

Company Debt Policies Across Different Tax Rate Structures

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ABSTRACT

Managers deciding which form of finance to select in order to fund investments, namely debt or equity, are posed with the challenge of understanding the different costs implicated with these two types of financing.

Equity investors expect far greater returns than lenders of debt, yet repayment of their investment is more flexible. Debt is associated with stringent repayment terms, yet the tax benefits of this source of finance are material.

The ultimate decision rests on the returns to the shareholders, which are increased with higher debt levels due to the concept of gearing of returns.

This research report investigates the tendency of managers to exploit the tax benefits offered by debt in a range of different tax rates as well as different interest rates. These are the two factors which impact on the tax benefits offered by debt financing. Capital structure data has been collected from selected stock exchanges and central banks. This data has been used in multiple regression analyses where debt levels have been regressed against tax and interest rates in order to determine the impact of these variables on debt funding levels.

The results show that when countries are grouped geographically, there is no correlation between changes in financing behaviour and tax rate changes. However, when countries are grouped according to tax rate brackets, more significant connections may be observed.

The relationship between financing decisions and changes in interest rates also proved more significant throughout the report.

The report demonstrates that financing decisions change in relation to tax rate changes and highlight the tax benefits of debt financing.

DECLARATION

I, Jedd Myers declare that this research report is my own, unaided work. It is submitted in partial fulfilment of the requirements of the degree of Masters of Business Administration at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Jedd Myers

Signed at Johannesburg

On the 2nd Day of December 2011

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1 INTRODUCTION

1.1 Purpose of the study

The purpose of this research is to provide another dimension to the comprehensive, currently available research regarding the relationship between tax levels and corporate debt policy. This relationship is material to decision making about the financing of investments and capital structures of firms.

Debt can add significant value to an organisation due to the tax shield, and other benefits, if suitably structured (Kemsley and Nissim 2002). This paper explores the degree to which these debt benefits are being fully utilised under different corporate tax levels.

In research and analysis by other authors, the existence of a relationship between the corporate tax rate and debt policy of companies has been established, as well as the value of this relationship (Graham, 2000; Kemsley and Nissim, 2002; Mackie Mason, 1990). This study aims to investigate differences in this relationship at different tax levels.

In addition, other factors that impact the debt policy of a company will be discussed.

1.2 Context of the study

Companies exist to produce a profit and deliver a return to their shareholders through this profit, through wealth creation by investment and expansion and through market share growth (Modigliani and Miller 1958). Calculated risks are undertaken in an attempt by businesses to deliver the highest returns to their shareholders. These risks are assessed prior to making decisions by

management with the intention being either to increase profits or maximise market valuation of the company (Modigliani and Miller 1958).

Current academic thought is that value growth is the paramount metric, both for shareholders and portfolio managers. These objectives face difficulties, however, due to agency problems arising when management focus on their own objectives rather than maximising investor wealth. This is discussed further below. (Zalewski, 2003).

From a shareholder's perspective, high-risk investments with subsequent expected high returns should outweigh the security of bank deposits. As risks in investments increase, the expected returns of shareholders increase. How the shareholders invest and to what extent they invest, is reflected in these risks.

These shareholder expectations, and the decisions that must be taken with regards to capital structure, weigh heavily on the company's management impacting on the agency problem, in particular regarding the following:

- the performance assessment and remuneration of the management themselves;
- the awareness that their decisions related to business performance impacts on the employees, for whom an important aspect is employment security, which is directly dependant on effective management; and
- the consideration that, from a broader social perspective, the contribution of profits to the growth of a country is also a significant factor.

Although these are not necessarily primary concerns relating to corporate debt policy and capital structure decisions, they do involve the company's decision makers.

In order to effectively calculate the true returns of investments made by a company, all contributory factors such as the cost of capital employed, opportunities foregone as well as forecasted cash flows need to be considered (Ang 1973; Glenn V. Henderson 1979; Vélez-Pareja and Tham 2009). This report will focus on the financial risks and costs involved with the financing of investments, and provide some understanding relating to their returns.

Essentially, a company can finance investments with either equity or debt or a combination of these.

Each form of finance has its own risk profile and corresponding return expectations. When forecasted, the expected returns from investments need to exceed the cumulative costs of financing the investment. The Capital Asset Pricing Model (CAPM) of Sharpe and Lintner has been the basis for determining the required return on investment for a number of years and will be discussed later in the paper (Sharpe 1964; Lintner 1965).

A significant benefit to debt as a form of financing is that the interest is tax deductible which reduces the cost of borrowing or creates a tax shield (Graham 2000). With increasing tax rates, the benefit of the tax shield becomes more pronounced (Graham 2000). Other authors have calculated and assessed this benefit (Modigliani 1982; Graham 2000; Kemsley and Nissim 2002); and conducted research to test the presence of the relationship between corporate tax and financing decisions (Mackie-Mason 1990). Their findings are discussed below.

This study will analyse the debt to equity ratios of different stock exchanges across a range of tax levels to examine whether tax shield benefits are being utilised in relation to the relevant tax levels.

1.3 Problem statement

1.3.1 Main problem

The purpose of this research is to investigate whether companies appear to optimise their capital structures and realise the full potential benefits of the tax shield as tax rate this change..

1.4 Significance of the study

This study fills a gap in that corporate stakeholders - CEO's, CFO's and company boards - are often confronted with the dilemma of how to organize their company's capital structure effectively, while also financing necessary investments. In this regard, use of the tax shield provided by using debt as a form of capital should be considered.

This study will provide guidance to the above decision makers as to how best to finance the investments of their companies in order to deliver the greatest returns to shareholders. This will be based on the practices of the various stock exchange indices assessed.

The study will benefit decision makers in providing insight around the balance between the perceived risk to their companies due to the amount of leverage used in the capital structure- which affects equity investors' expected returns - and the actual risk in place due to the debt incurred with regards to the repayment obligations thereof.

It will also provide guidance to investors as to how to determine what capital structure will allow for the greatest returns on. The study will also investigate which countries' tax regimes will allow returns to be maximised

1.5 Delimitations of the study

Since the research and data collection necessary for this study depend on well-documented tax laws, transparent stock and security exchanges, and publicly traded companies, below are stated the delimitations of this paper.

To be included in this study:

- Countries must have an entrenched tax regime, whereby data can be collected on historical corporate tax levels;
- Countries must have a registered stock and securities exchange, whereby companies can trade under public scrutiny with public shareholders;

To be excluded from this study:

- Countries with no registered stock and securities exchange where companies can only trade in a private forum; and
- It should be noted that countries change their tax rates at different time intervals throughout the year, which could affect the consistency of the data as the timing of the changes might have a seasonal effect. However, due to the generally minimal incremental changes observed, this factor will be excluded from this analysis.

Due to the fact that tax rate changes are incremental, an event-based approach could not be used

1.6 Definition of terms

- Company – a business created as a distinct legal entity. Used interchangeably with the terms *business*, *firm* and *corporation*. Implies limited liability to its shareholders.
- Stock Market or Stock Exchange – the point of purchase and sale of shares of publicly listed companies.
- Capital structure – the funding of the operations of the business. Comprised of debt and equity.
- Tax shield – the effective proportion of profits saved by using tax deductible debt as part of a firm's capital structure.

1.7 Assumptions

The following assumptions hold for this study:

- The information provided regarding the different stock exchange indices as well as country tax and interest rates selected is assumed to be factual and complete;
- The stock exchanges to be assessed are assumed to be efficient markets and respond to the available information as, at least, *semi-strong* tests (Fama 1969);
- The debt to equity ratios to be assessed over the stock exchange indexes included have used the same calculations;
- Debt is classified in the same manner across all stock exchanges considered; and
- Equity is classified in the same manner across all stock exchanges considered.

2 LITERATURE REVIEW

2.1 Introduction

Although several sources are cited, the research of the following authors has proved to be pivotal in providing a significant theoretical underpinning to this paper.

Sharp (1964) and Linter (1965) described the CAPM model, later supported by Jagannathan and Meier (2002) who outline its use, and Perold (2004) who discusses the importance of CAPM in financial theory. The recognised significance of this model justifies its use in this research.

It may be noted here that although there are concerns around CAPM, expressed by Fama and French in their articles *The CAPM is wanted dead or alive* (1996) and *The value premium and the CAPM* (2006), these relate to the application of the CAPM model in the valuation of assets, as well as the use of beta as a measure of market volatility. Since this study does not utilise the CAPM model as a basis for business valuation and decision making, but rather as a basis for understanding cost of capital in WACC calculations, these issues are unrelated to the specific focus of this paper.

Modigliani and Miller (1958) provided discussion on the important aspects of debt and equity; investment risk; and debt risk to the company. Their literature is considered throughout the paper and is core to this pool of knowledge.

Kemsley and Nissim (2002), as well as Mackie Mason (1990), have investigated the phenomenon of the tax shield.

Discussion regarding the relationship between tax rates and corporate debt policy is based on research in the United States (US) economy (Mackie-Mason 1990; Graham 2000; Kemsley and Nissim 2002).

Graham (2000) provided background to the non-tax factors that impact on decision making related to corporate debt policy.

Finally, since the intention of this study is to assess this relationship in settings outside of the US as well, the research of Ajayi, Mehdiian and Perry (2004), Chang, Pinegar and Ravichandran (1993), and Roll (1992) were examined. They assess the characteristics of stock exchanges outside of the US and compare these markets. Their focus is on emerging economies in Eastern Europe. Chang *et al* (1993) also categorise the stock exchanges into the geographical regions of Europe, North America, Pacific Basin and Other. The countries selected by Chang *et al* (1993) were used as a starting point for this study.

2.2 The Capital Asset Pricing Model (CAPM)

Companies have two finance options for investing to deliver returns - debt and equity (Modigliani and Miller 1958). Each of these finance choices are associated with certain degrees of uncertainty and, therefore, risk and expectation (Modigliani and Miller 1958).

The CAPM combines the inherent attendant risk and return of these types of finance in order to reflect the real cost of investment decisions to companies (Sharpe 1964; Lintner 1965). Eun (1994) and Perold (2004) highlight this model as fundamental to corporate finance theory and credibility.

This combination of the different finance costs is the foundation for calculating the Weighted Average Cost of Capital (WACC) used to finance investment decisions and is the basis for the following formula:

$$WACC = K_d (Debt/Total\ Capital) + K_e (Equity/Total\ Capital)$$

(Ang 1973; Glenn V. Henderson 1979; Vélez-Pareja and Tham 2009)

In this equation, that the risk of each type of finance its weighted on the basis of the ratio of that finance source to the total financing. Total capital refers to total market value of debt plus the total market value of equity, of the business.

This study will utilise the CAPM model primarily as a guide to explain the balance of risk required by equity investors. Despite its shortcomings as a basis for determining cost of equity capital which may be used in business valuation, CAPM is still widely used as the *de facto* model for valuing investments and making investment decisions.

This research uses the CAPM as a factor to calculate the WACC. The WACC equation determines the cost of a given mix of debt and equity capital. By calculating different mixes, investors are able to find the balance between the advantages of debt as a source of finance and the resultant perceptions of risk caused to equity investors due to high company debt levels.

Higher debt levels, alongside the investors' resultant perceptions of risk, could escalate their expected returns, and consequently the cost of equity. This, in turn, could raise the cost of capital for the investment (Modigliani and Miller 1958). This places pressure on corporate decision makers when considering investment opportunities, even though higher debt levels might assist with complete utilisation of the tax shield (Graham 2000; Kemsley and Nissim 2002).

2.3 Equity Financing and Stock Exchange Volatility

Equity financing refers to the actual capital provided by shareholders to a business. This capital is provided once an assessment of the business' financial performance and prospective future is completed by prospective investors.

Ultimately, shareholders seek to derive a return from their investments, and most investors consider the risks involved in a thorough manner. Generally, investments that appear too risky relative to their returns are overlooked for more favourable investments (Modigliani and Miller 1958; Klos, Weber et al. 2005). In addition, those who invest in any company forego the opportunity to make more secure investments offering certain returns, such as government bonds (Modigliani and Miller 1958). As a result, corporate equity investors are quite specific regarding the expected returns of their investment relative to the risk associated with that business.

2.3.1 *Risks Relating to Equity Financing*

The risk that equity investments attract derives from the potential that shareholders may forfeit their investment as a result of poor business performance, poor decision making by managers and poor market performance. This risk is split into two components, one related to the operational aspects of the business, inherent to its structure, systems and processes and the other to the debt and financing aspect of the business and the obligations and risks inherent in this aspect.

These risks, which are both associated with the business at a fundamental level, are perceived differently by different investors (Kritzman and Rich 2002). These perceptions of risk, if they are that the risk is high over the lifetime of their investment, drives the expected returns that the investors wish to receive. This is a significant factor in escalating the cost of equity finance.

Sharpe (1964) discusses the concept of risk relative to equity investments on stock exchanges and splits this risk into two: that associated with the underlying asset or investment and that associated with the context of the asset or investment, inherent to the stock exchange of listing. The inherent stock exchange risk results from the volatility of the stock exchange due to changing environmental conditions (Sharpe 1964; Lintner 1965).

Just as the stock exchange of listing has an inherent volatility, so too does the share of the company being assessed relative to the returns expected by its shareholders. These expected returns drive the demand for a share which in turn, drives the price of the shares listed on the exchange.

The risk associated with a share can be reflected by its volatility relative to the volatility of the exchange on which it is listed (Sharpe 1964; Lintner 1965). This measurement is referred to as beta in the CAPM which is covariance of the returns on the share versus the returns on the market. A share with a beta of less than one is less volatile than the exchange on which it is listed, and so involves less investment risk relative to other companies listed on that exchange. This share would be a more attractive investment for long term equity investors, who are less concerned about the short term lower resultant expected return and more concerned with long term stability and investment security.

A beta of more than one implies that the returns of a share are more volatile than the returns of the All Share index of the exchange on which it is listed relative to other shares listed on that index, and so attracts higher risk. This would increase the expected return of the equity investors of this firm.

The risks perceived to be inherent to a company result from a number of factors, and no clear definition of risk exists (Klos, Weber et al. 2005). For the purpose of this research, one key factor here is the debt to equity ratio of the capital structure of the company. The higher the debt to equity ratio, the

more aggressive the company is seen to be and the higher becomes the risk as perceived by investors due to the need for repayment (Sharpe 1964).

In order for investors to gauge the risks within a business, the correct and factual information needs to be made available to them. This information - such as earning statements, decisions on restructuring and announcements on prospective deals - is made public under the legalities associated with trading in the relevant countries (Fama 1969).

2.3.2 *Market Efficiency and Relation to the CAPM*

For the purpose of this research, it is assumed that the stock exchanges assessed function efficiently. This section elaborates on this assumption when describing the effects that stock market transparency and availability of information can have on the performance of the shares of a company listed on that exchange.

Fama (1969) discusses three different degrees of market efficiency relating to investors having access to factual information. These are:

- Strong form tests - a benchmark for market efficiency, but not a realistic depiction of the day-to-day market activities;
- Semi-strong form tests - this level assumes full disclosure of information and also holds the efficient market theory; and
- Weak form tests - information is purely historical, and day-to-day price changes cannot be found to correlate with the information.

Because the debt levels of companies are published as a component of their financial statements at regular intervals, this information is freely available and assumed to be correct. Since this information contributes to at least a semi-strong form test of efficient markets, it has an effect on investor perception (Fama 1969). The higher the debt levels of the different

companies, the more risky these companies are perceived to be and the higher the expected return of the shareholders in these businesses (Modigliani and Miller 1958). Again, these expectations would drive up the cost of equity relative to the cost of debt impacting on the cost of capital as described by the CAPM.

Modigliani and Miller (1958) maintain that value to investors is gained only if and when the return of their investment exceeds the rate of interest offered by, for example Government Bonds, which attract minimal risk. This form of investment is far simpler for investor participation and attracts virtually no risk, because of the relative stability of financial institutions relative to the stock market. In the CAPM model, this is termed the risk free rate (Sharpe 1964).

Due to the risks involved with investing in the listed shares of a company compared to “riskless assets” such as bank deposits, investors expect a return of their investments over and above the standard interest rates of financial institutions (Modigliani and Miller 1958; Sharpe 1964). This is referred to as the market premium. This premium is different for every market, and is usually based on the historical average returns of the stock exchange being assessed (Eun 1994).

2.3.3 Cost of Equity Financing

The formula for calculating the cost of equity is:

$$K_e = R_f + \beta(MP)$$

Where

- *K_e = Cost of Equity*
- *R_f = Risk free rate (The prime lending rate)*

- $B = \text{Beta}$
- $MP = \text{Market Premium}$

(Ang 1973; Glenn V. Henderson 1979; Vélez-Pareja and Tham 2009).

The purpose for including the calculation of cost of equity in this study is to emphasise the fact that risk, due to increased debt ratios, will increase the cost of equity financing and possibly, the cost of capital. Subsequently, this will impact on the Net Present Value (NPV) of investments. For decision makers in business, this is a material component in determining the most efficient method of investment financing (Modigliani and Miller 1958).

2.4 Debt Financing

Debt refers to the external financing utilised by companies over and above the contributions of its shareholders. This type of finance, usually in the form of loans from banking institutions, bonds and other types of debt financing, attracts with it certain obligations with regards to its repayment terms. These obligations include timing of repayments as well as the interest to be paid on these loans. The obligations of these loans rank ahead of shareholder returns in the form of dividends and are required to be repaid irrespective of business performance. In this regard, they pose a risk of financial distress on businesses (Modigliani 1982) as well as risks relating to defaulting on the debt and being liable for closure (Molina 2005).

Management needs to weigh up the benefits of this source of financing over the potential costs involved (Negash 2001).

2.4.1 Sources of debt financing

Different sources of debt financing include:

- Corporate loans from financial institutions;

- Credit facilities; and
- Corporate bonds.

2.4.2 *Leverage and Gearing*

The relation of debt to equity, within the capital structure of a company, is commonly referred to as leverage (Molina 2005). By using debt as a form of finance, returns to equity holders can be increased, or levered up, and so the business becomes a more attractive investment (Modigliani 1982; Molina 2005). This is because a smaller capital input is required from shareholders to deliver similar returns to those should the company be financed purely by equity. This is facilitated by the debt finance portion of capital that requires less burdensome returns than equity and is one of the primary attractions of debt as a source of financing.

2.4.3 *Tax Policy and Revenue Collection*

Tax policies change between individual countries. The tax policy of a particular country depends on its associated political policies, capital requirements and social forces (Hunter and Nelson 1995). These different tax policies have varying degrees of effectiveness. They also impact the different benefits that can be derived from the utilisation of debt by the companies operating within that country (Rao 1979). These benefits and their associated effects will now be examined.

2.4.4 *The Tax Benefits of Debt Financing*

The *tax shield* provides a significant benefit when using debt as a source of financing (Kemsley and Nissim 2002). The tax shield is derived by deducting the interest paid on loans from the taxable profit of a business. This, in turn, lowers the actual amount required to be paid in taxes by these companies

and increases retained earnings, impacting firm valuation and share prices (Molina 2005). The value of the annual tax shield is the interest paid multiplied by the tax rate. Mackie-Mason (1990) affirms that there is a clear relationship between corporate tax rates and the financing decisions of businesses; and emphasises the link between debt and the resultant tax shield. Much research has been conducted to describe and value the extent of this tax shield and to describe the optimum level of debt required to maximise the effect of this tax shield. Kemsley and Nissim (2002) assign the value of the tax shield at approximately 40% of debt balances of a business.

Huizinga et al found that the local tax rate of countries can often predict the debt levels of companies within those countries as they seek to optimise the potential tax benefits of this source of financing. They also found that multinational corporations, with the ability to hold different capital structures in different subsidiaries across the globe, can optimise these benefits by holding more debt in higher taxed countries (Huizinga, Laeven et al. 2007).

2.4.5 *Cost of Debt Financing*

Graham (2000) devised a method to assess the actual benefit value of debt more empirically and found that companies have persistent patterns of debt utilisation - those companies with high debt capacities do not utilise this capacity optimally and those companies utilising debt aggressively do so consistently. With the added benefit of a tax shield, the assumption could be made that companies would find this type of financing more attractive than equity financing. But since both the cost of debt and the cost of equity are components of the WACC, a higher tax shield does not necessarily lower the WACC due to a resultant increased cost of equity. This would be observed until an optimum debt:equity level is reached whereafter, WACC would increase again.

This relationship is clarified in the equation relating to the cost of debt, as a component of WACC:

$$K_d = \text{Interest rate} \times (1 - \text{tax rate})$$

Where:

- *K_d = the cost of debt*
- *Interest rate = the rate of interest on outstanding debt*
- *Tax Rate = the corporate tax rate*

(Ang 1973; Glenn V. Henderson 1979; Vélez-Pareja and Tham 2009)

2.4.6 Risks of Debt Financing

Modiglianni (1982) discusses four major ways in which debt can adversely affect a company's value, thereby impacting their share volatility and in turn, their cost of equity. These include:

- Bankruptcy costs associated with the need for liquidation of a business;
- Agency costs related to the management and owners of a business. Moh'd, Perry and Rimbey (1991) found this to be a factor in the decision making around the capital structure of businesses, and correlates to the degree in which the personal wealth of the management is determined by their role in the business. It has been discussed that debt financing allows for higher shareholder returns. Should this be an incentivised area of performance for managers, their appetite for debt could be higher.;

- Opportunity costs, namely the foregone opportunities for investments outside of the business where the business could add value superior to the investment being considered ; and
- The cost involved in taking on debt purely as a tax shelter (Modigliani 1982) as opposed to taking on debt with the intention of utilising its other benefits.

With these costs in mind, the benefit of the tax shield still impacts on the financing decisions of company management, and their choice between utilising debt or equity financing (Mackie-Mason 1990). The tax shield is based on the statutory rates of tax of the country concerned. Because each firm has a different probability of producing a taxable profit, the probability of having to pay tax, and therefore being sheltered from this by the interest repayments on debt, is different for each (Mackie-Mason 1990). This implies that a different optimum debt ratio must be calculated for each firm and, as Mackie-Mason (1990) and Marsh (1982) conclude, each must have different target levels of debt ratios that they utilise in financial planning. Again, the tax rate of the country in which it operates plays a significant role in the debt policy of a company due to its effect on the tax shield.

2.4.7 Debt Policy in Relation to the Corporate Tax Rate

Graham (2000) and Kemsley and Nissim (2002) base their calculations of the value of the tax shield on the statutory corporate tax rate, which implies that a change in the corporate tax rate changes the value of the tax shield. (Trezevant 1992) found a change in the value of the tax shield and, therefore its applicability as a corporate finance tool with a changing tax rate. This is a key aspect of this research report – to understand how changes in corporate tax rates impact the debt ratios of companies in different economic settings. The above findings indicate that these factors should influence the financing decisions of companies.

2.4.8 Related Factors Impacting the Decision of Debt Financing

Graham (2000) finds that factors other than tax rates affect the finance decisions of businesses. He emphasises how, for the purposes of his study, he held these factors constant; and these non-tax factors that in his opinion potentially contribute to a company's debt policy are listed below:

1. The expected costs of financial distress relate to existing debt repayments, and the potential for opportunities foregone with other investment possibilities. This highlights a significant trade-off that companies make when selecting to take on debt (Graham 2000).
2. Cash flow and liquidity are critical to investors. These are linked to the ability of the company to absorb the effects of turbulent financial times. Cash flow, liquidity and profitability also affect the rate of interest that will be levied by the lending institution on the company as well as the terms of repayment. Companies with poor liquidity markers bear more stringent repayment terms. Market and industry factors play a role here as they impact the liquidity markers and profitability of a business(Graham 2000).
3. The size of the company and the asset balance have an effect on the availability of debt, as they often act as collateral for that debt. The collateral for the debt impacts on the amount to be offered and the terms of lending (Graham 2000). Frank and Goyal also found firm size as well as the presence of collateral to be a factor in this regard (Frank and Goyal 2003)
4. The company's management style, as well as the attitudes of the different managers towards debt, is also significant. The risk profile and individual objectives of management has an impact on the debt policy of companies, and is also seen to be persistent over time (Graham 2000). Moh'd *et al* (1998) also found correlations between

management ownership of companies and the resultant debt policy as this may have an effect on the agency costs of the business.

5. As discussed, the availability of information about the debt levels of companies, and the stimulus this has on investors' perceptions, is a key determinant in the cost of equity financing. Due to this, the availability of this type of information might act as a deterrent to increasing debt levels (Graham 2000).
6. The rate of interest to be levied on the debt of a company is a contributory factor to the cost of debt. Myers (1974) and Graham (2000) researched the debt policy linked to the interest rate, and found this factor to be connected to the liquidity and profitability of a company, which in turn, as discussed above, contributes to debt policy.
7. Taggart (1991) references Myers in his discussion around the operating cash flow as another feature influencing debt policy, and this is indirectly related to interest rates. Summarily, the interest rate levied on the debt of a business is a material factor in the financing model of a business, due to its effect on both liquidity and profitability. The interest rate is also fundamental in assessing the affordability of the debt.
8. Faulkender and Petersen found that firms with greater access to public bonds tend to have greater appetite for debt as a source of finance. They also found that firms needing to borrow through financial intermediaries had lower debt levels due to the potential for higher costs of debt related to the required transparency of company financial performance and status (Faulkender and Petersen 2005). This shows that the source of debt is a factor in the debt levels of businesses.

Frank and Goyal found that industry behaviour impacted debt levels in companies. Their finding was that companies in industries with higher debt levels reflected the industry behaviour. Their research also demonstrated that firms with higher internal risk as well as firms with higher market to book value held less debt as opposed to equity (Frank and Goyal 2003).

Although not mentioned in the literature on the chosen topic, the culture of the country concerned has been found to impact business related decisions. In two separate articles, evidence to support the impact of country culture on corporate financing decisions was established (Kogut and Singh 1988; Moh'd, Perry et al. 1998). This factor is difficult to assess adequately, reflected by the sparse amount of research found on the topic.

The different confounding factors, not to be assessed in this research report, with regards to change in debt policy of companies have been discussed. It is accepted that these events do have an impact on the debt policy of companies. In his paper titled "How Big are the Tax Benefits of Debt", Graham (2000) discusses that to have a significant impact on debt policy, these non-tax explanations of debt policy need to have a large and predictable effect and, although he discussed the need for further research in this area, he conducted his study and analysis holding these factors constant by focusing purely on the effect of the tax rate change.

As has been discussed, sufficient research to establish the relationship between tax rates and corporate debt policy has been conducted. This study aims to contribute to the pool of knowledge by comparing the debt policies in different countries that are subject to different tax regimes.

2.4.9 *The impact of interest rate on debt policy*

As highlighted by Graham (2000), the interest rate charged on debt influences the financing decisions of a company, and is a significant factor to be considered when calculating the cost of debt financing. Although Graham (2000) ignored certain factors in his paper, the interest rate levied in a particular country cannot be discounted.

The interest rate also affects the conditions of repayment to the lending institution, namely the particular amount to be paid back at specified regular intervals. This impacts significantly on the cash flow of the company due to the obligation to maintain the regular repayments (Myers 1974; Taggart 1991). It is this obligation and its priority in the finances of a business that is a deterrent to using debt as a source of finance.

Merton (1974) maintains that there are three factors that affect a company's decision to utilise debt financing:

- The risk free rate of government bonds;
- The particular conditions of the repayment of the debt; and
- The probability of default on the debt.

Two of these factors - the repayment conditions and the probability of default on payments - are related to the interest rate that will be levied on this debt by the lending institution. The fact that businesses might face bankruptcy and possible liquidation in the event of failing to repay the debt taken on, is a significant factor in the minds of management when structuring the capital of the business.

As is evident, and important for this research, the interest rate charged on debt within a country impacts the financing decisions of a company's management. This factor must be considered when calculating the cost of

debt, so necessitating its inclusion in any analysis of the utilisation of the tax shield.

2.5 Methodology of Previous Literature

2.5.1 Study Type and Data Collection

In his study on the effect of taxes on corporate financing decisions, Mackie-Mason (1990) made use of a time-based approach and then used a regression analysis technique to assess his hypothesis.

Mackie-Mason (1990) also indicates the challenge faced by using a change in the tax rate to assess the impact on a firm's debt policy, since the incremental changes in tax rates over time make the rates relatively stable, and, therefore, unsuitable as a variable in the analysis. This argument rules out the use of an event-based study approach to this report as a significant event would be required to take place that is both unexpected as well as having an effect on the measurable outcome (McWilliams and Siegel 1997).

An event-based study, although the preferable option is not applicable in this setting as drastic tax rate changes are not common. This prevents research into the effect on debt policy to due changes in tax rates (Mackie-Mason 1990). Instead, a time-based approach appears more appropriate.

This study examines the relationship between tax rates and corporate debt policy. It considers research related to the United States (US) economy (Mackie-Mason 1990; Graham 2000; Kemsley and Nissim 2002); and economies outside of the US by Ajayi, Mehdian and Perry (2004), Chang, Pinegar and Ravichandran (1993), and Roll (1992). Chang *et al* (1993), in addition, investigate comprehensively regions of Europe, North America, Pacific Basin and Other, and these will be the focus of this study.

2.6 Definition of topic or background discussion.

The objective of this research is to determine whether or not companies alter their debt policy relative to tax rate changes in an attempt to optimise their utilisation of the tax shield benefits associated with debt funding.

2.6.1 Hypothesis 1

The Null Hypothesis (H_0): Different corporate tax rates between countries have no altering effect on the debt to equity ratios of companies.

The Alternate Hypothesis (H_a): Different corporate tax rates between countries significantly influence the debt to equity ratios of companies.

2.6.2 Hypothesis 2

The Null Hypothesis (H_0): Different interest rates between countries have no altering effect on the debt to equity ratios of companies.

The Alternate Hypothesis (H_a): Different interest rates between countries significantly influence the debt to equity ratios of companies.

2.7 Conclusion of Literature Review

The CAPM model of Sharpe (1964) and of Lintner (1965) forms the basis of understanding the cost of equity financing. When used within the WACC equation, one can begin to understand how different mixes of debt and equity can influence the financing decisions of business.

Equity financing attracts certain inherent costs related to shareholder expectations, to general stock market volatility and to the volatility of the share itself. A company with higher debt levels and subsequent higher risk factors will provoke increased expectations for higher returns in its

shareholders. This, in turn, holds the potential for resulting in higher costs for equity financing. Information regarding debt and equity was researched from the study of Modigliani and Miller (1958).

These higher costs must be balanced against certain benefits related to debt, primarily the tax shield. The tax shield, derived from the tax deductibility of the interest paid on debt, decreases the taxable profit and, by extension, the amount to be paid in tax by the business and increases the ultimate profitability of a business. This issue is discussed by Kemsley and Nissim (2002). This results in increased after-tax cash holdings, and therefore greater business value. There is also a benefit gained by gearing the shareholder's returns to deliver a higher return on their equity contribution, a phenomenon commonly referred to as leverage.

The size and value of the tax shield has been researched extensively, establishing a good literature base for this research report. The focus of this research report is to determine whether debt levels changed significantly across a range of different corporate tax rates. While considering this relationship, the interest rate charged on the repayment of the debt utilised cannot be ignored due to its possible ramifications to the cash flow and sustainability of a business. This relationship will also be explored.

3 RESEARCH METHODOLOGY / PARADIGM

The research methodology used is a quantitative time-based approach. This method was selected due to the type of data that is necessary to prove or disprove the hypothesis. The data gathered here comprises corporate tax rates from a variety of countries, as well as the debt levels of different stock exchange indices within these countries, across corresponding time intervals.

When researching the tax shield, Graham (2000) and Kemsley and Nissim (2002) used time-based approaches to collect data sets. After collecting data over a period of time, they then assessed it using various techniques unique to their research.

3.1 Research Design

The hypotheses of this study were drawn out of the researched literature. Although previous investigation has proven that a relationship exists between the corporate tax rate and a company's debt policy, here this hypothesis is examined across a range of different countries and, by extension, tax rates.

The methodology used in this research report followed this process:

- Literature review;
- Data collection and collation;
- Multiple regression analysis; and
- Analysis and discussion from the regression outputs.

The advantage of this chosen methodology is that the hypothesis has been assessed by means of statistics gathered from independent, publicly available sources. Multiple regression analysis was selected as a technique

to prove or disprove the hypothesis. This methodology considers the degree of correlation between the variables being assessed, namely tax rates, index debt to equity ratios and interest rates, and whether this correlation has significance.

The disadvantage of the quantitative method is the exclusion of other factors on debt levels that require a more qualitative approach. Graham's (2000) discussion highlights that these are influential on capital structure decisions. Despite this, he still holds them as a constant for the purpose of understanding the impact that tax rate has on financing decisions. Another qualitative feature, and so not to be included here, would be the personal preferences regarding debt financing of the CEO and CFO of the company.

3.2 Population and sample

3.2.1 *Population*

The population - or selected areas for research - examined in this study relates to countries that have registered stock exchanges, well-documented tax laws, transparent stock and security exchanges and publicly traded companies. The population includes all global financial indices on these stock exchanges and the correlating tax rates and interest rates for these countries.

3.2.2 Sample and sampling method

Below are listed the aspects of the population to be sampled; and the way that the data was collected. In addition, the timeframe that the information was sourced for assessment is indicated.

a. Country Selection

The countries selected in the research of Chang *et al* (1993) - Europe, North America, Pacific Basin and Other - were the sample countries for data collection in this study. This provided an appropriate sample set from which to analyse the necessary aspects of different countries' stock exchanges, in particular the relationship between tax rates and corporate debt policy.

From the literature discussed, it is evident that the sample used needed to be one of convenience, to suit the requirements described, and not a random sample.

The countries listed all have a registered stock exchange and available data for assessment, and also impose corporate tax on the earnings of the entities registered in that particular country.

b. Market Index Selection

An initial consideration was to analyse the overall All Share Index of the relevant stock exchanges. But while assessing the available data, it became clear that some of these stock exchanges do not have overall indices measuring their performance, so the quoted index by international financial analysts was used instead.

Table 1: List of Countries, Stock Exchanges and Indices

Country	Name of Stock Exchange	Index to be Assessed
Denmark	Copenhagen Stock Exchange	OMX
Belgium	Brussels Stock Exchange	BEL-20
France	Euronext Paris	CAC 40
Germany	Deutsche Bourse	DAX
Ireland	Irish Stock Exchange	ISEQ Overall
Italy	Borsa Italiana	FTSE MIB and MIB
Netherlands	Euronext Amsterdam	AEX Index
Norway	Oslo Stock Exchange	OSE All Share
Spain	BME Stock Exchange	SMSI
United Kingdom	London Stock Exchange	FTSE All Share
Canada	Toronto Stock Exchange	S&P/TSX Composite
United States	New York Stock Exchange	AMEX Composite
Australia	Australian Securities	AORD
Hong Kong	Hong Kong Stock Exchange	Hang Seng
Japan	Tokyo Stock Exchange	Nikkei
New Zealand	New Zealand Stock Exchange	NZSE
South Africa	JSE Securities Exchange	JSE J203

c. ***Tax Rate***

Devereux, Griffith, Klemm, Thum and Ottaviani (2002) examined the change in corporate tax rates over a period of time in a number of different markets.

The tax rate used in this study was the statutory tax rate of the particular country at the time of assessment.

d. ***Interest Rate***

The interest rate used in this study was the prime lending rate of the central banking institution of the particular country at the time of assessment.

e. ***Financial Ratio***

The intention of this study is to determine whether companies alter their capital structures relative to tax rate changes, with specific emphasis on the use of debt as financing.

To make this comparable between companies, a financial ratio was utilised. The ideal ratio of total debt as a percentage of total capital of a company could not be gathered from the different research tools used. As a result, the ratio of total debt compared to total equity has been employed.

This ratio has been gathered from the Bloomberg terminal as an average ratio for the indices selected (Bloomberg.com).

f. ***Time intervals***

Graham (2000) discusses the time-based criteria for selection into his data set. He used a minimum of three years of data as a requirement for inclusion in his study, as this was the number of measurements required for his calculations. In their research, Kemsley and Nissim (2002) applied five years of data, maintaining that this is an adequate amount of time to assess the impact of growth in earnings on a business. Both of these studies focus on valuation of the tax shield, and required these time periods for their specific models.

Mackie-Mason (1990) applied a ten year window for data collection. He encountered difficulties with the length of this window regarding too much

possibility for variation in the sample set. Mackie-Mason also used a standard COMPUSTAT reporting tape and throughout this period, some companies had joined and left the sample set, creating further variability (Mackie-Mason 1990).

This research used a time period of approximately five years. The concerns highlighted by Mackie-Mason (1990) are acknowledged, and so this time frame is in line with the other cited research on the matter, namely that of Graham. This time line has also been selected due to the readily available data off the Bloomberg terminal.

3.3 The research instrument

The research instrument employed is a multiple regression analysis. The different tax rates, interest rates and index ratios have been regressed to assess their relationship. The overall data set was regressed as well as the different regional data sets:

- The Americas (United States and Canada);
- Europe (Netherlands, Denmark, United Kingdom, Germany, Ireland, Italy, Austria, Belgium, France, Norway, Spain);
- Australasia (Australia, New Zealand);
- Asia (Hong Kong, Japan); and
- Africa (JSE).

The purpose of this research instrument is to recognise the change in the dependent variable (the debt to equity ratio) relative to the independent variables, namely the tax rates and interest rates of the countries assessed over a period of time. So as to understand if the debt to equity ratio, and hence the debt levels of the exchanges considered, changed in relation to

variations in the tax and interest rates, other factors that could impact these changes are held constant for these regressions.

3.4 Procedure for data collection

3.4.1 *Market Index Data*

The data for the relevant stock exchange indices was derived from the indices analysed on the different markets through online tools. These are mentioned below.

- Yahoo! Finance (2010); and
- CNN Money (2010).

After gathering this data, the different portals used by corporate finance companies for financial data were used. These included Bloomberg, I-Net Bridge and McGregor BFA. The Bloomberg channel has been used to collect this data.

3.4.2 *Tax Rate Data*

The corporate tax rates for the countries selected were derived from the following web sites:

- OECD (2010);
- Price Waterhouse Coopers (2010)(PWC);
- Hong Kong Government (2010);
- Government of Singapore (2010);
- Government of Malaysia (2010); and

- South African Revenue Service (2010).

3.4.3 Interest Rate Data

The interest rates used were derived from the webpages of the central banking institution of the countries assessed, as well as from the World Bank website. The URL addresses of these websites are listed in the reference section.

3.5 Validity and Reliability

Cleary, Linn and Walster (1970), as well as Heise and Bohrnstedt (1970), research the statistical underpinnings of validity and reliability and emphasise the importance of these in academic research.

3.5.1 Internal Validity

Internal validity concerns itself with the methodology of a research paper (Cleary, Linn et al. 1970; Heise and Bohrnstedt 1970). A poor methodology might lead to bias in the data collection and results discussion.

This study collected data from regions and countries considered in previous research. The data collected was from objective sources producing data for a variety of purposes. The methodology used was carefully considered to ensure objectivity in this regard.

3.5.2 External Validity

External validity is a measure of the applicability of the findings of research to other environments or timeframes.

The data collected is derived from countries with a variety of political and economic policies as well as differing financial performance.

These results were considered both in terms of regional proximity as well as tax behaviour for the countries considered. In this way, the findings of the paper can be extrapolated to other environments not considered.

The applicability of the data was considered with regard to timeframes, but the major obstacle here is the availability of data to consider the different variables.

3.5.3 *Reliability*

Reliability concerns itself with the accuracy of the findings found in the research process (Cleary, Linn et al. 1970; Heise and Bohrnstedt 1970).

This has been dealt with by using significance levels of 5% and ensuring that these have been quoted when either accepting or rejecting the null hypothesis or the alternate hypothesis.

Due to the objective nature of the data collected, the statistical tests used provide a sound basis for the reliability of the results.

4 DATA ANALYSIS AND INTERPRETATION

A database was collated. This allowed for focused assessment of the data in looking for trends and overall appropriateness.

The research instrument used was a multiple regression analysis of the hypotheses referred to. The different tax rates, interest rates and index ratios were regressed to assess their relationship. The overall data set will be regressed as well as the regional sets. Finally, an array of tax rate behaviour data sets was analysed.

4.1 Data Analysis

The data collected was analysed using the NCSS software tool to understand the distribution of the data set as well as to conduct the multiple regression analyses. The multiple regression analyses were conducted to assess the relationship between the variables being assessed. Namely the stock exchange index ratios (debt to equity ratios) or dependent variables and the independent variables, namely the tax and interest rates.

One noticeable characteristic of the data analysed was the low degree of variability of the tax rate, demonstrating how minimally this changes over time in the countries assessed. This led to a shift in methodology. Regardless, the inclusion of this variable was considered material in the literature review conducted. Due to its static nature, the variability of the stock exchange index ratios could not be truly explained by the tax rate change in a number of data sets, and this is observed for all the regions assessed. However, significant results were found in the data sets based on tax rate behaviour.

4.2 Study Significance

The significance of the relationships, once correlation had been assessed, was reported on by calculating the probability of Type 1 and Type 2 statistical errors.

Type 1 error significance was tackled by considering the p-value found in the statistical tests. This study will use a p-value of 0.05 or less as demonstrating strong significance.

The assessment of the significance of results was also required to address Type 2 errors. The statistical measure used for this type of error is the Power of the Test.

These statistical measures will now be reported by each region assessed.

4.3 Results

The results of the different analyses are summarised in the table below.

Table 2: List of Overall Findings

	Regression	Data Count	R Squared	Sq root of Mean Squared Error	Regression Coeff for Tax Rate	Reject Ho at 5%	Power of Test	Regression Coeff for Interest Rate	Reject Ho at 5%	Power of Test
Overall Data Set	Log	157	0.0426	0.294201	-0.0021	No	0.0856	-0.0344	Yes	0.7329
Africa	Log	9	0.1265	0.0241	-0.0065	No	0.076	0.0083	No	0.1239
America	Index	19	0.3172	11.88474	-0.618	No	0.2937	9.997	Yes	0.627
Australasia	Log	13	0.555	0.1126	0.0115	No	0.0685	-0.0793	Yes	0.7909
Asia	Log	18	0.2012	0.0912	-0.004	No	0.0932	0.0054	No	0.073
Europe	Index	88	0.0113	143.1292	-2.1992	No	0.1634	0.8436	No	0.0501

	Regression	Data Count	R Squared	Sq root of Mean Squared Error	Regression Coeff for Tax Rate	Reject Ho at 5%	Power of Test	Regression Coeff for Interest Rate	Reject Ho at 5%	Power of Test
European Outliers	Log	6	0.588	0.2674	0.0794	No	0.1426	-0.7723	No	0.2803
Low Average Tax Rate	Log	85	0.1671	0.2847	0.0385	yes	0.9365	-0.0237	No	0.3271
High Average Tax Rate	Log	72	0.052	0.2674	0.0023	No	0.0717	-0.0394	No	0.4332
High Variation in Tax Rate	Log	79	0.4127	0.221	0.0304	Yes	0.9999	-0.2209	Yes	1
Low Variation in Tax Rate	Log	78	0.1558	0.2661	-0.0151	Yes	0.9314	-0.0261	Yes	0.5095

In order to regress the variables within the different data sets, the distribution of the index ratios was assessed, these being the dependent variable in the analyses. In the majority of cases, the distribution of the normal values was either positively skewed or did not show the characteristics of a standard distribution considered necessary for inclusion. In all cases, the logarithm of the index ratios was calculated and the distribution assessed. Where this showed more regularity than the normal values, the logarithm was used in the regression analysis.

Where the two distributions had similar characteristics, the logarithm was used in an effort to maintain consistency.

The first component of the analysis of the results concerns the relationship between the debt to equity ratios of the stock exchanges assessed and the tax and interest rates of the countries where these exchanges are found, as represented by the R-Squared (R^2) value.

4.3.1 Overall and Europe

One outcome was the profound relationship that became defined as the geographical regions were narrowed down. The overall data set and the European data set, being the largest and second largest respectively, show little explanations of variation of the variables with high error values. It was assumed that the different cultures and factors at play in each nationality represented in these regions contribute to the large error values and low correlations found.

Table 3: Results for the Overall and European Data Sets

	Overall	Europe
R Squared	0.0426	0.0113
Sq root of Mean Squared Error	0.294201	143.1292
Regression Coeff for Tax Rate	-0.0021	-2.1992
Reject Ho at 5%	No	No
Power of Test	0.0856	0.1634
Regression Coeff for Interest Rate	-0.0344	0.8436
Reject Ho at 5%	Yes	No
Power of Test	0.7329	0.0501

This high error value (E) for the European data set ($E = 143.13$) might contribute to the insignificant results found from the regression, rejecting the alternate hypothesis for both hypothesis one and two. The literature review, as well as the academic theory presented, has a strong foundation. The lack of supporting results from the regression analysis, shown by the R-Squared for both the overall data set ($R^2 = 0.043$) as well as the European data set ($R^2 = 0.011$) which shows a very weak fit of the regression and therefore a

weak relationship between the index ratios and variables, questions the modern day validity of this academic base.

As the regions were broken down, stronger correlations were presented with lower error values. It was presumed that the various factors proposed by Graham (2000) influenced the different error values observed.

Some of these factors, excluding the tax rate and interest rate, are considered to contribute to the large error values. Company size, liquidity target and management styles are some of the factors discussed by Graham (2000) that impact on the financing decisions of companies. The range of countries and exchanges, and by extension, the range of companies assessed in these two data sets is vast.

Although difficult to assess, further areas of study should include the affinity of managers to use debt as opposed to equity as a source of finance as well as the different targets regarding liquidity in businesses. Indeed, return on equity targets might rank behind profitability and market share targets in different stages of company growth.

Some further contribution to these large error values might relate to the differing targets of companies at various stages of growth, despite being listed on the same exchange in the same country.

4.3.2 Africa

Table 4: Results for the African Data Set

	Africa
R Squared	0.1265
Sq root of Mean Squared Error	0.0241
Regression Coeff for Tax Rate	-0.0065
Reject Ho at 5%	No
Power of Test	0.076
Regression Coeff for Interest Rate	0.0083
Reject Ho at 5%	No
Power of Test	0.1239

Although the African subset held little data for assessment, the results do show a low explanation in variation of the index ratios ($R^2 = 0.13$) and insignificant results for each coefficient (-0.01 for the tax rate and 0.01 for the interest rate). The study attempted to find the underlying relationship between tax rate, interest rate and debt policy but the findings of the African region do not uncover one.

The period assessed coincides with a variety of legal and financial instruments promoting the use of black economic empowerment (BEE) structures. The deals structured within the framework of these instruments were intended to stimulate wealth creation in previously disadvantaged population groups. In order to promote these deals, a range of tax benefits were designed which did not reflect in the statutory tax rate of the country at that time.

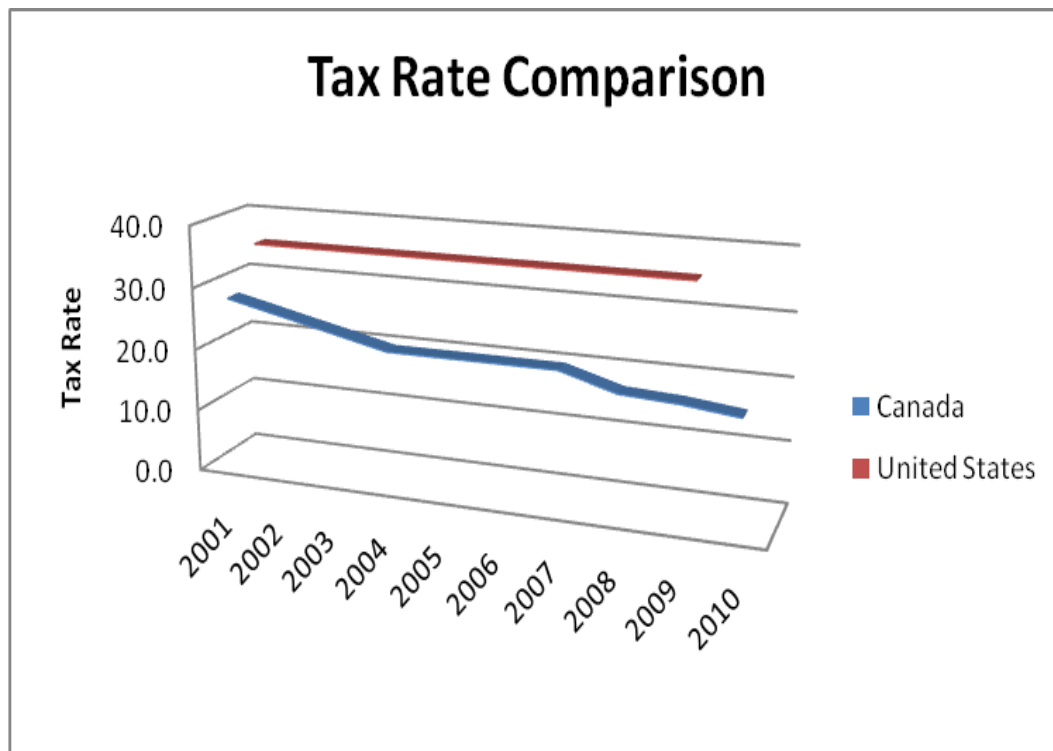
Other benefits, such as procurement from BEE accredited businesses, have been attractive enough to companies to forego possible short term detriments to cash flow and liquidity. This could explain the poor relationship with the interest rate revealed in this analysis, as companies sought benefits outside the financial realm.

4.3.3 *Americas*

This region showed a higher degree of explanation of the variability of the index ratios ($R^2 = 0.32$) but found a very high error value ($E = 11.88$) in the analysis. This was not in line with expectations based on the results of the literature review, as well as the findings of other more concentrated geographic regions.

In order to understand this finding, the behaviour of the tax rates of the constituent countries of this data set (United States and Canada) was assessed and the two countries' tax rates are seen in the graphs below.

Graph 1: Tax Rate Comparison between United States and Canada



This found the US tax rate to show a very low variation during the period assessed, with an average tax rate of 35% and a standard deviation of zero, shown in the horizontal line in the graph above. This consistent tax rate prevented the research from gaining an understanding around the impact that changes in tax rates have on the financing decision of companies. Conversely, the Canadian tax rate showed one of the highest degrees of variability with a Standard Deviation of 3.15. The large error value might be a reflection of this discrepancy in tax rate behaviour between the two countries. They were both considered differently when grouped with other countries of similar tax rate behaviour.

When assessing the relationship that each variable has on the regression equation, it was noted that the tax rate held an insignificant relationship whereas the interest rate proved to be significant. This rejected the null hypothesis of hypothesis two of the study, and implied that interest rates do

have an influence on the debt levels of companies. However, this needs to be seen in the context of the low correlation and high error value.

Table 5: Results for the American Data Set

	America
Regression	Index
Data Count	19
R Squared	0.3172
Sq root of Mean Squared Error	11.88474
Regression Coeff for Tax Rate	-0.618
Reject Ho at 5%	No
Power of Test	0.2937
Regression Coeff for Interest Rate	9.997
Reject Ho at 5%	Yes
Power of Test	0.627

Of interest is that the timing of this study coincided with the subprime mortgage crisis in the US. In this crisis, irresponsible lending by financial institutions and the subsequent on-selling of this debt, as well as the irresponsible borrowing patterns of the US population, caused the collapse of the financial system in the US.

Both countries showed a similar average interest rate for the period assessed, with the US at 4.08% and Canada at 4.28%. This low interest rate environment, as well as the affinity for debt by US businesses during this time, lead to a significant finding in the regression analysis, showing higher levels of debt levels with higher interest rates. This is counterintuitive and contradicts the literature review as well as the common understanding of

business, where lower levels of debt with higher interest rates would be expected. However, it also emphasises the irresponsible financial behaviour during this period. It is assumed that this contributes further to the large error value observed.

4.3.4 Australasia

The Australian and New Zealand data showed that 5.6% of the variation of the index ratios was explained by the change in the tax and interest rates. There was also a lower error value ($E = 0.113$) than seen in the previous data sets. This is of interest when compared to the Americas region of developed economies. The Australasian region's economies are also considered to be developed and the low standard error ($E = 0.113$) implied the lack of certain factors reflected in the analysis of the Americas region such as the abnormal behaviour regarding interest rates.

Table 6: Results for the Australasian Data Set

	Australasia
Regression	Log
Data Count	13
R Squared	0.555
Sq root of Mean Squared Error	0.1126
Regression Coeff for Tax Rate	0.0115
Reject Ho at 5%	No
Power of Test	0.0685
Regression Coeff for Interest Rate	-0.0793
Reject Ho at 5%	Yes
Power of Test	0.7909

The hypothesis test of hypothesis one showed no significance in the relationship, accepting the null hypothesis that a change in tax rate does not influence the financing decisions of managers. This refuted the findings in the literature review on this topic, namely that despite the benefits of debt as a source of finance, this is not being exploited by managers.

The findings regarding the second hypothesis, concerning the effect of the interest rate, were significant in rejecting the null hypothesis. The high Power of Test in this regard confirms the theory discussed that changes in interest rates affect the debt levels of companies.

This proved relevant as in the majority of data sets analysed, the relationship with the interest rate was found to be significant, whereas that with the tax rate showed significance only in a small number of data sets, and in none of the regional sets. Although in the other regional assessments, effort to understand this discordance with the literature reviewed was made, in this data set little insight could be gained from the additional research done. The consistent nature of the tax rate remained the primary explanation for this.

4.3.5 Asia

Eastern business practices have anecdotally differed from Western business practices and possibly from the research found in the literature review, which was predominantly based on Western examples.

Table 7: Results for the Asian Data Set

	Asia
Regression	Log
Data Count	18
R Squared	0.2012
Sq root of Mean Squared Error	0.0912
Regression Coeff for Tax Rate	-0.004
Reject Ho at 5%	No
Power of Test	0.0932
Regression Coeff for Interest Rate	0.0054
Reject Ho at 5%	No
Power of Test	0.073

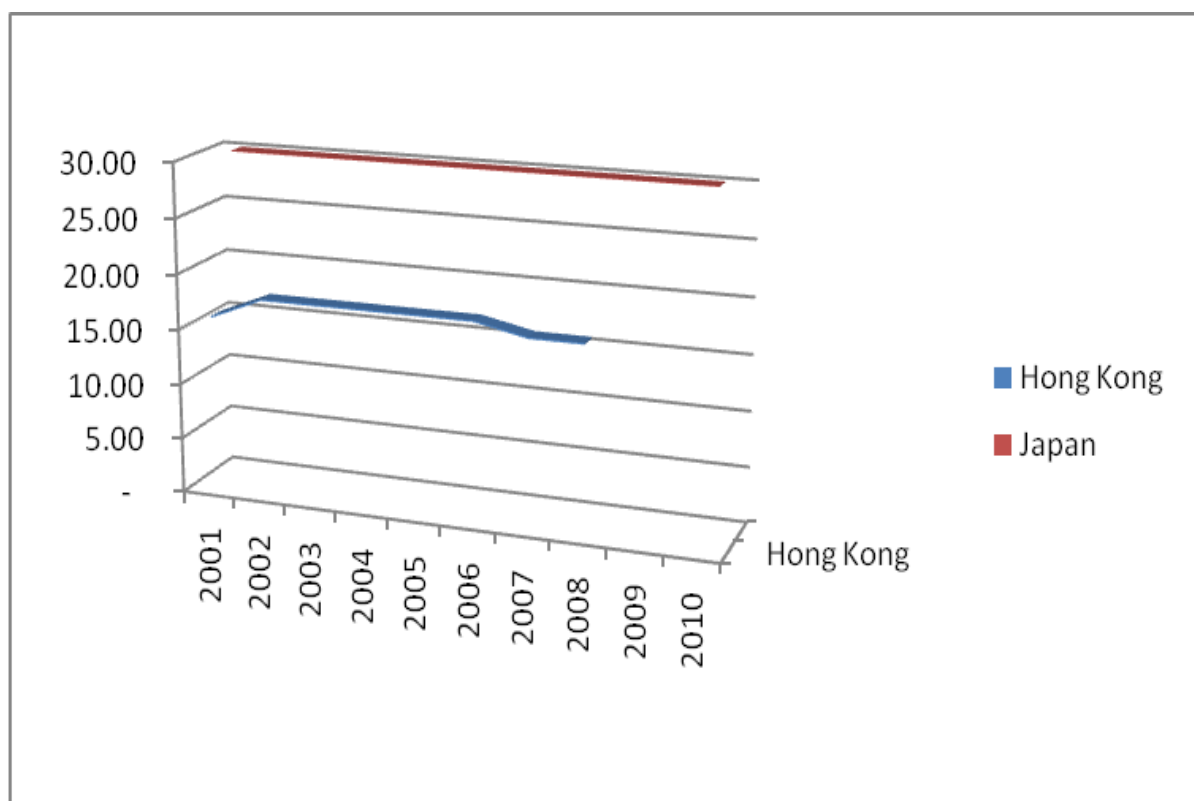
The coefficient of determination of the fit of the regression found in the analysis was very low ($R^2 = 0.201$). Further, the relationship between the dependent variable and both independent variables were not found to be significant. Both variables had weak correlation coefficients and no significance. As a result, both null hypotheses were accepted.

This was surprising as there is a low mean squared error value ($E = 0.09$) when compared to other regions. The other factors at play in this region are not obvious. It is considered that the cultural influences of this region have a

larger influence than in the other regions assessed, but this is reflected elsewhere than in the error value, presumably in the different management styles.

The tax rate behaviours of the two countries are very different and emphasise the need for consideration outside of the regional boundary. Japan has very high tax rates of 30% throughout with no change in this value for the period assessed. Conversely, Hong Kong has an average tax rate of 17.5%, with a standard deviation of 0.8 for the period assessed.

Graph 2: Tax Rate Comparison between Hong Kong and Japan



Japan and Hong Kong also have low interest rates which could impact on the analysis being conducted. Although not core to this paper, the behaviour of interest rates, and the categorisation and subsequent analysis of companies' tendencies to use debt as a preferred source of finance, will be suggested as an area of further study.

4.3.6 European Outliers

There are a number of outliers belonging to the European region. These were from two countries (The Netherlands and Belgium) for the years 2004 through to 2006. Considering that these countries are close geographically and the years of the outliers correspond, it seemed prudent to regress this small data set of 6 data lines in an attempt to understand the reasons behind the abnormal values.

The high correlation ($R^2 = 0.6$) and low error value ($E = 0.27$) implied some basis for the outliers and the similarity of dates and region. However, further research into this found no substantial explanation.

Table 8: Results for the European Outlier Data Set

	European Outliers
Regression	Log
Data Count	6
R Squared	0.588
Sq root of Mean Squared Error	0.2674
Regression Coeff for Tax Rate	0.0794
Reject Ho at 5%	No
Power of Test	0.1426
Regression Coeff for Interest Rate	-0.7723
Reject Ho at 5%	No
Power of Test	0.2803

The low amount of data in the subset could have been the reason no significant relationship was uncovered. It would be of value to research

further the events that lead to the outlying values found in the debt to equity ratios recorded.

4.3.7 Tax Rate Environment Comparison

The effect of the tax rate on debt policy is central to this study. In the analyses conducted above the tax rates have not been split into different categories. The low variability of the tax rate in the majority of populations assessed prevented the finding of statistically significant results to confirm the literature review conducted.

The reason for assessing the different tax rate brackets in this analysis is to understand the possible effect that higher and lower tax rates can have on financing decisions due to the larger benefits offered by the tax rate.

This is an important consideration in this study as it is possible that different tax rate brackets could impact on financing decisions, considering the relative stagnant nature of tax rates observed in the data. To establish whether a change in the tax rate forces managers to make different financing decisions so as to optimally exploit the tax shield, countries have been split according to the variation in the tax rate.

The categories assessed in this component of the analysis were:

- a. High average tax rate countries;
- b. Low average tax rate countries;
- c. Countries with high variation in the tax rate; and
- d. Countries with low variation in the tax rate.

a. ***Countries with a Low Average Tax Rate***

The countries considered as having a low tax rate were those with an average tax rate of less than 29% for the period assessed. These countries are listed below and provided the population with 72 lines of data for the regression analysis:

- Austria;
- Ireland;
- Hong Kong;
- Canada;
- Germany;
- Denmark;
- Norway; and
- The Netherlands.

This subset of data was not expected to contribute towards confirming the findings of the literature review, due to the low tax rates and relative paucity of tax shield benefits derived when compared to the potential benefits with higher tax rates.

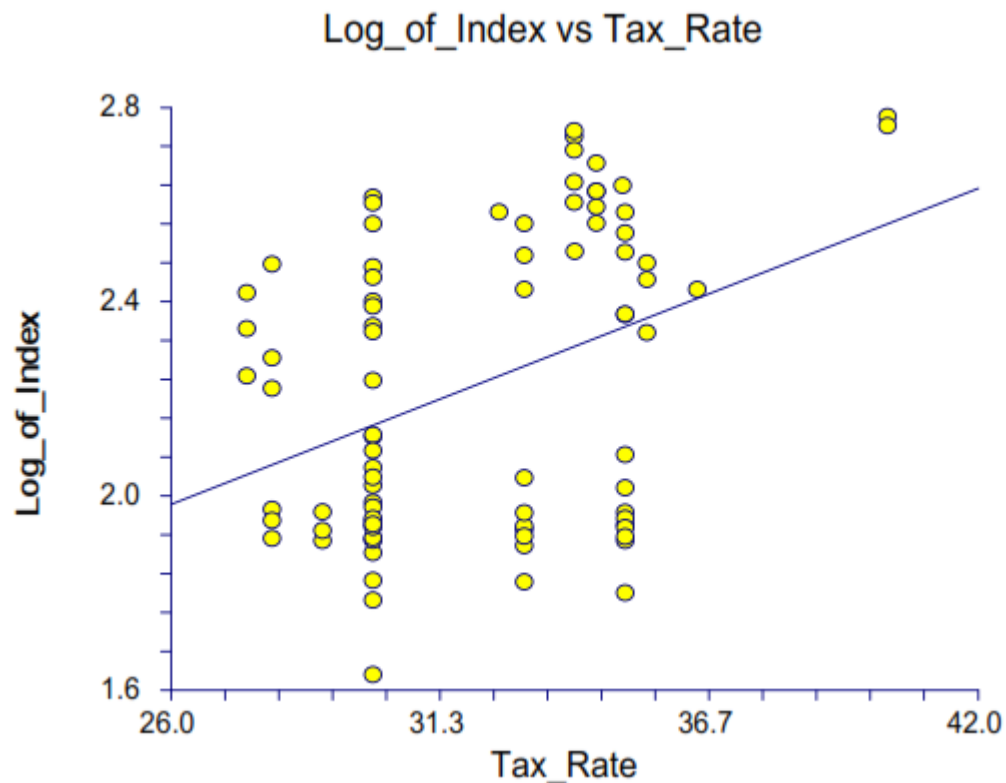
Table 9: Results for Countries with a Low Average Tax Rate

	Low Average Tax Rate
Regression	Log
Data Count	85
R Squared	0.1671
Sq root of Mean Squared Error	0.2847
Regression Coeff for Tax Rate	0.0385
Reject Ho at 5%	yes
Power of Test	0.9365
Regression Coeff for Interest Rate	-0.0237
Reject Ho at 5%	No
Power of Test	0.3271

Although the fit of the regression was relatively low ($R^2 = 0.17$), the regression had a very low error value ($E = 0.28$).

When assessing the relationship that the tax rate held with the debt to equity ratio in this subset, the relationship was found to be significant at 5%. This rejects the null hypothesis and finds in favour of the alternate. This shows that changes in the tax rate have an impact on the debt levels of companies and that due to this tax rate change, managers look to exploit the benefits of the tax shield and utilise tax as a preferential source of finance.

Graph 3: Regression of Debt to Equity Ratio to Tax Rate in Countries with a Low Average Tax Rate



The graph above demonstrates the increased use of debt in the countries assessed with increasing tax rates.

This was not observed in the results of the relationship held with the interest rate, which was proved to be insignificant.

These results correspond to the literature review conducted and find that although the benefits of the tax shield in this type of environment might be low, there is a correlation between the tax rate and debt levels of companies.

b. ***Countries with a High Average Tax Rate***

The regression of the data set for those countries with a high average tax rate (being above 29% is discussed below. The countries included in this analysis are:

- South Africa;
- Australia;
- Belgium;
- France;
- Italy;
- Japan;
- New Zealand;
- Spain;
- United Kingdom; and
- United States.

It was expected that this data set would contribute further to the confirmation of theory of the tax shield expounded upon in the literature review, considering that the higher the tax rate, the larger the potential tax savings available with the tax shield.

Table 10: Results for Countries with a High Average Tax Rate

	High Average Tax Rate
Regression	Log
Data Count	72
R Squared	0.052
Sq root of Mean Squared Error	0.2674
Regression Coeff for Tax Rate	0.0023
Reject Ho at 5%	No
Power of Test	0.0717
Regression Coeff for Interest Rate	-0.0394
Reject Ho at 5%	No
Power of Test	0.4332

The findings did not support the expectations, yet did support the literature review. Although underpinned by a low coefficient of determination ($R^2 = 0.052$), there was a small error value for this data set of 0.27.

The relationship with the tax rate proved insignificant and in support of the null hypothesis. This finding is the opposite in environments with low tax rates. When grouped together, these two data sets revealed no noteworthy relationship between the tax rate and debt to equity ratio, nor with the interest rate and debt to equity ratio. It was discussed that this could be due to the number of different factors at play contributing to the large error values observed in the overall and European data sets.

However, when split into the different tax bracket groupings, despite having an array of countries present in these groups, the error readings were low (E

= 0.27). This implied that some of the similarities between the countries in these two subsets regarding the factors discussed by Graham (2000) were thought to contribute to the errors observed.

c. ***Countries with a High Variation in the Tax Rate***

As discussed in the literature review, the change in the tax rate should alert managers to rethink the capital structures of their businesses, so as to utilise the benefits offered by the tax shield.

The countries found to have a high standard deviation in their tax rates for the period assessed, being 1.5 and over were:

- Austria;
- Belgium;
- Canada;
- Denmark;
- Germany;
- Italy;
- The Netherlands;
- New Zealand; and
- Spain.

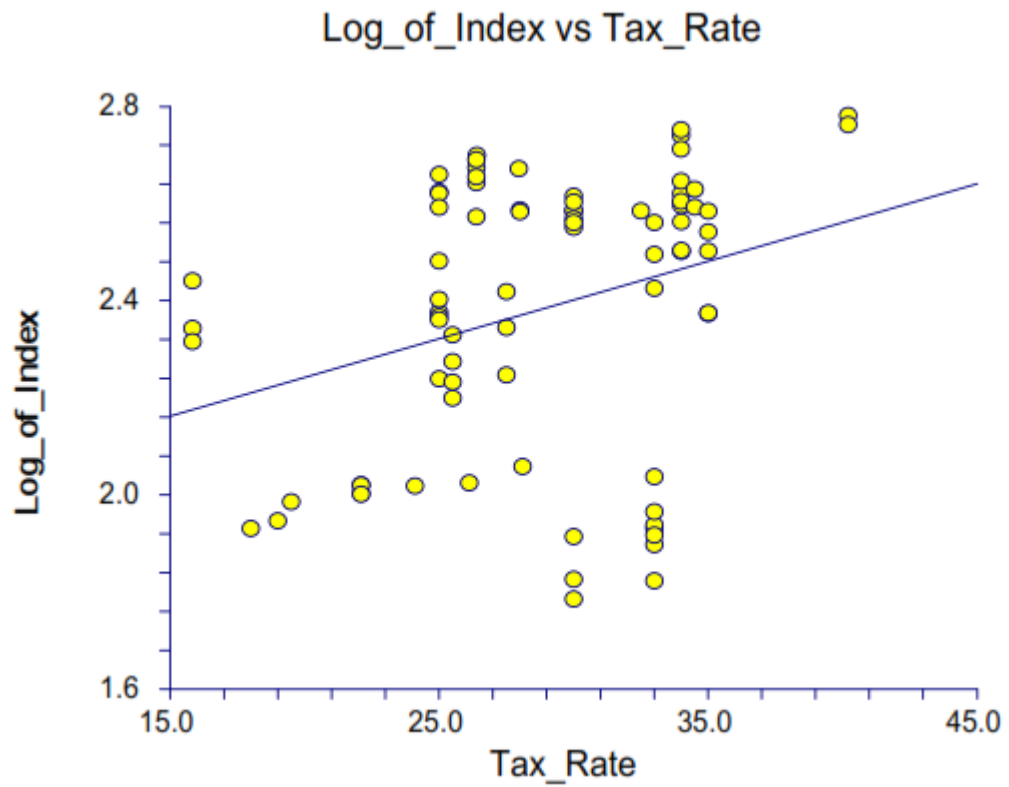
Core to the interpretation of the results of this paper was the acknowledgement of the impact that the change in the tax rate has on the debt to equity ratios of the exchanges assessed.

Table 11: Results for Countries with a High Variation in Tax Rate

	High Variation in Tax Rate
Regression	Log
Data Count	79
R Squared	0.4127
Sq root of Mean Squared Error	0.221
Regression Coeff for Tax Rate	0.0304
Reject Ho at 5%	Yes
Power of Test	0.9999
Regression Coeff for Interest Rate	-0.2209
Reject Ho at 5%	Yes
Power of Test	1

The coefficient of determination, explaining the percentage of variability of the independent variables by the dependent variable, found in the regression of this data set was high ($R^2 = 0.41$) relative to the other data sets observed. A low error value was also reported being 0.22. The relationship with the tax rate also proved significant, with a high power of test of 0.999. This is a material finding in this research as it rejects the null hypothesis in an environment that analyses the key issue being assessed – that of the influence a change in tax rate has on the financing decisions of businesses.

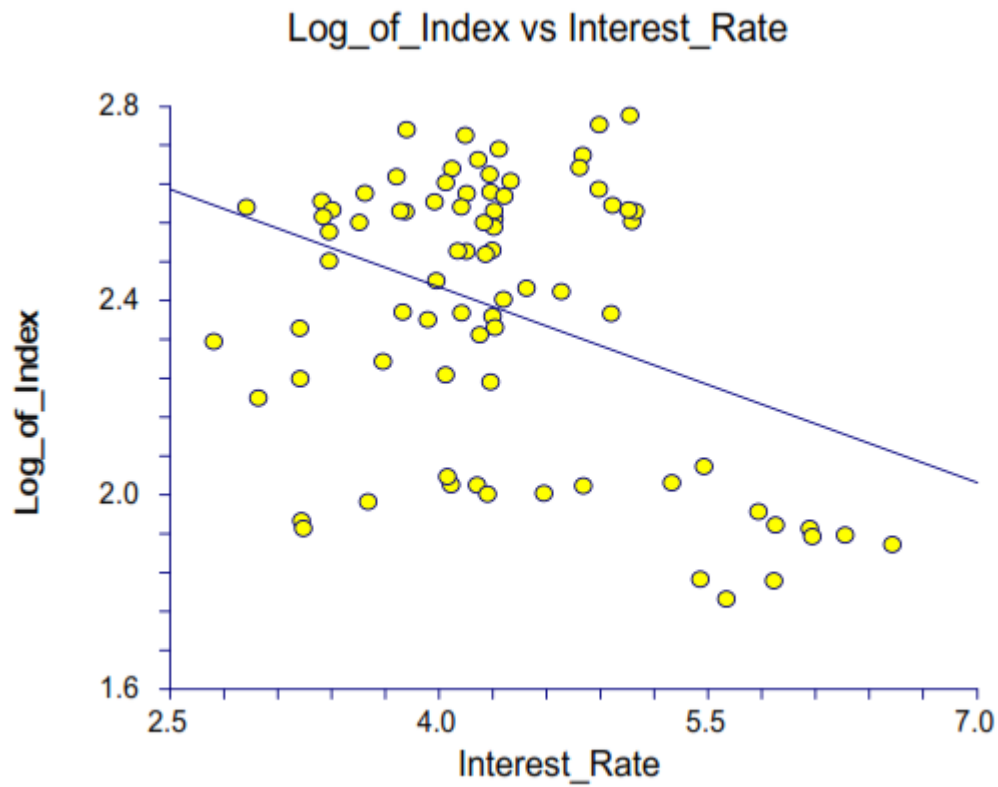
Graph 4: Regression of Debt to Equity Ratio and Tax Rate in Countries with a High Variation in Tax Rate



The graph above describes the significance of the relationship between the debt to equity ratio and the corresponding tax rate.

The relationship with the interest rate in this environment was also regarded as significant with no possibility of Type Two errors being present. This is seen in the graph below which shows lower levels of debt (reflected in the debt to equity ratio) with higher interest rates.

Graph 5: Regression of Debt to Equity Ratio and Interest Rate in Countries with a High Variation in Tax Rate



The literature review assessed the influence that both the tax rate and the interest rate had on debt levels in companies. It also suggested that, if these rates change, management should reconsider the benefits and detriments that this could have on the financial structure of their businesses, and possibly manipulate these structures in response. The findings of the regression in this subset confirm these discussions.

d. ***Countries with a Low Variation in the Tax Rate***

These countries had a standard deviation in their tax rate of less than 1.5 and included:

- Australia;
- Japan;
- United States;
- France;
- Hong Kong;
- United Kingdom;
- South Africa;
- Ireland; and
- Norway.

The expectations of this data set was to uncover results that refuted the literature review regarding the levels of debt of countries and the corresponding tax rate differences between those countries. This was observed when the countries assessed were split according to geographic location. In these analyses, the relative consistency of the tax rate lead to the acceptance of the null hypothesis in many instances, as the low tax rate variability did not reveal any change in behaviour related to a tax rate change.

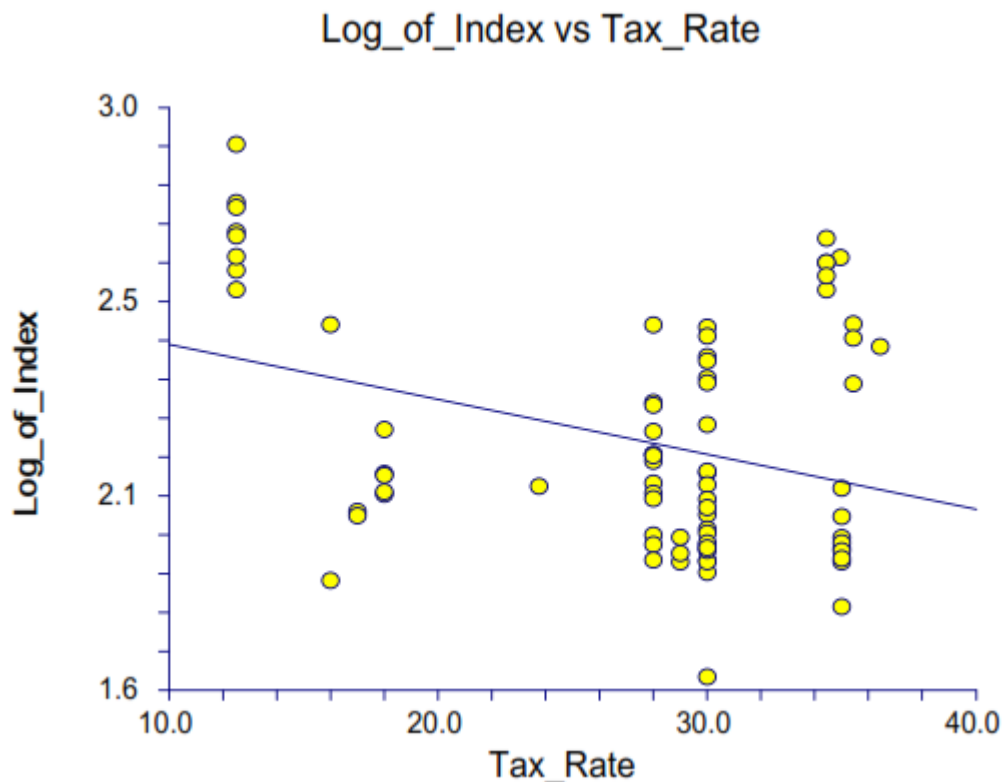
Table 12: Results for Countries with a Low Variation in Tax Rate

	Low Variation in Tax Rate
Regression	Log
Data Count	78
R Squared	0.1558
Sq root of Mean Squared Error	0.2661
Regression Coeff for Tax Rate	-0.0151
Reject Ho at 5%	Yes
Power of Test	0.9314
Regression Coeff for Interest Rate	-0.0261
Reject Ho at 5%	Yes
Power of Test	0.5095

However, the results did not correspond to these expectations. Although underpinned by a low coefficient of determination ($R^2 = 0.2$), the relationship between the tax rate and debt to equity ratios of the countries assessed was found to be significant. This rejected the null hypothesis in favour of the alternate, which confirmed the literature review theories that changes in tax rates lead to managers changing their debt levels. The very high Power of Test for this variable, and the low error value ($E = 0.3$) of the regression analysis in this population, reinforced this. However, the finding was underpinned by a negative coefficient ($R^2 = -0.015$) indicating lower levels of debt with higher tax rates. This implied a lack of effort by managers in these countries to exploit the benefits offered by the tax shield. An alternative reason for this was the geographical location of the operations of companies. Companies situate their operational structures in countries where tax benefits can be found and show higher profits in these countries than those

countries with burdensome tax regimes. This factor could have distorted the data set.

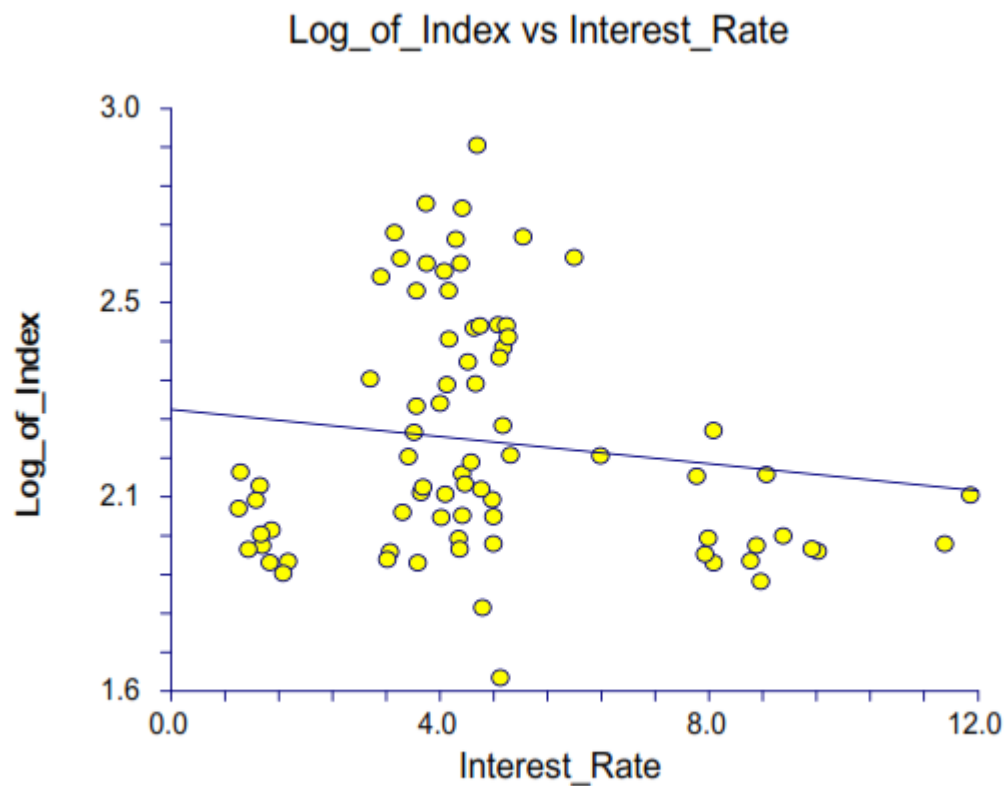
Graph 6: Regression of Debt to Equity Ratio and Tax Rate in Countries with a Low Variation in Tax Rate



The graph above demonstrates the significance of the relationship observed between the debt to equity ratio and the corresponding tax rate. This relationship was the inverse of the expected trend and showed lower levels of debt, reflected in the debt to equity ratio, with higher tax rates. Although significant, this finding was not in line with the hypothesised relationship.

The relationship between the interest rate and debt to equity ratios also proved to be significant and was supported by a high Power of Test.

Graph 7: Regression of Debt to Equity Ratio and Interest Rate in Countries with a Low Variation in Tax Rate



These findings add further to the currently available pool of knowledge. The categorisation of countries according to tax rate behaviour removed some of the contributory factors leading to the high error values observed, as well as the insignificant relationships found when assessing countries according to geographical location.

4.4 Summary

Table 13: Summary of Hypothesis Test Results

	R2	Error Value	Reject Null Hypothesis One at 5%	Reject Null Hypothesis Two at 5%
Overall Data Set	0.0426	0.294201	No	Yes
Africa	0.1265	0.0241	No	No
America	0.3172	11.88474	No	Yes
Australasia	0.555	0.1126	No	Yes
Asia	0.2012	0.0912	No	No
Europe	0.0113	143.1292	No	No
European Outliers	0.588	0.2674	No	No
Low Average Tax Rate	0.1671	0.2847	Yes	No
High Average Tax Rate	0.052	0.2674	No	No
High Variation in Tax Rate	0.4127	0.221	Yes	Yes
Low Variation in Tax Rate	0.1558	0.2661	Yes	Yes

The table above summarises the discussion of the results of the different regression analyses undertaken. In these regression analyses, the results did not always reflect the academic basis found in the literature review.

With regards to hypothesis one, which suggested that changes in the tax rates of countries influence the debt levels of companies, this was found to be the case in only three instances. Apart from the regional data sets, other data sets analysed rejected the null hypothesis. Only countries aggregated based on tax rate behaviour had this finding. These groups were made up of countries with a low average tax rate and of countries with high and low variations in their tax rates.

The results drawn from other data sets also rejected the null hypothesis of hypothesis two. This hypothesis suggested that a change in the interest rate of the countries assessed would influence the debt levels in companies. But

the low variability of the tax rate of many countries assessed prevented a review of a true relationship, despite the literature review showing that interest rates do affect financing decisions. There were a number of data sets that accepted the alternate hypothesis and these are shown in the table above.

5 DISCUSSION OF RESULTS

The findings of the literature review provided the basis for the hypotheses. The CAPM model and the benefits that can be derived from the tax shield imply greater benefits for the use of debt as source of finance. When one considers these, as well as the benefits of higher return on equity with higher debt levels, a preference for this type of finance by managers might be predicted.

However, debt financing is not without risk and the risk of bankruptcy and the burden associated with repayment of loans can be a deterrent.

A number of factors contribute to the choice of a company's management to select debt over equity. The intention of this paper was to understand whether changes in the corporate tax rate would impact on this decision. This in turn could not be gauged without considering the interest rate change in the countries assessed, due to the effect of this factor in relation to common understanding as well as according to the literature review conducted.

The countries selected for research were in line with previous studies on this topic. To begin with, these countries were categorised according to geographical regions as suggested in the literature. Later categorisation of these countries was based on the different behaviours of their tax rates.

On initial inspection of the data, the relatively stagnant nature of tax rates was of concern, as to find the different changes in tax rates and their

corresponding effects on management decisions would be difficult. However, in certain regions this did not prove to be of concern.

The regions with a wide range of countries, specifically the European data set, produced high error values in their regressions (European E = 143). It is proposed that these high error values reflected the range of different fiscal, monetary, political and legal policies of the countries assessed. These differences could influence greatly the decisions of managers and eclipse the impact that tax as well as interest rates could have on management decisions.

Table 14: Error Values

	Sq root of Mean Squared Error
Overall Data Set	0.294201
Africa	0.0241
America	11.88474
Australasia	0.1126
Asia	0.0912
Europe	143.1292
European Outliers	0.2674
Low Average Tax Rate	0.2847
High Average Tax Rate	0.2674
High Variation in Tax Rate	0.221
Low Variation in Tax Rate	0.2661

The more concentrated regions found lower error values due to the relative paucity of confounding factors seen in the larger data sets. However, the lack of significant relationships did lead to further consideration.

Empowerment structures put in place in the South African context during the time of analysis might have distorted the common thinking and practice related to debt financing, as the added benefits of tax deductions became commonplace.

The behaviour related to debt in the US economy prior to the subprime mortgage crisis seemed to also distort the expected results. The different tax

rate behaviours of the two countries in this dataset (US and Canada) also demonstrated the need for a different categorisation of countries.

In the majority of regions assessed, no significant finding related to the tax rate was found and in all instances, the null hypothesis could not be rejected implying that different tax rates do not lead to different levels of debt across countries.

The relationship between the interest rate and the debt to equity ratio of a number of these regions was found to have relevance. In these instances, the null hypothesis was rejected therefore indicating that the alternate hypothesis should apply, namely that an adjustment change in the interest rate leads to changes in the debt levels of companies who consequently would take on more debt.

This finding was expected as the majority of countries assessed showed a relatively high variation in their interest rate when compared to the tax rate. It was also thought that the benefit of lower interest rates might spur managers into increasing a company's debt levels. This business concept is easier to understand and calculate when weighing the variety of factors that managers need to take into account when making these decisions, and these would include the relative benefits of lower interest rates on repayments of loans.

When the countries analysed were split into groupings of different tax rate behaviours, the concepts discussed in the literature review were revealed with higher correlations and more significant relationships.

When grouped according to average tax rates, the concepts discussed above regarding the interest rates and their influence on debt policies became insignificant.

The relationship with the tax rates and debt to equity ratios of the different countries in the high average tax rate countries was also found to be insignificant. This contradicted the established literature based on a valuation

of the tax shield. Higher tax rates offer larger benefits from this phenomenon; however the countries in this subset showed no relationship correlating with this.

Conversely, in countries with low average tax rates, the relationship with the tax rates and debt to equity ratios was found to be significant. The error value found in these countries is low, implying that variables other than those being assessed had little influence on the financing decisions of companies. Why the relationship is stronger in countries with lower tax rates is unclear and could be related to factors other than the tax rate that have a common theme throughout.

The intention of this research was to consider whether the different tax rates of countries influence the debt levels of the companies within them. Although difficult to assess, due to the consistency of tax rates over time, a change in the tax rate could impact on decision making, because of the change in potential benefits offered by the tax shield.

In order to understand whether this change does affect these decisions, countries were split according to the variability of their tax rates. It was uncovered that countries with both low and high variability in tax rates have a significant relationship with the tax rate and debt levels of their companies.

This finding refuted the lack of evidence supported by the analyses conducted in the regional data sets. When the same countries were reassessed with a different categorisation, lower error values and higher levels of significance were found. This suggests that certain factors contributing to the high error values and low significance levels found in the regional analysis were not present in these analyses. It was thought that these factors relate primarily to the political, fiscal, monetary and legal policies of the countries assessed and implied a level of conformity in this regard between regions.

5.1 Areas of Further Study

The relatively stagnant nature of tax rates and the high error values observed in certain data sets revealed a number of other factors contributing to the change in debt levels of companies.

Although potentially lucrative, the tax shield might not be the ultimate factor in the financing decisions of managers and a more qualitative study assessing these factors would add value to the knowledge pool.

As the data sets were rearranged into sets determined by tax rate behaviour, more significant results were found; and the potential conformity between the countries assessed in these data sets with respect to fiscal and monetary policy should be reviewed to understand the potential economic impact on companies and debt levels in these countries.

5.2 Conclusion

This research demonstrates the potential for a current, practical application of the theories encompassing the tax shield and its benefits. It has been shown that, despite risks, debt is equally attractive a source of finance as equity, and the use of debt finance is not without sound academic basis.

These findings may be used by contemporary business managers as they consider the different factors which could influence decision making around the optimum financial structure of their companies.

This research also offers government officials of the countries assessed an insight into the impact that a tax rate change could have on both the financial structures and revenue of their registered companies.

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