimed to establish whether companies would, as some empirical research suggested, focus on retiring debt as a means of

maintaining financial flexibility, or continue to increase the use of debt financing to minimise the WACC. The study provided an indication as to changes in capital structure of companies listed on the JSE Securities Exchange under recent bear market conditions.

1.4 Subsequent Chapters of the Project Report

Chapter 2 The Literature Survey

The literature survey provided a theoretical framework for the proposed research and was used as a review of existing theory on the relevance of capital structure to firm value. The literature survey initially discussed the irrelevance theory of capital structure, whose main proponents were Modigliani and Miller (1958) and the evolution of the static theory of capital structure, which represented a trade-off between the benefits of the tax shield of debt and increasing financial distress costs. Factors which led to adjustments of the capital structure of firms were reviewed and contrasted with the financial position and outlook of the firm. These formed the basis for the formulation of hypotheses, which tested for firm behaviour in adjusting capital structures under bear market conditions.

Chapter 3 Research Methodology

This chapter provided an outline as to the research population and the sources of secondary data, which included annual reports, links to a database of share prices and the calculation of parameters such as the debt-equity ratio, return on investment, and the price-to-book ratio. Importantly, the statistical methods for testing of hypotheses were presented as was the determination of bear market periods for the respective sectors of the JSE.

Chapter 4 Presentation of Results and Analysis

In this chapter, the sectors of the JSE, which had experienced bear periods as established from linear regression were presented. This chapter also factually presented the outcomes of hypothesis testing and indicated any significant changes in the sector debt-equity ratios due to the effects of the bear period. The hypothesis tests formulated for firms classified according to the four different attributes were presented and significant changes in the debt-equity

ratios of firms in the categories were highlighted. In some cases additional hypothesis testing was carried out to determine the cause for the change in debt-equity ratios.

Chapter 5 Interpretation of Results

The interpretation relied on a comparison of the results of the hypothesis tests to trends and results presented in literature. In particular, the results were interpreted as either being consistent with behaviour of firms reflecting a conservative financial policy or in a manner suggesting value maximising behaviour. The cause for changes in the capital structure of firms with different attributes was interpreted and the effects of bear periods discussed.

Chapter 6 Conclusions

The conclusions drawn from the research and the hypotheses formulated were listed and their implications on financial policy of companies faced with bear market conditions indicated.

2 LITERATURE REVIEW

2.1 The Capital Structure Theory of Companies

2.1.1 The Irrelevance Model of Capital Structure

The irrelevance model of capital structure as proposed by Modigliani and Miller (1958) stated that (in a perfect financial market) the value of the firm did not depend on its capital structure. In introducing the effects of increased leverage Modigliani and Miller (1958) suggested that: "A firm's cost of equity capital is a positive linear function of its capital structure" (Ross et al 2001:449). In other words, as a firm takes on more debt and leverage is increased, the increased risk associated with debt financing is reflected by a linear increase in the required return or cost of equity.

The equations, which mathematically express the propositions made by Modigliani and Miller (1958), can be summarised as follows:

$V = E + D$ and

$R_e = R_a + (R_a - R_d) \times D/E$

Where,

V is the value of the firm

E is the value of equity

D is the amount of debt

R_e is the required return on equity (also the cost of equity)

R_a is the required return on the firm's assets

and R_d is the cost of debt.

In applying the irrelevance model of capital structure to the research, there should be little incentive in changing the capital structure of a firm simply to maximise firm value or minimise WACC. Taken further, adjustments to capital structure under any market conditions to reach an optimal structure would not be carried out as this would have no impact on the market value of the company. A company faced with decreased cash flows would simply be able to issue more debt, literally up to the point of bankruptcy, without any adverse market reaction, provided that its returns are still in line with the market risk premium brought about by the increased leverage. However, as summarised by Brigham & Daves (2002) this initial Miller & Modigliani (1958) study was based on strong assumptions that have a material effect on the existence of an optimal capital structure. Assumptions made by Miller and Modigliani (1958) are:

i) There were no brokerage costs. This is particularly relevant as it assumed that debt can be issued to repurchase equity and equity raised to retire debt at no additional costs, hence capital structure decisions involve no brokerage costs.

ii) There were no taxes. This is significant from the point of view of both company and personal taxes. (Modigliani and Miller

(1963) included a revised treatment of capital structure with taxes in 1963.)

iii) There were no bankruptcy costs.

iv) Investors could borrow at the same rate as corporations.

v) All investors had the same information as management about the firm's future investment opportunities.

vi) Earnings Before Interest and Tax (EBIT) was not affected by the use of debt.

Some of these assumptions were unrealistic but by indicating the conditions under which capital structure was irrelevant, Miller & Modigliani (1958) laid the foundation for a body of research aimed at eliciting factors relevant to the firm's capital structure and hence relevant to the value of the firm.

2.1.2 The Effects of Taxes on Capital Structure Theory

Modigliani & Miller in their follow up paper in 1963 went on to address the effects of corporate tax on capital structure. The effects of corporate taxes were to increase the value of a firm commensurate with increasing firm leverage, i.e. the employment of larger amounts of debt as source of funding. This effect was derived from the fact that interest payments were tax deductible and that the levered firm thus derived benefits from the tax shield. In other words, firms that made use of debt as source of funding could distribute the tax-exempt portion of income to investors and hence the firm became more valuable. The mathematical equations from Ross et al (2001) that showed the effects of including the tax shield were as follows:

$$V_l = V_u + T_c \times D \text{ and}$$

$$R_e = R_u + (R_u - R_d) \times (D/E) \times (1-T_c)$$

Where,

V_l is the value of the levered firm

V_u is the value of the unlevered firm

R_u is the unlevered cost of capital

T_c is the corporate tax rate

From this set of equations it was predicted that a firm could simply increase the amount of debt and continuously increase the value of the firm until it was 100% financed by debt. This is not observed in practice however, mainly because of the existence of bankruptcy costs. Furthermore, even under bear market conditions, highly levered firms would nonetheless be expected to show returns commensurate with the risk premium associated with their particular degree of leverage requiring adequate financial flexibility. Modigliani and Miller (1958) hinted at another reason, namely that of personal taxes. If individual investors were holders of corporate bonds, they assert that income in the form of interest payments were taxable to the owners under personal income tax. This was in contrast to a debt-free company, which could reinvest all of its net income thus raising the value of the company whilst subjecting the investor only to capital gains tax.

Miller (1977) went as far as suggesting that the off-set under personal taxes may be one-to-one, i.e. the investors may reap no gain whatever from the firm's use of tax deductible debt rather than equity capital. What is apparent though is that the use of debt has increased in the USA to the point where debt is taken on to ward off investors seeking to take over underleveraged firms (Brigham and Daves 2002). Van Horne (2002:267-268) also stated that the "personal tax effect does not entirely offset the corporate tax effect and that there is a tax advantage to borrowing for the typical corporation." The implication is thus that a firm can, by including greater proportions of debt, nonetheless increase its value. The reasons for not increasing debt to excessive levels appear to lie rather with the trade off factors as discussed in one the following section. More importantly, the existence of trade off factors, which would limit the increase in firm value through increasing leverage, would point to the existence of an optimal solution and hence the relevance of capital structure to maximising firm value.

2.1.3 The Effects of Bankruptcy on Capital Structure

According to Guzhva and Pagiavlas (2003) it was not readily observed that firms even in highly leveraged sectors decided on debt-equity ratios in excess of unity, which suggested that the benefits of the tax shield on using debt financing were balanced by factors such as bankruptcy costs. Evidence of the existence of bankruptcy costs is generally not disputed, however, the extent of these costs and their derivation are topics on which opinions differ. Miller (1977:266) for example, contended that: "great emphasis on bankruptcy costs in recent discussions of optimal capital structure policy seems to have been misplaced." Warner (1977) investigated the issue of bankruptcy costs of US railway companies and found that the bankruptcy costs for the largest railroad company analysed was only 1.7% but was in excess of 9% for the smallest company. The conclusion of Warner (1977:345) was that the direct costs of bankruptcy were "unambiguously lower than the tax savings on debt to be expected" and hence a lesser factor in determining capital structure. This study seemed to focus, however, only on the direct costs of bankruptcy, which included professionals' fees (mainly lawyers and accountants) as well as the costs of managerial time spent on administering the bankruptcy.

This approach is somewhat simplistic, especially since on average the companies lost 78% of their market value as measured over the seven years preceding bankruptcy. During the same period and particularly in the last 12 months before bankruptcy, all the companies showed increases in their debt-equity ratios. If these increases are considered by the market as proxy for financial distress, signalling theory would suggest that the market value of companies faced with spiralling debt-equity ratios would further decrease. The significance of this would be that companies faced with bear market conditions would, if their financial situation allows, decrease their debt-equity ratios firstly to avoid the risk of bankruptcy and secondly to signal financial soundness to the market. Myers (1984:581) summarised this concept by stating that: "Risky firms ought to borrow less, other things equal."

Myers (1984) also expanded on the costs of financial distress and included costs such as agency, moral hazard, monitoring and contracting costs. It should be noted that financial distress costs are the sum of both direct and indirect bankruptcy costs. Ross et al (2001) indicated that the indirect costs of bankruptcy, i.e. additional costs incurred as the firm fights to stave off bankruptcy, included costs such as operational disruption, loss of sales, loss of valuable top employees, and forgoing valuable opportunities due to lack of funding. These costs are considerable and are likely to exceed any direct costs of bankruptcy, hence there is significant support for a trade off between the tax shield advantage of debt and the costs of financial distress.

2.1.4 The Effects of Agency Costs on Capital Structure

Van Horne (2002) described agency costs as costs that arose when different stakeholders, viz. shareholders, managers and debtholders monitored each other's behaviour. Managers, for example, are empowered by the firm's shareholders to make decisions that affect the future of the company. Conflicts of interest between managers and shareholders result in agency costs as explained by agency theory. Debtholders, and banks in particular, tend to monitor the performance of management and may increase the cost of debt or employ restrictive covenants should they perceive greater risk to the debtholder. However, these costs and agency costs in general ultimately end up being carried by the shareholders.

Chamberlain (1990) expanded on how shareholders attempt to overcome the agency problem associated with aligning management and shareholder interest by resorting to performance-based incentives such as share options and bonuses. There appears to be little evidence, however, that shareholders of these corporations are able to control management and Chamberlain (1990) provided an analysis of debt-equity ratios based on the pursuit of managerial self-interest as basis for the selection of a particular debt-equity ratio. Reasons for managerial self-interest are:

i.) that the company is the primary source of the manager's income, power and status,

ii.) that managers' stakes in the company comprises much of the managers' investment portfolios,

iii.) that the long term association with the company often extends into retirement.

Agency costs and the potential conflict of interest between shareholder and management was also the basis of a study carried out by Friend & Lang (1988). They proposed that management was likely to reduce its bankruptcy risk implicit in higher debt-equity ratios simply out of concern over its own stake in the company. They were also able to show that the level of debt decreases as the level of management shareholding increases, as this reflected a greater level of non-diversifiable risk to management compared to the public investor who tended to eliminate diversifiable risk through portfolio investments. For the present research, implications are that management, who own a significant portion of shares in their companies would, under bear market conditions, reduce the debt-equity ratio of the company if they perceive even a remote bankruptcy risk, which would represent a risk to their own personal investment.

This is especially true for companies that do not have large non-managerial shareholders, which are able to exert some influence over management in terms of decisions relating to capital structure. Evidence for this was found by Friend & Lang (1988:280), who concluded "that the existence of large nonmanagerial stockholders might make the interests of managers and public stockholders coincide".

2.1.5 Signalling Theory and the Effects on Capital Structure

The basis of signalling theory is the existence of information asymmetry between management and shareholders. This is because management have a better understanding of the company's future prospects as compared to outside investors by virtue of running the company on a daily basis. It should be noted

that the existence of information asymmetry is in contrast to the Miller & Modigliani (1958) irrelevance proposition, which assumed that the market was perfectly informed about the future cash flows and hence the value of all companies. Blazenko (1987) in his study of the effects of asymmetric information on capital structure asserted that the raising of equity by a company was generally interpreted as a negative signal by the market, which led to substantial declines in stock prices. The raising of equity is frequently perceived as a timing decision by management set to coincide with the maximum likely share price after periods of overall strong market performance. An additional explanation was offered by Brigham & Daves (2002) in that a firm with unfavourable prospects in need of financing raised equity to bring in new investors to share in possible future losses. Blazenko (1987:842) added that "managers of firms with low-quality projects have no incentive to misrepresent their projects by using debt since misrepresentation creates excessive risk" and, by corollary, therefore had a tendency to issue equity.

For a firm with excellent growth prospects and projects with highly positive returns, it would be expected that management would avoid issuing equity and raise capital via debt, even if this would mean an increase beyond the normal capital structure. The motivation for raising additional debt could thus be explained through management self-interest, as Blazenko (1987) suggested that managers could increase their own wealth by simply signalling with debt financing. (The rationale is that investors would interpret the increase in debt as implying funding for a high-quality project as investors understand that the use of debt financing is only carried out if the risk of bankruptcy remains small.) Giner & Reverte (2001) further added that the market could distinguish between a successful firm signalling high-quality projects by engaging in debt financing, and an unsuccessful company that was facing low liquidity and was forced to take on further debt. This additional debt was regarded as a bad signal by the market due to doubts about repayment of debt and interest due.

As far as bear market conditions are concerned, the raising of capital via equity would send a negative signal to the market, particularly if the market feels that the company is faced with low return projects due to poor economic conditions.

Raising equity under these conditions would very likely be interpreted as bringing in new investors to share in possible losses, at least until the economic outlook improves. For companies that engage in high-quality projects and maintain an ROI greater than the cost of debt, an increase in leverage would still send a positive signal to the market. Conversely, a company with indifferent growth prospects but steady earnings flow would be expected to decrease the levels of debt until high-quality projects under improved economic conditions can be undertaken. Hovakimian, Opler & Titman (2001) contended that the more profitable firms tended to become underlevered, and therefore on average have lower debt-equity ratios. Reducing leverage under low growth conditions would be consistent with this approach. Finally, companies that have low-quality projects and depend on debt financing for liquidity would send a very negative signal to the market by virtue of spiralling debt-equity ratios as they are forced to take on more debt to stave off bankruptcy, at least in the short term.

A further contribution to signalling theory was made by Baker, Powell & Veit (2003) who confirmed that a frequent motivation for open-market share repurchases, which have only recently been approved and regulated in the South African market, was the signalling of the undervaluation of shares to the market. Managers in this situation essentially signal their disagreement with how the market is pricing the share and resort to share buy-backs to illustrate that the share is undervalued. Undervaluation of shares resulting in lower price-earnings ratios is typical for bear market conditions. Companies with strong cash flows or excess cash reserves often engage in share repurchases, which then lead to an increase in debt-equity ratios. However Baker *et al* (2003) found that as open-market share buy-back programs often extended over many months if not years, they were expected to have only a smaller effect on the immediate capital structure of the company. This was in contrast to the work by Warner (1977) who presented evidence on the rapid increase of 30% in the average debt-equity ratio over a twelve month period of more than 10 American railroad companies facing financial distress. Finally, Baker *et al* (2003) presented evidence that some companies timed announcements of share

buy-back programs not to coincide with any particular market condition but rather to coincide around the time of exercise of executive stock options.

2.1.6 Evidence of an Optimal Capital Structure for Companies

Numerous authors including Castanias (1983), Lev & Pekelman (1975) and Myers (1984), supported the existence of an optimal capital structure. This theory was based on the trade-off between the benefit of the tax shield from additional debt and the financial distress costs that arose from taking on further debt. Bradley, Jarrell & Kim (1984) stated that: "The firm's optimal capital structure will involve the trade off between the tax advantage of debt, and various leverage related costs." Miller & Modigliani (1958) in acknowledging the tax shield effect and later (although perhaps not fully in the case of Miller (1977)) the costs of bankruptcy, conceded to the existence of an optimal solution or at least an optimal range of solutions for minimising WACC and thus maximising firm value. Fischer, Heinkel & Zechner (1989), for example, argued for the existence of a range of optimal debt equity ratios within a set of boundary conditions.

Reasons for firms not adjusting instantaneously to the optimal debt-equity ratio include timing the market as far as raising equity is concerned and the presence of significant adjustment costs. Gatward & Sharpe (1996) found that in the presence of adjustment costs, firms gradually adjusted to an optimal debt-equity ratio over time. Possible reasons for such a slow adjustment were provided by Dzamba (2003) in a study of factors relevant to decision making about capital structure. The study confirmed that only 10% of firms had a strict target capital structure whilst over 55% of companies had either a flexible target or no target debt-equity ratio at all. These latter companies are more likely resort to changing their capital structure in response to bear market conditions, as they are not bound by a strict target capital structure. This would most likely apply to issuing debt where concerns about future earnings and cash-flow volatility according to Dzamba (2003) were amongst the most significant in the decision to issue debt. Issuing equity in bear market conditions is less likely according to this study as share issues are related to

increases in share price and thus timing of the market during a market growth phase. There is thus empirical evidence to support the notion that adjustments in response to economic and market conditions are undertaken even if these result in adjustments away from the long term optimal capital structure.

2.1.6.1 Optimal Capital Structure based on Historical Firm Capital Structure

Two proxies for the optimal capital structure of a firm are found in literature. The first proxy for the optimal capital structure of a company is the average of recent historical debt-equity ratios. Titman & Wessels (1988) supported a firm specific debt-equity ratio based on the amount of retained earnings accumulated per firm, which would be an important determinant of the current capital structure. Highly profitable firms would use their earnings to repay debt, for example, whilst less profitable firms would resort to debt financing and become more levered. The fact that highly profitable firms tended to repay debt and reduce their debt-equity ratio seems to be inconsistent with debt financing being seen as a cheaper form of raising capital when compared to equity finance. There is, however, a significant body of literature, which appears to support the fact that successful companies tend to become underlevered. Eriotis *et al* (2002) found that firms that preferred to finance their investment activities through self-finance were more profitable than firms, which financed investment by borrowed capital. Myers (1984) confirmed the case of an unusually profitable firm in an industry generating relatively slow growth. The firm simply ended up with an unusually low debt-equity ratio compared to the industry average. Hovakimian *et al* (2001) also argued that firms with high past cash flows tended to accumulate financial slack and repay debt therefore becoming underlevered. As is apparent from this discussion, the historical debt-equity ratio of a specific firm is a benchmark against which changes in capital structure can be evaluated.

2.1.6.2 Optimal Capital Structure based on Industry Sectors

Bowen, Daily and Huber (1982) proposed that a firm's optimum capital structure was similar to that of other firms in the industry and that trends in

leverage ratios in firms of a specific sector were informative as to the targeted leverage. They also concluded that there was a statistically significant difference between mean industry financial structure and that the ranking of these financial structures demonstrated significant stability over the entire period studied.

Similar evidence was provided by Bradley, Jarrell and Kim (1984), who found that the permanent firm leverage ratios were strongly related to industry classification. This was based on the findings of intra-industry similarities in capital structures of firms and persistent inter-industry differences in the leverage of different sectors. This work also provided strong support for the existence of optimal capital structures with costs of financial distress providing a strong incentive for industry specific leverage. Further evidence of the importance of industry specific leverage was provided by Hull (1999) who investigated the impact of stock-for-debt transaction announcements on share price movement. The researcher found that for firms moving closer to the industry debt-equity ratio a positive market response was obtained as opposed to firms that moved away from the industry debt-equity ratio. The mean industry leverage is thus a strong proxy for the optimal capital structure of companies in that specific industry sector.

2.1.7 The Effects of Volatility and Profitability on Capital Structure

It can be expected that the greater the earnings volatility of the firm, the greater would be management's concern about the probability of bankruptcy and the importance of financial distress costs in determining the optimum capital structure. Bradley, Jarrell and Kim (1984) indeed showed that firm leverage ratios were negatively related to the volatility of firm earnings if the costs of financial distress were non-trivial. Under bear market conditions therefore, expectations are that firms that experience greater earnings volatility will reduce debt-equity ratios out of concern for increasing financial distress costs. Titman and Wessels (1988) also included earnings volatility as a determinant of the capital structure choice and used the standard deviation of the percentage change in operating income as indicator of volatility.

Profitability of a firm is a strong determinant of the amount of retained earnings and hence the capital structure of a firm. More profitable firms also tend to become underlevered with time as they either build reserves to increase flexibility or simply issue greater dividends to slow retained earnings accumulation. This was echoed by Eriotis, Frangouli & Ventoura-Neokismides (2002) who found that firms that financed their investment activities through self- finance were more profitable than firms with high debt-equity ratios that made use of borrowed capital.

2.1.8 Capital Structure and the Market Value of Firms

The effects of changes in capital structure on the valuation of companies have recently been evaluated by Giner & Reverte (2001) for the case of Spanish firms listed on the Madrid stock exchange. Their work reaffirmed the existence of an "optimal" debt-to-equity ratio and that departures from the optimal capital structure were perceived negatively by the market. In other words, Giner & Revente (2001) suggested that, even when faced with lower growth prospects and adverse market conditions, firms chose not to deviate from their optimum capital structure as this was not rewarded by the market. Giner & Rivente (2001) further considered the cases of successful and unsuccessful companies and stated that an increase in the debt-equity ratio for the latter companies was negatively perceived by the market. The theoretical argument presented would therefore indicate that, particularly under bear market conditions, spiralling debt, which causes an increase in the debt-equity ratio of companies, would not be rewarded.

Hull (1999) provided support for the industry debt-equity ratio as a wealth-maximising target consistent with the existence of an optimum debt-equity ratio. The announcement-period stock returns for firms deviating from industry debt-equity ratios were found to be significantly more negative than for those firms adjusting toward the industry average capital structure. This would suggest that wealth-maximising firms would tend not to significantly deviate from the mean industry debt-equity ratio unless forced to do so by increases in

earnings volatility and looming financial distress costs. This behaviour may even result in firms forgoing positive NPV projects in order not to raise exposure to riskier debt during bear market conditions.

2.1.9 Summary of Literature Survey

Several researchers including Titman and Wessels (1988) and Eriotis, Frangouli and Ventoura-Neokosmides (2002) presented empirical findings that profitable firms in the long run tended to finance new projects out of retained earnings and relied less heavily on increased leverage for growth and therefore become underlevered. Moreover, any concerns about future earnings volatility meant greater emphasis on the company retaining financial flexibility, which, according to Dzamba (2003), represented the foremost consideration when using debt financing.

Under bear market conditions Guzhva and Pagiavlas (2003:1) suggested that "flexible and active management of capital structure as reflected in liabilities might be a way to improve the profitability and reduce bankruptcies." Dzamba (2003) also reported that financial flexibility and concerns about earnings and cash-flow volatilities were amongst the most important factors considered by managers when issuing debt. From empirical evidence therefore, the active management of debt and the reduction of liabilities, especially if the cost thereof exceeds the returns generated, are expected to lead to a reduction in the debt-equity ratio of companies as a result of bear periods.

This is, however, in contrast to modern portfolio theory based on the Capital Asset Pricing Model and the cost of capital, which is a weighted average of the proportions of debt and equity financing. As debt is frequently the cheapest source of finance, the retiring of debt even during declining market periods would not be consistent with value maximising behaviour of the firm. The research therefore evaluated whether South African listed companies behaved in a manner as suggested by empirical findings or whether these companies pursued value maximising behaviour, tempered only by possible bankruptcy costs.

2.2 Hypotheses

The behaviour of firms with respect to changes in capital structure under bear market conditions was expected to differ depending on the outlook of the firm and the returns on the capital invested in the firm. In order to test for the significance and direction of change of such capital adjustments, the following hypotheses were formulated.

2.2.1 Hypothesis Testing for Changes in the Sector Debt-Equity Ratios as a result of declining market trend conditions

Null Hypothesis 1 was that the present debt-equity ratios of companies comprising a particular market sector *were unchanged* from the sector debt-equity ratios prior to the 18 month declining market trend period.

The *alternative Hypothesis* was that the present debt-equity ratios of companies comprising a particular market sector *were significantly different* from the sector capital structure prior to the 18 month declining trend period.

This hypothesis was designed to test for the significance of changes in capital structure of various industry sectors in response to bear market conditions. For example, the effects on capital structure of a 35% sector index decline of the Cyclical Consumer Goods Sector may have differed significantly from that of a nearly 70% sector index decline in the Information Technologies Sector.

2.2.2 Hypothesis Testing for companies, for which the Cost of Debt was less than the Return on Investment and the Price-to-Book Value was greater than the Median

Null Hypothesis 2 was that the present debt-equity ratios of companies, for which the cost of debt was less than the return on investment and the price-to-book value was greater than the median, *was equal to or less than* the historical mean debt-equity ratio of these companies.

The *alternative Hypothesis* was that the present debt-equity ratios of companies, for which the cost of debt was less than the return on investment and the price-to-book value was greater than the median, *was greater than* the historical mean debt-equity ratio of these companies.

The rationale for this hypothesis was that companies with returns greater than the cost of debt and a price-to-book value greater than the median had numerous positive NPV projects at their disposal. These companies were expected to continue growing and make use debt to finance expansion as the raising of equity in a declining market was not preferred.

2.2.3 Hypothesis testing for companies where the Cost of Debt was less than the Return on Investment and the Price-to-Book Value was less than the Median

Null Hypothesis 3 was that the present debt-equity ratios of companies, for which the cost of debt was less than the return on investment and the price-to-book value was less than the median, *was equal to or greater than* the historical mean debt-equity ratio of these companies.

The *alternative Hypothesis* was that the present debt-equity ratio of companies, for which the cost of debt was less than the return on investment and the price-to-book value was less than the median, *was less than* the historical mean debt-equity ratio of these companies.

The rationale for this hypothesis was based on empirical findings (Titman and Wessels 1998) that suggested that historically profitable companies that did not possess sufficient new positive NPV projects tended to retire debt, particularly in the face of increased earnings volatility under bear market conditions. This behaviour would, however, not be consistent with minimizing the weighted average cost of capital and would not maximise the value of the firm.

2.2.4 Hypothesis testing for companies where the Cost of Debt was greater than the Return on Investment and NOPAT was positive

Null Hypothesis 4 was that the present debt-equity ratio of companies, for which the cost of debt was greater than the return on investment and NOPAT was positive, *was equal to or greater than* the historical mean debt-equity ratio of these companies.

The *alternative Hypothesis* was that the present debt-equity ratio of companies, for which the cost of debt was greater than the return on investment and NOPAT was positive, *was less than* the historical mean debt-equity ratio of these companies.

The rationale for this hypothesis was similar to that of hypothesis 3. According to empirical findings (Dzamba 2003) the rationale differed further in that management due to increased concern about bankruptcy costs due to high earnings volatility reduced debt financing.

2.2.5 Hypothesis test for companies where the Cost of Debt was greater than the Return on Investment and NOPAT was negative

Null Hypothesis was that the present debt-equity ratio of companies, for which the cost of debt was greater than the return on investment and NOPAT was negative, *was equal to or less than* the historical mean debt-equity ratio of these companies.

The *alternative Hypothesis* was that the present debt-equity ratio of companies, for which the cost of debt was less than the return on investment and NOPAT was negative, *was greater than* the historical mean debt-equity ratio of these companies.

Companies that fell into this category were faced with negative returns, which were reflected in increased earnings volatility. In the absence of the possibility of raising additional equity, which for this class of company would be interpreted very negatively by the market, the debt-equity ratio was expected to increase. This increase would be due to the company having eroded the accumulated reserves by adding sustained losses to the balance sheet. This factor would lead to an increase in the debt-equity ratio for this class of company.

3. RESEARCH METHODOLOGY

3.1 The Research Population

The research population comprised all shares listed on the JSE Securities Exchange main board as at 31 December 2003 and which had been listed for at least four years prior to this date. Because of differences in reporting of capital structures for the banking sector, banking stocks were excluded from the research population. Furthermore, the research population was limited to sectors (or subsectors) of the JSE, which had in fact, experienced declining

trend (bear) market conditions for a period of not less than eighteen months between 1999 and 2003. For the purposes of the research, a declining trend market was defined as a set of 18 consecutive monthly sector index returns, for which the average return decreased by at least 1.9% per month and for which the regression model yielded a coefficient of determination (r^2) of at least 0.7. Four sectors (or subsectors) showed such declining trends, viz. Cyclical Consumer Goods (19 companies), Cyclical Services comprising the General Retail and Support Services only (42 companies), Financials, excluding Banking and Real Estate (76 companies), and the Information Technology sector (29 companies).

Furthermore, firms comprising the abovementioned sectors of the JSE were divided into four categories on the basis of financial ratios derived from annual financial reports in a method similar to that used by Giner & Reverte (2001). The latter researchers, however, divided stocks into only three categories and did not investigate the effects of profitability as expressed by an either positive or negative net operating profit after tax (NOPAT). It was suggested that companies with a negative NOPAT eroded shareholders' equity which resulted in increased debt-equity ratios. This held true especially in the absence of the possibility of raising further equity in a bear market.

The first of two subdivisions was undertaken for the category of firms, for which the cost of debt was less than the return on investment. The intention was to separate those companies, for which the price-to-book ratio was greater than the median from those below the median. This separation allowed for increases in the debt-equity ratio of profitable companies with high price-to-book ratios consistent with signalling theory. This behaviour was expected to differ from companies with returns greater than the cost of debt but low price-to-book ratios.

The second of the two subdivisions concerned the category of firms, for which the cost of debt was greater than the return on investment. The intention was to separate those companies, which remained profitable compared to those with a negative NOPAT. This allowed for significant increases in the debt-equity ratio

of companies with a negative operating profit that were eroding accumulated reserves. This behaviour was expected to differ from companies with positive returns.

3.2 Sample Size

As all companies of the respective JSE sectors that were identified as having been subject to a declining market trend formed the population, a population census was carried out. Hypothesis testing for companies with specific attributes was only carried out, however, once the entire population had been classified according to the four attributes.

3.3 Data Collection

All data used in this research was taken from secondary sources of data. The most important source of data was the annual reports of listed companies included in the research population. In the case of unavailability of such data, published information regarding capital structures was obtained from the relevant edition of the JSE Handbook (Alexander & Oldert 2002). Furthermore, monthly share price data was obtained from I-Net Bridge and was used in identifying declining market trends.

3.4 Reliability and Validity

The validity of the data was affected by new listings, delistings and suspension of stocks, under which conditions the firms were excluded from the population. As the classification of stocks was undertaken at the beginning of a bear market period of each particular sector, and the release of financial statements were unlikely to coincide with that particular point in time, financial reports released up to 12 months prior to this period were considered for carrying out this classification. Out of necessity, some of the debt-equity ratios could not reflect the exact position as at the beginning or end of the bear period, which introduced some bias to the results presented.

3.5 Data Analysis

Hypothesis tests for the statistical significance of changes in capital structure against historical means, which served as proxy for the target debt-equity ratio, were based on tests for two populations of related data. As changes of capital structure in a certain direction were anticipated, one tailed tests were applied. (As the level of data is ratio, the appropriate test was either a Paired t Test or a Wilcoxon test, depending on whether the distribution of data was normal). Louw (1983), however, made use of the Student's *t* distribution to test for significance in capital structure changes on a sample of JSE listed shares between 1972 and 1980. It appears therefore that Louw (1983) regarded the populations (i.e. debt-equity ratios calculated from selected shares in 1972 and those of 1980) as being independent and of normal distribution. Louw (1983), however, did not carry out tests or present references to support the argument that the populations of debt-equity data were, in fact, normal distributions. Sprent (1989) indicated that if there was any doubt about the validity of assumptions regarding the family of distributions to which a population may belong, a nonparametric test that is valid under weaker assumptions was preferable. The only assumption for the application of the Wilcoxon Signed rank test is that of a continuous distribution and symmetry. The latter assumption seemed realistic as the debt- equity ratio of a company would very likely have been symmetrically distributed about its target debt-equity ratio.

In the present case, the debt-equity ratios were separated by a declining market period of 18 months duration and the debt-equity data of a stock before and after this event were considered as related or paired samples. Testing the response of an intervention or stimulus by comparing paired data before and after an event is a typical field of application for the Paired Wilcoxon test (Sprent 1989).

Hypothesis testing for the significance of changes of the average debt-equity ratio of companies from a particular sector immediately before and after bear market periods, was therefore based on a Paired Wilcoxon test that applied to populations of dependent data.

In all cases testing was carried out using the .05 significance level.

3.6 Limitations of the Research

i.) Banking stocks were excluded from this study. The reason for this was that the change to liquidity ratios in banking stocks was not comparable to debt-equity ratios used for companies comprising the population.

ii.) If the data required to calculate the cost-of-debt was not available directly from an annual report, the cost-of-debt was assumed to be that of the sector average. In these cases, the approach of Louw (1983) and Wimberley (2001) was adopted in assuming an average cost-of-debt value.

iii.) In all calculations, the debt-equity ratios, short term liabilities and shareholders' equity before the bear period were taken as the arithmetic mean of three years of data. In certain cases, less than three years of data was available before the onset of the bear period.

iv.) For some of the sectors and classifications, the number of data points was less than 30 due to the limited number of companies comprising the population.

3.7 Definition of Financial Ratios

3.7.1 The Price-to-Book Ratio

The price-(or market)-to-book ratio is a relative measure of how the growth option of a company is being valued in comparison to its physical assets because of either industry attractiveness or competitive advantage (van Horne 2002). Companies can either trade at a premium or a discount to their net asset value. For the purpose of this work the median of the price-to-book ratio was considered as the critical value for the classification of companies, which follows the approach of Giner and Reverte (2001).

Price-to-book ratio = share price/book value per share

Where:

Book value per share = Common shareholders' equity / number of common shares outstanding

3.7.2 The Debt-Equity Ratio

In following Garrison and Noreen (2000), the debt-equity ratio was defined as follows:

Debt-equity ratio = Total liabilities/ shareholders' equity

From the above formula it was apparent that Garrison and Noreen (2000) did not distinguish between short term and long term liabilities, implying that companies would not be able to change their debt-equity ratios by converting short term debt to non-current liabilities and vice versa. In determining the extent of total liabilities, Reilly and Brown (2003) included all long-term fixed obligations, including lease obligations and subordinated convertible bonds. Deferred tax was also included as a long-term liability as it was argued that if this liability arose as a difference in accelerated and straight-line depreciation,

this deferred liability may never be paid. Thus, as long as the firm added new assets, the total deferred tax account continued to grow and was never paid off.

3.7.3 The Return on Investment

Return on Investment (ROI) is defined as net operating income divided by the average operating assets.

(ROI) = (Net operating income – accounts payable) /average operating asset

Net operating income can in turn be defined as income before interest and tax expenses or EBIT. Operating assets include cash, accounts receivable, inventory, plant and equipment and any other class of assets held for productive use (Garrison and Noreen, 2000). The approach of defining ROI net of accounts payable followed that of Giner and Reverte (2001).

4. PRESENTATION OF RESULTS AND ANALYSIS

4.1 Selection of JSE Sectors showing Declining Trend (Bear) Periods

Four sectors of the JSE, namely the Financial Services Sector (excluding Banks and Real Estate), the Cyclical Consumer Goods Sector, the Cyclical Services Sector and the Information Technology Sector were selected as meeting the criteria for having sustained a declining market or bear period. This meant that each of these sectors sustained an average monthly return of at least minus 1.9% for an 18 month period, and that a straight line fitted to these monthly returns by linear regression yielded a coefficient of determination of 0.7 or greater. The plot of returns together with the regression plots for the returns for each sector are shown by Figures 1 to 4. The results of the regression models per sector are summarised in Table 5.1. For the purposes of carrying out the

linear regression and correlation analysis, the *null hypothesis* and *alternate hypothesis* were:

H_0: $\rho = 0$ (There *was no significant* correlation between market trend and time elapsed.)

H_1 $\rho \neq 0$ (The correlation between market trend and time elapsed *was significantly* different from zero.)

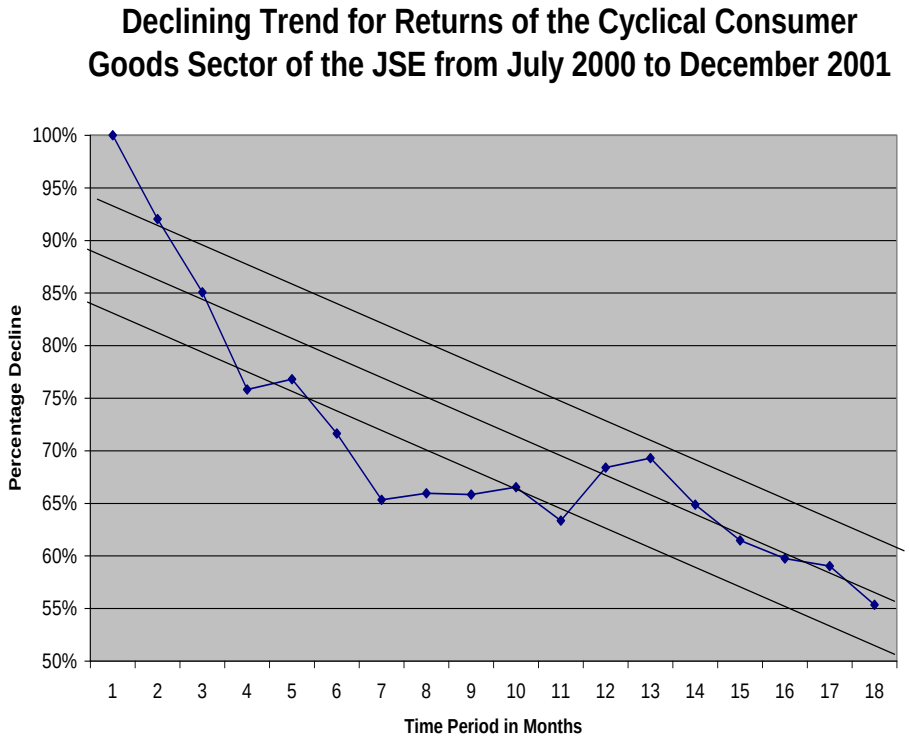


Figure 1: Graph showing declining trend market of the Cyclical Consumer Goods Sector between July 2000 and December 2001

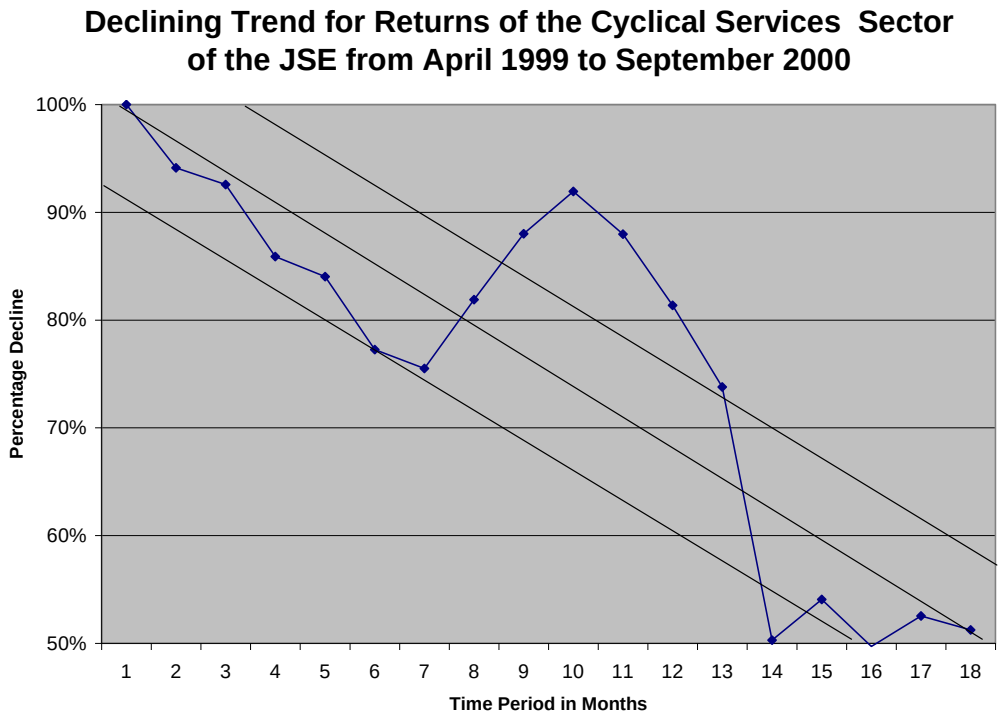


Figure 2: Graph showing declining trend market of the Cyclical Services Sector between April 1999 and September 2001

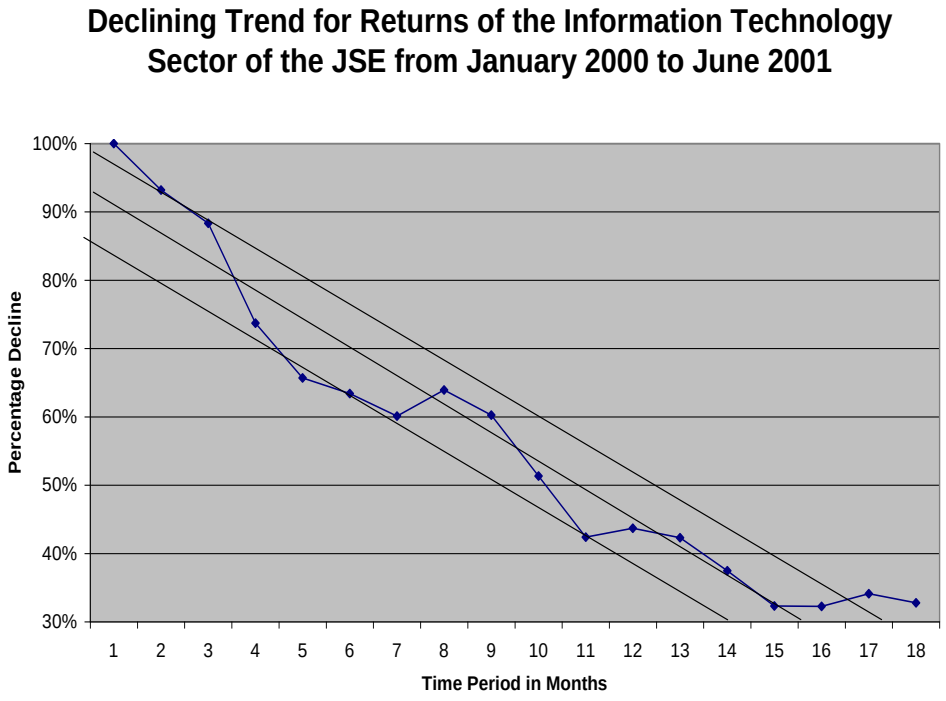


Figure 3: Graph showing declining trend market of the Information Technology Sector between January 2000 and June 2001

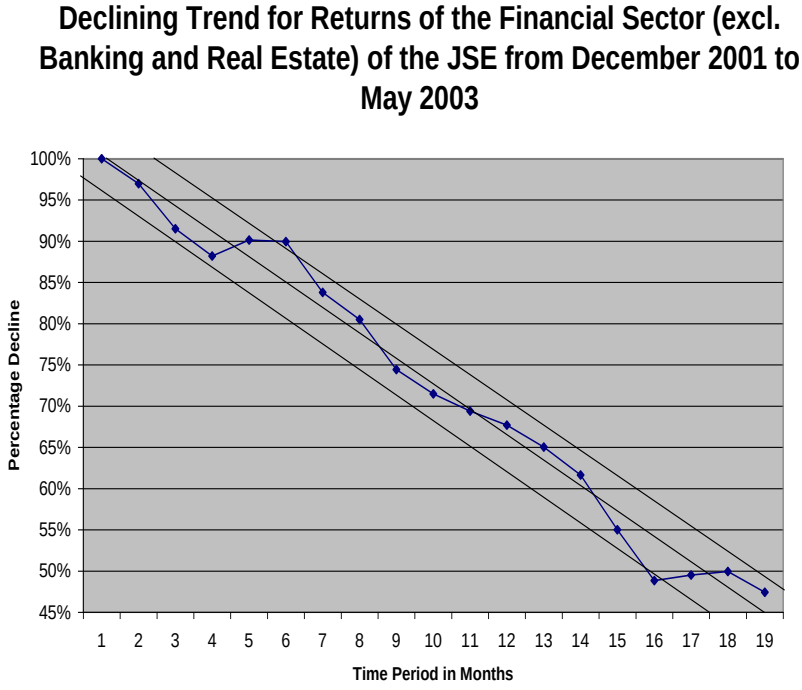


Figure 4: Graph showing declining trend market of the Financials Sector between December 2001 and May 2003

The results for the coefficients of determination presented in table 4.1 indicated a strong correlation of time elapsed with the declining trends of the four different sectors. The very small p values, which in all cases were less than $1x\ 10^{-5}$, indicated that H_0 was rejected and had a very low likelihood of being true.

Table 4.1: Summary of Regression Results of Monthly Returns for Declining Trend Sectors of the JSE

JSE SECTOR	CYCLICAL CONS GOODS SECTOR	CYCLICAL SERVICES SECTOR	FINANCIAL SECTOR	INFORMATION TECHNOLOGY SECTOR
Period of Declining Trend	July 2000 to December 2001	April 1999 to September 2000	December 2001 to May 2003	January 2000 to June 2001
Percentage Decline	45%	49%	53%	67%*
P-value for regression model	$2{,}62 \times 10^{-6}$	$7{,}44 \times 10^{-6}$	$7{,}00 \times 10^{-15}$	$6{,}77 \times 10^{-10}$
Intercept (a)	0,8856	1,0208	1,0387	0,9200
Slope (b)	-0,0192	-0,027	-0,032	-0,0397
Coefficient (r^2) of determination	0,758	0,725	0,979	0,913
F Value	50,07	42,13	754,4	167,7
Basis for calculation of decline	Previous month	Previous month	Previous month	January 2000* Level

***Cumulative monthly declines exceeded 100%, basis for percentage decline was taken as the January 2000 level for Information Technology Sector.

4.2 Hypothesis 1: Testing for Changes in Sector Debt Equity Ratios following a declining trend period

The *null hypothesis* was formulated to state that the present debt-equity ratios of companies comprising a particular market sector *were unchanged* from the sector debt-equity ratios prior to the 18 month declining market trend period.

The results of the *hypothesis* tests carried out using the nonparametric Wilcoxon signed rank test for paired data are shown in Table 4.2. (The Excel spreadsheets are contained in Appendix I, whilst the NCSS outputs are presented in Appendix II.) Use was made of paired data analysis as the debt-equity ratio of a company before the declining trend period was compared to that of the same company after this intervention. The population of data therefore comprised pairs or sets of related data.

Tests for normality of the distribution of debt-equity ratios showed that normality was rejected for all four JSE sectors as is reflected in Table 4.2. This confirmed the selection of nonparametric statistical methods for the data comprising the population. The results showed in all cases, that the *null hypothesis* was accepted at the 5% decision level. There was therefore no significant change in sector debt-equity ratios prior to and after the respective declining trend periods. Nonetheless, the four categories of companies within each sector behaved differently in adjusting their debt-equity ratios. The significance of these changes was tested by the *hypotheses* outlined further.

Table 4.2: Hypothesis Testing for changes in sector debt-equity ratios before and after declining trend periods

JSE SECTOR	NORMALITY	1ST* NUMBER LOWER	1ST* NUMBER HIGHER	SUM OF RANKS (W)	DECISION (5%)	P-VALUE
Information Technology	Reject Normality	9	11	103	Accept H_o	0,955
Financials	Reject Normality	26	16	321	Accept H_o	0,068
Cyclical Services	Reject Normality	20	14	195	Accept H_o	0,0812
Cyclical Consumer Goods	Reject Normality	9	10	98	Accept H_o	0,920

*1st Number is data average prior to declining market trend.

4.3 Hypothesis 2: Testing for Changes in Paired Debt-Equity Ratios for companies with Cost of Debt less than the Return on Investment and a Price-to-Book Value greater than the Median

The *null Hypothesis* was that the present debt-equity ratios of companies, for which Kd was less than ROI and the price-to-book value was greater than the median, *was equal to or less than* the historical mean debt-equity ratio of these companies.

As shown by Table 4.3, the *null hypothesis* was accepted suggesting that there had not been a significant increase in debt-equity ratios from before to after the declining market period.

In defining the components of debt, however, the approach by Reilly and Brown (2003) to include all long-term fixed obligations, including lease obligations, deferred tax and subordinated convertible bonds was followed. As operating leases and deferred tax liabilities did not increase the value of the tax shield, an increase in non-interest bearing liabilities would not have contributed to the value maximising behaviour of the firm. However, should companies have increased the proportion of interest bearing liabilities, and proportionally decreased non-interest bearing liabilities leaving the overall debt component of the debt-equity ratio unchanged, they still would have benefited from a net increase in the value of the tax shield. By increasing the use of interest bearing debt through changing the proportion of interest bearing to total liabilities from before to after the declining market trend, companies could have engaged in value maximising behaviour. In order to test for an increase in the ratio of interest bearing to total liabilities, the following *hypothesis* was formulated:

> H_0: The ratio of interest bearing debt to total liabilities *was equal to or less* after the bear period for companies with Kd greater than ROI and a price-to-book value greater than the median.

H_1: The ratio of interest bearing debt to total liabilities *was greater* after the bear period for companies with Kd greater than ROI and a price-to-book value greater than the median.

Table 4.3 showed that the *null hypothesis* was rejected indicating an increased level of debt funding as a ratio of total liabilities for companies with ROI greater than the cost of debt and a price-to-book value greater than the median.

Table 4.3: Hypothesis Testing for companies with a Cost of Debt less than the Return on Investment and a Price-to-Book Value greater than the Median

CLASSIFICATION OF ROI>CD AND PRICE TO BOOK > MEDIAN.	NO. OF DATA	NORMALITY	1ST NUMBER LOWER	1ST NUMBER HIGHER	DECISION (5%)	P-VALUE
Debt-Equity Ratio was equal to or less after bear period	35	Reject Normality	17	17	Accept H_o	0,694
Interest bearing debt to total liabilities was equal to or less after bear period	35	Cannot reject Normality	21	10	Reject H_o	0,046

4.4 Hypothesis 3: Testing for Changes in Paired Debt-Equity Ratios for companies with Cost of Debt less than the Return on Investment and a Price-to-Book Value less than the Median

The *null Hypothesis* was that the present debt-equity ratios of companies, for which Kd was less than ROI and the price-to-book value was less than the median, *was equal to or greater than* the historical mean debt-equity ratio of these companies.

The results of testing Hypothesis 3 as presented in Table 4.4 showed acceptance of the *null Hypothesis* confirming that companies comprising this group had not decreased their level of debt funding in response to bear market conditions. To again confirm a possible change in the use of interest bearing to total liabilities, a further *hypothesis* similar to that in Section 4.3 was formulated:

H_0: The ratio of interest bearing debt to total liabilities *was unchanged* after the bear period for companies with Kd greater than ROI and a price-to-book value less than the median.

H_1: The ratio of interest bearing debt to total liabilities *was significantly different* after the bear period for companies with Kd greater than ROI and a price-to-book value less than the median.

Table 4.4 shows that the *null hypothesis* was accepted at a high probability level of 68% illustrating that the level of debt funding as a ratio to total liabilities had remained constant.

Table 4.4: Hypothesis Testing for companies with a Cost of Debt less than the Return on Investment and a Price-to-Book Value less than the Median

CLASSIFICATION OF ROI>CD AND PRICE TO BOOK < MEDIAN.	NO. OF DATA	NORMALITY	1ST NUMBER LOWER	1ST NUMBER HIGHER	DECISION (5%)	P-VALUE
Debt-Equity Ratio was equal or less after bear period	35	Reject Normality	17	17	Accept H_o	0,694
Interest bearing debt to total liabilities was unchanged after bear period	35	Cannot reject Normality	21	10	Accept H_o	0,68

4.5 Hypothesis 4: Testing for Changes in Paired Debt Equity Ratios for companies with Cost of Debt greater than the Return on Investment and a positive NOPAT

The *null Hypothesis* was that the present debt-equity ratio of companies, for which Kd was greater than ROI and NOPAT was positive, *was equal to or less than* the historical mean debt-equity ratio of these companies.

As is evident from Table 4.5, the *null hypothesis* was rejected implying that the present debt-equity ratio for this category of companies *was greater than* the historical mean prior to the bear period. In order to confirm that the apparent

increase in the debt-equity ratio was not due to a decrease in ordinary shareholders' interest, an additional *hypothesis* was formulated:

> H_0: The value of ordinary shareholders' interest *was equal or greater* after the bear period for companies with Kd less than ROI and positive NOPAT.
>
> H_1: The value of ordinary shareholders' interest *was less* after the bear period for companies with Kd less than ROI and a positive NOPAT.

As reflected by Table 4.5, the *null hypothesis* was accepted at the 99% probability level, indicating that the increase in debt-equity ratio was due to an increase in total liabilities rather than a reduction in shareholders' equity.

In order to test for an increase in interest bearing liabilities, the following hypothesis was tested with respect to changes in short term liabilities for this category of companies:

> H_0: The short term liabilities *were equal or less* after the bear period for companies with Kd less than ROI and a positive NOPAT.
>
> H_1: The short term liabilities *were greater* after the bear period for companies with Kd less than ROI and a positive NOPAT.

As is apparent from table 4.5, the *null hypothesis* was rejected confirming that the increase in the debt-equity ratios for this category of companies was due to an increase in short term liabilities.

Table 4.5: Hypothesis Testing for companies with a Cost of Debt greater than the Return on Investment and a Positive NOPAT

ROI<CD and POSITIVE NOPAT	NO. OF DATA	NORMALITY	1ST NUMBER LOWER	1ST NUMBER HIGHER	DECISION (5%)	P-VALUE
Debt-Equity Ratio was equal to or less after bear period	32	Reject Normality	19	13	Reject H_o	0,0288
Shareholders' equity was equal to or greater after bear market period	32	Reject Normality	23	9	Accept H_o	0,993
Short term liabilities were equal or less after bear market period	32	Reject Normality	17	10	Reject H_0	0.0419*

* rejected at Exact Probability Level

4.6 Hypothesis 5: Testing for Changes in Paired Debt-Equity Ratios for companies with Cost of Debt greater than the Return on Investment and a negative NOPAT

The *null hypothesis* was that the present debt-equity ratio of companies, for which Kd was greater than ROI and NOPAT was negative, *was equal to or less than* the historical mean debt-equity ratio of these companies.

The results presented in Table 4.6 show that the *null hypothesis* was rejected at a p-value of 0.003, which suggested strong support for an increase in debt-equity ratios for this category of companies. (The finding of such a significant change in debt-equity ratios for companies with a negative NOPAT supported relatively rapid adjustments in capital structure.) However, this *hypothesis* did not clarify the exact cause of the increase in debt-equity ratios as this could have been due to either a significant decrease in shareholders' equity, or an increase in the levels of debt. In order to clarify the reason for this adjustment, the following *hypothesis* was formulated:

H_0: The level of interest bearing debt *was unchanged* after the bear period for companies with Kd greater than ROI and a negative NOPAT.

H_1: The level of interest bearing debt *was significantly different* after the bear period for companies with Kd greater than ROI and negative NOPAT.

Table 4.6 shows that the *null hypothesis* was accepted at the highest probability level of 100% illustrating a similar level of interest bearing debt prior to and after the bear period.

In order to confirm that the increased debt-equity ratios were as a result of a decline in the value of the shareholders' equity due to the effects of cumulative losses on retained earnings, the following *hypothesis* was tested:

H_0: The value of ordinary shareholders' interest *was equal to or greater* after the bear period for companies with Kd greater than ROI and negative NOPAT.

H_1: The value of ordinary shareholders' interest *was less* after the bear period for companies with Kd greater than ROI and a negative NOPAT.

The *null hypothesis* was rejected at a 0.3% probability level, which confirmed a significant decline in ordinary shareholders' interest.

Table 4.6: Hypothesis Testing for companies with a Cost of Debt greater than the Return on Investment and a Negative NOPAT

ROI<CD and NEGATIVE NOPAT	NO. OF DATA	NORMALITY	1ST NUMBER LOWER	1ST NUMBER HIGHER	DECISION (5%)	P-VALUE
Debt-Equity Ratio was equal to or less than before the bear period	18	Reject Normality	13	5	Reject H_o	0,003
Level of Interest bearing debt was unchanged	18	Reject Normality	9	9	Accept H_o	1,000
Shareholders' equity was equal to or greater after bear market period	18	Reject Normality	4	14	Reject H_o	0,003

4.7 Hypothesis Testing for the prevalence of Vendor Finance before and after Bear Market Periods

It was noted that a significant number of companies spread over the four sectors of the JSE employed vendor finance as a means of structuring long term liabilities. Amounts due to vendors represent purchase considerations owing in respect of acquisitions, which can be settled through the issue of shares or in cash. The amounts owing are often contingent to the fulfilment of certain profit warranties. In order to test for changes in the use of vendor finance in response to bear market periods the following additional *hypothesis* was proposed:

> H_0: The prevalence of vendor finance *was equal to or greater* after the bear period for companies comprising the four sectors of the JSE.
>
> H_1: The prevalence of vendor finance *was less* after the bear period for companies comprising the four sectors of the JSE.

The results presented in Table 4.7 show that the *null hypothesis* was rejected, implying that the prevalence of vendor finance was significantly less after the bear period.

Table 4.7: Hypothesis Testing for the prevalence of vendor finance before and after bear market periods

COMPANIES COMPRISING POPULATION	NO. OF DATA	NO. OF ZEROS	1ST NUMBER LOWER	1ST NUMBER HIGHER	DECISION (5%)	P-VALUE
Prevalence of Vendor Finance was equal to or greater after the bear period	117	94	4	19	Reject H_o	0,001

5. INTERPRETATION OF RESULTS

In terms of analyzing capital structure changes of listed companies in a developing country such as South Africa, it may be of relevance to consider whether such debt ratios are affected similarly to those of developed countries. Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001) investigated the determinants of capital structure in developing countries, and concluded that, in general, debt ratios seemed to be affected in the same way and by the same types of variables that were significant in developed countries. The application of findings based on studies from developed countries in interpreting the present results is therefore supported.

5.1 Capital Structure Changes specific to JSE Sectors

Hypothesis testing for changes in sector specific debt-equity ratios confirmed that bear market periods did not result in significant changes in capital structure for the sectors investigated. (If this was because the duration of the bear periods was too short, then similarly, the capital structure of companies classified into one of four categories would also have remained unaffected. This was, however, not the case as shown in the following sections.) The significance of this finding was that the sector debt-equity ratio, which according to Bradley, Jarrell and Kim (1984) also proxied as the optimal or target capital structure for that sector, remained unaffected throughout the bear market periods studied.

It was shown by Hull (1999) that for transactions resulting in firms moving closer to the industry debt-equity ratio, a positive market response was obtained as opposed to firms that moved away from the sector debt-equity ratio. Since the bear market periods studied left the sector capital structure essentially unchanged, the movement of individual firms away from this target was not in the interest of the firm.

5.2 Capital structure changes in Firms for which ROI exceeded the Cost of Debt

5.2.1 Firms with a Price-to-Book Ratio greater than the Median

Companies falling into this classification were shown not to have increased their debt-equity ratios as compared to levels prior to the bear market period. However, additional *hypothesis* testing for changes in the ratio of interest bearing to total liabilities confirmed the increased use of debt as a proportion of total liabilities. (In practice this would translate to greater increase in interest bearing liabilities as compared to for example, the increase in the value of operating leases or vendor finance, which is discussed in Section 5.4.) The importance of this finding was that companies with a price-to-book ratio greater than the median were shown to engage in value maximising behaviour by lowering their WACC through a proportional increase in debt funding in order to derive greater benefit from the tax shield. The proportional increase in debt funding was also consistent with the findings of Kemsley and Nissim (2002) who showed that firm value was a positive strong function of debt.

Titman and Wessels (1998) have also identified the profitability of a firm as a strong determinant of the amount of retained earnings and hence the capital structure of a firm. For this category of firms it was, however, shown that even though the levels of retained earnings increased, the debt-equity ratio did not decrease as further debt was taken on to, for example, fund positive NPV projects.

5.2.2 Firms with a Price-to-Book Ratio less than the Median

Firms classified in this category were found to have maintained their capital structure irrespective of the economic cycle. It was also shown that these firms did not increase their portion of interest-bearing debt expressed as a fraction of total liabilities. This may be as a result of a lack of positive NPV projects or simply due to the conservative use of debt funding. The behaviour of firms in this category therefore was more typical of that found in empirical studies carried out by Dzamba (2003).

As ROI is a measure of profitability of companies, companies classified as having an ROI greater than the cost of debt represented the more profitable section of companies in the population. In this regard, unchanged debt-equity ratios were often typical for large, liquid and profitable firms with low expected distress cost, which made very conservative use of debt funding (Graham, 2000). The conservative use of debt by these companies was, however, not consistent with maximising the value of the firm. A South African study by Wimberley (2001) showed that through increasing financial leverage by using debt to repurchase shares, companies in the Indi25 Index of the JSE could have realised a 3% to 14% increase in value. Similarly, Graham (2000) estimated that a debt-conservative firm could add significantly more value by the increased use of debt. By leveraging to the optimum, the typical firm could add 15,7% to firm value; this figure decreased to 7.3% when considering the effects of personal taxes. The comment made by Graham (2000) that conservative debt policy was persistent, probably applied to companies comprising this category and was likely to be largely independent of the economic cycle.

5.3 Capital structure changes in Firms for which ROI was less than the Cost of Debt

5.3.1 Firms with a positive NOPAT

The *hypothesis* that companies with a return on investment less than the cost of debt but a positive NOPAT decreased their debt-equity ratios was primarily based on the possible concern for financial distress costs. This *hypothesis* was, however, rejected at the 0.029 probability level, indicating that concern for financial distress costs was not a major determinant of capital structure. The lack of concern for financial distress costs may also be due to the fact that these companies were underlevered in the first place, as indicated by Louw (1983), who was unable to find evidence to support that JSE listed firms were highly geared.

Titman & Wessels (1988) supported the notion that leverage was largely firm-specific and based on the amount of retained earnings accumulated per firm, which was an important determinant of current capital structure. Highly profitable firms used their earnings to repay debt, for example, whilst less profitable firms resorted to debt financing and became more levered. The finding by Titman and Wessels (1998) that highly profitable firms reduced their leverage was not supported by the present study, particularly for the case of companies with a price-to-book ratio greater than the medium. However, there was significant support for their latter finding that the less profitable firm resorted to increased debt funding. In the case of bear periods in particular, funds raised may have been used for restructuring of the firm to return to greater profitability or to simply retain sufficient financial flexibility. “Trading out of difficulty” by expanding operations may have been another approach adopted, with both approaches having led to an increase in interest bearing debt.

5.3.2 Firms with a negative NOPAT

The *alternative hypothesis* formulated for this category of firms, which stated that the debt-equity ratios significantly increased was accepted at the 98% probability level. The increase in debt-equity ratios was postulated to have been due to a combination of decreased retained earnings and the likely increased use of debt financing to maintain liquidity. These findings were consistent with the work carried out by Warner (1977) who presented evidence of a rapid increase of 30% in the average debt-equity ratio over a twelve month period of more than 10 American railroad companies facing financial distress. Warner, however, did not analyse whether this was due to an increase in debt funding or a decrease in retained earnings or a combination of both factors.

Further *hypothesis* testing confirmed that the level of interest bearing liabilities for these firms remained unchanged as compared to levels prior to the bear market period. However, the level of shareholders' equity was significantly decreased as a result of the decrease in retained earnings. The adjustment to greater debt-equity ratios was thus not due to an increased use of cheaper debt funding in order to change the capital structure of the company, but rather as a direct result of the accumulation of significant losses accrued over the bear period.

5.4 Changes in the Prevalence of Vendor Finance

It was also shown that the prevalence of vendor finance, which requires the future settling of amounts outstanding in respect of purchase considerations for companies acquired, decreased significantly from levels before the bear period. This was found to hold true for the entire population of stocks from the four sectors investigated. Settlement of the amounts owing due to vendor finance can be achieved through a combination of shares and cash. However, Baker and Wurgler (2002) showed through an analysis of actual financing decisions that firms tended to issue equity when market values were high. Hence, the attractiveness to settle amounts owing to vendors by issuing shares during a bear period is decreased as market values are relatively low. It has thus been

shown that, similar to the practice of equity market timing, the decision to use vendor finance also appeared to coincide with the high market valuation of companies and that the prevalence of vendor finance declined accordingly during bear market periods.

6. CONCLUSIONS

This study focussed on capital structure changes in four sectors of the JSE during a declining trend or bear market period of at least 18 months. The bear market was defined as an average sector index decline of at least -1.9% per month. The study found that:

- The sector debt-equity ratios of the four sectors of the JSE, viz. Cyclical Consumer Goods, Cyclical Services, Information Technology and Financials Sector remained unchanged from before to after the bear periods. This meant that the target debt-equity ratio proxied by the sector debt-equity ratio also remained unchanged. Any change away from the optimal (i.e. constant sector debt-equity ratio) would not have been in the interest of the firm. Once the stocks were divided according to their returns, price-to-book ratios and profitability, significant changes in capital structure were apparent as set out in the following conclusions.

- The first group of companies analysed had an ROI greater than the cost of debt and a price-to-book ratio greater than the median. Companies comprising this group were shown to have maintained their leverage. However, the proportion of interest bearing debt to total liabilities, which include non-interest bearing components such as operating leases and vendor finance, was shown to have increased from before to after the declining trend period. By increasing the proportion of interest-bearing debt in order derive greater benefit from the tax shield, these companies were shown to have engaged in value maximising behaviour.

- Companies with an ROI greater than the cost of debt but a price-to-book ratio less than the median were shown to have maintained their leverage. This behaviour was typical for profitable firms with a very conservative financial policy and suggested behaviour consistent with empirical research. These companies would have benefited by adopting value maximising behaviour through a less conservative debt policy, which would have led to increased firm value.

- Firms with a return on investment less than the cost of debt and a positive NOPAT were found to have increased their debt-equity ratios. This finding was similar to that of other researchers, who found that less profitable firms tended to make greater use of debt funding. During a bear period therefore, when profitability was generally reduced and the raising of equity was not preferred due to market timing, the use of debt funding was found to have significantly increased.

- Firms with a return on investment less than the cost of debt and a negative NOPAT were found to have substantially increased their debt-equity ratios. This was, however, not as a result of increasing levels of debt, consistent with value maximising behaviour, but rather as a result of a significantly decreased shareholders' equity due to the accumulation of retained losses over the duration of the bear period.

- Finally, the prevalence of vendor finance was found to have been significantly reduced after the bear period. Any outstanding balances due to vendors were normally settled by a combination of cash and shares. Since the latter requires the issuing of equity, the downturn in vendor finance in a bear market was ascribed to equity market timing effects.

7. RECOMMENDATIONS FOR FUTURE WORK

It is recommended that the study be extended to cover different downturns or bear periods in time, thereby also increasing the number of JSE sectors sampled. This would give greater certainty of the capital structure changes observed as findings would be more representative of the JSE board. The results of this work could be generalised further, particularly if sampling were to cover several bourses and the behaviour found to be similar or consistent.

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A P P E N D I X I

FINANCIAL DATA ANALYSIS (EXCEL SPREADSHEETS)

A P P E N D I X II

RESULTS OF STATISTICAL ANALYSIS (NCSS REPORTS)