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MODELLING THE CAPITAL STRUCTURE OF MANUFACTURING, MINING AND RETAIL FIRMS LISTED ON THE JOHANNESBURG STOCK EXCHANGE

by

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DEDICATION

This thesis is dedicated to my family and my dear friend, Hans Scholte. Thank you for all the support that you gave me throughout my studies.

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ABSTRACT

This thesis examines three aspects of capital structure of manufacturing, mining and retail firms listed on Johannesburg Securities Exchange (JSE). Firstly, it tests for the validity of the pecking order, the static trade-off and the dynamic trade-off theories in the context of South African manufacturing, mining and retail firms. The study used data from 42 manufacturing, 24 mining and 21 retail firms with complete data for four or more consecutive years during 2000-2010 (panel 1) to test the validity of these theories. The research hypotheses were formulated and tested using generalised least squares (GLS) random effects, maximum likelihood (ML) random effects, fixed effects, Prais-Winsten regression, Arellano and Bond, Blundell and Bond and the random effects Tobit models.

Secondly, the thesis examines the impact of the firm's key financial performance variables on firm leverage and speed of target adjustment. A panel of 49 manufacturing, 24 mining and 23 retail firms with complete data for two or more consecutive years during the period 2005-2010 (panel 2) was constructed and used in this test. The research hypotheses were formulated and tested using the same regression models used in panel 1.

Lastly, the thesis examines the existence of the discounted value premium in manufacturing, mining and retail firms listed on the JSE. This study was done using panel of 47 manufacturing, 31 mining and 20 retail firms with complete data for four or more consecutive years during the period 2006-2010. A simple t-test was used to evaluate the significance of the sample's discounted value premium.

The study documents that firm growth rate, non-debt tax shields, financial distress, profitability, capital expenditure, asset tangibility, price earnings, ordinary share prices and changes in working capital were significant predictors of firm leverage. Dividend paid, capital expenditure, firm growth rate, profitability, cash flow from operations and economic value added were positively correlated to leverage. Asset tangibility, firm profitability, non-debt tax shields, financial distress, liquidity, price earnings, share price and retention rate were negatively correlated to leverage.

Asset tangibility, financial distress, firm growth, non-debt tax shields, and long-term debt repaid were negatively correlated to changes in debt issued, whilst profitability, actual dividend paid, capital expenditure and changes in working capital were positively correlated. These results confirm the complementary nature of the trade-off and pecking order theories.

Furthermore, the firms had positive and significant speeds of adjustment. In panel 1, the true speed of adjustment for the sample was 57.64% (0.81 years) for book-to-debt ratio (BDR) and 42.44% (1.25 years) for market-to-debt (MDR). The speed for manufacturing firms was 45.08% (1.16 years) for BDR and 44.59% (1.17 years) for MDR; for mining firms, 72.07% (0.54 years) for BDR and 56.45% (0.83 years) for MDR; and for retail firms, 28.42% (2.07 years) for BDR and 42.48% (1.25 years) for MDR. In panel 2, the true speed of adjustment for the sample was 64.20% for book-to-debt ratio (BDR) and 28.11% for market-to-debt ratio (MDR). The true speed for manufacturing firms was 34.42% for BDR and 30.56% for MDR; for mining firms, 69.59% for BDR and 45.77% for MDR; and for retail firms, 9.34% for BDR. These results confirm the validity of the dynamic trade-off theory.

Finally, manufacturing, mining and retail firms had a positive discounted value premium. This ranged from 5.16% to 9.48% (on perpetual growth), with mining firms having the largest (9.48%), followed by manufacturing (8.54%) and retail firms (5.16%). Of the observations for the full sample, 92.23% showed a positive discounted value premium.

This evidence on the speed of adjustment and discounted value premium suggests the existence of a target capital structure different from the theoretical optimal capital structure hypothesised by the static trade-off theory.

***Keywords*:** Capital Structure, Pecking Order Theory, Trade-off Theory, Speed of Adjustment, Discounted Value Premium

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LIST OF ACRONYMS

A&B: Arellano and Bond

AltX: Alternative Stock Exchange

APV: Adjusted Present value

ASSET: Asset tangibility

B&B: Blundell and Bond

BDR: Book-to-debt ratio

BLUE: best linear unbiased estimator

CAPEX: Capital expenditure

CAPM: Capital Asset Pricing Model

CBOT: Chicago Board of Traders

CCNs: carbon credits notes

CEE: Central and Eastern European

CEOs: chief executive officers

CFO: cash flow from operations

CFOs: Chief Financial Officers

CLN’s: credit linked notes

CPI: Consumer Price Index

DD: debt deficiency

DCFs: Discounted Cash Flows

DEF: Internal funds deficiency

D/FV: debt-to-firm value ratio

DIV: Dividends paid

DPF: dynamic panel data with a fractional dependent variable

DTS: debt tax shield

DV: discounted value

DVP: discounted value premium

EBIDTA: earnings before interest, depreciation, tax and amortaisation

EFA: Exploratory factor analysis

EFTs: exchange treaded funds

EPS: Earnings per Share

ERP: equity risk premium

ETNs: exchange traded notes

EVA: Economic Value Added

FCF: free cash flow

FDIST: Financial distress costs

FE: Fixed Effects

FGLS: feasible generalised least squares

FMAB: Financial Markets Advisory Board

FSB: Financial Services Board

FTSE: Financial Times and the London Stock Exchange

FV: firm value

G7: group 7 countries (France, Germany, Italy, Japan, United Kingdom, United States and Canada).

GAAP: Generally-Accepted Accounting Practices

GBP: Great Britain Pound Sterling

GLS RE: Generalised least squares random effects

GMM: General Methods of Moments

IAS: International Accounting Standards

IAAS: International Auditing and Assurance Standards

IDX: international derivatives

IFE: International Fischer effect

IFRS: International Financial Reporting Standards

IPOs: initial public offerings

JIBAR: Johannesburg Inter Bank Rate

JSE: Johannesburg Stock Exchange

KFPI: key financial performance indicators

LIQ: liquidity

LSDV: the least squares with dummy variables

MDR: Market-to-debt ratio

ML: maximum likelihood

ML RE: Maximum Likelihood random effects

MPC: Monetary Policy Committee

MTB: Growth opportunities

MTR: Marginal Tax Rate

MV: market value

NA: net assets

NDTS: non-debt tax shield

NPV: net present value

NOPAT: net operating profit after tax

OLS: Ordinary Least Squares

P: share price

P/E: price earnings ratio

PPE: property, plant and equipment

PPP: Purchasing Power Parity

PROF: firm profitability

RE: Random Effects

REIT's: real estate investment trusts

REVA: Refined Economic Value Added

ROE: return on equity

RR: earnings retention rate

RSSS: restricted residual sums of squares

SARB: South African Reserve Bank

SARS: South African Revenue Services

SAS: Statistical Analysis Software

SAVI: white maize

SIZE: Firm size

S&P: Standard & Poors

SPSS: Statistical Package for the Social Sciences

SPVs: special purpose vehicles

TALX: Trading Access Link to Exchange

TB: Treasury Bill

TED: Treasury Bill of Eurodollar spread

TS: Time Series

USD: United States Dollar

VIF: variance inflation factors

VOL: Earnings volatility

WACC: Weighted average cost of capital

WFE: World Federation of Exchanges

ΔWC: changes in working capital

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The relevance of capital structure decisions on firm valuation has been debated since Modigliani and Miller (1958:296) initially argued that capital structure was irrelevant to firm valuation. In this seminal work, they argued that, in a perfect market with no taxes, a firm's capital structure is totally irrelevant to its valuation; what matters are the cash flows that the firm's assets generate. Modigliani and Miller (1963:442) later revised their paper to incorporate both market imperfections and taxes; and the result was that the corporate financing decisions were not as simple as they had earlier concluded. Their conclusion in this later theoretical argument was that, when market imperfections and taxes are incorporated, capital structure *does* matter in firm valuation; thus a firm will have an optimal capital structure when its market value is maximised. Modigliani and Miller (1963:442) concluded that this optimal capital structure represents the trade-off between taxes and market imperfections.

This seminal work of Modigliani and Miller (1958 & 1963), although it did not incorporate the other multiple determinants of capital structure as identified by modern theories, is hailed as the foundation of the modern corporate finance theory (Myers, 2008:218). Subsequent empirical research has proposed a number of theories that attempt to explain the financing behaviour of corporations. These include: the trade-off theory, originally introduced by Kraus and Litzenberger (1973); the pecking order theory, proposed by Myers (1984) and Myers and Majluf (1984); the agency cost theory, proposed by Jensen (1986) and Jensen and Meckling (1976); and the information asymmetry theories (the signalling and market timing theories) proposed by Baker and Wurgler (2002); Korajczyk, Lucas and McDonald (1992); and Lucas and McDonald (1990).

Evidence from these theories is non-discriminatory and tends to be complementary. The theories are not mutually exclusive and hence no single theory can fully explain the observed financing behaviour of firms (Barclay and Smith, 2005:8). Myers (1984:575) termed this intriguing debate on the behaviour of corporate financing policy as, *“the capital structure puzzle*”. This puzzle remains unsolved to the present day. Myers (2008:217) stated: “*The above theories are complementary; there is no single theory that can be applied to fully explain the financing behaviour of firms… there is no universal theory of capital structure, and there is no reason to expect one”.* Judging from the volume of research done in this area of corporate finance, the two leading conditional theories of capital structure are the trade-off and pecking order theories (Myers, 1984:589). Past empirical tests on these two theories have been mixed, with no clear discrimination. For example, the empirical work done by Frank and Goyal (2003a:241); Lemmon and Zender (2010:1161); Myers (1984:590); and Shyam-Sunder and Myers (1999:242) confirms the pecking order hypothesis as a good descriptor of corporate financing behaviour, but empirical tests done by Auerbach (1985:318); Fama and French (2005:579); Jalilvand and Harris (1984:142); Leary and Roberts (2010b:351); Marsh (1982:142); Opler, Saron and Titman (1997:32); and Taggart (1977:1483) conclude that firms follow the trade-off model of corporate financing. More recent studies by Mukherjee and Mahakud (2012:53) and Ramjee and Gwatidzo (2012:62) showed that the two theories are complementary.

According to Barclay and Smith (2005:8), the main impediment to the resolution of the capital structure puzzle has been the lack of conclusive tests to successfully model the determinants of capital structure. They contended that the tests have tended to be qualitative and directional and have not derived a precise predictive quantitative model for an optimal capital structure. This problem is further exacerbated by the fact that some of the determinants of capital structure are difficult to quantify and can therefore not be incorporated into such a predictive quantitative model. A lot of empirical work on testing these theories has produced a number of sophisticated regression models that link leverage and changes in new debt issued to a number of firm-specific variables. However, these models have several weaknesses.

Firstly, they are not predictors of an optimal capital structure; they are merely relationship models. Secondly, on repeated testing, they have produced conflicting results. Thirdly, they only concentrate on quantifiable determinants of capital structure and ignore the signalling and market timing aspects which, according to Baker and Wurgler (2002:29) and Miglo (2007:85), play a major part in the overall financing behaviour of a firm. Fourthly, these models have primarily been derived using data from developed countries, especially the USA and Western Europe. The tests have been concentrated on firms from these regions, with limited tests being done on firms from emerging markets, especially Africa. The contributions from South Africa have also been very limited with the main studies being De Vries and Erasmus (2012), Lemma and Negash (2011), Mans and Erasmus (2011), Negash (2001), Negash (2002), Ramjee and Gwatidzo (2012) and Wu and Negash (2002). These studies however have several limitations which are discussed later in chapter 3.

Cook and Tang (2010:86) and Drobetz and Wanzenried (2006:956) document that financing behaviour is a combination of firm-specific, industry-specific and country-specific factors. A question that arises is: Can the same models be applied to explain the corporate financing behaviour of firms in emerging markets, especially in Africa?

Furthermore, the concepts of target leverage and speed of adjustment towards target leverage have become very important in capital structure research. This is normally cited as further evidence that firms follow the trade-off theory of corporate financing. The speed of adjustment derives from firm-specific factors with heterogeneity being persistent among firms (Elsas & Florysiak, 2011b:181). Further questions arise here: Does the speed of adjustment estimate for European firms provide the best estimate for South African firms? Is there heterogeneity in the speed of adjustment between sectors?

Empirical research on capital structure has identified a number of important firm-specific factors that affect the firm’s financing decision. De Angelo and Masulis (1980:26) showed that, in addition to financial distress costs, non-debt tax shields are important determinants of leverage; they are perfect substitutes for debt interest tax shields. According to Frank and Goyal (2009:26) and Huang and Song (2006:22), the important reliable determinants of leverage are: median industry leverage, market-to-book (firm growth rate) ratio, asset tangibility, profitability, log of assets (firm size) and non-debt tax shields. Frank and Goyal (2003a:220); Mukherjee and Mahakud (2012:41); Rajan and Zingales (1995:1428); Shyam-Sunder and Myers (1999:224); and Titman and Wessels (1988:9) have used some of these factors to test for the validity of both the trade-off and pecking order theories. Other researchers, notably Elsas and Florysiak (2011b:184); Flannery and Rangan (2006:472); Hovakimian and Li (2010:4); Hovakimian and Li (2011:35); and Ramjee and Gwatidzo (2012:60) have also used some of these factors to estimate the speed of adjustment for firms.

This list, however, excludes the firm's important key financial performance metrics such as the firm's share price, price earnings ratio, earnings retention rate, liquidity, and the more recently developed value measure, the economic value added (EVA). The question that might be asked: What is the relationship between firm leverage and these financial performance metrics? Can these variables be used to estimate the firm's target adjustment speed? This study attempts to provide answers to these questions by developing a partial adjustment model that uses these variables together with some traditional determinants of leverage.

Corporate finance literature has argued that the main objective of financial management is to maximise the wealth of shareholders. This translates into maximising the firm's ordinary share price (Brealey, Myers & Allen, 2008:22-24 and Damodaran, 2010:2-5). Opler, Saron and Titman (1997:21) argued that capital structure decisions offer management an opportunity to enhance shareholder value and as such, define an optimal capital structure as the leverage ratio where shareholder value is maximised. Thus management will seek to attain this objective, and any capital structure that they adopt has to enhance their chances of achieving this primary objective. According to Damodaran (2010:3), the main pillars of corporate value drivers are: the investment, financing and dividend policies; all these must be optimised if the share price is to be maximised. The firm's optimal capital structure can therefore be defined in terms of the optimal financing mix that will help management maximise the firm's value. For listed firms, this value translates to a maximum share price for the firm. The share price is a key financial performance metric for listed firms, and it is monitored daily by shareholders, potential investors and other stakeholders. Ideally, management should not falter on the management of this metric.

One of the arguments of this study is that an optimal capital structure cannot only be defined in terms of WACC minimisation or financial slack maximisation; but also in terms of a financial structure that will allow the firm to deliver superior financial performance. Corporate financing is a key component of corporate financial strategy and as such, it is expected to link with the firm's key financial performance metrics. An optimal capital structure will therefore result in the improved overall financial performance of the firm, thus resulting in the maximisation of all key financial performance indicators, and this will be reflected in the share price growth. At this point, all determinants of capital structure, both quantitative as well as qualitative, will be at a convergence point; and this will define the optimal capital structure of the firm. This optimal capital structure is not static, but rather dynamic, as all variables do change. It also depends on the size and industrial sector of the firm, as these factors reflect the levels of operating risks. *The key is therefore a dynamic or instantaneous capital structure rather than a static capital structure.*

As explained above, the two leading theories of capital structure are complementary (Mukherjee & Mahakud, 2012:53; Myers, 2008:217; and Ramjee & Gwatidzo, 2012:62). The complementary nature of the theories suggests that firms follow some elements of the trade-off and pecking order theories in their financing. Furthermore, research has shown that firms have target leverage ratios towards which they adjust over time (Elsas & Florysiak, 2011b:184; Flannery & Rangan, 2006:472; Hovakimian & Li, 2010:4; Hovakimian & Li, 2011:35; and Ramjee & Gwatidzo, 2012:60). This total body of evidence suggests that firms have target leverage ratios which allow them to maintain some financial flexibility. They adjust their capital structures over time so as to maintain these target leverage ratios. Some questions arise here: Are these target leverage ratios optimal as defined by the trade-off theory? Do firms always gear to the theoretical optimal level?

The concept of financial flexibility is compatible with the pecking order theory. Various studies have shown that firms place premium value on financial flexibility, as it enables them to carry out their business plans and to deal with unforeseen capital demands (Bancel & Mittoo, 2011:214; Campello, Graham & Harvey, 2010:486; Graham & Harvey, 2001:232; Marchica & Mura, 2010:1339; and Shivdasani & Zenner, 2005:31). Past empirical work on financial flexibility by Drobetz, Pensa and Wanzenried (2007:24); Gamba and Triantis (2008:2293); Marchica and Mura (2010:1339); and Pontuch (2011:23) shows that financial flexibility is directly proportional to an increase in new investments.

This study argues that firms have target leverage ratios, but these are not the optimal targets as defined by the trade-off model. Instead, they are operational optimal target ratios that allow the firm some financial flexibility. Firms will therefore strive to achieve and maintain these target ratios and hence the positive speed of adjustment. This means that firms have a positive discounted value premium which indicates that they do not gear to the theoretical optimal leverage. The discounted value premium is the price that they pay for achieving and maintaining financial flexibility. This therefore implies that firms have two optimal capital structures: the theoretical optimal as well as the operational optimal leverage. Management would be concerned with the operational optimal target ratio. The question then becomes: What is the discounted value premium of South African manufacturing, mining and retail firms?

1.2 THE OBJECTIVES AND QUESTIONS OF THE RESEARCH

The first objective of the study is to test and evaluate the validity of the trade-off and pecking order theories in the context of South African manufacturing, mining, and retail firms listed on the Johannesburg Stock Exchange. Past empirical work by Mukherjee and Mahakud (2012:53) and Ramjee and Gwatidzo (2012:62) confirm these two as the leading capital structure theories that can be used to explain the financing behaviour of a firm. This research study seeks to test their relevance in explaining the financing behaviour of firms listed on the Johannesburg Stock Exchange.

Using historical financial data of manufacturing, mining and retail firms listed on the Johannesburg Stock Exchange, this study tests for the relevance and validity of both the trade-off and pecking order theories in the context of South African firms. These are very important sectors to the South African economy. In the fourth quarter of 2011, manufacturing and retail sectors were the largest contributors to the gross domestic product growth of 3.2% with each sector contributing 0.7% and 0.6% respectively (Statistics South Africa, 2011:2). On the other hand, mining firms make up 38.10% of the FTSE/JSE Top 40 index (FTSE Group, 2011:2). Furthermore, the number of firms in each of these sectors is large enough to construct a panel data set that all the chosen estimators can handle with minimum bias. The empirical tests are performed in three stages. The first stage tests for the correlation between firm-specific factors and leverage as well as changes in net debt issued by the firm. The correlation tests follow the basic testing procedures that were developed by Frank and Goyal (2003a:14); Rajan and Zingales (1995:1428); Shyam-Sunder and Myers (1999:224); and Titman and Wessels (1988:9). This study, however, makes use of a number of panel data estimators in order to test for the consistency and reliability of estimators that are normally used in capital structure research. These estimators include: the random effects, fixed effects, time series, dynamic panel and random effects Tobit estimators.

The second stage tests for the partial adjustment towards the target capital structure by the sampled firms. This is a further test on the validity of the dynamic trade-off theory. The envisaged speed of adjustment confirms convergence towards the optimal capital structure. This speed is affected by macro-economic financial variables, micro-economic variables and firm-specific variables. This study investigates the impact of firm-specific variables on the speed of adjustment. Hovakimian, Opler and Titman (2001:24) and Ju, Parrino, Poteshman and Weisbach (2005:279) argued that the dynamic trade-off theory is the most appropriate descriptor of corporate financing. This study uses the target adjustment models developed by Elsas and Florysiak (2011b:184); Flannery and Rangan (2006:472); Hovakimian and Li (2010:4); and Hovakimian and Li (2011:35) to estimate the speed and frequency of target adjustment by the South African firms. Lastly, the research estimates the discounted value premium as a further test on the validity of both the trade-off and pecking order theories. The discounted value premium is defined as the difference between the theoretical optimum value at optimal leverage and the actual value observed. The Damodaran estimator is used to estimate the firm's optimal capital structure as well as the discounted value premium. Again, the speed is estimated using a number of estimators, so as to test the bias of the estimators.

The second objective of the study is to derive and test a model that links leverage with the firm's key financial performance metrics. Using the same dataset described above, the study develops a regression model that links leverage to the firm's key financial metrics contained in Table 1.1 below.

Table 1.1: The Key Financial Performance Indicator Metrics

Firm value, size & growth	Profitability & cash flow generation	Financial stability
• Firm size • Firm growth rate • Firm value-EVA • Share price • Price earnings ratio	• Profitability • Cash flow generation • Firm's capital expenditure	• Asset tangibility • Financial distress • Retention ratio • Liquidity

The ultimate aim of this test is to derive a predictive quantitative model linking leverage to the firm's key financial performance indicators. Such a model is expected to vary with firm size, growth rate and industrial sector of the firm; thus the researcher will derive a model for the industry average. It is hypothesised that by establishing the capital structure model for each firm category, future decisions on financial policy can be made with reference to this best practice rather than by trying to balance a number of factors which may be difficult to quantify in practice. Financial metrics are measurable and can be predicted through forecast financial statements; thus the target capital structure that a firm desires will also be predictable.

Past research has concentrated on identifying the firm-specific factors that affect the capital structure decision. These factors have been used in testing the validity of each theory. This study adopts similar testing techniques, but extends the test to cover the key financial performance metrics of the firm. It is argued that the solution to the capital structure puzzle lies in deriving a model that links leverage to the firm's financial performance indicators, as these are the measures of value creation by firms. These metrics are measureable as well as predictable through financial forecasts. Thus, if the study can establish the leverage model for each firm category and size, financial directors can use this model as a guiding tool in making financing decisions. As argued by Leary and Roberts (2010a:33) and Mackay and Phillips (2005:1463), a firm's financing pattern is likely to follow that of its peers. This model defines the ideal peer capital structure. Corporate financing decisions lie in the financial strategy domain of firms, and therefore they must be linked to the key financial performance metrics of the firms. It is further argued that this is a more useful approach and has less controversy than the current theories. Past researchers have advocated a different approach in solving the capital structure puzzle, and this study suggested that the use of financial performance indicators may be the starting point in solving this puzzle.

A review of past empirical work on capital structure shows that various estimators have been used to test the various theories. Are these estimators consistent? This study uses a number of estimators to test and evaluate the validity of the trade-off and pecking order theories in the context of South African manufacturing, mining, and retail firms listed on the Johannesburg Stock Exchange. The same data and estimators are used to estimate the speed of adjustment for manufacturing, mining and retail firms. The study follows the testing procedures that were developed by Elsas and Florysiak (2011b:184); Flannery and Rangan (2006:472); Hovakimian and Li (2010:4); and Hovakimian and Li (2011:35) to estimate the speed and frequency of target adjustment by the South African firms.

1.3 CONTRIBUTIONS TO THE BODY OF KNOWLEDGE

This study makes four major empirical contributions to the body of knowledge of capital structure. Firstly, it provides further evidence on the two leading theories of capital structure, that is, the pecking order and trade-off theories. Secondly, it further estimates the speed and frequency of adjustment towards target capital structure for South African firms. Thirdly, it presents the concept of "*discounted value premium*", which explains why firms will not gear to the expected theoretical optimal levels. The capital structure theories have mainly been derived and tested using data from firms in the developed countries like the USA and the Western European countries. There has been limited testing of these theories in the South African context. This study explores whether the hypothesis of these leading theories apply to South African firms.

Fourthly, the study proposes and presents empirical evidence on the relationship between leverage and the firm's key financial performance indicators which measure firm value. A firm's financial strategy is grounded on these financial variables, and hence the study argues that the debt decision must be linked to the same variables if it is to fit in with the firm's overall strategy. The optimal capital structure must therefore be defined in terms of a financing policy that enhances the maximisation of these key financial performance indicators. The study presents capital structure models for each of the three industries.

1.4 STRUCTURE OF THE STUDY

The remaining chapters of the study are structured as follows: Chapter 2 presents an overview of the South African economy, looking at the practice of monetary policy and its impact on the performance and financing of firms. The practice of monetary policy affects key financial macro-economic variables such as interest, inflation and exchanges rates, and changes in these variables do affect returns on the capital markets. The chapter further provides a review of the structure of the South African capital market, with a particular focus on the structure and performance of the Johannesburg Stock Exchange.

Chapter 3 reviews all the relevant literature on capital structure. The review begins with a discussion of the contributions of Modigliani and Miller (1958 and 1963). It then discusses the major theories of corporate financing and focuses on the trade-off and pecking order theories as the leading capital structure theories. This discussion evaluates the effect of wider macro-economic variables, industry variables and firm-specific variables on the financing decisions of firms.

Chapter 4 discusses the enquiry methodologies that were followed in investigating the financing patterns of South African firms. The chapter begins with a brief overview of panel data estimators. The testable models, together with their hypotheses, are also discussed in this chapter.

Chapters 5, 6 and 7 respectively present and discuss the study's descriptive statistics and results on the tests of the trade-off and pecking order theories; results on the partial adjustment models; and results on the discounted value premium model. Chapter 5 also presents test results on the relationship between leverage and the key financial performance metrics.

Finally, Chapter 8 presents the conclusions about the financing patterns of South African firms. The chapter concludes with recommendations for future research on this topic.

CHAPTER 2
OVERVIEW OF THE SOUTH AFRICAN CAPITAL MARKET

2.1 INTRODUCTION

The chapter begins with a review of the practice of monetary policy in South Africa and how this policy affects the returns on the capital markets. The inflation targeting monetary policy and its practice in South Africa are discussed in detail. This policy affects interest, inflation and exchange rates, and changes in these macro-economic variables have an impact on the returns from the capital markets as well as on the performance of firms. Subsequent discussion reviews the structure and performance of the JSE. The final section discusses the structure of the South African bond market and how this links to the macro-economic variables. The changes in the country's macro-economic variables define the business cycles of the wider economy. Hackbarth, Miao and Morellec (2006:542) provide evidence that these cycles have an impact on both the performance and the financing decisions of firms.

Since 1994, South Africa has experienced two major economic shocks (South African Reserve Bank, 2011:64). The first shock occurred in the period from 1997 and ended in the last quarter of 1999. This was caused by the 1998 Asian global financial crisis. The second shock, which ended a 99-month high growth cycle, began in November 2007, reaching the lowest point in March 2009, and returning to the original peak in February 2010 (Venter, 2011:62). This resulted from the global financial crisis which emanated from the US subprime crisis. The crisis triggered the current European sovereign debt crisis which commenced in 2010 (Arghyrou & Tsoukalas, 2011:174). The European debt crisis started in Greece and it has since spread to the rest of the European Union countries with regional economies like Ireland, Spain, Italy and Portugal. There have also been minor shocks, with the latest shock occurring during the period 2000-2003; this was triggered by the exchange rate crisis and an increase in grain prices (Aron & Muellbauer, 2007:706).

After the collapse of Lehman Brothers, the global financial crisis spread to the rest of the emerging markets and this triggered the global recession. South Africa, as a commodity exporting country, was affected by this global slowdown as well (South African Reserve Bank, 2011:65). This shock was directly transmitted to the local economy and it affected the South African capital markets as well, with the real effects of the shocks being reflected in the negative returns of the JSE-listed firms. For example, the acquisition of equity assets by firms listed on the JSE fell from about R25b in 2007 to less than R4b in 2008, before rising to over R30b in 2009 (South African Reserve Bank, 2011:63). This trend follows the above-described business cycle. These negative returns on the capital markets provide evidence regarding the interconnection between macro-economic variables, returns on the capital markets and firm performance (Bancel & Mittoo, 2011:214; Campello, Graham & Harvey, 2010:486; Choe, Masulis & Nanda, 1992:23; and Korajczyk & Levy, 2003:104). The implication is that the macro-economic shocks directly affect firm-specific variables, which in turn affect the firm's financial performance. The firm's performance in turn has an impact on its investment programme, its payout policy and its financing choices.

2.2 A REVIEW OF THE SOUTH AFRICAN MACRO-ECONOMIC ENVIRONMENT

2.2.1 Interest and Inflation Rates

Given the business cycles described above, the primary goal of most governments should be that of maintaining a stable and favourable macro-economic environment, which is essential for sustainable economic growth in the country. A stable and favourable macro-economic environment promotes private sector investment, which is the key driver of economic growth. One of the tools that governments use to achieve this stability is their monetary policy. Monetary policy is simply the action taken by the country's central bank to change monetary and financial variables, in order to spur positive economic growth (Andersen & Jordan, 1968:13). As this policy affects key financial factors such as interest, inflation and exchanges rates, it indirectly affects the returns on the capital markets and the availability of credit to firms and consumers. These effects explain why monetary policy actions are closely watched by financial market economists. The changes in the monetary policy financial variables in turn affect the financing, investment and profitability of firms. According to Bordo (2010:209) and Chick (1973:12), monetary policy seeks to effect the achievement of wider economic goals which include maintaining:

- a stable or low inflation rate (most economies have a target inflation rate or range as a policy goal)
- a full or higher rate of employment
- a sustainable non-inflationary growth
- a stable or favourable exchange rate, as well as a favourable balance of payments position.

Economists agree that these goals cannot be achieved simultaneously, as there is conflict amongst them; authorities normally settle on a trade-off between the goals (Chick, 1973:8). The costs and effects of high inflation in the economy are well-known to economists, and many regard inflation as the key macro-economic variable which must be closely monitored (Bank of England, 1992:444). It is for this reason that many economists argue that the primary goal should be that of maintaining low inflation while trying to achieve other goals. The implementation and conduct of the monetary policy is normally delegated to the country's central bank, which is an agent of the government. There are a number of instruments that the central bank can use to conduct its monetary policy, with the main instruments being the following: (Keran, 1970:8 and Waud, 1973:1)

- Reserve requirements
- Discount rate or the repurchase (repo) rate or the official interest rate
- Open market operations.

The ultimate goal of monetary policy is to maintain financial stability in the country. Financial stability, in simple terms, refers to the stability of price levels (low inflation and interest rates) as well as stability in the value of the local currency. According to Buckley (2004:55)**,** the three variables are interlinked through the Purchasing Power Parity (PPP) and the International Fischer effect (IFE), that is:

$$\frac{1+r_a}{1+r_b} = \frac{1+i_a}{1+i_b} = \frac{Predicted\ future\ echange\ rate\ \left({}^{a}/_{b}\right)}{Spot\ exchange\ rate\ \left({}^{a}/_{b}\right)} \tag{2.1}$$

Where:

r_a and r_b are interest rates in the two countries

i_a and i_b are inflation rates in the two countries

A high volatility in any of these financial variables increases uncertainty about returns, and it retards investment by firms. This has a direct impact on the achievement of other goals of economic policy. Good examples of the consequences of monetary policy failure are the 1999-2002 Argentinean financial crisis and the 1998-1999 Brazilian financial crisis. In both cases, inflation, interest, unemployment and exchange rates spiralled out of control, leading to a collapse of both countries' currencies. With the current high level of integration of global capital markets, monetary policies of major countries have a global impact, and these policies are therefore closely watched by the global financial markets.

The South African government has, since 2000, adopted a formal target for inflation as its monetary policy goal (Aron & Muellbauer, 2007:709). This rate is measured by the Consumer Price Index (CPI) for all urban areas, and the target rate is set by central government in consultation with the South African Reserve Bank (SARB). For example, in 2009 the government set the flexible inflation target for the year-on-year increase in the headline CPI to be between 3% and 6%. The government has delegated the implementation and conduct of the monetary policy to the SARB. The SARB, through its Monetary Policy Committee (MPC), which is headed by the bank's governor, ensures that inflation is kept within the set targets. The MPC consists of seven members and it meets six times a year to review and project inflation rates. The meetings are normally scheduled in January, March, May, July, September and November, and the committee can also schedule other meetings should the need arise. The SARB uses the repurchase interest rate as its main monetary policy instrument for keeping inflation within the set targets. When inflation shoots above the target, the bank raises its repurchase rate, and this increase is transmitted to the whole economy through the commercial banks, the foreign currency markets and the Johannesburg Stock Exchange. This increase reduces the expectations of consumers and the private sector, which reduces the overall expenditure and investment in the economy by reducing the availability of credit. This reduction in both consumption and investment lowers total demand in the economy, and this forces the inflation rate down to within the set targets. If the inflation rate drops below the target, the SARB stimulates expenditure by reducing its repurchase rate, and this is again transmitted to the whole economy in a similar way as described above. The levels of the repurchase rate thus affect the total demand in the economy, and this makes it an effective instrument in the management of inflation. The transmission mechanism described above is summarised in Figure 2.1 below (South African Reserve Bank: 2004:24).

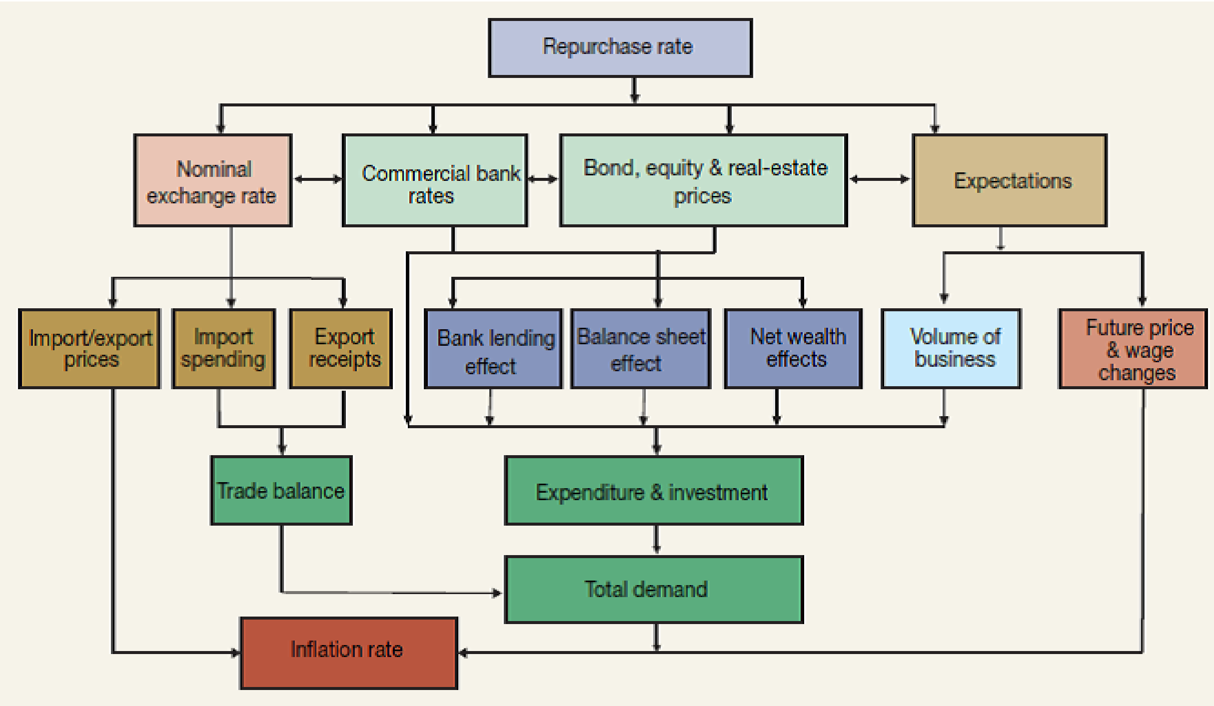


Figure 2.1: The Monetary Policy Transmission Channels

(South African Reserve Bank Monetary Policy Review, 2004:24)

This indirect transmission mechanism can be summarised as follows: (Ireland, 2010:217 and University of Leicester, 2006.10)

An increase in money supply is summarised as:

$$\Delta MB \Uparrow \Rightarrow \Delta M \Uparrow \Rightarrow \Delta R \Downarrow \Rightarrow \Delta E \Uparrow \Rightarrow \Delta Y \Uparrow \Rightarrow \Delta P \Uparrow \qquad (2.2)$$

A decrease in money supply is summarised as:

$$\Delta MB \Downarrow \Rightarrow \Delta M \Downarrow \Rightarrow \Delta R \Uparrow \Rightarrow \Delta E \Downarrow \Rightarrow \Delta Y \Downarrow \Rightarrow \Delta P \Downarrow \qquad (2.3)$$

Where:

ΔMB = change in the money base

ΔM = change in money supply

ΔR = change in the interest rate

ΔE = change in expenditure

ΔY = change in national income

ΔP = change in aggregate price levels

The conduct of monetary policy therefore has an indirect impact on the financial markets, especially the Johannesburg Stock Exchange. It affects the prices and performances of equities and bonds, it affects the availability of credit, and it also affects the exchange rate of the Rand against other currencies. An appreciation in the exchange rate reduces the competitiveness of local firms in the global markets; this in turn reduces the profitability of firms. An increase in interest rates increases the cost of financing new investments, and it forces firms to scale down on new investments. Furthermore, an increase in the interest rate reduces the amount of credit available to both firms and individual households, and this slows down the total demand in the economy.

This effect of indirect transmission on the financial markets can be summarised as follows:

$$\Delta MB \Uparrow \Rightarrow \Delta M \Uparrow \Rightarrow \Delta R \Downarrow \Rightarrow \Delta business\ investment \Uparrow \qquad (2.4)$$

$$\Delta MB \Uparrow \Rightarrow \Delta M \Uparrow \Rightarrow \Delta R \Downarrow \Rightarrow \Delta residential\ housing \Uparrow \qquad (2.5)$$

$$\Delta MB \Uparrow \Rightarrow \Delta M \Uparrow \Rightarrow \Delta R \Downarrow \Rightarrow \Delta consumer\ durable\ expenditure \Uparrow \qquad (2.6)$$

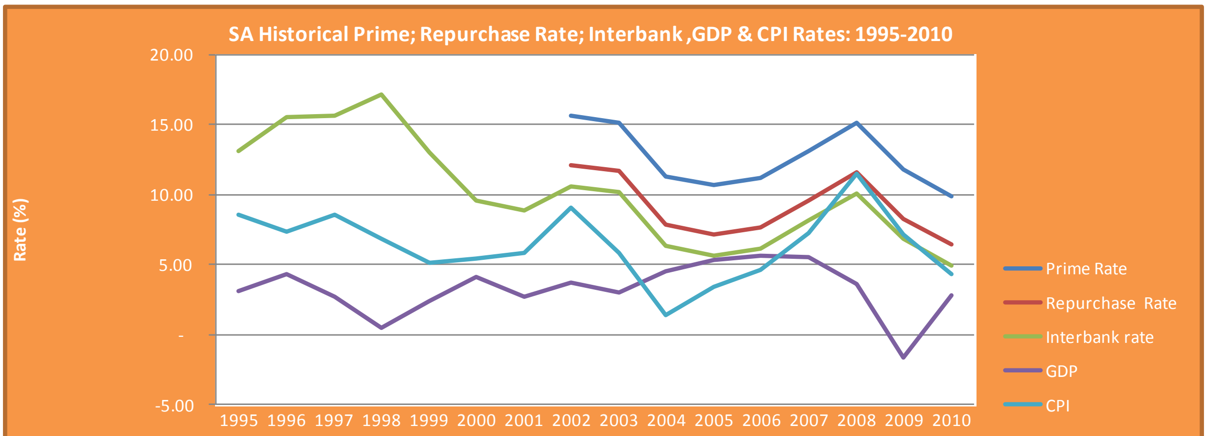
And the stock market channel can be summarised as:

$$\Delta MB \Uparrow \Rightarrow \Delta M \Uparrow \Rightarrow \Delta R \Downarrow \Rightarrow \Delta SP \Uparrow \Rightarrow Tobin's\ q \Uparrow \Rightarrow \Delta business\ investment \Uparrow \qquad (2.7)$$

Where:

ΔSP = change in stock market prices

The conduct of the monetary policy implies that the repurchase rate will follow the same pattern as the inflation rate, but its curve will lag behind that of the inflation rate. This pattern, together with changes in the prime rate, the repurchase rate, the inter-bank rate and the CPI are shown in Figure 2.2 below.



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Prime Rate								15.6	15.1	11.3	10.6	11.1	13.0	15.1	11.8	9.91
Repurchase Rate								12.0	11.6	7.81	7.14	7.64	9.58	11.6	8.29	6.41
Interbank rate	13.0	15.5	15.5	17.1	13.0	9.54	8.83	10.6	10.1	6.31	5.64	6.13	8.11	10.1	6.86	4.91
GDP	3.12	4.31	2.65	0.52	2.36	4.15	2.74	3.67	2.95	4.55	5.28	5.60	5.57	3.58	-1.68	2.84
CPI	8.60	7.30	8.60	6.80	5.10	5.40	5.80	9.10	5.80	1.40	3.40	4.60	7.20	11.5	7.1	4.3

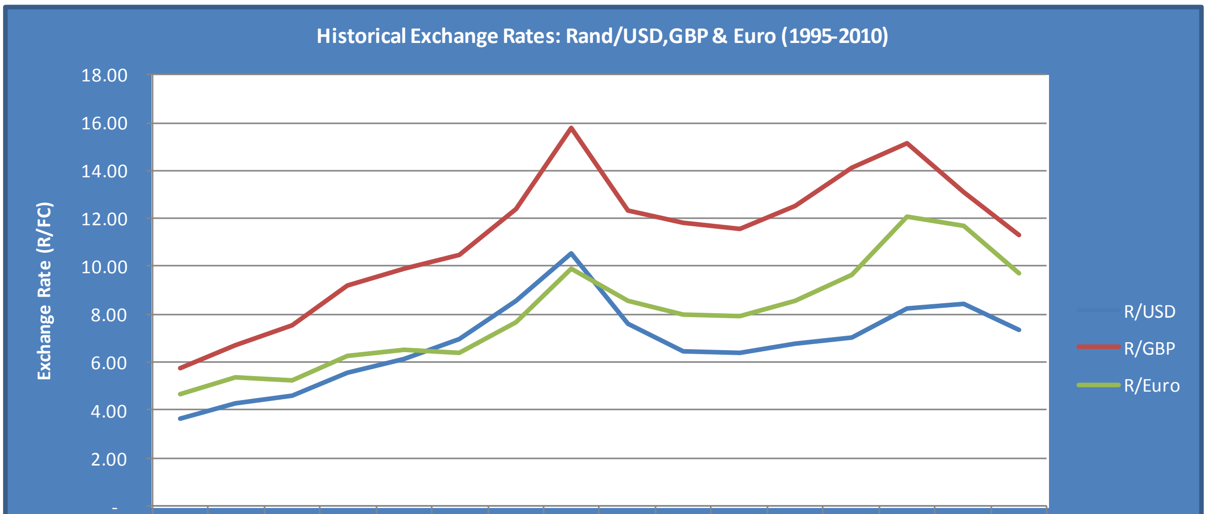
Figure 2.2: History of South African Prime, Repurchase, Interbank, GDP, and CPI Rates

(Data source for the graphs: South African Reserve Bank)

The inter-bank interest rates were above 12% in the years 1995-1999, declined in the years 2000-2001, and rose again in the years 2002-2003. The rates have, however, been declining since 2003, hitting the lowest rate of 5.64% in 2005. The interest rate rose again in 2007-2008, peaking at 10.1% in 2008. Since then, the rates have declined to 4.91% and have remained constant to date. The interest rates always lag the changes in the CPI, as the repurchase rate is used to correct the inflation target deviation. As can be seen from Figure 2.2, the CPI was at its lowest level of 1.4% in 2004.

2.2.2 Exchange Rates

The changes in interest and inflation rates partly determine the changes in the exchange rate of the Rand against major currencies, and these three financial variables are linked through the International Fischer effect (IFE) and the Purchasing Power Parity (PPP) models. The changes in the Rand exchange rate against the United States Dollar (USD), the Great Britain Pound Sterling (GBP) and the Euro are shown in Figure 2.3 below. The Rand has been weakening since 1995, and it reached its lowest level in 2002, when it traded at 10.5 against the USD, 15.7 against the GBP, and 9.91 against the Euro. These weak exchange rates caused the economy to stagnate; that is, it reduced economic growth, causing inflation and interest rates to rise. The exchange rates declined, however, in the years 2003-2007, and inflation and interest rates followed a similar pattern, reaching the lowest levels in 2004. Then in 2008 there was a global financial crisis which was caused by the US subprime crisis. This crisis resulted in inflation and interest rate increases, and the Rand then weakened against the major currencies. This situation was, however, short-lived; the SARB cut the interest rate to tame the inflation. The situation stabilised until early 2011, which then saw the beginning of the European sovereign debt crisis contagion. This crisis has put pressure on the economies of the emerging markets, which include South Africa.



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
R/USD	3.63	4.30	4.61	5.54	6.11	6.94	8.58	10.5	7.57	6.45	6.37	6.78	7.05	8.26	8.43	7.32
R/GBP	5.73	6.72	7.55	9.18	9.89	10.4	12.3	15.7	12.3	11.8	11.5	12.5	14.1	15.1	13.1	11.3
R/Euro	4.69	5.38	5.21	6.24	6.52	6.39	7.69	9.91	8.54	8.01	7.92	8.54	9.66	12.0	11.6	9.71

Figure 2.3: History of Exchange Rates: ZAR/USD, GBP and Euro

(Data source for the graphs: South African Reserve Bank)

2.2.3 Macro-economic Variables and the Performance of the Johannesburg Stock Exchange

The impact of the monetary policy together with the macro-economic variables on the financial markets can be best illustrated by the performance of the JSE. The JSE returns are tracked by three indices: the JSE/ Financial Times and the London Stock Exchange (FTSE), the JSE/FTSE top 40, and the JSE/FTSE Resource 20. Appendices 1, 2 and 3 illustrate the performance of these indices since 1995. The changes in inflation and interest rates as well as the currency exchange rates ultimately define the country's business cycles and the degree of its macro-economic stability. The returns of the JSE-listed firms depend on these business cycles. The indices have been growing steadily since 1995, and this reflects the favourable macro-economic conditions that have existed in the country. There are, however, three shocks on the graph. As described above, the first shock began in 1997 and ended in the last quarter of 1999. This resulted from the global financial crisis caused by the 1998 Asian banking crisis. The second shock occurred in the period 2002-2003, while the last shock occurred in the period 2007-2010. As explained above, the 2002-2003 slowdown was caused by the grain shortage as well as the Rand Exchange Rate. During this crisis, the currency depreciated to: less than R10.5 against the USD, R15.7 against the GBP, and R9.91 against the Euro. The weakening exchange rate caused an increase in both inflation and interest rates, and any increase in these financial factors adversely affects returns on the capital markets, as explained above. Furthermore, investors may have feared the repeat of the 1998-1999 Brazilian crisis and the 1999-2002 Argentinian crisis, resulting in capital flights which worsened the performance of the JSE indices.

The third major economic slowdown, which occurred in the period 2008-2009, was caused by the global financial crisis which resulted from the US subprime crisis. Since 2003, the JSE/FTSE all share index, the JSE/FTSE top 40, and the JSE/FTSE resource 20 index have all substantially outperformed returns from the Hang Seng, Standard & Poor's 500 (S&P 500) and FTSE 100. The surge in commodity prices may also have significantly contributed to these high returns on the JSE, as it lists some of the world's largest mining firms such as Anglo American, Anglo Platinum, Anglo Gold, BHP Billiton and many others. For example, the price of Gold increased by 520% from USD300/ounce in 2001 to USD1, 850/ounce in 2011; this is an average increase of 45% per year. The country's average gold production over the period 2005-2009 was close to 250MT per annum, which is 51% of the continent's total production, and this represents 10% of the world's production (Gajigo, Mutambatsere & Ndiaye, 2012:2). For the period 2001-2009, the price of platinum increased by 400% from USD400/ounce in 2001 to USD1, 650/ounce in 2011; this is an average increase of 36.36% per year. South Africa is the world's largest producer of platinum. The prices of gold, platinum and other commodities were also affected by the cycles in the South African economy. Appendices 4 and 5 illustrate the price curves of both gold and platinum since 1992. During the 2008 global financial crisis, the price of platinum dropped by 63.60% from the highest level of USD2, 198/ounce to USD800/ounce, and has since struggled to recover to the pre-crisis price levels. On the other hand, gold prices only dropped 25.20% from USD1,000/ounce to USD748/ounce; and gold, unlike platinum, did recover very well and has since reached an all-time highest price of USD1,900/ounce on the 05th September 2011.

2.3 A REVIEW OF THE STRUCTURE AND PERFORMANCE OF THE JOHANNESBURG STOCK EXCHANGE (JSE)

The Johannesburg Stock Exchange (JSE) is the only public securities exchange market in South Africa and it is also the largest Stock Exchange in Africa both in terms of the number of firms listed as well as the total market capitalisation. The main Stock Exchanges in Africa that are part of the World Federation of Exchanges (WFE) are the following, (World Federation of Exchanges, 2011:26)

- Johannesburg Stock Exchange: In 2011, the WFE ranked it 20th out of 52 leading global stock markets. It had a market capitalisation of USD 728, 207.3 million as of September 2011.
- Casablanca Stock Exchange: It had a market capitalisation of USD 63, 574.2 million as of September 2011.
- Egyptian Stock Exchange: It had a market capitalisation of USD 53, 684.3 million as of September 2011.

- Mauritius Stock Exchange: It had a market capitalisation of USD 7, 924.1 million as of September 2011.

The JSE is an active and highly liquid market for a variety of financial market instruments which include the following: (Johannesburg Stock Exchange, 2010:8)

- **Equities**: These include B-Ordinary shares, N-Ordinary shares, Ordinary shares, preference shares, carbon credit notes (CCNs), debentures, depository receipts, exchange treaded funds (ETFs), exchange traded notes (ETNs), Kruger Rands, linked units, participatory interests, real estate investment trusts (REIT's), share instalments, Trading Access Link to Exchange (TALX) and warrants. The main sources of equity for corporates are ordinary shares, preference share securities and share warrants.
- **Interest rate products**: These are mainly bonds (vanilla, credit linked notes (CLN's), amortizing floating rate notes, inflation-linked bond indices, amortizing instruments, weighted floating rate notes, commercial papers, total return indices and floating rate notes.
- **Interest rate derivatives**: These include bond futures, options on bond futures, Johannesburg Inter Bank Rate (JIBAR) futures and index derivatives.
- **Commodity derivatives:** The commodity derivatives traded on the JSE are: Chicago Board of Traders (CBOT) Soy complex futures and options, grain futures and options, Chicago soft red wheat futures and options, Chicago corn futures and options, crude oil futures and options, options on commodity futures, copper futures, South African Volality Index (SAVI) white maize, silver futures, gold futures and options, and platinum futures and options.
- **Currency derivatives**: These include currency futures and options.
- **Equity derivatives**: The main equity derivatives traded on the JSE are: can-do-futures and options, single share derivatives, equity index derivatives, dividend futures, equity options and international derivatives (IDX).

The main products of interest to the corporate financial manager are the equities and interest rate securities. The JSE equities market is very well developed. Its average market capitalisation since 2007 is R5, 081.4 billion. It is an active market for equity capital raising and trading. The key statistics of the JSE equities performance are contained in Appendices 6, 7 and 8, which show that a total of R12, 851m in equity capital was raised in 2007; R76, 690m in 2008; R106, 984m in 2009; and R80, 857m in 2010. As of August 2011, the JSE's liquidity stood at 60.7%, and that ranked it 26th out of the 52 members of the WFE. The total number of listed firms as of 31 September 2011 was 341 on the main board and 70 on the Alternative Stock Exchange (AltX); the total market capitalisation of these listed firms was R6, 384.6bn. The total number of listed securities was 848 for the same period. Appendix 8 contains all the key statistics on the JSE transactions.

2.3.1 The JSE Listing Requirements

The main JSE listing requirements are summarised in Table 2.1 below (Johannesburg Stock Exchange, 2011:4.1).

Table 2.1: The JSE Listing Requirements

Listing Requirements	Main Board/Africa Board	AltX
Share capital	R25 million	R2 Million
Profit history	3 years	None
Pre-tax profit	R8 million	N/A
Shareholder spread	20%	10%
Number of shareholders	300	100
Sponsor/DA	Sponsor	Designated advisor
Publication in the press	Compulsory	Voluntary
Number of transaction categories	2 (threshold 25%)	2 (threshold 50%)
Annual listing fee	0.04% of average market capitalisation with a minimum of R33, 545 and a maximum of R170, 440.55 (including VAT).	R2,7189.25 (including VAT)
Education requirements	N/A	All directors to attend Directors Induction Programme

The JSE is a holder of an exchange license issued in terms of the Securities Services Act, 2004 (Act No. 36 of 2004), and its activities are supervised by the Financial Markets Advisory Board (FMAB), a department of the Financial Services Board (FSB) (Johannesburg Stock Exchange, 2010:1).

The additional JSE listing requirements are:

- **Full compliance with the Companies Act 71 of 2008**. This Act applies to all companies registered in South Africa, and full compliance with this Act is a pre-condition for all firms seeking a new listing and for those that want to remain listed on the JSE.
- **Compliance with the Code of Corporate Governance**: Compliance with the King lll Code of Corporate Governance is now a standard practice and all listed firms must adopt this code and comply with it.

The primary objective of these requirements is to protect holders of listed securities. These listing requirements, together with the Companies Act 71 of 2008, provide a strong regulatory framework for investor protection. Unlike the US and other developed countries, South Africa does not have an explicit bankruptcy code. Creditors of firms facing financial difficulties can approach the High Court to apply for either straight liquidation or an administration order to place the firm under Judicial Management.

2.3.2 Taxation of Interest from Corporate Debt

In South Africa, the taxation of interest is dealt with under Section 24J (2) of the Income Tax Act 1962 (Stiglingh, Koekemoer, Van Schalkwyk, Wilcocks, De Swardt & Jordaan, 2010:680). The Act provides for the full deduction of interest expense from the trade income of the issuer (borrower) if interest is incurred in the production of income. Interest incurred in the production of income normally comes from the following interest-bearing debt instruments:

- Shares, bonds, debentures, bills, promissory notes and certificates
- Deposits with banks or financial institutions
- Secured or unsecured loans
- Interest rates SWAPS or Options

It specifically excludes leases. The interest constitutes taxable gross income in the hands of the holder (the lender) of the debt instrument. Thus all the interest incurred from both long-term and short-term borrowing is tax deductible in the hands of the issuer of the debt instruments, and fully taxable in the hands of the holder. This effectively discounts the cost of debt to the borrower. The effective cost of debt to the firm that issues debt instruments is therefore given by the following formula:

$$K' = (1 - T_c) \times I_{debt} \tag{2.8}$$

Where:

K' = after tax cost of debt

T_c = corporate tax rate

I_{debt} = interest of debt

2.3.3 Taxation of Dividends and Share Capital Gains

According to Stiglingh *et al.* (2010:78), in South Africa, dividends are paid out of taxed profits and they are further subject to a withholding tax (secondary tax on companies) of 10%. The taxation of dividends is dealt with under sections 10 (1) (k) (i) and 10 (1) (k) (ii) of the Income Tax Act. From 1 April 2012, the secondary tax on companies is replaced by the dividend taxation which is levied at 15% on dividends paid. The definition of dividends specifically excludes share buybacks. Share buybacks, together with share disposals, are taxed under the Capital Gains Tax which was introduced in October 2001.

The taxation of debt interest, dividends and capital distributions in South Africa is therefore similar to the taxation practices in both the US and the UK. This implies that the assumptions of the capital structure tax theories, which are mainly based on practices in these countries, also apply to South African firms.

2.4 THE JSE DEBT MARKET

The JSE's interest rate market is dominated by government- and state-owned enterprises; the level of corporate activity in the debt market is very low. The total nominal value of total listed debt securities grew by 54.00% from R826, 943m in Q1-2009 to R1, 269,697m in Q3-2011. In the same period, total government debt (issued by central and local government as well as state-owned enterprises) increased by 69.08% from R556, 028m to R940, 150m. The contribution by corporates has been minimal, although total corporate debt, excluding special purpose vehicles (SPVs) and dual listings, increased by 57.84% from R155, 056m in Q1-2009 to R244, 740m in Q3-2011. The main issuers of corporate debt were banks; their nominal debt values increased by 82.28% from R96, 373m in Q1-2009 to R175, 670m in Q3-2011. The growth in other corporates was modest, with the total listed debt increasing by 17.70% from R58, 683m to R69, 070m during the same period (Johannesburg Stock Exchange, 2011:8). The growth in nominal values of listed bonds during this period is shown in Figure 2.4 below (the graph was constructed using data sourced from the Johannesburg Stock Exchange's Strategy and Legal Counsel Department).

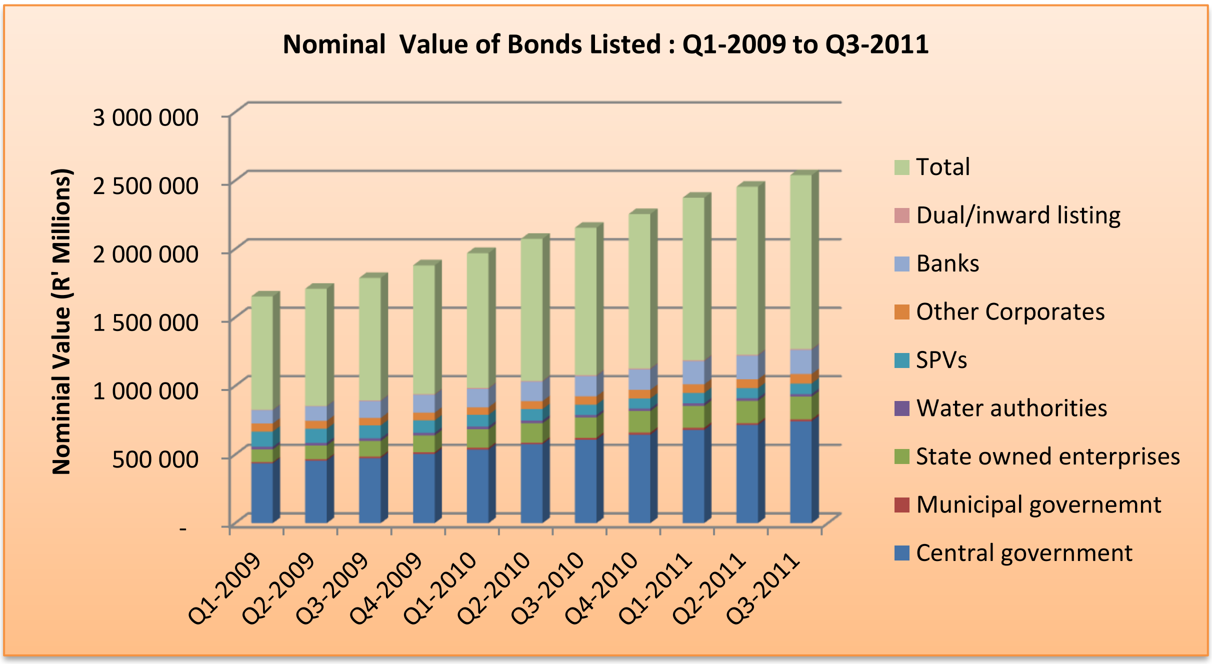
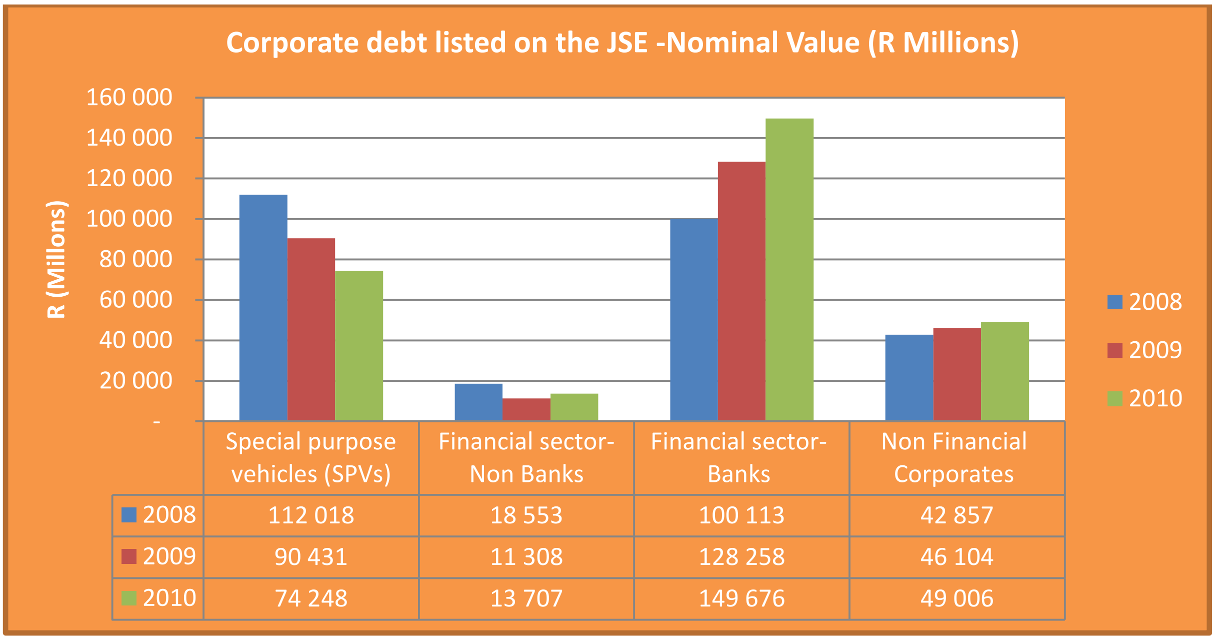


Figure 2.4: Nominal Value of Bonds Listed: Q1-2009 to Q3-2011

(Data source for the graphs: Johannesburg Stock Exchange)

The nominal value of corporate debt listed on the JSE is very small compared to the market capitalisation of the JSE. This implies that the corporate bonds market is not as developed as the equities market. Listed corporates show little appetite for listed debt securities; they may be crowded out by government- and state-owned enterprises who dominate the debt market. The financial firms are the leading players in the listed corporate debt securities, with banks dominating all corporates. For example, in 2010, the nominal value of listed debt held by banks was R149, 676m; non-banking financial firms had a total debt of R13, 707m; and the other corporates only had an outstanding listed debt of R49, 006m. Taking into account that there are only four major banks in South Africa, this makes the banks the main players in the public corporate debt markets. Figure 2.5 below shows a breakdown of corporate debt listed on the JSE for the years 2008-2010.

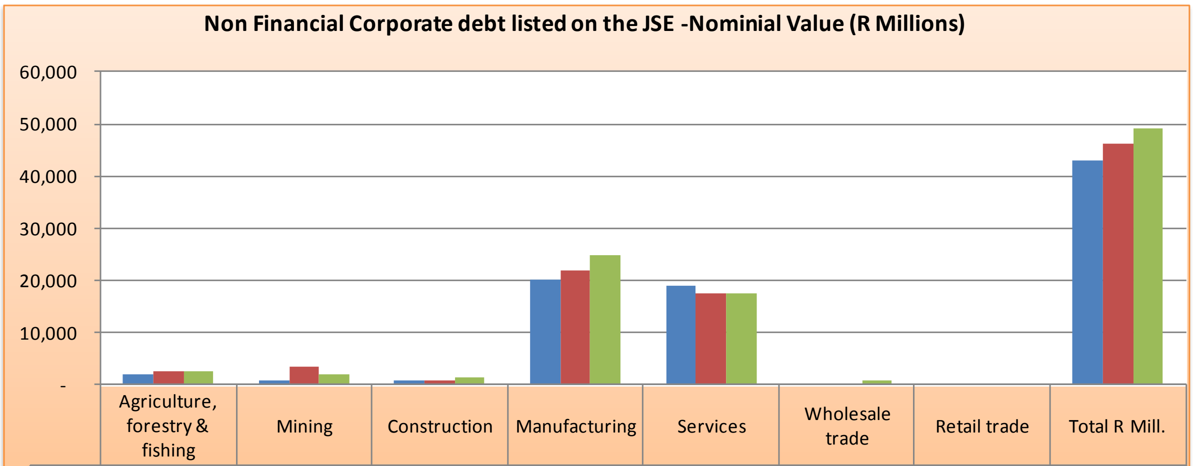


	Special purpose vehicles (SPVs)	Financial sector-Non Banks	Financial sector-Banks	Non Financial Corporates
2008	112 018	18 553	100 113	42 857
2009	90 431	11 308	128 258	46 104
2010	74 248	13 707	149 676	49 006

Figure 2.5: Corporate Debt Listed on the JSE - Nominal Value (R Millions)

(Data source for the graphs: Johannesburg Stock Exchange)

The breakdown, by sector, of non-financial corporate debt outstanding at the end of the years 2008, 2009 and 2010 is shown in Figure 2.6 below. The nominal value of listed debt securities issued by non-financial firms increased by 14.35% from R42, 857m in 2008 to R49, 006m in 2010. The main issuers were firms from manufacturing and services sectors, which respectively accounted for 50.63% and 35.85% of the total non-financial corporate debt in 2010. Firms in the retail and entertainment and leisure sectors did not list any debt during the same period. The total nominal values of outstanding tradable debt securities for mining and construction firms were R2, 029m (4.14% of the total listed non-financial corporates in 2010) and R1, 345m (2.74%) respectively. Mining firms, which are normally characterised by high capital expenditures, use less public debt. This set of statistics indicates that most non-financial firms do not rely on public debt for their financing needs. This may imply that they rely more on other debt sources which may include privately placed debt securities, straight bank loans, finance leases and Euro bonds. The main motivation for foreign borrowings may be the attractive loan terms as well as the low and less volatile interest rates on Euro bonds. The management of such loans has been further simplified by the development of both the interest rate and currency derivatives. Firms with overseas operations may choose to borrow abroad so as to match their borrowings with revenue sources; this is an effective technique for managing exchange rate risk.



	Agriculture, forestry & fishing	Mining	Construction	Manufacturing	Services	Wholesale trade	Retail trade	Total R Mill.
2008	2,000	897	850	20,215	18,895	-	-	42,857
2009	2,500	3,357	850	21,901	17,496	-	-	46,104
2010	2,500	2,029	1,345	24,812	17,570	750	-	49,006

Figure 2.6: Non-financial Corporate Debt Listed on the JSE - Nominal Value (R Millions)

(Data source for the graphs: Johannesburg Stock Exchange)

2.5 MACRO-ECONOMIC CHANGES AND CAPITAL STRUCTURE DYNAMICS

Like all emerging economies, the South African economy has been growing very well, with GDP averaging 3.26% per annum (1995-2010). This growth has been driven primarily by the stable and favourable macro-economic environment as well as the record growth in the prices of the resources which dominate the JSE. The growth in returns of the firms listed on the JSE has followed a similar pattern. This economic growth has, however, not been smooth. The economy slowed down in

2002-2003 (the GDP declined to 2.95% in 2003) as well as in 2008-2009 (the economy went into a recession in 2009 and the GDP growth rate declined to -1.68%). These shocks resulted from the currency crisis (the Rand appreciated 28% against the USD), a sharp decline in agricultural production, and the global financial crisis. This slowdown also affected the returns of the JSE equities, with all the indices registering a negative growth in the respective periods. Apart from these two shocks, the returns on the JSE equities have always been very high. The financing patterns of firms generally follow the performance of the stock market, with the market being categorised into three phases:

- ***Static state***: The share returns are neither growing nor declining; they are static.
- ***Rising state***: The stock market returns are growing.
- ***Declining state***: The market is recording negative growth; share returns are declining.

There is evidence that firms time their equity issuances to coincide with the rising market (Baker & Wurgler, 2002:1). Issuances made during this state have a high chance of success and the net proceeds are higher, as the share prices are at their highest. Firms avoid issuing equity when the market is falling; instead, they issue debt during this period. This implies that the leverage of firms will decline in a rising market and increase when the market returns decline. This financing behaviour is expected to have been followed by the JSE listed firms as well. The firms would have issued more equity than debt, except for the periods 2002-2003 and 2008-2009 when the share returns declined.

Debt issuance should also follow the returns on the interest rate markets, with firms timing the interest rate market as well. The cost of borrowing depends on the level of interest rates. Firms would be expected to borrow more when the interest rates are low and to borrow less when the interest rates are at their highest. The effective cost of a loan is lower when interest rates are low (the borrowing proceeds are higher at the same interest cover ratios). The South African interest rates have been declining since 1997 and they hit their lowest level in 2010. Debt issuance is expected to have followed this pattern of interest rates, with more debt being issued during the periods

1999-2001, 2003-2007 and 2009-2010. The firms would be expected to have issued less debt in the periods 1995-1998, 2002-2003 and 2008-2009, as the interest rates were high. There were, however, periods that were favourable to the issuance of either debt or equity; the final decision would be at the discretion of management. It must be noted that although the states of the stock and debt markets play a significant role in the security issuance decision, the final decision would be a trade-off between other firm-specific factors (current level of cash holdings, firm credit ratings, management expectations, industry leverage ratios, level of bankruptcy costs and the riskiness of the project being considered) and the discretion of management. Management would balance all factors and then decide which security should be issued.

Lastly, the South African public debt market is dominated by government- as well as state-owned enterprises and these players tend to crowd out the JSE corporates. The corporate public debt securities are mainly issued by banks and other non-bank financial firms such as the insurance firms. Non-financial firms issue very little public debt. This implies that they rely on bank loans, private loans, finance leases or Euro loans for debt finance. This has a bearing on the debt capacity and the cost of borrowing for the firms; loans from banks and private sources are generally more expensive that public debt. The less-developed public debt market may also force firms to rely more on internal funds and outside equity for their financing.

2.6 SUMMARY

This chapter provided a review of the South African macro-economic environment. Since 1990, the country has experienced three major economic shocks. The first shock occurred in the period 1989 to the first half of 1993, and the second negative cycle began in 1997 and ended in the last quarter of 1999. The third shock, which ended a 99-month high growth cycle, began in November 2007, reaching the lowest point in March 2009 and returning to the original peak in February 2010. There have been minor shocks as well, with the latest occurring in the period 2000-2003. These shocks define the country's business cycles, which in turn affect corporate financing and performance.

The chapter further provided an overview of the practice of monetary policy in South Africa. The monetary policy transmission mechanism affects the inflation, interest and exchange rates, and this ultimately affects returns from the Johannesburg Stock Exchange.

The last part of the chapter provided an overview of the structure and operations of the Johannesburg Stock Exchange as a primary capital market for South African firms.

The next chapter reviews and evaluates the current literature and empirical work on the main capital structure theories.

CHAPTER 3
A STUDY OF THE CAPITAL STRUCTURE LITERATURE

3.1 INTRODUCTION

This chapter covers the literature survey of both empirical and theoretical work on capital structure. The importance of capital structure in firm valuation was first debated by Modigliani and Miller in 1958 and it is a logical step to start the discussion there. Their 1958 publication sparked a lot of interest in the subject and since then, there have been major contributions to the development of corporate financing theory. The most significant contributions include those of:

- Kraus and Litzenberger (1973): They developed the trade-off theory from the work of Modigliani and Miller (1963).
- Myers (1984) and Myers and Majluf (1984): They developed the pecking order theory of financing.
- Jensen and Meckling (1976) and Jensen (1986): They developed the agency cost theory of corporate financing.
- Baker and Wurgler (2002); Korajczyk, Lucas and McDonald (1992); and Lucas and McDonald (1990): They advanced the information asymmetry theories (signalling and market timing theories) of corporate financing.
- Jalilvand and Harris (1984) and Marcus (1983): They developed the partial adjustment models used to estimate the speed and frequency of target adjustment by firms.

Most of the empirical tests and theoretical arguments have been focused on identifying both country-specific and firm-specific factors that influence the capital structure decision of firms. These factors have been identified as:

- **Firm-specific factors:** asset tangibility; profitability; competitiveness; earnings volatility; size; growth rate; financial distress and bankruptcy costs; agency costs; credit ratings; dividends and share buybacks; internal funds deficiency and investment programmes; state of the stock and bond markets;

tax factors; the degree of the firm's capital market orientation; peer or industry capital structure; and managerial factors.

- **Country-specific factors**: global and local macro-economic conditions and business cycles; the level of development of the local capital market; the performance of the stock market; corporate governance systems; and Civil or Common law orientation.

All these factors combine to shape the financing policy of the firm. The trade-off and pecking order theories have emerged as the leading and competing theories that can best explain the financing behaviour of firms (Hennessy, Livdan & Miranda, 2006:1 and Mehrotra, Mikkelson & Partch, 2005:18).

The chapter is structured as follows: Section 3.2 reviews the seminal work of Modigliani and Miller (1958 and 1963). This work marked the beginning of the current debate on capital structure relevancy. Section 3.3 discusses the post-Modigliani and Miller theories on capital structure, with special emphasis on the basis and implications of the theory. Section 3.4 reviews the prominent modern capital structure theories. Section 3.5 reviews the trade-off and pecking order theories as the leading capital structure theories. It also discusses the empirical evidence of these theories. Section 3.6 discusses the reliable determinants of capital structure. Section 3.6.1 provides a detailed discussion of the identified relevant firm-specific factors that affect the capital structure decision. Sections 3.6.2 and 3.6.3 provide a detailed discussion of the identified relevant country-specific factors that affect the capital structure decision. These sections also present detailed empirical evidence on the effects of the identified factors. Section 3.6.4 discusses the implications of these factors for the financing behaviour of South African firms. Section 3.7 discusses the concepts of costs of capital and how these link to firm valuation methods. The chapter ends with a critical analysis of the leading theories and then suggests a way forward in solving the capital structure puzzle.

3.2 EARLY BEGINNINGS OF CAPITAL STRUCTURE THEORY

The controversy around capital structure decisions, together with the importance of capital structure in firm valuation, was first tackled by Modigliani and Miller in their seminal work in 1958. In this paper, Modigliani and Miller argued that capital structure is irrelevant in firm valuation. Since its publication, this paper has sparked a lot of debate on the composition of the firm's capital structure, with Weston (1963:105) conceding that "*Modigliani and Miller have thrown traditional concepts of cost of capital structure into turmoil* ". Before the publication of Modigliani and Miller's paper in 1958, many financial economists had assumed that this subject was a settled matter. In their publication, and assuming perfect and frictionless capital markets, Modigliani and Miller (1958) came up with four propositions regarding capital structure decisions and the value of a firm. Their paper was based on the assumptions that capital markets are frictionless, that firms and individuals can borrow and lend at the risk-free rate, that there are no bankruptcy costs, that all firms are in the same risk class, that there are no corporate and personal taxes, that all cash flow streams are perpetuities, that there is zero information asymmetry, and that there are zero agency costs (Modigliani & Miller, 1958:265).

In ***Proposition I***, also known as the *capital structure irrelevance proposition,* Modigliani and Miller (1958) argued that the value of a firm is independent of its capital structure. Firm value only depends on the free cash flows (FCFs) that the firm's assets generate. To obtain firm value, these cash flows are discounted at the firm's cost of capital, which is a constant at all levels of leverage (Brealey, Myers & Allen, 2008:476). They argued that firm value cannot be altered by changing the firm's capital structure; there is no magic in leverage. Ryan (2007:193) restated the proposition as:
"*The average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalization rate of the pure equity stream of its class"*

This can be expressed mathematically as:

$$V_{geared\ firm} = V_{ungeared\ firm} \qquad (3.1)$$

Where:

$V_{geared\ firm}$ = *value of a geared firm*

$V_{ungeared\ firm}$ = *value of an ungeared firm*

This means that if the geared and ungeared firms generate equal cash flows, then their values will be equal, since their discount rates are equal. The discount rate is given by the firm's Weighted Average Cost of Capital (WACC). This is equal for both geared and ungeared firms:

$$WACC_{geared\ firm} = WACC_{ungeared\ firm} \tag{3.2}$$

For the geared firm, the WACC is obtained from the equation:

$$WACC = \frac{D}{(D+E)} \times K_d + \frac{E}{(D+E)} \times K_e \tag{3.3}$$

Where:

D = market value of debt

E = market value of equity

K_d = cost of debt

K_e = cost of equity

Equation 3.3 can also be expressed as:

$$K_{eg} = K_{eu} + \frac{D}{E} \times (K_{eu} - K_{eg}) \tag{3.4}$$

Where:

K_{eg} = cost of equity in a geared firm

K_{eu} = cost of equity in an ungeared firm

The implications of Proposition I are shown in Figure 3.1 below. The firm's WACC is not a function of capital structure. It is constant at all levels of leverage. The increasing cost of equity is offset by the increasing proportion of cheaper debt.

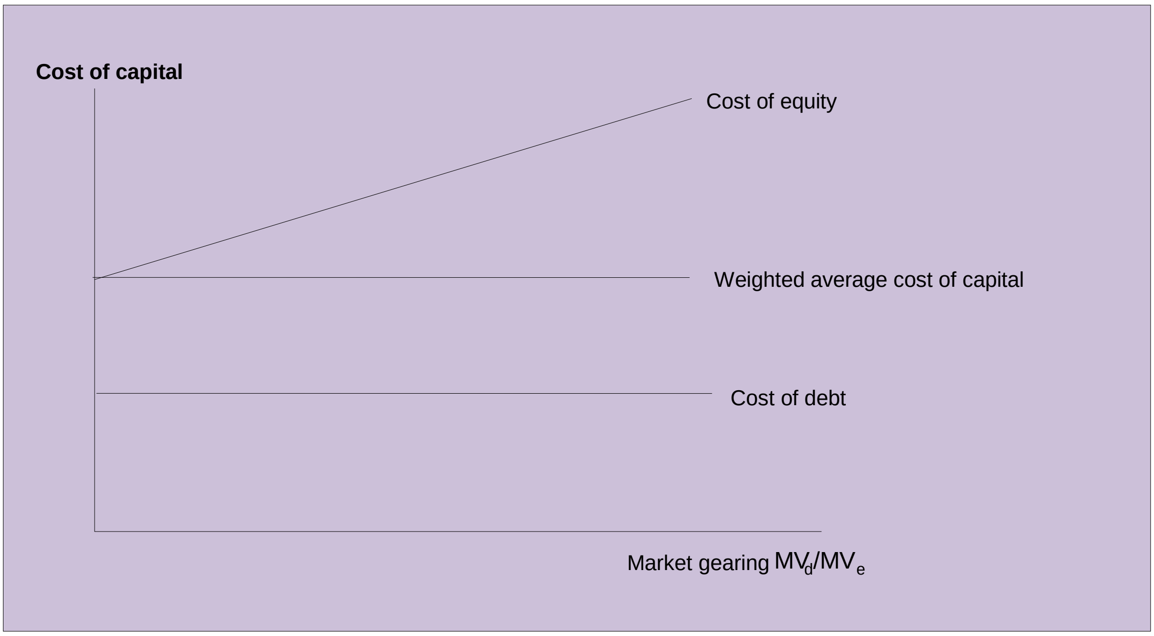


Figure 3.1: Modigliani and Miller Propositions I and II - The Zero Arbitrage Relationship Between the Weighted Average Cost of Capital and Market Gearing (No Taxes)

(Ryan, 2007:198)

Proposition II: In proposition II, Modigliani and Miller (1958) argued that *the rate of return on equity grows linearly with the debt-equity ratio expressed in market values*. This is also shown in Figure 3.1 above.

The rate of return on equity in a geared firm, R_e, is equal to the cost of equity in the geared firm, K_e; and proposition II can be stated as:

$$R_{eg} = R_{eu} + \frac{MV_d}{MV_e} \times (R_{eu} - R_d) \qquad (3.5)$$

Where:

R_{eg} = required rate of return on equity for a geared firm

R_{eu} = required rate of return on equity for an ungeared firm

R_d = required rate of return on debt

MV_d = market value of debt

MV_e = market value of equity.

Proposition III states that *the distribution of dividends does not change the firm's market value: it only changes the mix of equity (E) and debt (D) in the financing of the firm.*

Proposition IV states that *in order to decide on an investment, a firm should expect a rate of return at least equal to its return on equity* (R_e), no *matter where the finance would come from*. This means that the marginal cost of capital should be equal to the weighted average cost of capital. The constant r_a is sometimes called the *"hurdle rate"* (the required rate of return for capital investment).

Using arbitrage and perfect market assumptions, Modigliani and Miller proved all these propositions to be correct. These propositions laid down the foundations for the capital structure irrelevancy theory which has remained valid under the assumptions of a perfect market. However, real world markets are imperfect. In the real world, capital markets are not frictionless; there are transaction costs; firms and individuals cannot borrow and lend at the risk-free rate; firms do not face the same risk class; investors and firms both pay taxes; cash flow streams are not perpetuities as assumed; and information asymmetry, agency costs and bankruptcy costs are a reality. These market imperfections are the order of the day and they invalidate the capital structure irrelevance theory. It was due to the existence of these imperfections that Modigliani and Miller revised their 1958 paper in 1963 to incorporate the impact of taxes, bankruptcy costs and other market imperfections on the capital structure decisions.

3.3 CAPITAL STRUCTURE IN PRACTICE

Adjusting their models to accommodate the real world conditions, Modigliani and Miller (1963) concluded that capital structure is relevant in firm valuation. This relevance is due to the presence of the market imperfections that they ignored at first (Stewart, Smith, Ikenberry, Nayer, McVey & Anda, 2005:38). Further evidence against the capital irrelevance theory in the real world was presented by Castanias (1983:1629). In his research, he tested the relationship between failure rates and leverage ratios for 36 lines of business and established that the results were inconsistent with the capital structure irrelevance hypothesis; capital structure does matter, and financial distress costs are a reality. This does not, however, invalidate the theory if the assumptions made earlier are valid; hence the theory remains valid under those assumptions. The main market imperfections that Modigliani and Miller (1963) incorporated into their analysis were taxes, financial distress and agency costs.

3.3.1 The Impact of Taxes

In almost all regimes across the world, firms and individuals pay taxes. Under most tax regimes, debt interest or finance charges are tax deductible in arriving at the firm's taxable profits. This constitutes the tax benefit of debt finance. That is, there is an added advantage of financing through debt: debt interest is tax deductible. This interest deductibility reduces the overall cost of debt or it gives rise to a benefit of using debt, namely the tax shield. The interest tax shield effectively reduces the firm's WACC:

After-tax cost of debt: $K'_d = K_d(1 - T)$

Where:
T = corporate tax rate

The after-tax required rate of return on debt is given by: $R'_d = R_d(1 - T)$

After-tax WACC*:*

$$WACC = \frac{D}{(D+E)} \times K'_d + \frac{E}{(D+E)} \times K_e \qquad (3.6)$$

Thus proposition I is reduced to:

$$K_{eg} = K_{eu} + \frac{D}{E} \times (K_{eu} - K'_d) \qquad (3.7)$$

Proposition II is reduced to:

$$R_e = R_{eu} + (R_{eu} - R'_d) \times \left(\frac{MV_d}{MV_e}\right) \qquad (3.8)$$

In conclusion:

$$MV_L = MV_{UL} + PV_{TS} \qquad (3.9)$$

Where:

MV_L = market value of geared firm

MV_{UL}= market value of ungeared firm

PV_{TS} = present value of tax shield

The implications of equations 3.7 and 3.8 are that the firm's WACC decreases as the leverage ratio increases, and the firm's market value (MV) increases as the D/E ratio (the ratio of the market value of debt to the market value of equity) increases. The argument is therefore to use as use as much debt as possible so as to maximise firm value. That is, to maximise a firm's value, managers must exhaust the debt capacity of the firm, as this minimises the WACC and leads to an optimal interest tax shield. Modigliani and Miller (1963) initially argued that, given the value of the tax shield, firms should gear up to 100%, as this leads to an optimal firm value. The impact of taxes on the cost of debt, the WACC and the firm value is illustrated in Figure 3.2 below.

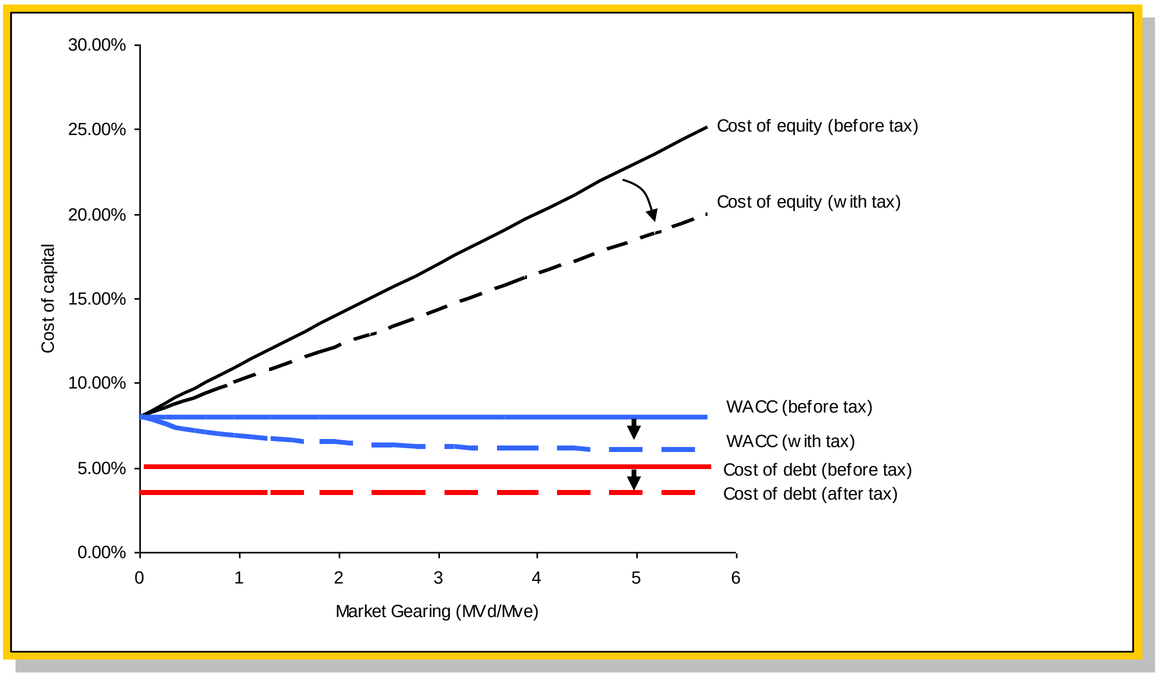


Figure 3.2: Modigliani and Miller Propositions I and II - The Impact of Tax upon the Weighted Average Cost of Capital

(Souce: Ryan, 2007:201)

In the real world, firms hardly ever gear up to 100% (Ryan, 2007:201). This is because, at extreme levels of gearing, financial distress and agency costs will outweigh the net benefits of debt, and the cost of both debt and equity will rise, leading to an increase in the WACC and a decline in firm value.

3.3.2 The Impact of Financial Distress Costs

According to Altman (1984:1067), direct bankruptcy costs include legal costs, accounting costs, filling costs and other administration costs, while indirect bankruptcy costs include lost profits. He argues that these costs are not trivial; they can exceed 20.0% of the firm value, but they generally range between 11.0% and 17.0% of the firm value (Altman, 1984:1087).

Bankruptcy occurs when the firm breaches its loan stock covenants. At the extreme, the firm defaults in servicing its debt, and this may lead to bondholders filing for bankruptcy. Bankruptcy is very costly, as the firm has to sell its assets at discounted prices in order to settle with creditors. At extreme levels of gearing, the costs of both equity and debt should rise as investors begin to factor in the costs of financial distress in pricing these securities. The costs of financial distress are both direct (accounting fees, legal fees and trustee fees) and indirect (disruption in management; employee costs such as low morale and high staff turnover; and loss of customers) (Bessler, Drobetz & Kazemieh, 2008:18). This implies that at low levels of leverage, the firm benefits from the tax shield, and its value is expected to increase. However, this happens only up to a certain point where the costs of financial distress begin to creep in; these offset whatever tax benefit the firm has, and thus the value of the firm begins to decline. This is illustrated in Figure 3.3 below.

3.3.3 The Value-Maximising Capital Structure

$$MV_L = MV_{UL} + PV_{TS} - PV_{FD} - PV_{AC} \qquad (3.10)$$

Where:

PV_{FD}= present value of financial distress costs

PV_{AC}= present value of agency costs

The firm's value is maximised at the point where the marginal benefit of the tax shield just offsets the marginal cost of the PV of both financial distress and agency costs. This is illustrated in Figure 3.3 below.

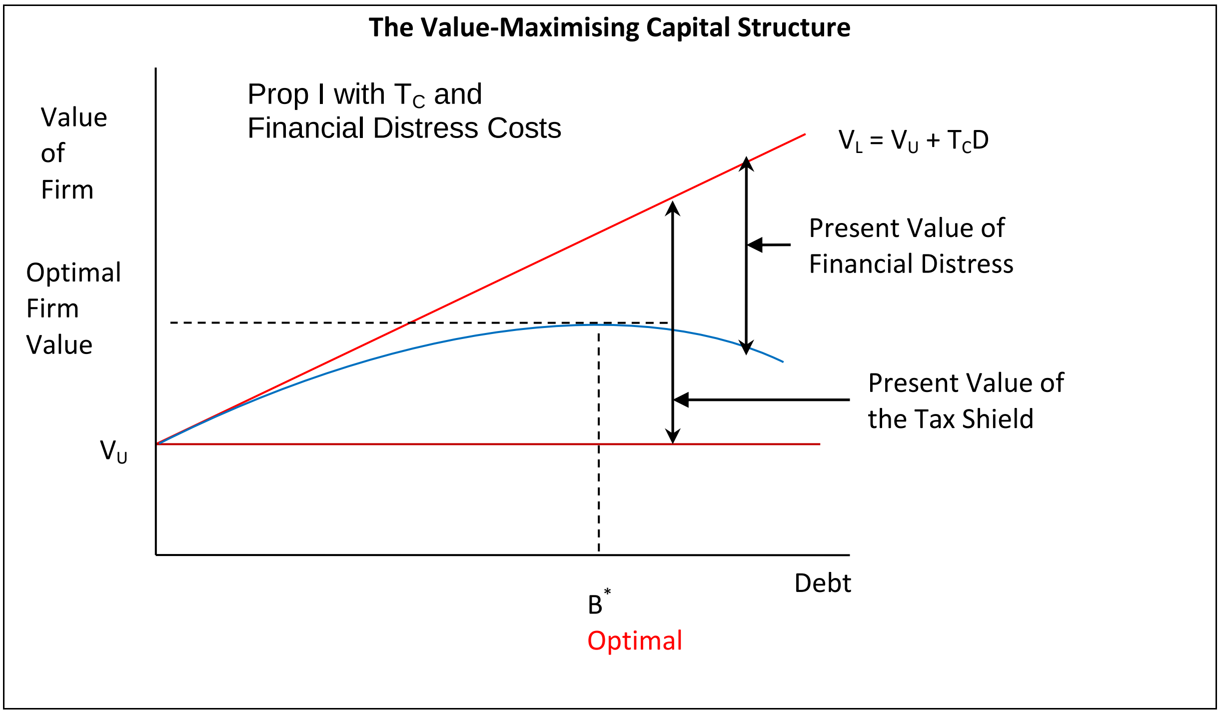


Figure 3.3: The Relationship between the Default Risk and the Weighted Average Cost of Capital under the Impact of Tax

The value of the firm is maximised at point B, where the marginal benefit of the tax shield is just offset by the increase in financial distress costs. From zero leverage up to point B, tax shield benefits dominate, and this result in an increase in firm value up to an optimal point B. Beyond point B, financial distress (default risk) costs dominate, leading to a decline in firm value. The implication of this analysis is that too little debt in the capital structure can destroy value, as the firm fails to fully utilise its tax shield benefit. At the same time, too much debt also destroys value by increasing the probability of default and thus making the probability of financial distress costs a reality. Warner (1977:345), using failed rail companies, investigated the size and significance of both the direct and the indirect costs of bankruptcy. He noted that these costs are normally anticipated or speculated. They cannot be quantified until bankruptcy occurs. He concluded, however, that these costs are very small, but that they cannot be neglected. On the contrary, Haugen and Senbet (1978:384) presented an argument that bankruptcy costs are insignificant in the determination of a firm's optimal capital structure. They argued that, under the assumptions that capital market prices are competitively determined by rational investors, bankruptcy costs are negligible or non-existent. They further argued that it is common to misallocate liquidation costs as bankruptcy costs. According to Haugen and Senbet (1988:38), liquidation costs cannot be linked to the capital structure decision. The bankruptcy costs can easily be eliminated by including simple features into corporate charters and bond indentures. The importance of bankruptcy cots on capital structure however still remains an unresolved puzzle.

The costs of bankruptcy are calculated as a percentage of firm value, but the expected costs increase with the probability of bankruptcy. Under the optimal financing policy, the firm trades these costs off against the tax shield benefits. The optimal trade-off point therefore occurs at a point where the difference between the two is zero. This is defined by Modigliani and Miller (1963) as the optimal leverage point where the firm value is maximised.

The conclusion from the Modigliani and Miller (1963) analysis was that, when taxes and market imperfections are incorporated into the analysis of capital structure decisions, capital structure decisions are relevant to firm valuation. This means that firms have an optimal capital structure and that the optimal capital structure corresponds to the maximum value of the firm. The firm's WACC is at its minimum at this point. That is, firm value maximisation occurs at a point where the WACC is minimised (Shackelton, 2009:120). The question is: How important is this optimal leverage to corporate financing decisions? Another question that arises is: Do firms follow this optimal financing policy in practice? Evidence from past studies shows that, although firms have target leverage ratios, they rarely gear up to this optimal level (Drobetz & Wanzenried, 2006:956). Furthermore, this analysis assumes a static capital structure, but in reality, firms do rebalance their leverage, and thus the appropriate descriptor is a dynamic capital structure theory (Drobetz & Wanzenried, 2006:942). This behaviour fits in with the firm's operating environment. The work of Modigliani and Miller (1963), as stated earlier, opened doors for research in this important area of corporate finance, and to date, a number paper have been published on this topic. The reality is that, despite all these papers, the capital structure puzzles remain unsolved.

3.4 DEPARTURE FROM MODIGLIANI AND MILLER THEORIES: THE MODERN CAPITAL STRUCTURE THEORIES

Nobel Prize Laureates Modigliani and Miller (1958 and 1963) initiated a robust debate on capital structure which sparked a lot of empirical research on the subject. The resulting empirical research has produced a number of theories that attempt to explain the financing behaviour of firms. According to De Wet (2006:4); Myers (2008:217) and Barclay and Smith (2005:9), the following are the predominant capital structure theories:

- The Modigliani and Miller capital structure irrelevance theory proposed by Modigliani and Miller (1958)
- The trade-off theory, originally introduced by Kraus and Litzenberger (1973). Past research has developed a dynamic version of this theory.
- The pecking order theory proposed by Myers (1984) and Myers and Majluf (1984). Past research has developed a dynamic version of this theory.
- The agency cost theory proposed by Jensen and Meckling (1976) and Jensen (1986)
- The signalling theory and the market timing theory proposed by Baker and Wurgler (2002); Korajczyk, Lucas and McDonald (1992); and Lucas and McDonald (1990).

Other less-documented theories of capital structure include:

- The corporate control theory. This theory was proposed by Harris and Raviv (1991) and Stulz (1988), and was further developed by Israel (1991).
- The product cost theory. This theory was developed by Harris and Raviv (1991).

The above theories were an attempt by financial economists to explain the financing behaviour of firms across the globe. The number of theories illustrates the complexity of the subject. The theories have conflicting predictions about factors that determine the ultimate capital structure of a firm. The primary weakness of Modigliani and Miller's capital structure irrelevance model is that it assumes that firms operate in frictionless markets with no taxes or bankruptcy costs. These assumptions do not apply in real markets, and therefore the theory had to be revised to incorporate market imperfections together with taxes. The adjusted theory provided a basis for the formulation of the trade-off theory of corporate financing. According to the trade-off theory, firms have optimal leverage ratios where firm value is maximised. The firm's financing policy is aimed at achieving and maintaining the optimal leverage ratio. The main rival of the trade-off theory is the pecking order theory which postulates that firms do not have leverage targets, but that they rather aim to maximise their financial slack. The theory asserts that the financing of firms follows a hierarchy which descends from internal funds to external debt and external equity, and this order reflects the increasing risk of the securities. This hierarchy is caused by the asymmetry of information between mangers and investors, and it creates a signalling effect (Chirinko & Singha, 2000:418 and Shyam-Sunder & Myers, 1999:223). Further information asymmetry theories include the signalling theory and the market timing theory. The agency theory hypothesises that financing decisions have an impact on the managerial rents and on the managerial investment and operating decisions. There are agency costs associated with too much or too little debt (Jensen, 1986:324 and Myers, 2008:240). Information asymmetry theories attempt to explain financing bahaviour with reference to the existence of information differences between managers and investors, whereas the agency theories attempt to explain financing decisions with reference to the costs of conflicts of interest between managers and investors. The central argument of the agency theory is that debt can be used to reduce this conflict (La Rocca, 2011:45). Much empirical research has been conducted in an attempt to test the validity of each of these theories, but the evidence has been mixed, with conflicting results for each theory. This conflict is the main reason why the capital structure puzzle remains unsolved to this day and, according to Chirinko and Singha (2000:418), it remains enigmatic.

The sections below discuss the capital structure theories described above.

3.4.1 The Trade-off Theory

The trade-off theory is a direct consequence of an extension of the work done by Modigliani and Miller (1963), as well as the work of traditional theorists such as

Solomon (1963). Kraus and Litzenberger (1973:918) formalised these ideas into the trade-off theory. According to the static trade-off theory, firms have an optimal debt-to-equity ratio. This ratio is reached when the marginal value of tax shields on additional debt is just offset by the increase in the present value of possible financial distress costs (Brealey *et al.,* 2008:503; Modigliani & Miller, 1963:434; and Myers, 2001:88). This changes Modigliani and Miller's proposition I to the equation:

$$V = D + E = \bar{V} + (PV_{TS} - PV_{FD} - PV_{AC}) \quad (3.11)$$

In reality, this equation must relate to the market values of both debt and equity, that is:

$$V = MV_D + MV_E = \bar{V} + (PV_{TS} - PV_{FD} - PV_{AC}) \quad (3.12)$$

Where:

$\bar{V}$= market value of an ungeared firm

According to Shackelton (2009:120), this optimal capital structure coincides with WACC minimisation and Value maximisation, and this point is mathematically defined as:

$$V\frac{\partial R_V}{\partial X} = (r - R_V)\frac{\partial V}{\partial X} \quad (3.13)$$

$$(V \neq 0) \qquad \frac{\partial y}{\partial x} = 0 \Rightarrow \frac{\partial R_V}{\partial X} = 0$$

Where:

V = firm value

X = face value of debt yields

∂ = 1st derivative

Rv = WACC

y = dependent variable

X = face value of debt yields

r = interest rate

At optimal leverage, firm value is maximised whilst WACC is minimised. The static trade-off theory argues that the financing decisions are driven by the need to achieve and maintain an optimal capital structure. The aim is therefore to avoid too much or too little debt, as both situations destroy value (Barclay & Smith, 1999:8). If the firm has too little debt, it is losing out, as it is not maximising its tax shields. Such a firm will be paying higher taxes, assuming that it is profitable. To move its leverage to the optimal level, the firm should either issue more debt or increase its capital distribution to shareholders (by means of dividends and/or share buybacks) so as to pay out the excess capital. Too much debt means that the firm is destroying value, as the present value of financial distress and agency costs exceed the present value of its interest tax shield. The firm should therefore reduce its leverage to the optimal level by either issuing equity or adjusting its dividend policy so as to retain higher earnings (Stewart *et al.,* 2005:39). The adjustment process will, however, depend on a number of firm-specific factors such as firm size, profitability, debt capacity and collateral levels (stock of re-deployable tangible assets). The state of the bonds and share markets will also affect the adjustment towards this optimal capital structure (Drobetz & Wanzeried, 2006:947). The optimal target ratio can be defined either in terms of the market values or in terms of the book values of both debt and equity.

Cook and Tang (2010:76) and Flannery and Rangan (2006:471) defined the leverage ratio using market values as follows:

$$MDR_{i,t} = \frac{D_{i,t}}{D_{i,t} + S_{i,t}P_{i,t}} = \frac{SD_{i,t} + LD_{i,t}}{SD_{i,t} + LD_{i,t} + S_{i,t}P_{i,t}} \quad (3.14)$$

Where:

$MDR_{i,t}$= market-to-debt ratio

$D_{i,t}$ = book value of interest bearing debt

$SD_{i,t}$ = book value of short-term interest bearing debt

$LD_{i,t}$ = book value of long-term interest bearing debt

$S_{i,t}$ = number of ordinary shares

$P_{i,t}$= ordinary share price

Cook and Tang (2010:76) also defined the leverage ratio in terms of the book values of equity and debt as:

$$BDR_{i,t} = \frac{D'_{i,t}}{D'_{i,t} + BVE_{i,t}} = \frac{SD_{i,t} + LD_{i,t}}{TA_{i,t}} \quad (3.15)$$

Where:

$BDR_{i,t}$= book-to-debt ratio $D'_{i,t}$ = book value of debt

$BVE_{i,t}$= book value of equity

$TA_{i,t}$= book value of total assets

The MDR ratio fluctuates with the changing prices of the debt and equity securities. If this measure is used, firms will not have a static leverage ratio, but rather a dynamic one which reflects the changing market values of outstanding and new securities. On the other hand, the BDR ratio remains constant throughout the year unless new securities are issued or retired. The BDR therefore presents a stable measure of the firm's debt ratio, but the MDR ratio presents a true leverage measure of the firm. Most empirical work, for example that of Fama and French (2002:8); Hovakimian, Opler and Titman (2001:8); Leary and Roberts (2005:2588); Welch (2004:107); and Welch (2011:5), has tended to focus on the MDR rather than the BDR. Other studies, notably those of Flannery and Rangan (2006: 480); Hovakimian (2004:1047); and Hovakimian and Li (2010:5) used both measures.

Although firms from the same industry are expected to have similar patterns of debt ratios, it is observed that heterogeneity in leverage is persistent even in firms from the same industry. The optimal debt ratio is a function of the firm-specific characteristics of the individual firm. According to Ali Ahmed and Hisham (2009:62); Frank and Goyal (2009:26); Huang and Song (2006:22); Rajan and Zingales (1995:1453); Shyam-Sunder and Myers (1999:224); and Titman and Wessels (1988:17), the leverage ratios are mainly driven by the firm's age, asset tangibility and structure, size, financial distress costs, profitability, growth rate, non-debt tax shields, internal funds deficiency, and earnings volatility. Mature firms, which Stewart *et al.* (2005:39) call "*value*" firms, tend to be very profitable, have less growth options, and generate excess cash. This can result in what Jensen (1986:323) and

Stewart *et al.* (2005:39) call the "*free cash flow*" problem. Free cash flow is the cash flow in excess of the capital required to invest in all available projects with a positive net present value (NPV-positive projects) (Jensen, 1986:323). Furthermore, mature firms tend to have higher stocks of tangibles, less volatile earnings, lower financial distress costs and deliberate higher internal funds deficiencies due to generous capital distribution policies. This implies that value firms have higher debt capacities, since they can access cheaper debt at attractive terms. This makes debt finance more attractive to these firms.

According to the trade-off theory, the financing requirements of value firms are mainly driven by the need to maximise the present value of their tax shields, as they have a lot of profit with which to capture a larger portion of interest tax relief. To achieve these goals, the theory asserts, value firms normally dispose of the excess cash by paying dividend bonuses as well as purchasing more of their shares and replacing this portion of equity with debt. This increases the present value of the tax shield by increasing the tax deductible debt interest. The theory argues that value firms tend to have higher debt-to-equity ratios to reflect these financial realities. The primary drawback of this theory is that it advocates optimal leverage. It does not incorporate the firm's need for financial flexibility. It is implausible that a firm can deliberately gear to the optimal level. Past research has shown that firms value financial flexibility (Graham & Harvey, 2001:232). This implies that their financing needs are driven by the need to build and maintain financial flexibility. This entails maintaining reserve borrowing and equity raising capacities. The value of financial flexibility cannot be discounted (Marchica & Mura, 2010:1339). Myers (2001:83) observed a negative correlation between firm profitability and leverage. That is, during profitable years, management concentrates on paying down debt and borrows less, as the firm has increased internal equity in the form of retained earnings. This financing pattern reduces the firm's outstanding debt and increases its future borrowing capacity. It also has the potential to increase its equity-raising capacity, as the firm carries less debt which reduces its cost of equity. This financial slack makes up the firm's financial flexibility. This is the central argument of the pecking order hypothesis.

On the other hand, small, fast-growing and unprofitable firms are expected to be financed through equity, making them less geared. Their financing needs, according to Stewart *et al.* (2005:39) are driven by the need to avoid the under-investment problem as well as to maintain adequate financial flexibility in order to be able to carry out their business plans. These firms generate less profit and therefore have minimal potential tax shield benefits. Because of the heavy capital investment, they benefit from the non-debt tax shields (NDTS), which are perfect substitutes for the debt interest tax shields. That is, due to these characteristics, small firms are expected to not pay any dividends, or at least to have sticky dividend policies so as to preserve internally generated equity capital. Small firms normally have lower stocks of tangibles, are less profitable, and have lower debt capacities. This significantly increases their bankruptcy costs, thereby increasing their borrowing costs. Due to the unfavourable borrowing costs, small firms are forced to rely more on equity financing and hence they are less leveraged than large firms. The trade-off theory therefore predicts a positive correlation between leverage and asset tangibility, firm size, and profitability. This is consistent with the findings of Frank and Goyal (2009:1). Leverage is negatively correlated to growth rate, earnings volatility and financial distress costs. On the other hand, changes in new debt issued are positively correlated to asset tangibility, firm size, profitability and dividends paid; and they are negatively correlated to financial distress, firm growth rate, the non-debt tax shield and earnings volatility. Frank and Goyal (2009:1) identified 39 firm-specific factors that are associated with a firm's leverage. They identified a number of these factors that were the most important. They are presented in Table 3.1 below.

Table 3.1: The Determinants of Capital Structure

Most Reliable Factors (effect on leverage)	**Less Reliable Factors (effect on leverage)**
Median industry leverage (+)	Share returns (-)
Bankruptcy risk (-)	Net operating loss carried forward (-)
Firm's size (+)	Financial constraints (-)
Dividends paid (-)	Profitability (-)
Intangibles (+)	Change in total firm assets (+)
Market-to-book ratio(-)	Top corporate income tax rate (+)
Collateral (+)	Treasury bill rate (+)

These findings are consistent with the predictions of the trade-off theory. The firm-specific determinants affect both the firm's capacity and the cost of debt. It is, however, puzzling that the study classifies profitability as being less important. Profitability is the main determinant of the internal funds generation capacity of the firm, and this directly impacts on the firm's internal funds deficiency.

Although the trade-off theory was derived only from the trade-off of debt costs and benefits, subsequent research has extended this and linked the firm's leverage to a number of firm-specific variables. These variables determine the firm's ultimate debt ratio. Past empirical research has derived a number of regression models to demonstrate the relationship between leverage and the various firm-specific leverage determinants. These models, however, only account for quantifiable variables. They exclude all qualitative and non-measurable firm variables. This exclusion does not, however, imply that the qualitative determinants of capital structure are less important. The regression models derive from the traditional trade-off and pecking order models, which attach importance to the internal funds deficiency as the main driver of changes in debt issued.

The basic leverage model used by Frank and Goyal (2009:14) and Hovakimian and Li (2011:35) defined leverage as:

$$LEV_{i,T} = \beta_0 + \beta X_{i,T} + \varepsilon_{i,T} \qquad (3.16)$$

Where:

$LEV_{i,T}$ = firm's leverage defined in either market or book values at time T

β_0 = regression constant

$X_{i,T}$ = vector of firm-specific capita structure determinants

β = vector coefficient

$\varepsilon_{i,T}$ = error term

Kasozi and Ngwenya (2010:9) extended this regression model by incorporating the firm-specific factors and the trade-off model. They defined leverage as:

$$LEV_{i,T} = \beta_0 + \beta_1 ASSET_{i,T} + \beta_2 SIZE_{i,T} + \beta_3 FDIST_{i,T} + \beta_4 PROF_{i,T} + \beta_5 MTB_{i,T} + \beta_6 NDTS_{i,T} + \beta_7 VOL_{i,T} + \varepsilon_{i,T} \quad (3.17)$$

Where:

$ASSET_{i,T}$ = asset tangibility at time *T*

$SIZE_{i,T}$ = firm's size at time *T*

$FDIST_{i,T}$ = firm's financial distress ratio at time T

$PROF_{T}$ = firm's profitability at time *T*

$MTB_{i,T}$ = firm's growth rate at time *T*

$NDTS_{i,T}$ = firm's non-debt tax shields at time T

$VOL_{i,T}$ = firm's earnings volatility at time T

Frank and Goyal (2003b:221) and Shyam-Sunder and Myers (1999:224) developed a model that defines leverage in terms of changes in new debt issued by the firm. This definition is derived from the pecking order models that assume that any internal funds deficiency should increase the net debt issued. According to Ali Ahmed and Hisham (2009:62), the static trade-off model can be stated in terms of internal funds deficiency as:

$$\Delta D_{i,T} = \beta_0 + \beta_1 + DEF_{i,T} + \beta_2 NDTS_{i,T-1} + \beta_3 SIZE_{i,T-1} + \beta_4 STRUCTURE_{i,T-1} + \beta_5 GROWTH_{i,T-1} + \varepsilon_{it} \quad (3.18)$$

Where:

$\Delta D_{i,T}$ = changes in net debt issued at time T

$DEF_{i,T}$ = internal funds deficiency

$STRUCTURE_{i,T-1}$ = firm's asset structure

$GROWTH_{i,T-1}$ = firm's growth rate

The proxies for the above variables are defined in Table 3.2 below.

Table 3.2: Proxies for the Determinants of Capital

Factor	Proxy
ASSET= asset tangibility	Ratio of fixed assets to total assets
SIZE = firm size	Natural log of total assets
FDIST = financial distress	the De la Rey (1981) financial distress ratio
PROF = firm profitability	Return on equity
MTB = firm growth rate	Price-to-book ratio
NDTS = non-debt tax shields	Ratio of depreciation charge to total assets
VOL = volatility	Standard deviation of profit before tax
CAPEX = capital expenditure	Ratio of firm's annual CAPEX to total assets
ΔD = changes in net debt issued	Debt issued or retired
DEF = internal funds deficiency	$DIV_t + I_t + \Delta W_t + R_t – C_t = \Delta D_t + \Delta E_t$
$\mathbf{DD_{i,T}}$ = firm's debt deficiency	$DIV_t + I_t + \Delta W_t + R_t – C_t = \Delta D_t + \Delta E_t$
DIV = dividends	Dividends paid
Ri,t = current portion of long-term debt	Current portion of long-term debt
ΔWC = changes in working capital	Changes in working capital
C_t = cash flow from operations	Cash flow from operations after interest and taxes

These regression models only predict the relationship between leverage and firm-specific factors. They do not predict the effect of changes in any of the factors on leverage. Most of the factors incorporated into the regression models hardly make it into the Key Financial Performance Indicators (KFPIs) of many firms. For example, very few firms, if any, state that their objective is to maximise the NDTS or to maximise their asset structures or to increase their stock of tangible assets. Most of the firms' KFPIs relate to total financial risk, profitability, growth rate and firm value. The ultimate goal of a firm is to maximise its value (share price) through maximisation of earnings and minimisation of the WACC. These important elements are not contained in any of the regression equations. This implies that they are assumed to be unimportant. The trade-off theory is mainly founded on the assumption that optimal leverage, and hence firm value, is a function of only interest tax shields and financial distress costs. But all the regression models above exclude interest tax shields and only use the non-debt tax shields (NDTS). The models do, however, incorporate financial distress. Does this imply that interest tax shields do not matter in the financing decisions of the firm? Do financial distress costs rank higher than interest tax shields in the capital structure decision? Is there sufficient empirical evidence to support this hypothesis?

The main weakness of the above regression models is that they only account for quantitative aspects of capital structure determinants. As will be explained later, there are also behavioural factors that influence the capital structure decision.

It should be noted that past empirical evidence shows that the assumed tax benefits of debt may be overstated (Blouin, Core & Guay, 2010:195). The study by Cordes and Sheffrin (1983:104) concluded that the after-tax cost of debt varies across industries, while Kane, Marcus and McDonald (1984:852) concluded that the tax advantage and bankruptcy trade-off is so small that it is unlikely to be a determinant of observed leverage patterns. Graham (2000:1901) estimated that the capitalised benefit of the tax shield is about 9.7% of the firm value, and as low as 4.3% when personal taxes are deducted. Stewart *et al.* (2005:40) argued that the value of tax shields, which, according to research, can contribute 5%-8% of a public firm's value, may be overstated; they suggest that the need to avoid overinvestment may be the main driver of capital structure decisions in mature firms. In another study, Lemmon and Zender (2010:1171) also established that firms forego tax shield benefits associated with debt, and they do not gear to the theoretical maximum.

On the other hand, the importance of financial distress and agency costs cannot be discounted. Altman (1984:1087) used failed US firms to evaluate the empirical evidence on both direct and indirect bankruptcy costs. He found that these costs are not trivial; they exceeded 20% of the firm value in many cases. In the long run, it may be beneficial for the firm to forego tax benefits rather than to increase its exposure to bankruptcy. This is one of the reasons why firms rarely gear to the expected theoretical levels. This may explain the observed under-leverage as well as the existence of zero-leveraged firms observed in the empirical work of Minton and Wruck (2001:23) and Strebulev and Yang (2006:33). In summary, these findings provide reasons why debt interest tax shields are excluded in the regression models outlined above.

3.4.1.1 The Implications of the Trade-off Theory

The first implication of the static trade-off theory is that firms have an optimal mix of debt and equity where firm value is maximised and the overall cost of capital is minimised. Firms will strive to maintain this mix and avoid too much or too little debt, as this destroys firm value. This optimal debt-to-equity ratio varies between firms and industries, and tends to be influenced by firm-specific variables (Brealey *et al.*, 2008:520). According to Myers (1977:150), the market value of a firm consists of the value of assets in place and the value of available growth options. The assets in place are the tangibles that the firm has in stock, and these produce the current cash flows. That is:

$$V = V_A + V_G \tag{3.19}$$

Where:

V_A = value of assets in place (tangibles that generate current cash flows)

V_G = value of growth options of the firms (these are more risky than the assets in place)

This means that there are two categories of firms: firms whose values mainly consist of assets in place (those that Stewart *et al.* (2005:39) call value firms), and those whose values consist of growth options. The financing policies of these two categories of firms would be expected to be different, as the firms have different business plans.

Firms whose values mainly come from assets in place tend to be large, mature and profitable firms with stable cash flows. As their assets are less risky, these firms have larger debt capacities due to increased collateral available. Value firms face lower financial distress costs, which in turn lower their borrowing costs. Furthermore, these firms have lower stock of growth options. This implies that their capital expenditures are predictable, as they mainly relate to asset replacements. Stewart *et al.* (2005:40) argued that the financing policy of these firms is primarily driven by the need to maximise the interest tax shield. The firms have adequate profits to fully capture the increased debt interest, and this means that they can move to the optimal capital structure hypothesised by the static trade-off theory. These firms will therefore be highly leveraged (Brealey *et al.*, 2008:520; and Shivdasani & Zenner, 2005:30).

On the other hand, firms whose values mainly come from growth options tend to be small, risky and fast-growing firms which are less profitable. These firms have lower stocks of tangible assets in place and therefore have reduced debt capacities. Because of their lower profitability, these firms cannot fully capture the increased debt interest and will therefore use less debt. They also face high financial distress costs due to lower quality collateral. According to the trade-off theory, these firms will therefore have lower optimal leverage than value firms. Their financing policies are mainly driven by the need to achieve and maintain financial flexibility, which is key to exercising their growth options. According to Stewart *et al.* (2005:39), growth firms will have lower leverage so as to build and maintain financial flexibility. This financing approach enables them to exercise a higher proportion of their growth options.

How do mature value firms achieve high target levels? Stewart *et al.* (2005:40) suggested that they have two options. The first option may be to return excess capital to shareholders by means of increased dividends and/or share buybacks. If firms exercise this option, they are expected to show generous dividend payment patterns or increased share buybacks (Barclay & Smith, 2005:10). This distributed capital is then replaced with debt capital, and the net effect is to increase both leverage and deductible debt interest. The second option is to adopt a policy of financing all future investments with debt until the firm reaches the desired level of leverage.

In growth firms, the target capital structure is achieved by paying low dividends or no dividends so as to preserve the retained earnings and use these to finance the growth options. This internal equity can be supplemented with external equity. The theory therefore predicts that growth firms will issue more equity than debt, since they have low debt capacities deriving from poor profits and asset qualities.

These financing policies of both value and growth firms fully reconcile with the predictions of the agency theory. This theory is discussed in Section 3.4.3. It deals with the use of financing mechanisms to avert the agency costs of overinvestment in value firms and underinvestment in growth firms.

Is the static trade-off theory practical? Are firms expected to maintain a rigid leverage point? Ju, Parrino, Poteshman and Weisbach (2005:279) and Hovakimian *et al.* (2001:24) argued that this approach to corporate financing is impractical, as it entails a firm's continuously issuing or redeeming securities in order to achieve the optimal target leverage. Zero target deviation is therefore impossible. They argued that the static trade-off theory can be replaced by the more relevant dynamic trade-off theory which contends that even if firms have target leverage ratios, these are rarely static. As the cost of deviating from the target is very small (about 0.5% of firm value), the observed leverage ratios fluctuate around the target within an acceptable range. If the ratios deviate from the range, they are brought back through the manipulation of financing means (Fischer, Heinkel & Zechner, 1989:39 and Leland, 1994:1248-1249). This is a more realistic model than the traditional trade-off theory. Firm conditions change over time, and the debt ratios behave in a similar way. Firms would therefore have a dynamic target range debt ratio as opposed to a static ratio. The dynamic trade-off theory, however, does not specify whether the target is optimal or not. Is this adjustment towards the target capital structure frictionless, and how frequently does it occur? At what speed do firms adjust their ratios towards the target?

If the adjustment process were frictionless, then firms would not deviate from their chosen targets. But empirical work by Leary and Roberts (2005: 2613) points to the presence of adjustment costs, and presents evidence that regardless of these adjustments costs, firms still actively rebalance their capital structures. Flannery and Rangan (2006:472) argued that due to the presence of market frictions, firms will partially and infrequently adjust their capital structures towards the target capital structure. The presence of information asymmetry, transaction and adjustment costs prevents frequent and full adjustment towards the target leverage ratio. There are two approaches that can be adopted in testing for the target adjustment behaviour of corporate financing. The first type uses the debt or equity issuance decisions to test for target adjustment (Hovakimian *et al.,* 2001:7; Jalilvand & Harris, 1984:131; and Marsh, 1982:127). The central argument for this test is that firms will issue equity to move their leverage ratios towards their target and will issue (retire) equity or debt to bring down their leverage ratios towards the target. This uses the following debt-equity regressions (Hovakimian & Li, 2011:39):

$$DI^*_{i,T+1} = \alpha + \beta\left(BDR^*_{i,T+1} - BDR_{i,T}\right) + \varepsilon_{i,T+1} \tag{3.20}$$

$$ER^*_{i,T+1} = \alpha + \beta\left(BDR^*_{i,T+1} - BDR_{i,T}\right) + \varepsilon_{i,T+1} \tag{3.21}$$

Where:

$DI^*_{i,T+1}$ = latent continuous variable measuring the propensity to issue debt in preference of equity

$BDR^*_{i,T+1}$= predicted value

$ER^*_{i,T+1}$ = latent continuous variable to repurchase equity rather than retire debt

β = coefficient vector

α = regression constant

This approach is very much in contrast with both the pecking order and market timing capital structure hypotheses.

The second approach uses the one-step and two-step partial adjustment models developed by Jalilvand and Harris (1984:130). These models have since been used by other researchers, notably Elsas and Florysiak (2011b:185); Fama and French (2002:10); Flannery and Rangan (2006:472); and Hovakimian and Li (2011:36). They derived a partial adjustment model which shows that managers take steps to correct the deviation from the target; it also estimates the speed of adjustment. The basic target ratio is defined as:

$$MDR^*_{i,T+1} = \beta X_{i,T} \tag{3.22}$$

Where:

$MDR^*_{i,T+1}$ = firm i desired debt ratio at T+ 1

$X_{i,T}$ = a vector of the firm's characteristics

The standard partial adjustment model is then modelled as:

$$MDR_{i,T+1} - MDR_{i,T} = \alpha + \lambda\left(MDR^{*}_{i,T+1} - MDR_{i,T}\right) + \tilde{\delta}_{i,T+1} \quad (3.23)$$

Where:

$MDR_{i,T}$ = market-to-debt ratio

λ = speed of adjustment

$\tilde{\delta}_{i,T+1}$ = error term

According to Flannery and Rangan (2006:472) and Hovakimian and Li (2011:36), equations 3.22 and 3.23 can be reduced to a single equation:

$$MDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T} + \tilde{\delta}_{i,T+1} \quad (3.24)$$

Using the Book-to-debt ratio (BDR) defined in equation 3.16, Hovakimian and Li (2011:36) redefined the above partial regressions as:

$$BDR_{i,T+1} = \beta X_{i,T} + \varepsilon_{i,T+1} \quad (3.25)$$

$$BDR_{i,T+1} - BDR_{i,T} = \alpha + \lambda\left(BDR^{*}_{i,T+1} - BDR_{i,T}\right) + \varepsilon_{i,T+1} \quad (3.26)$$

The speed of adjustment is defined by λ.

Where:

$$BDR^{*}_{i,T+1} = \hat{\beta}X_{i,T} \quad (3.27)$$

According to Flannery and Rangan (2006:472), equation 3.26 can be re-written as:

$$BDR_{i,T+1} = \alpha + \lambda\beta X_{i,T} + (1-\lambda)BDR_{i,T} + \varepsilon_{i,T+1} \quad (3.28)$$

The leverage ratio based on market values has a lot of noise, as the security prices are subject to frequent changes, making it very volatile. The book value measures have less noise and are more stable; hence any changes in the ratios strictly reflect changes in equity or debt issued or retired.

Leary and Roberts (2005:2613); Mauer and Triantis (1994:1272) and Titman and Tsyplakov (2007:442) argued that in cases where the deviation from the target is small, it may be unprofitable to adjust the capital structure, and such deviations are therefore allowed to persist. This implies that the size of adjustment costs and the target deviation spread play a major role in the target adjustment decision. Further empirical work by Antoniou, Guney and Paudyal (2008:86); Hovakimian and Li (2011:33); Huang and Ritter (2009:267); Kayhan and Titman 2007:27); and Lemmon, Roberts and Zender (2008:1605) confirm the relevance and validity of this partial adjustment model. The partial adjustment model presents further evidence that firms do have target capital structures which they want to maintain. This evidence further supports the dynamic trade-off hypothesis; but the models do not tell us whether such a target is optimal as advocated by the trade-off theory. The value and importance of this target are also questionable, as Hovakimian and Li (2011:44) established that it takes an average of ten years for a firm to fully adjust to its target ratio. This casts doubt on whether firms do prioritise maintaining a target capital structure.

Can the results of the target adjustment models be used to reject the pecking order hypothesis? Chang and Dasgupta (2009:1794); Hovakimian and Li (2011:33); and Shyam-Sunder and Myers (1999:242) all disagreed with the discriminatory power of the partial adjustment model. In their research, they obtained the same results when they applied the tests under the pecking order behaviour. They therefore concluded that the partial adjustment model has no power to reject the pecking order hypothesis. It cannot therefore be used as the basis for confirming the dynamic trade-off hypothesis while rejecting the dynamic pecking order hypothesis. Debt ratios lie between 0 and 1, and are thus fractional. The leverage ratio has the tendency to mechanically revert to the mean even if a firm does not have a target ratio (Chen & Zhao, 2007:223). The main reason for the weakness of the partial adjustment test is cited to be the bias towards the target adjustment hypothesis (Hovakimian & Li, 2011:43). This bias can be completely eliminated by combining the debt-equity choice regressions models and the partial adjustment models. But if firms can naturally revert to a target ratio without necessarily following the partial adjustment model, how does that discredit the partial adjustment model? The partial adjustment models predict a target leverage ratio and an adjustment speed. The mean mechanical reversion model does not specify the target or the speed of such mechanical reversion. This tendency does not therefore nullify the hypothesis of the partial adjustment model in confirming the trade-off theory, whilst rejecting the pecking order theory.

The unbiased speeds of adjustment are found to be in the range of 30% per year (Flannery & Rangan, 2006:499). Hovakimian and Li (2011:43) found the adjustment speed to be much lower; it ranges between 5.5% and 7.4% per year. The above target adjusting models only quantify changes in debt. The models do not link the adjustment speeds to the variables that cause the adjustment. The various adjustment speeds are shown in Table 3.3 below.

Table 3.3: Tests on Target Adjustment Speeds

Study	Country of study	Speed of adjustment	Regression Test
Fama and French (2002)	USA	7.00-17.00%	market value of equity
Kayhan and Titman (2007)	USA	8.00%	market value of equity
Flannery and Rangan (2006)	USA	36.00%	market value of equity
Antoniou, Guney and Paudyal (2008)	UK,USA, France, Germany & Japan	32.00%	market value of equity
Huang and Ritter (2009)	USA	21.00%	book value of equity
Cook and Tang (2010)	USA	25.00%	book value of equity
Hovakimian and Li (2011)	USA	5.5-7.40%	book value of equity
Mukherjee and Mahakud (2012)	India	43.00%	book value of equity
Ramjee and Gwatidzo (2012)	South Africa	65.00%	Total long-term debt

Surprisingly, Flannery and Rangan (2006:472) expected firms to exhibit similar adjustment speeds towards the target ratio. This expectation is rather unusual, as firms have different characteristics and target deviation spreads. Elsas and Florysiak (2011b:181) confirmed heterogeneity in the speed of adjustment. This is more realistic. According to Drobetz and Wanzenried (2006:947), the speed of adjustment depends on both the firm-specific factors (growth opportunities, size, and the spread between actual and target leverage) and the macro-economic factors (these are closely linked to the economy's business cycles: the term spread, the short-term interest rate, the default spread and the TED spread - TED is the political risk premium, defined as the 3-month Eurodollar rate less the 90-day yield on US Treasury Bill (TB) . Legal and financial traditions, as well as institutional factors, affect the speed, size and frequency of adjustment (Oztekin & Flannery, 2012:88). The speeds of target adjustment will vary between countries, reflecting the differences in these factors. Countries with high-quality firms, good legal systems, favourable institutional features and stable or growing economies will exhibit a higher speed of adjustment. According to Oztekin and Flannery (2012:88), these characteristics lower adjustment costs and hence facilitate faster and more frequent adjustments.

Where firms adjust their capital structures internally, there is a negative correlation between leverage spread and adjustment speed, and the adjustment speed is positively correlated to both the firm's growth rate and size. The macro-economic factors generally predict business cycles which affect the firm's performance. The speed of adjustment is higher during the boom cycle and slows down during recession times (Hackbarth *et al*., 2006:543). In particular, the profitability of the firm would be expected to have a significant influence on the speed of adjustment. A firm whose ratio is above the target can quickly correct this position if its profitability increases and it retains its historical dividend policy. The excess profits add to the internal equity, thereby reducing leverage. Highly profitable firms can adjust their leverage ratios internally by adjusting their distribution policies; this should increase the speed of adjustment.

A number of researchers have tested both the static and dynamic theories against its main rival, the pecking order theory; and the results have been mixed. These empirical tests are contained in Section 3.5.1 below.

3.4.2 The Pecking Order Theory

The pecking order theory was first proposed by Myers (1984:576) and further developed by Myers and Majluf (1984:219). This theory rejects the idea of a target or optimal capital structure. It asserts that firms do not have leverage targets (Hovakimian, Opler & Titman, 2002:25). Myers (1984:588) argued that capital structure decisions still remain a puzzle and cannot be explained by the trade-off theory, but rather by the pecking order theory. According to this theory, the main determinant on capital structure is the firm's need to build and preserve its financial flexibility or financial slack (Brealey *et al.*, 2008:521). The firm places a premium value on creating and maintaining financial flexibility, and this flexibility is viewed as a "real option" to the firm (Shivdasani & Zenner, 2005:31). The optimal capital structure is therefore defined as the point where the firm's financial slack is optimised. This may mean a point where the firm has zero leverage or where the firm has sufficient internal funds to finance all its available growth options. The theory places les emphasis on tax benefits of debt and financial distress costs. According to Baskin (1989:33), taxes and bankruptcy costs play a less significant role in the determination of leverage. Pinegar and Wilbricht (1989:89), in their survey of what managers think of capital structure theory, concluded that financial managers are more likely to follow the pecking order theory than the trade-off theory of corporate financing. The survey done by Graham and Harvey (2001:232) on US firms also confirms the value chief financial officers (CFOs) attach to financial flexibility when designing the firm's financial structure.

Myers and Majluf (1984:219) base their theory on the existence of asymmetric information between managers and investors. This information asymmetry in turn creates a preference ranking on how firms raise additional funds (Leary & Roberts, 2010b:351). They argue that financing choices signal the firm's quality or the expected earnings quality, and firms can use their capital structures to signal their quality. Good quality firms signal their quality by relying more on internal funds to finance growth options, and poor quality firms rely on external equity. This argument is plausible. Given market frictions in raising external capital, firms would only approach capital markets if they faced an internal funds deficiency. Myers and Majluf (1984:219) contend that good quality firms prefer internal financing to external financing. Thus, for good quality firms, the financing hierarchy descends from internal funds to debt and lastly to external equity (Chirinko & Singha, 2000:424). When faced with an internal funds deficit, the managers of good quality firms would follow the external finance hierarchy. This hierarchy starts with the safest and cheapest source of external capital, which is exhausted before moving on to the next source. The hierarchy followed is: pure debt first, then hybrid debt, and lastly equity, which is the riskiest source of capital and very expensive to raise (McGuigan, Kretlow & Moyer, 2009:453). The financing hierarchy is as follows:

Retained earnings (available liquid assets) ⇒Straight debt financing ⇒Lease financing ⇒Convertible debt financing ⇒Preferred equity financing ⇒Ordinary equity financing

The pecking order theory therefore implies that leverage is a function of internal funds deficiency, as it directly reflects the deficiency in internal funds. Thus, firms with more internal funds are expected to borrow less, and will therefore be less leveraged. According to this theory, highly profitable firms should be less leveraged than less profitable firms, as they will have more internal funds available, and this lowers their financing deficits. The theory predicts a negative correlation between leverage and profitability. The pecking order theory asserts that firms prioritise maximisation of their financial slack, and they achieve this by retaining a higher proportion of their earnings. They build this financial slack by adopting conservative or sticky dividend and share buyback policies (McGuigan *et al.,* 2009:454). Firms can only consider generous dividend payments and share buybacks once they have achieved the required financial slack. Myers (1984:586) found that higher debt-to-equity ratios were found in firms with a high proportion of tangible assets and low profitability. This is contrary to the assertions of the trade-off theory. Myers and Majluf used the inverse correlation between leverage and profitability as "*the most telling evidence against the trade-off theory*" (Mehrotra *et al.,* 2005:18).

The main problem with this model is that it does not define and quantify the maximum slack or the costs associated with having too much or too little slack (Shivdasani & Zenner, 2005:31). It also does not specify when the firm should move to the next source of finance. Do firms exhaust all their internal reserves before approaching the capital markets? Do firms borrow to capacity before considering equity issuances? This is unlikely to be the case, as part of maintaining financial flexibility entails the firm having a "reserve currency" of each source of finance.

On the other hand, if there is maximum slack, will this not amount to an optimal or target capital structure? The emphasis of the theory is on maximisation of the financial slack, and this is made up of highly liquid assets such as cash, untapped borrowing facilities and marketable securities (McGuigan *et al., 2*009:454). Such a financial slack enables the firm to take advantage of highly profitable investment opportunities as they become available, and reduces the financial distress costs to the minimum. The pecking order theory therefore allows the firm to build some financial flexibility which enables the firm to maximise its investment policy. But how does the slack affect the value of the growth options? The optimal capital structure suggested by the trade-off theory minimises the firm's WACC, thus increasing the value of the growth options by lowering the hurdle rate. The pecking order theory is, however, silent on both WACC minimisations and growth options value maximisations.

As with the trade-off theory, past empirical research has derived a number of regression models to show the relationship between the firm's changes in new debt issued and the determinants on internal funds deficiency. The models only account for quantifiable variables. The qualitative and behavioural factors that determine debt ratios are excluded in these models. The models derive from the traditional pecking order as well as from the modern pecking order model, which attaches importance to internal funds deficiency as the main driver of changes in debt issued.

Shyam-Sunder and Myers (1999:224) define the pecking order model as:

$$\Delta D_{it} = \alpha + \beta DEF_{it} + \varepsilon_{it} \tag{3.29}$$

Where:

$\Delta D_{it} = amount\ of\ debt\ issued\ or\ retired$

$DEF_{it} = internal\ funds\ deficiency$

The internal funds deficit is defined as:

$$DEF_{i,T} = DIV_{i,T} + X_{i,T} + \Delta WC_{i,T} + R_{i,T} - C_T \equiv \Delta D_{i,T} + \Delta E_{i,T} \tag{3.30}$$

Where:

$DIV_{i,T}$ = dividend payments at time *T*

$X_{i,T}$ = capital expenditure at time *T*

$\Delta WC_{i,T}$ = changes in working capital at time *T*

$R_{i,T}$ = current portion of long-term debt at time *T*

C_T = operating cash flows after interest and tax at time *T*

$\Delta E_{i,T}$ = net equity issued at time *T*

This model shows that the change in new debt issued is a linear function of the firm's financing deficit. Firms will only issue debt if they have insufficient internal funds.

Under the pecking order model, firms rarely issue equity; that is $\Delta E_{i,T} = 0$. Equity issue is only done in extreme cases (Frank & Goyal, 2003b:221). As $\Delta E_{i,T} = 0$, equation 3.30 can be re-written as:

$$DEF_{i,T} = \Delta D_{i,T} = DIV_{i,T} + X_{i,T} + \Delta WC_{i,T} + R_{i,T} - C_T \qquad (3.31)$$

This model defines the internal funds deficiency as equal to the changes in debt issued, and Ali Ahmed and Hisham (2009:61) define the extended pecking order hypothesis as:

$$\Delta D_{i,T} = \beta_0 + \beta_1 DIV_{i,T} + \beta_2 R_{i,T} + \beta_3 \Delta WC_{i,T} + \beta_4 X_{i,T} + \beta_5 CFO_{i,T} \qquad (3.32)$$

Where:

$CFO_{i,T}$ = cash flow from operations

The pecking order model can also be defined in terms of the actual changes in the firm's leverage and the firm-specific factors that determine leverage. For example, Kasozi and Ngwenya (2010:9) link the changes in leverage to the firm's size, growth rate profitability, capital expenditure and dividends paid. Leverage is therefore defined as:

$$LEV_{i,T} = \mu_0 + \mu_1 PROF_{i,T} + \mu_2 MTB_{i,T} + \mu_3 SIZE_{i,T} + \mu_4 CAPEX_{i,T} + \mu_5 DIV_{i,T} + \varepsilon_{i,T} \qquad (3.33)$$

Where:

μ_0 = regression constant

The proxies for the variables are defined in Table 3.2 above.

As postulated by the pecking order theory, the model implies that firms with more internal funds face a lower internal funds deficit and will therefore borrow less. This means that highly profitable firms should be less leveraged than less profitable firms, as they will have more internal funds available. The financial slack is maximised by reducing dividends and share buybacks (McGuigan *et al.,* 2009:454). The financial slack is similar to the firm's financial flexibility, and this can be a valuable asset to a growing firm. Financial flexibility enables the firm to realise most of its growth options by reducing the agency costs of underinvestment. The value of financial flexibility is reflected in the firm's overall performance as well as its performance during economic downturns. Financially flexible firms tend to outperform financially constrained firms, as the latter only implement a few selected growth options. Financially flexible firms also perform better during economic downturns, as they are able to absorb most of the negative effects of business cycles (Bancel & Mittoo, 2011:214) and Campello, Graham & Harvey (2010: 486). Past empirical work on financial flexibility by Drobetz, Pensa and Wanzenried (2007:24); Gamba and Triantis (2008:2293); Marchica and Mura (2010:1339); and Pontuch (2011:23) does confirm the positive correlation between firm financial flexibility and the increase in new investment.

3.4.2.1 The Implications of the Pecking Order Theory

In contrast to the both the static and dynamic trade-off theories, the pecking order theory contends that firms have no optimal target leverage where firm value is maximised. The theory places more emphasis on the firm achieving an optimal financial slack. According to the pecking order theory, firms prefer internal financing, as this signals their quality. Quality firms are self-reliant; they rely less on external funds (Bessler *et al.*, 2011:18). This implies that external financing reflects the firm's internal funds deficit. Good quality firms will have lower or zero internal funds deficits while poor quality firms rely more on external funds to finance their growth options. Firms have sticky dividend policies which are meant to preserve internal funds.

This theory implies that value firms are expected to have the lowest leverage while growth firms are expected to have the highest leverage, as they face higher internal funds deficits due to their lower profitability. Taxes and financial distress costs are not the primary drivers of corporate financing policies. Firms follow the pecking order in financing their internal funds deficits. This means that they issue debt to their optimal debt capacity before they can issue shares. As value firms have higher debt capacities, the pecking order theory further asserts that firms would therefore not issue any shares post initial public offerings (IPOs) (Frank & Goyal, 2003b:228).

The theory further implies that young, growing firms which are characterised by high internal funds deficits should use more debt than equity. If the financing hierarchy is followed, then such firms will issue debt to capacity before they issue equity. The pecking order theory therefore implies that young and unprofitable firms should be highly leveraged. But the debt capacity of these firms is very small. The firms' assets mainly consist of intangibles in the form of growth options and this, coupled with lower earnings, reduces the firms' implied collateral (implied debt capacity) which then increases its borrowing costs. Lower earnings also reduce the firm's ability to service the debt. Generally, unprofitable firms tend to be poor quality firms, and they face unfavourable borrowing terms and reduced debt capacities. Although these firms are expected to borrow to capacity before issuing equity, their borrowing capacity is very restricted, and thus they will rely more on equity financing. This financing behaviour is reconcilable with the predictions of the trade-off and agency theories. Myers (1977) approaches this from the angle of the underinvestment problem in such firms. He argues that these firms cannot take on debt, as this will financially constrain them. To avert debt overhang, small and unprofitable firms tend to rely on equity financing as opposed to debt, and this violates the principles of the pecking order theory. The predictions of the pecking order theory are thus difficult to justify in poor quality firms. They can, however, be applicable to high quality firms, as they have good financing choices.

The agency theory of corporate financing is discussed below.

3.4.3 The Agency Costs Theories

Both the trade-off and pecking order theories naively assume that the interests of owners (the shareholders) and managers (the agents) are well aligned and that there is no conflict that exists between the two groups. The theories assume that managers act in good faith to maximise the firm's (or rather the owners') wealth. To achieve this, the interests of the managers would either have to be aligned with those of the owners, or be irrelevant. However, in practice this is not the case, and these assumptions are clearly misplaced. Managers have their own interests which, in most cases, have nothing to do with firm value maximisation, as they hold less that 100% of the firm's residuals (Jensen & Meckling, 1976:313).

The agency theory is derived from the conflict of interest between the firm's key stakeholders (managers, existing shareholders, new shareholders and debt holders). The theory contends that the relationship between these groups is fraught with conflicting interests concerning the operations, financing and investment policies of the firm (Harris & Raviv, 1991:302). A modern corporation is characterised by the separation of brains and capital (Shleifer & Vishny, 1997:740). Investors (existing and new shareholders, as well as debt holders), as principals, appoint managers as their agents and delegate to them the task of managing the firm and making decisions on their behalf. Thus investors entrust their investments to managers on the assumption that managers will uphold and advance their interests.

However, managers also have their own interests in the firm. Harris and Raviv (1991:300) and Myers (2008:240) argued that managers primarily seek to maximise their managerial rents which come in the form of higher-than-market-level salaries, consumption of perquisites, improved job security and, in extreme cases, the direct transfer of assets. According to Myers (2008:240), managers also improve their job security by undertaking manager skills-entrenching investments, even if these investments may not be in the best interests of the firm. Such investments align the firm's operations with the skills of managers, thus making them indispensable. The managerial rents are usually positively correlated to the size of the firm, and this compensation structure motivates the managers to engage in empire building as well as investment in risky projects at the expense of creating value (Jensen, 1986:323). All these interests are not aligned with the firm's value maximisation objectives, but rather with satisfying the interests of the agencies.

The usual expectation of shareholders is that managers, who act as their agents, will prioritise firm value maximisation. This maximisation translates into increased dividends and increased share price, and this can only be realised if managers improve the firm's operational efficiency of existing assets and invest in NPV-positive and less risky projects (Stulz, 1990:9). On the other hand, debt holders want the firm to maintain or improve its credit rating so that their investment is always protected. They want to receive their periodic interest payments while maintaining the same or better credit risk that they were exposed to at the time of lending. This protection can only be achieved if the firm avoids investment in poor and risky growth options.

There is clearly a conflict of interest between investors and managers, with each group pushing for the realisation of its interests. This conflict also extends to shareholders and bondholders (Harris & Raviv, 1991:304). Jensen and Meckling (1976:357) argued that this conflict of interest between the stakeholders may give rise to agency costs. Agency costs are costs that other stakeholders suffer as a result of managerial discretion, and these costs are real. Managers use their discretion in implementing the firm’s financing and investment programme (Stulz, 1990:5). These costs illustrate the biggest dilemma faced by investors: *how can they control managers so that they serve their interests*? According to the agency theory, firms can use their financing policies to achieve this control. Appropriate use of debt or equity can reduce the agency costs of both overinvestment and underinvestment (Stulz, 1990:3). Other mechanisms include the strengthening of corporate governance practices within firms. Firms can also introduce managerial insider ownership; this aligns the interests of managers with those of existing shareholders, but does not resolve the conflict of interest with debt holders.

3.4.3.1 Agency Costs and the Firm’s Financing Choices

Overinvestment occurs when a firm invests in value-destroying projects. These are either NPV-negative projects or high risk NPV-positive projects. Past empirical work by Jensen (1986:328) and Stulz (1990:23) identifies empire building (or managerial overinvestment) and risk-shifting (or overinvestment in risky projects) as the main types of overinvestment agency cost. Managerial overinvestment results from a conflict of interest between managers and shareholders about the firm’s investment strategy and the management of free cash flow (Jensen, 1986:323 and Stulz, 1990:23). This problem is prevalent in highly profitable firms that generate excess free cash flows, have low leverage ratios, and face limited growth options. Jensen (1986:323) defined free cash flow as the excess cash that remains after a firm has invested in all its NPV-positive projects. The main problem faced by such a firm is what to do with the excess free cash flow. The free cash flow can motivate managers to engage in empire building by acquiring poor targets and as well as to invest the free cash flows in NPV-negative projects. Because managerial rents are positively correlated to firm size, empire building improves the power, status and compensation of managers. This action by managers destroys firm value, and it is the shareholders who ultimately bear this agency cost.

Harvey, Lins and Roper (2004:27) and Stulz (1990:23) argued that the overinvestment problem can be effectively resolved by increasing leverage in such firms. Haugen and Senbet (1979:692) also contended that the agency problems associated with the consumption of perquisites and information asymmetry can be minimised through an appropriate financing package which makes use of a complex mix of debt, equity and stock options. A firm can increase its dividend and share buybacks and substitute this equity portion with debt (Harris & Raviv, 1991:300). According to Barclay and Smith (2005:11), this substitution also helps concentrate equity ownership and increase the Earnings per Share (EPS). It also helps improve the investment and operational efficiency of managers, as debt is not as forgiving as equity in terms of returns to investors. The motivation for this financing mechanism is that debt effectively disciplines management by committing the excess cash flows to debt interest payment and making a provision for debt redemption. The further disciplining effect of debt is that it gives investors the option to liquidate the firm if cash flows from investments are poor. This financing mechanism effectively deters managers from investing in inferior or NPV-negative projects (Harris & Raviv, 1991:302).

The main benefit of debt financing, according to the agency theory, is that it resolves the conflict between managers and shareholders in firms that generate excess free cash flows. Debt reduces the agency costs of overinvestment. Thus mature and profitable firms with limited growth options are expected to be highly leveraged (Harris & Raviv, 1991:301). They are further expected to return more capital in the form of increased dividends and share buybacks to shareholders. Due to their size, earnings quality and general financial health, these firms can access debt finance at attractive terms. This further enhances the argument for a leverage-increasing financing policy. The argument for increasing the leverage of these highly profitable firms is also supported by the trade-off theory, although for a different reason. According to the trade-off theory, the increase in leverage will help the firm increase its value through an increased debt tax shield. The two theories are reconciled with regard to the relationship between leverage and firm profitability and the stock of growth options.

However, De Angelo and De Angelo (2007:19) disagree with this solution to the overinvestment problem. They argue that it reduces the firm's financial flexibility, as the firm is forced to fully utilise its credit lines so as to increase leverage. Financial flexibility is a key asset to the firm. It allows the firm to realise growth options that may become available at short notice (Graham & Harvey, 2001:232 and Marchica & Mura, 2010:1361). According to De Angelo and De Angelo (2007:19), firms facing the agency costs of free cash flow must distribute the excess cash to shareholders, maintain moderate cash holdings, and use less debt. This solution ensures that the firm retains its financial flexibility. Firms generating excess free cash flows are therefore faced with two financing choices: they can either substitute equity for debt (thus increasing their leverage) or they can simply pay out the excess cash flow to investors (thus retaining the same leverage). The latter option seems plausible. It enables managers to reward investors whilst maintaining some financial flexibility within the firm. It does not, however, totally eliminate the temptation of managers to use the free cash flow to invest in value-destroying projects.

The agency problem of overinvestment in risky projects occurs when managers deliberately select and invest in high risk projects which have low probabilities of yielding positive cash flows. According to La Rocca (2011:45), this problem arises when managers team up with existing shareholders and work against the interests of debt holders. This problem is common in highly leveraged firms that have low, high-risk and unprofitable growth options. These firms also have low available cash flows. Firms with these characteristics find it difficult to attract external equity and hence rely heavily on expensive debt to finance their risky and unprofitable growth options. Managers are generally under pressure to deliver growth, but the scarcity of good NPV-positive growth options forces them to invest in risky and NPV-negative projects. Debt is the obvious choice for such projects. Investment in these projects shifts the risk from equity holders to debt holders, with debt holders bearing the full cost of failure whilst equity holders get the full benefit of success. Increase in leverage worsens this problem. Firms facing these problems should desist from investing in these kinds of project and they must reduce their leverage so as to improve financial flexibility. Equity financing reduces the agency cost (Stulz, 1990:23). There are limited solutions to this problem. The obvious solution is for managers not to engage in such investments, but they are under pressure from shareholders to deliver growth. The other option is to force the shareholders to share the risk with bondholders by contributing equity as well - after all, they are the net beneficiaries of any positive proceeds from these projects.

Underinvestment occurs when a firm passes up NPV-positive projects because it does not have the capital to invest in these projects (Stulz, 1990:23). The underinvestment problem is prevalent in highly leveraged firms that have low cash flows deriving from their poor profitability records. These firms have problems in raising external equity, and because of their low profitability, they have limited internal equity to finance NPV-positive growth options. Myers (1977:149) and Stulz (1990:23) identified the following two types of underinvestment problem:

- A suboptimal investment policy which is induced by risky debt
- Underinvestment caused by management’s lack of credibility when it claims it cannot locate NPV-positive projects in which to invest existing resources.

The underinvestment agency costs induced by risky debt are caused by two types of conflict: managers and shareholders in conflict with debt holders, and existing shareholders in conflict with new shareholders. This problem is common in highly leveraged firms that face low growth options and have very low cash flows available for investment in growth options. These firms may be faced with bankruptcy in the near future. Leverage is made up of risky and expensive debt. Existing shareholders team up with managers to turn down NPV-positive projects, as they are of the opinion that such projects will only benefit debt holders and new shareholders. Existing shareholders of such firms are reluctant to inject new equity, as they argue that this will only benefit the holders of risky debt. The firm therefore foregoes the NPV-positive projects and this destroys value. Increases in leverage will further increase the risk of debt and worsen the debt overhang problem. However, Brito and

John (2002:30) argued that risky debt does not necessarily promote the suboptimal investment policy as proposed by Myers; certain conditions must exist for this to occur. They argued that risky debt will increase the agency costs of suboptimal investments only in firms that have poor growth options. They stated that this effect does not apply to firms with good illiquid growth options; risky debt will not result in suboptimal investment problems in these firms. However, this statement is arguable. As long as the growth options are highly NPV-positive, their chances of yielding positive cash flows can be real.

In risk avoidance, managers are in conflict with shareholders and debt holders. This agency problem is common in firms that have high leverage, high growth options and low internal funds. These are normally young firms that have a high growth potential. They need capital to realise these growth options. High leverage limits their growth, as managers refuse the risky NPV-positive projects due to financial constraints caused by high leverage. These firms can, however, grow if shareholders are able to raise external equity to finance the NPV-positive projects (Barclay and Smith, 2005:10).

According to Stulz (1990:23), firms facing underinvestment problems should use more equity than debt financing, as debt financing worsens the problems of underinvestment by further constraining the firm. Shareholders must inject new equity to finance the NPV-positive projects. If this is realised, these projects will improve the internal equity available for financing future projects.

3.4.3.2 Agency Costs, Corporate Governance and Management Compensation

If the role of debt is to discipline management, what role will it serve if management is already disciplined? The agency theory assumes that all managers of firms with excess free cash flows have a tendency to destroy value. This is unlikely to be the case, given the increased global diffusion of codes of good corporate governance across countries (Aguilera & Cuervo-Cazurra, 2004:437). According to Aguilera and Cuervo-Cazurra (2009:376), these codes of good corporate governance are spreading rapidly across the globe. The main reasons for this rapid spread are the following:

- There is a positive correlation between demanding corporate governance standards and firm market valuation (Strenger, 2004:11). The findings of El Mehdi (2007:1439) and Udayasankar and Das (2007:270) also confirm this correlation.
- Chen, Chung, Hsu, and Wu (2010:244) established that good and effective corporate governance practices reduce both information asymmetry and agency costs. Information disclosure in accordance with the codes of good corporate governance reduces information asymmetry. Furthermore, a study by Mande, Park and Son (2012:205) provided evidence that effective corporate governance increases the chances of equity issuance, especially in firms that have high information asymmetry between managers and investors.

The advances in corporate governance systems seem to be tailored towards reducing information asymmetry as well as agency costs. If effective, they take over the role played by debt in reducing agency costs. The aim of the code is to promote good corporate governance. For example, in South Africa, the King III Report promotes discipline, transparency, independence, accountability, responsibility and fairness as the cornerstones of good corporate governance (Vaughn & Ryan, 2006:506). Shareholders also make use of auditors, credit rating agencies, the share price for listed firms, company analysts and banks to monitor the behaviour of managers (Jensen & Meckling, 1976:338). The code also promotes shareholder activism in promoting good corporate governance. All these monitoring mechanisms are now a standard practice in most firms and countries. For listed firms, the stock market also has stringent regulations that the firms should comply with for their listing continuance. These regulations are aimed at promoting good corporate governance and protecting the investors in these firms. Firms that fail to comply with listing regulations may be delisted, and delisting can have very serious consequences for the careers of the management team. All these corporate monitoring mechanisms, if effectively implemented, will significantly reduce the agency costs of managerial discretion.

Although these corporate governance practices have covered a lot a ground in reducing agency costs, failures are not uncommon. A good example of corporate governance failure is the failure of financial firms in the 2008 global financial crisis. Adams (2012:32) attributed this failure to both poor governance practices and poor incentive structures in the financial firms. The bonuses of Chief Executive Officers (CEOs) encouraged them to take more risks so as to increase the bank's profits, with the rents being positively correlated to bank profits.

In conclusion, the agency costs of managerial discretion are real and these have the potential to destroy a firm's value. These costs can be reduced through the use of appropriate investment financing policies; the use of appropriate corporate governance and firm monitoring mechanisms; and the thorough implementation of manager-shareholder alignment compensation.

3.4.4 The Market Timing Theory

The market timing theory was developed by Baker and Wurgler (2002:29) from the initial empirical work of Korajczyk, Lucas and McDonald (1992) and Lucas and McDonald (1990). This theory argues that capital structure reflects past attempts by managers to time the equity markets. Managers only issue equity when they believe that the firm's shares are currently overvalued; otherwise they issue debt. The overvaluation comes in two forms. Firstly, overvaluation can result from a reduction in information asymmetry between managers and investors. This reduction happens when managers release information about the future prospects of the firm based on the general positive outlook of the economy (Korajczyk *et al*., 1992:412). The firm's prospects are likely to be better during boom periods, and firms are therefore likely to issue equity during boom periods. Release of this information increases the firm's share price, and thus it becomes less costly for the firm to issue equity. The second form of overvaluation results from irrational investors who misprice the firm's shares (Baker & Wurgler, 2002:3). Managers exploit this overpricing by issuing equity, and it sends a signal to the irrational investors that the firm's shares are overpriced. This explains why a share issue is normally followed by a significant drop in the share price.

According to Smith (1986:5), the share price of industrial firms can fall as much as 3.14% after the announcement of a share issue. The rationale for market timing equity issuances is that managers want to maximise their proceeds from security issuances and they can only achieve this if the shares are either correctly priced or overpriced. There is no incentive in issuing underpriced shares. Evidence from the survey done by Graham and Harvey (2001:230) confirms the persistence of market timing behaviour amongst CFOs. The high share returns are not, however, the only reason for the propensity towards issuing equity. Evidence from Alti and Sulaeman (2012:84) confirms that the likelihood of issuing equity peaks when high share returns coincide with a strong demand from institutional investors. In cases where institutional investor demand remains low, firms may still issue debt even if share returns are high. The findings of Hovakimian, Hovakimian and Tehranian (2004:539) also confirm the existence of market timing behaviour amongst firms. Equity buybacks follow an opposite pattern to market timing. Firms only purchase shares when they believe that they are undervalued, as this enables the firms to get a discount in the purchase price (Ikenberry, Lakonishok & Vermaelen, 2000:2373). Again, share prices rise after a repurchase, as investors correct this undervaluation (Chan, Ikenberry & Lee, 2007:2673 and Dittmar, 2000:354). Market timing therefore plays an important role in security issuance and in repurchase decisions. By extrapolation, firms are likely to issue debt if they forecast favourable debt markets.

3.4.5 The Signalling Theory

This is an extension of the pecking order theory and is also based on the existence of information asymmetry between managers and investors. Managers can signal their confidence in the firm's prospects through security issuance decisions (Miglo, 2007:85). By its nature, debt commits a firm to regular interest payments, and thus management can only consider issuing debt if they believe that the future earnings of the firm will be sufficient to cover these payments (Ross, 1977:23). Unlike equity, debt is not forgiving in terms of contractual commitments. On the other hand, equity does not commit the firm to any future payments (Barclay & Smith, 1999:12). Management can therefore signal their confidence in the firm's future prospects by issuing debt rather than equity. Debt issuance sends a signal to the market and the result is that issuance of debt is normally accompanied by an increase in share prices. If management is not confident about the firm's future earnings, they will not commit to increased interest payments; hence they will issue equity to signal this. The market will pick up this signal and the share price will fall (Miglo 2011:178).

The trade-off, market timing and signalling theories are based on information asymmetry (Barclay & Smith, 2005:11). Although these information asymmetry theories explain the share price reaction to both equity and bond issuances, they do not tell us how much debt the firm needs in its capital structure. They also imply that if the market continues on a high note, the firm will never issue debt, and this will confuse the investors by not communicating a correct signal. Further, they imply that where the market continues on a low, the firm will never issue equity. However, this is not practical. The theories are simply focused on market timing and signalling, and overlook the benefits of debt in corporate financing. Signalling is not the only benefit that debt brings to corporate financing. In particular, the tax and agency cost mitigation benefits of debt financing cannot be overlooked.

As explained earlier, the theories described above are an attempt by financial economists to explain the financial structure of corporations across the globe. The theories focus on different aspects of firms, and the empirical evidence on the success of each is mixed. Pecking order and trade-off theories focus on the quantitative and measurable firm-specific factors. The theories attempt to derive regression models that link these financial factors to the changes in the firm's leverage. The agency and information asymmetry theories purely focus on the behavioural aspects of both managers and shareholders. These theories argue that the behavioural factors play an important role in designing the capital structure of the firms. The theories are all fragmented and complementary; there is no single theory that incorporates all the different factors in explaining the financing of corporations. On closer analysis, these theories exclude some important firm characteristics such as operations diversity, the uniqueness of firms, the level of cash holdings, the interest cover ratios, the background of the Chief Executive Officer and the Financial Director, and the national culture. These factors determine the success of the firm, and they should also affect the firm's financing decisions. Furthermore, the theories do not explicitly link leverage to the firm's known key financial performance metrics such as earnings per share (EPS), price earnings (P/E) ratio, cash flow ratios, profitability ratios, share price and Economic Value Added (EVA).

3.5 THE LEADING CAPITAL STRUCTURE THEORIES

The importance of maintaining a target or a target range of debt ratio cannot be totally dismissed. Investors prefer stability and positive growth in the firms that they invest in, and firms must signal this stability and positive growth to investors. One way of achieving this is by maintaining a stable and predictable financing policy, and this entails maintaining a target debt ratio. Such a ratio is, however, not expected to be static, but it can vary within a pre-defined range. As discussed in Section 3.6.1.5 below, a firm's debt ratio is a significant determinant of its credit rating. An extreme change in the debt ratio will affect the firm's credit rating. Therefore, if a firm aims to maintain or upgrade its credit rating, it can do so by maintaining or improving its debt ratio, and this implies a target or target range debt ratio.

On the other hand, the importance of the target debt ratio cannot override the value of financial flexibility. A firm will therefore need a balanced capital structure. A balanced capital structure is a financing policy that supports the firm's overall business strategy. It provides the firm with adequate financial flexibility to implement its business plan, it reduces its overall financial risk, and it signals stability and sustainable growth within the firm.

The trade-off theory and the pecking order theory are the two leading and most well-researched theories regarding capital structure decisions (Hennessy *et al.,* 2006:1 and Mehrotra *et al.,* 2005:18). The main advantage of these theories is that they attempt to explain the financing decision in terms of quantitative and measurable factors. A lot of research has been done in trying to test the validity of each of the two theories, and these tests have produced conflicting results. Some results are consistent with the theories, some results reject the theories, and other results confirm the non-mutual exclusiveness of the theories.

3.5.1 Some Evidence on Pecking Order versus Trade-off Theory Tests

Table 3.4 shows the non discriminatory results of the pecking order and trade-off theories. Tables 3.5 and 3.6 show some of the empirical tests that confirm the trade-off theory and reject the pecking order theory. Table 3.7 shows the tests that confirm the validity of the pecking order theory whilst rejecting the trade-off theory.

Table 3.4: Pecking Order versus Trade-off Theory: Tests Showing Mixed Results

Researchers	Test methods	Results and conclusions
Graham and Harvey (2001)	They surveyed 392 CFOs about the financing, costs of capital and budgeting techniques that they use in their firms.	The study found that 44% of firms have a strict target range; and 64% of investment-grade firms have a strict target ratio. Debt ratio is important in security issuance decisions. Firms value financial flexibility and credit ratings.
Fama and French (2002)	They tested the validity of both the pecking order (PO) and trade-off (TO) theories, using US data.	The study found that highly profitable firms and firms with less growth options pay higher dividends. Profitable firms are less leveraged; this is consistent with the PO theory. Firms with more growth options are less leveraged; this confirms the predictions of the TO theory. Short-term investment variation deficits are mostly absorbed by debt; this is consistent with the PO theory.
Lemma and Negash (2011)	The study used 152 firms listed on the JSE to examine the firm-specific factors that affect leverage and relate the findings to the theories of capital structure.	Consistent with both theories, the study documented that capital structure is negatively correlated to profitability, liquidity, growth opportunities and business risk.
Mukherjee and Mahakud (2012)	The study used 891 Indian manufacturing companies which had continuous data for the period 1992-93 to 2007-08. This represents a period of liberalization in India.	The study found that the trade-off and pecking order theories are complimentary to each other to determine the capital structure and therefore, Indian manufacturing companies' financing behavior is best explained by the modified pecking order theory. It also finds that Indian manufacturing companies do have target leverage ratios and the adjustment speed towards the target has been around 43%.

Table 3.5: Empirical Test Results Confirming the Validity of the Trade-off Theory

Researchers	Nature of Test	Results and conclusions
Jalilvand and Harris (1984)	The study investigated the financing decisions of US firms by looking at their issuance of long-term debt, short-term debt and equity; their maintenance of liquidity; and their payout policies.	They concluded that firms have leverage targets and financing decisions are driven by the need to adjust to the target leverage ratio.
Graham and Harvey (2001)	The study surveyed 392 US CFOs on how they make investment and financing decisions. The sample was made up of small and large firms.	They found that 81% of CFOs have an optimal/target ratio; 37% have flexible targets; 44% have strict target ratios.
Hovakimian, Opler and Titman (2001)	The study used data drawn from the S&P's for the period 1979-1997 to test for target adjustment behaviour. The sample size was 39,387 firm years.	The results of the study confirmed that firms have target leverage ratios. The target adjustment process is aimed at maintaining these targets as hypothesised by the trade-off theory.
Ozkan (2001)	The study used a panel of data from 390 UK firms to investigate the determinants of target capital structure and the target adjustment behaviour.	The results showed that firms have long-term target ratios and they adjust towards these ratios fairly rapidly; the adjustment costs are very important. Profitability, liquidity, NDTS and growth options are negatively correlated to leverage. Firm size is not an important determinant.
Barclay, Morellec and Smith (2006)	The study used data from 9,037 US firms for the period 1950-1999 to investigate the relationship between growth options and leverage.	The results confirmed that firms have an optimal capital structure. The debt capacity of growth options is negative; this is consistent with the trade-off theory.
Kayhan and Titman (2007)	The study investigated the effects of cash flows, investments and share prices on leverage.	They found that share prices and funds deficits have significant effects on leverage decisions. Firm histories influence their capital structures, but firms have target capital structures.
Chang and Dasgupta (2009)	The study used data from samples of US firms listed in the Computat Industrial Annual Files in the period 1971-2004. The sample size was 112,035 firm years.	The study found evidence in favour of the target behaviour; this supports the trade-off theory.
Frank and Goyal (2009)	The study investigated the firm-specific factors that determine leverage ratios, using data from US firms for the period 1950-2003.	The evidence of the study strongly supported the trade-off theory. Industry leverage, asset tangibility and inflation are positively correlated to leverage. Market-to-book ratio and profitability are negatively correlated to leverage.
Harford, Klasa and Walcott (2009)	The study investigated 1,188 large acquisitions in the US to establish whether firms have leverage targets.	Their results showed that the firms have leverage targets. Although the observed ratios may deviate from this target, managers correct them over time through a financing mix. Of the deviations, 75% are corrected within years.

Table 3.6: Empirical Test Results Confirming Target Reversion of Debt Ratios

Researchers	Test methods	Results and conclusions
Leary and Roberts (2005)	The study investigated the frequency of target adjustment and the role of adjustment costs in US firms.	The results showed that firms actively rebalance their leverage ratios to stay within the optimal range. The observed leverage shocks are due to active adjustment.
Drobetz and Wanzenried (2006)	The study investigated the determinants and the speed of adjustment of 90 Swiss firms for the period 1991-2001.	The results of the study confirmed that faster growing firms and those with the largest target spread readily adjust their capital structures. The target adjustment speed increases with term spreads and good economic prospects.
Flannery and Rangan (2006)	The study used the partial adjustment model to investigate the target behaviour of 12,919 non-financial firms during the period 1965-2001.	The results showed strong evidence of target behaviour in the sampled firms. Over- and underleveraged firms adjust at a speed of 30% a year.
Hackbarth, Miao and Morellec (2006)	The study developed a theoretical model to analyse the impact of the macro-economic condition on leverage and speed of adjustment.	The model predicted that adjustment speed is higher during boom periods and that firms adjust their leverage by smaller amounts.
Titman and Tsyplakov (2007)	The study used a continuous time-series adjustment model and randomly generated data to test for target adjustment.	The results showed that firms adjust towards leverage targets; the adjustment speed is faster where a firm is subject to financial distress costs and where there is no conflict between equity and bondholders.
Antoniou, Guney and Paudyal (2008)	The study used the 2-step GMM procedure to investigate target adjustment behaviour in market-oriented (US & UK) and bank-oriented (French, German & Japanese) firms.	The results of the study indicated that firms have target ratios. French firms have the fastest adjustment speed while Japanese firms have the slowest adjustment speed.
Huang and Ritter (2009)	The study used an econometric technique to eliminate bias in estimates of the speed of adjustment towards the leverage target.	The results showed that firms have leverage targets and that they moderately adjust towards these targets with a half-life of 3.7 years for book leverage.
Hovakimian and Li (2011)	The study used both the equity-debt regression model and all the partial adjustment models to estimate adjustment speeds in US firms. The sample size was 132,665 firm years.	The results of the study indicated that combining the two models eliminates possible test bias. Firms have target ratios and the unbiased adjustment speed is estimated at 5.5-7.4% per year.
Oztekin and Flannery (2012)	This study compared the capital structure adjustment speeds across countries.	The results indicated that legal and financial traditions are strongly correlated to the adjustment speed. Consistent with the dynamic trade-off theory, institutional transaction costs also affect the adjustment speed.

Table 3.7: Empirical Test Results Confirming the Pecking Order Theory

Researchers	Test methods	Results and conclusions
Titman and Wessels (1988)	The study used a sample of 469 US firms to investigate the relevancy of the leading capital structure theories.	The results showed that past profitability is negatively associated with leverage; this is consistent with the pecking order theory.
Kamath (1997)	The study involved a survey of NYSE-listed firms excluding the FORTUNE 500.	The survey results indicated that financial managers are more likely to follow a financing hierarchy (pecking order theory). They value financial flexibility. The few firms that have a target ratio use the industry-average as the target.
Shyam-Sunder and Myers (1999)	The study used a sample of 157 US firms to test the pecking order theory against the trade-off theory.	The study concluded that the pecking order model is a better descriptor of the observed corporate financing patterns. The test used has the power to reject the pecking order theory against the trade-off theory
Graham (2000)	The study estimated the value of debt interest tax shields and then investigated the leverage patterns of different firms against other capital structure determinants.	The results of the study indicated that quality firms (large, profitable and liquid firms) have very low leverage; this is persistent. This evidence rejects the trade-off theory and supports the pecking order model. The value of tax shields is overstated.
Minton and Wruck (2001)	The study investigated a sample of 5,613 financially conservative US firms for the period 1974-1998.	The study found that conservative (underleveraged) firms follow the pecking order theory. The firms concentrate on building financial slack and they have high tax rates and NDTS. Financial conservatism is largely transitory.
Tong and Green (2005)	This study tested the pecking order hypothesis using a cross-section of the largest Chinese listed firms.	The results showed a significant negative correlation between leverage and profitability; this is consistent with the pecking order theory.
Lemmon and Zender (2010)	Their study modified the current capital structure test models by incorporating debt capacity measures, and then re-tested the theories.	They found that after accounting for debt capacity constraints, the pecking order theory is a good descriptor of firm financing.

3.6 WHICH ARE THE RELIABLE DETERMINANTS OF CAPITAL STRUCTURE?

According to Schwartz and Aronson (1967:17), firms have developed capital structures that reflect their operational risks, profitability, structure and asset structures. Industries and firms face different macro-economic and micro-economic risks and fortunes. Firms and industries differ in terms of profitability, growth options, competitiveness, management's talents, legal and tax frameworks of countries where they operate, asset structures, and operational risks. The design of a firm's capital structure must therefore incorporate all these factors and enable it to remain competitive in the markets where it operates. The leverage ratios are expected to be dynamic and vary between countries, industries and firm sizes. The debt ratios will be greatly influenced by both the wider macro-economic and microeconomic factors, as well as by the uniqueness of each firm. Past empirical research has identified a number of factors that ultimately determine the financial structures of firms. The leading capital structure theories use these variables to explain the financing behaviour of firms.

The capital structure determinants can be categorised as firm-specific and country-specific. The variables included in each category are:

- **Firm-specific factors**: asset tangibility; profitability; competitiveness; earnings volatility; size; growth rate; financial distress and bankruptcy costs; agency costs; credit ratings; dividends and share buybacks; internal funds deficiency and investment programmes; the state of the stock and bond markets; tax factors; the degree of the firm's capital market orientation; peer or industry capital structure; and managerial factors (Frank & Goyal, 2009:26 and Harris & Raviv, 1991:336).
- **Country-specific factors**: global and local macro-economic conditions and business cycles; the level of development of the local capital market; the performance of the stock market; corporate governance systems; and Civil or Common law orientation (Antoniou *et al*., 2008:59; Bancel & Mittoo, 2011:214; and De Jong, Kabir & Nguyen, 2008:1954).

3.7 THE FIRM-SPECIFIC DETERMINANTS OF CAPITAL STRUCTURE

These are variables that derive from the firm's uniqueness. Past empirical tests on the trade-off theory have identified the following variables: asset tangibility; profitability; earnings volatility; size; growth rate; financial distress; and dividends and share buybacks as the key determinants of the firm's target leverage ratio. The predictions of the trade-off theory regarding the correlations between leverage and the factors that affect capital structure are presented in Table 3.8 below (Frank & Goyal, 2009:26).

Table 3.8: Trade-off Theory: Correlations between Leverage and Capital Structure Determinants

Factor	Effect on leverage
ASSET = asset tangibility	Tangibility has a positive effect on leverage
SIZE = firm size	Size has a positive effect on leverage
FDIST = financial distress	Financial distress has a negative effect on leverage
PROF = firm profitability	Profitability has a positive effect on leverage
MTB = firm growth rate	Growth rate has a negative effect on leverage
NDTS = non-debt tax shields	NDTS has a negative effect on leverage
VOL = volatility	Volatility has a negative effect on leverage
DEF = internal funds deficiency	There is no correlation between DEF and leverage
STRUCTURE = asset structure	Leverage is negatively correlated to asset structure

According to the pecking order theory, the key determinants of firm leverage are: profitability, growth rate, size, capital expenditure, dividends paid, long-term debt repaid, changes in working capital, and cash flow from operations. The predictions of the pecking order theory regarding the correlations between leverage and the factors that affect capital structure are presented in Table 3.9 below (Frank & Goyal, 2003:241 and Shyam-Sunder & Myers, 1999:224).

Table 3.9: Pecking Order Theory: Correlations between Leverage and Capital Structure Determinants

Factor	Effect on leverage
PROF = firm profitability	Profitability has a negative effect on leverage
MTB = firm growth rate	Growth rate has a positive effect on leverage
SIZE = firm size	Size has a positive effect on leverage
CAPEX = capital expenditure	Capital expenditure has a positive effect on leverage
DIY + SBB = dividends and share buybacks	Dividends have a positive effect on leverage
R = long-term debt repaid	Leverage is negatively correlated to R
ΔWC = changes in working capital	Leverage is negatively correlated to ΔWC
CFO = cash flow from operations	Leverage is negatively correlated to CFO

3.7.1 Asset Tangibility

The stock of the firm's tangible assets is a direct measure of the collateral that the firm can offer to bondholders (Campello & Giumbona, 2011:23 and Leland, 1994:1248). Firms with higher stocks of tangibles offer lenders increased security, which in turn increases the firms' debt capacities and lowers their costs of debt (Giambona, Mello & Riddiough, 2009:27). Thus firms with higher collateral values will find it cheaper and more attractive to borrow. The value of this collateral is further enhanced by the liquidity and redeployability of these tangible assets (Morellec, 2001:200). A higher stock of liquid or re-deployable tangible assets improves a firm's credit score, and this lowers its debt spread. The low spread increases the firm's debt capacity, makes debt finance attractive, and can even facilitate borrowing in periods when credit is tight. The result is that firms with higher stocks of tangible, liquid and re-deployable assets are expected to have higher leverage ratios than their counterparts. Asset tangibility is therefore positively related to leverage. However, asset tangibility is not the only determinant of debt capacity and interest rate spreads. Credit rating agencies consider other financial aspects of the firm such as profitability, earnings volatility, liquidity, growth rate and interest cover in arriving at the final credit score.

3.7.2 Profitability, Dividends and Equity Repurchases, and Earnings Volatility

Profitable firms have a greater chance of generating excess “free cash flows”, which Jensen (1986:323) defined as the residual cash after all financing requirements have been met. According to Barclay and Smith (2005:10), profitable firms tend to be large and mature firms with higher stocks of tangibles, and they have limited growth options. These features combine to give these firms a higher credit rating, and this makes borrowing attractive to them. On the other hand, the low growth options reduce the firm’s non-debt tax shields, which are perfect substitutes for the interest tax shields. The first problem that these firms face is that of higher corporate taxes which derive from their high profitability. The trade-off theory contends that this problem can be resolved by increasing the firm’s debt, which in turn increases the interest tax shield, thus lowering the corporate tax payable. The firm can achieve this by substituting the internal excess equity with debt. The excess internal equity can be returned to the shareholders in the form of dividends and/or share repurchases. The increased debt level ensures that the firm minimises its corporate tax bill while maximising its value through the increased debt interest tax shield. The other benefit of debt, according to Harvey *et al.* (2004:27); Jensen (1986:323); and Stulz (1990:23), is to reduce the agency costs of free cash flow. As debt compels the company to commit cash flows towards interest and capital repayments, it effectively disciplines management and improves their operational efficiencies. The trade-off and agency theories are therefore reconciled on the correlation between leverage and profitability. According to both theories, profitable firms have generous distribution policies and are more highly leveraged than their unprofitable counterparts. The financing policies of value firms are therefore driven by the need to minimise both the agency costs of free cash flow and the firms’ effective tax rates.

It should, however, be noted that firm profitability is not limited to large firms. There are also highly profitable firms which are small and fast-growing. If these firms have limited growth options, they will also adopt similar policies to those of large, profitable firms. High-growth firms have higher non-debt tax shields (NDTS) deriving from their capital expenditures and these can be perfectly substituted for the interest tax shield. The availability of growth options reduces the agency costs of overinvestment for these types of firm. These factors combine to make increased leverage unattractive for the firms. In fact, higher leverage increases the agency costs of underinvestment for small and fast-growing firms. These firms are therefore likely to follow a conservative leverage policy which increases their financial flexibility.

The financing policies of growth firms are mainly driven by the need to maintain the financial flexibility which enables them to exercise their growth options (Barclay & Smith, 2005:8). The benefits of debt are minimal in these firms. The firms achieve financial flexibility through the conservative use of debt and the adoption of sticky dividend policies. This implies that growth firms use debt conservatively.

However, the pecking order theory takes a different view on the role of debt in large and mature firms. Myers and Majluf (1984:220) argued that the primary objective of all firms is to achieve and maintain financial flexibility. A firm’s financing retention policies play a pivotal role in achieving this objective. They concede that financial flexibility minimises the firm’s internal funds deficiency and this reduces its financing frictions. Firms concentrate their financial policies on maximising their financial slacks, which they achieve by adopting sticky dividend polices. The low payout ratio ensures that the firm retains more cash for future financing. The pecking order theory predicts that large, mature and profitable firms have the lowest leverage ratios. The firms will therefore have high cash stockpiles and a high level of unutilised borrowing reserves. The theory predicts that leverage decreases with an increase in the firm’s profitability and cash flow from operations. Change in new debt issued also decreases with an increase in profitability and cash flow from operations. The problem with this approach is that the pecking order theory does not define the maximum slack that the firm must achieve. It also does not explain how firms manage the excess cash so as to avoid the inevitable agency costs of overinvestment that derive from excess free cash flows. The theory further sees no value in interest debt shields. It is, however, to be expected that the firm’s dividends would increase with profitability, and this means there is a positive correlation between dividends paid and leverage for both the trade-off and pecking order theories.

The volatility of the firm's earnings is also a major determinant of both debt capacity and the cost of debt. Firms with highly volatile earnings are risky and face high borrowing costs. This risk is derived from the high financial distress costs. Earnings volatility reduces the firm's credit rating, increases its borrowing costs, and lowers its debt capacity. It is the young and fast-growing firms that usually have volatile earnings. Mature firms tend to have stable earnings. Owing to the reduced debt capacity of such firms, both the pecking order and trade-off theories predict low leverage for the firms facing high earnings volatility. Leverage would therefore be negatively correlated to earnings volatility (Bessler, Drobetz & Kazemieh, 2011:26).

3.7.3 Debt and Firm Competitiveness in the Product Market

According to Campello (2006:168), the competitiveness of a firm also affects its financing decisions. This is particularly the case in concentrated industries where margins tend to be squeezed. Highly leveraged firms must increase their margins so as to be able to maintain the required interest covers. Assuming that firms incur similar unit production costs, a highly leveraged firm must increase its prices so as to maintain the required interest coverage ratios. Such an approach would render the firm's products uncompetitive, and the firm would lose market shares to its rivals. Firms with ratios lower that the industry average can grow their market shares by lowering their margins and prices. Thus debt can hurt or boost the firm's performance in the product market (Opler & Titman, 1994:1037). This effect of debt on firm competitiveness is likely to be more pronounced in firms that have large market shares or in industries where competition is very high. In such industries, low leverage financing policy would enhance and maintain the firm's market share.

3.7.4 Firm Size and Growth Rate

The firm's size also has a direct impact on its stock of tangibles, its growth options and growth rate, its profitability and cash flow generation, and its credit rating (Talberg, Winge, Frydenberg & Westgaard, 2008:198). The trade-off theory predicts a positive correlation between leverage and profitability, and a negative correlation between leverage and growth rate. But the pecking order theory predicts a negative correlation between leverage and profitability, and a positive correlation between leverage and growth rate. As explained above, large firms tend to be characterised by high profitability, excess free cash flows, high stocks of tangibles, and limited growth options (they are mature and tend to have higher credit ratings, compared to small firms). Stewart *et al.* (2005:39) refer to mature or large firms as “value firms”. They contend that the financing polices of these firms are driven by the need to minimise the taxable profits and agency costs that arise from excess free cash flows.

In contrast, small firms tend to have low profitability, limited cash flows, low stocks of quality tangibles, high stocks of growth options, and low credit ratings. These firms need to maintain financial flexibility so as to avoid the agency costs of underinvestment, and they achieve this through making conservative use of debt and adopting a sticky dividend policy or a no dividend policy. They rely more on equity financing than on debt financing. This is to be expected, as these firms have low debt capacities and ratings which are derived from their high-risk characteristics (Auerbach, 1985:306). They also benefit from the high non-debt tax shields deriving from their growth options. The net result should be that large firms are highly leveraged, whilst small firms have low debt ratios; these predictions are consistent with the trade-off hypothesis. The pecking order theory, in contrast, predicts the opposite.

The value of a firm is ordinarily driven by the realisation of its growth options. And the value of the growth options depends on the firm’s hurdle rate, and the weighted average cost of capital (WACC) which is derived from the firm’s cost of debt and equity. Financing through risky debt (which is expensive), increases the firm’s hurdle rate and this in turn lowers the value of its growth options. Risky debt also increases the agency costs of debt (debt overhang) and is related to firm value as follows: (Myers, 1977:170)

$$V_D^* \propto \frac{1}{\left({}^{V_G}/_{V}\right)} \qquad (3.34)$$

Where:

V_D^*= debt amount that maximises the market value of the firm

V_G= part of firm value, V, accounted for by the growth options

V = total firm value

Small firms, which have a high stock of growth options, must therefore avoid the use of risky debt and finance these options through equity (Hovakimian *et al.,* 2004:537). This implies that there is a negative association between growth options and leverage, and this is confirmed by the findings of Eriotis (2007:329) and Lang, Ofek and Stultz (1996:27). This correlation is predicted by the pecking order theory.

3.7.5 Financial Distress, Bankruptcy and Credit Ratings

The financial distress ratio is a direct measure of the firm's risk to default in its debt, and this ratio increases with the leverage ratio of the firm. This is one of the building blocks of the trade-off theory of corporate financing. Firms with higher leverage ratios face a higher probability of defaulting on their debt. The financial distress costs are real and they are significant (Cheremushkin, 2011:163). Several empirical studies, including those of Altman (1984:1087) and Hennessy and Whited (2007:1737), discovered that these costs could be in excess of 20% of the firm's value, but they generally range between 11.0% and 17.0%. These costs decrease with firm size and increase with leverage. Thus financially distressed firms are expected to rely more on equity financing so as to reduce the agency costs of debt. This argument is plausible to both the trade-off and agency theories. Financially distressed firms are synonymous with financially-constrained firms, and they have higher agency costs of underinvestment. To resolve this problem, these firms must issue more equity than debt, making them low-leveraged. The pecking order's financing hierarchy is thus violated. Financially constrained firms cannot borrow to capacity and then issue equity later; such a move would result in extreme costs of equity. The financing choices are limited, with firms finding it difficult to raise either debt or equity (Gilson, 1997:189).

Credit rating scores are normally used to assess a firm's default risk and to determine its debt capacity as well as its debt spreads. Firms with higher credit ratings have higher debt capacities at lower debt spreads. Such high-quality firms can even borrow from the public capital markets (Kisgen, 2007:65 and Shivdasani &

Zenner, 2005:26). On the other hand, low-quality firms have lower debt capacities and they face higher borrowing costs. These firms tend to rely more on private loans and bank loans for their debt financing (Faulkender & Petersen, 2006:74). Kisgen (2009:1343) argued that firms normally target minimum credit ratings. Firms facing either a ratings downgrade or a ratings upgrade generally issue more equity than debt, so as to avoid the downgrade whilst achieving the required upgrade (Kisgen, 2006:1067). Moody's formula for calculating a firm's credit rating incorporates its key financial performance metrics which include: current leverage ratio; profitability and cash flow generation; stock of tangible assets; and other business metrics. The leverage ratio metrics account for 42% of the ratings formula (Moody's mining sector ratings formula). This makes leverage the main driver of the ratings. Firms ordinarily want to maintain their credit ratings or upgrade them when possible. The credit rating of a firm does not only demonstrate the firm's quality, but it also measures its financial flexibility. Firms which are rated highly have a number of attractive financing options. Thus the credit rating can be a direct measure of the firm's financial flexibility, and this is directly related to its debt ratio. A significant change in the debt ratio will have an impact on the firm's overall credit rating.

3.7.6 Internal Funds Deficiency and Financial Flexibility

Myers and Majluf (1984:220) argued that any external financing is a direct consequence of a deficit in internal funds. According to the pecking order theory, a firm will only raise external finance if it faces an internal funds deficit, otherwise it will rely on its retained earnings for the financing of its growth capital expenditures. The magnitude of this deficit depends on the firm's historical profitability and distribution policy, as well as the size of planned capital expenditure. Profitable firms with higher earnings retention ratios will therefore register a smaller deficit than unprofitable firms when faced with the same capital expenditure. The pecking order theory postulates that the financing of this deficit follows a hierarchy, with firms issuing debt to capacity before issuing equity. This theory implies that firms facing a significant financing deficit will have a higher debt ratio post security issuance. As discussed above, the theory does not specify the internal funds depletion threshold that a firm must reach before considering debt. It also does not specify the external debt threshold that the firm must reach before considering equity issuances. Is it practical for a firm to issue debt to capacity before issuing equity? This approach sounds implausible. Firms try to balance their financing sources and leave some capacity in each source.

Contradicting the pecking order theory, Bessler, Drobetz and Graninger (2011:147) established that there is high correlation between equity issuance and internal funds deficiency. This evidence discredits the static pecking order theory, and empirical evidence suggests that firms follow a dynamic pecking order instead. The need for financial flexibility and the value of financial flexibility cannot be understated (Bancel & Mittoo, 2004:130; George & Hwang, 2010:76; and Graham & Harvey, 2001:188). Successful firms choose financial structures that afford them adequate financial flexibility to cope with business shocks. Financial flexibility entails a firm having a reserve capacity of each source of finance at any given point in time (Taggart, 1977:1484). Typically, financially flexible firms have higher cash holdings, lower leverage, higher credit ratings, and untapped borrowing reserves (Marchcia & Mura, 2010:1339). The need for financial flexibility is higher for firms that have a lot of growth options (Drobetz *et al.,* 2007:24). The aim of these high-growth firms is not to miss any of the net present value (NPV)-positive opportunities, and therefore financial flexibility becomes very important in financing the business plan (Denis & Sibilkov, 2010:267 and Gamba & Triantis, 2008:2293). The value of financial flexibility for firms is, however, not only limited to high-growth firms. Even mature or low-growth firms require sufficient financial flexibility (slack) to enable them to absorb any negative economic or business shocks. Bancel and Mittoo (2011:214) and Campello *et al.* (2010:486) investigated the impact of the 2008 Global Financial Crisis on the performance of firms across the globe. Their findings confirm the importance and value of financial flexibility for the firm's performance. They found that firms with financial flexibility outperformed those that were financially constrained.

According to the predictions of the trade-off theory, any internal funds deficiency will be financed in such a way that the firm minimises its deviation from the target or optimal capital structure. The security issuance choice will therefore depend on the direction and size of the target deviation spread. If the current target is above the optimal target, the firm will issue equity to bring it down. And in cases where the firm is underleveraged, it will issue debt to increase its leverage and bring it closer to the target. The aim is to minimise the target deviation spread. This means that the trade-off theory defines the internal funds deficiency in terms of the deviation spread from the target capital structure. This is a different definition to that provided by the pecking order theory, and the financing motives are totally different.

Finally, both the trade-off and pecking order theories assume that stock and bond markets will always be high at the time the firm decides to issue securities. In practice, this is not always the case. Empirical findings of the market timing theory contradict and discredit this prediction of both the pecking order and trade-off theories.

3.7.7 The State of the Share and Bond Markets

According to the market timing theory proposed by Baker and Wurgler (2002:29), the financing of the internal funds deficit follows neither the financing hierarchy nor the target correction approach as proposed by the pecking order and trade-off theories. The predictions of the market timing theory are that the choice of security to be issued will depend on the current state of the stock and bond markets. The state of these markets reflects the current valuation of the equities and debt securities as well as the current interest rates (Marsh, 1982:142). If the stock market is high, then the firm will issue equity, as this signals that management believes the shares are overvalued. The findings of studies done by Dittmar and Thakor (2007:49) and Larrain (2008:33) confirm the predictions of this theory. These researchers argue that firms follow the market timing theory because investors have a higher propensity to agree with managerial decisions. Conversely, the repurchase of shares is attractive when the market is low, as the shares will be undervalued (Peyer & Vermaelen, 2009:1742). According to Welch (2004:126), stock market performance is the most important determinant of corporate financing. The main advantage of issuing equity when the market is high is that the firm maximises its net cash issue proceeds during such times. The chances of issue successes are also very high during such periods. A rising stock market will mechanically reduce the leverage ratio measured in market value terms. The trade-off theory predicts that during such periods, the firm will be inclined to issue debt so as to correct the low leverage and bring it back to the optimal level. The market timing and time-varying adverse selection models suggest otherwise. Thus, when the stock market is high, firms are more inclined to issue equity than debt (Hovakimian *et al.,* 2001:22). This implies that a rising stock market is associated with low leverage.

The decision to issue debt also depends on the state of the bonds market and the prevailing interest rates. According to both the pecking order and trade-off theories, the main reason for issuing debt is that it is cheaper and less risky than equity. The issuing motives are, however, different. The debt cost is further discounted by the interest tax shield. The cost of debt is therefore a major determinant of the issue decision. This implies that firms will time debt markets; they will issue debt when interest rates are low. The empirical findings of Barry, Mann, Mihov and Rodriguez (2008:429) and Henderson, Jagadeesh and Weisbach (2006:93) confirm the market timing behaviour with regard to debt issuance. Firms issue less debt when interest rates are high, because high interest rates reduce the value of the loan in real terms, as firms pay a higher price for a small loan amount. The market timing theory does not, however, explain what happens when the stock market is low and the bond market is high. Will the firm be indifferent about issuing equity or debt, or it will it do dual issuances? The state of the capital markets does affect the leverage of the firm, as it affects the type of security to be issued. Leverage increases if the stock market consistently underperforms, as the firm is then forced to issue debt; and leverage decreases when the stock market remains high. Both the pecking order and trade-off theories fail to explain these issuance patterns. Their predictions are at odds with those of the market timing theory. Generally, it is attractive for a firm to finance through equity when the stock market is high, as the net issue proceeds are higher. And it is equally attractive to issue debt when the interest rates are low, as this represents a low cost of borrowing.

However, Dittmar and Thakor (2007:49) and Schultz (2003:515) argued that the market timing theory is not the sole predictor of equity or debt issuance decisions; security issuance decisions also have an agreement parameter. Managers are more inclined to issue a security if shareholders are likely to agree with the decision. Thus the issuance decision has both market timing and agreement parameters. The same analysis is applied in making a share repurchase decision. Firms will repurchase shares when the stock market is low, as the shares will be undervalued (Dittmar, 2000:354), and this decision must also please the shareholders.

3.7.8 The Interest Tax Shield and the Non-debt Tax Shields

The benefits of debt to the issuing firm are not only limited to the lower cost and risk of debt capital as suggested by the pecking order theory. According to the trade-off theory, debt finance also brings with it the interest tax shield which adds significantly to the overall value of the firm. And according to the agency theory, debt is an effective tool for reducing the agency costs in firms that generate high levels of excess cash flows. These benefits of debt form an integral part of both the trade-off and agency theories of corporate financing. Modigliani and Millers's capital structure relevance and trade-off theories are grounded on the tax benefit of debt to the issuing firm. The debt interest tax shield is a major source of corporate value, and it constitutes the major benefit of debt financing (Opler *et al.,* 1997:23). Equity dividends do not enjoy similar tax treatments. Thus the tax deductibility of debt interest further discounts the cost of debt finance. This benefit disappears, however, at extreme levels of leverage, as the increasing agency and financial distress costs outweigh the value of the interest tax shield contribution. According to the trade-off theory, the optimal capital structure occurs at a point described in equation 3.35: (Brealey *et al*., 2008:503)

$$MV_L = MV_{UL} + PV_{TS} - PV_{FD} - PV_{AC} \qquad (3.35)$$

Where:
MV_L = market value of leveraged firm
MV_{UL} = market value of unleveraged firm
PV_{TS} = present value of tax shield
PV_{FD} = present value of financial distress costs
PV_{AC} = present value of agency costs

At this point, the firm's value is maximised whilst its WACC is minimised.

Thus the optimal capital structure or debt capacity is reached at the point where:

$$\Delta PV_{TS} = \{\Delta PV_{FD} + \Delta PV_{AC}\} \equiv WACC_{Min} \equiv FV_{Max} \tag{3.36}$$

Where:

FV_{Max} = optimal firm value

The value of the firm is maximised at this point, and this assumes that the firm has adequate financial flexibility to exercise all its available growth options. The maximum firm value also coincides with minimum agency costs of debt and free cash flow. Where projects were abandoned because the firm was constrained by its capital structure, it would not represent an optimal capital structure. This is because the firm would not have exercised all its growth options, and hence its free cash flows would not have been maximised, due to the limiting capital structure. The optimal capital structure is a balanced capital structure (Patrick, 1998:77). A balanced capital structure minimises the firm's WACC, gives the firm adequate financial flexibility to exercise its growth options, and minimises the agency costs of free cash flow and debt. The trade-off and agency theories imply that as long as the tax shield value is more than the financial distress and agency costs, any debt finance introduced will benefit the firm in the form of a tax shield and lower agency costs. Past studies have attempted to quantify the value of the tax shield, but the computational method is still inconclusive. The main problem is deciding which tax rate to use in valuing the interest tax shield.

The cost of debt to a tax-paying firm is calculated as follows:

$$K'_d = (R_f + \delta_d) \times (1 - T) \tag{3.37}$$

Where:

K'd = after-tax cost of debt

Rf = risk-free rate

δ_d = debt spread

And using the Capital Asset Pricing Model (CAPM),

$$K_d = (R_f + \beta_d R_p) \times (1 - T) \tag{3.38}$$

Where:

$\beta_d R_p = \delta_d$

β_d = debt beta

R_p= debt risk premium

Brealey *et al.* (2008:497) defined the tax shield of debt interest as:

$$Tax\ shield = corporate\ tax\ rate\ \times interest\ payment = T_c(r_D D) \tag{3.39}$$

Where:

T_c = corporate tax rate

r_D = interest rate

D = book value of debt outstanding

The present value of the tax shield is therefore given by the equation:

$$PV(tax\ shield) = \frac{Corporate\ tax\ rate \times interest\ payment}{expected\ return\ on\ debt} = \frac{T_c(r_D D)}{r_D} = T_c D \tag{3.40}$$

However, Fernandez (2004:152) introduced some controversy to the valuation of the tax shields by suggesting that the value of the tax shield is not equal to the present value of the tax shield. The proposed valuation method is:

$$VTS = \frac{D \times T \times Ke_{ul}}{(Ke_{ul} - g)} \tag{3.41}$$

Where:

VTS = present value of tax shield

D = nominal or book value of debt

T = corporation tax rate

Ke_{ul}= cost of equity for unleveraged firm

g = firm growth rate

And for a perpetuity firm, g = 0 and the equation is reduced to:

$$VTS = D \times T \qquad (3.42)$$

The interest must not be discounted at K_d or R_f . He argues that these discount rates will reduce the firm's cost of equity (K_e).

However, Cooper and Nyborg (2006:225) disagreed with this debt tax shield (DTS) valuation methodology. They argued that this approach violates the concept of value additivity and it renders the adjusted present value (APV) technique useless. They presented a theoretical argument to demonstrate that:

$$VTS = PV(debt\ interest\ savings) \qquad (3.43)$$

The present value of the tax shield represents another source of the firm's value and it adds to the overall value of the firm. Cooper and Nyborg (2007:50) estimated that tax shields can contribute as much as 12.0% of the firm value. The total value of a leveraged firm can be calculated using the APV rule, where they use the following valuation model:

$$V_L = E + D \equiv V_L = V_U + PVTS \qquad (3.44)$$

Where:

V_L = value of a levered firm

V_U = value of unlevered firm

$PVTS$ = present value of interest tax shields

And:

$$PVTS = T_c \times D = T_c \times MV_D$$

This assumes that the debt ratio is constant and where it is not, Inselbag and Kaufold (1997:117) define the tax shield as:

$$DVTS_t = T \times \left[\frac{r_D D_t}{(1+r_D)} + \frac{r_D D_{t+1}}{(1+r_D)^2} + \frac{r_D D_{t+2}}{(1+r_D)^3} + \cdots..\right] \quad (3.45)$$

The total value of the firm can also be calculated using the discounted cash flow (DCF) technique. This is a two-stage process. The first stage is to calculate the discount rate, and for a levered firm it is the weighted average cost of capital (WACC). The cost of debt is adjusted for the tax shield as follows:

$$K'_d = (1 - T_c) \times K_d \quad (3.46)$$

Where:

K'_d = after-tax cost of debt

The firm's WACC is then calculated using the equation:

$$WACC = \frac{E}{V_L} \times K_e + \frac{D}{V_L} \times K_d \times (1 - T_c) \quad (3.47)$$

The firm's free cash flows are then discounted using the WACC to obtain the value of the levered firm. Thus the tax shield adds value to the firm's APV and it reduces the firm's WACC, thereby increasing the firm's value. The above models assume that debt is not risky; where debt is risky, the systemic risk of debt must be priced in.

The main problem that arises in computing the after-tax cost of debt and the tax shield is which tax rate to use in the computation. Firms have two tax rates: the statutory tax rate and the effective (or marginal) tax rate. Some academics like Brealey *et al.* (2008:497) use the statutory or published tax rate as the appropriate rate, whereas others, for example Cordes and Sheffrin (1983:104), use the firm's effective or marginal tax rate. The effective tax rate is more relevant, as it reflects the actual tax rate applicable to the firm after accounting for all the tax credits that a firm is entitled to in a particular financial year. Cordes and Sheffrin (1983:105) argued that the effective tax rate, rather than the statutory rate, would be the correct rate. They define the effective tax rate as the tax rate that incorporates all adjustments for the firm (past losses, foreign tax credits, investment credits and minimum tax). The effective tax rate can be estimated as the actual tax paid, divided by the taxable income. This reflects the actual tax savings arising from the deduction of debt interest. The only disadvantage with this tax rate is that it is not static. It depends on the firm-specific changes in the above adjustments. This was confirmed by Cordes and Sheffrin (1983:105) whose empirical work showed that there is a significant difference between the effective tax rate and the statutory tax rate, and that the effective rates vary from year to year. They established that the effective tax rate also varies significantly between firms and between industries. The tax shields lower a firm's marginal tax rate (MacKie-Mason, 1990:1489). A higher marginal tax rate implies that a firm is paying higher taxes, and such a firm must issue more debt so as to reduce the marginal tax rate. This argument is consistent with the predictions of the trade-off theory. In applying the trade-off theory, the changes in leverage are positively correlated to the firm's marginal tax rate (MTR).

A study by Graham (1996:71) confirmed that high-MTR firms issue more debt than low-MTR firms, and this effectively reduces their MTR in the subsequent years. The deductibility of interest rates is the primary reason for firms issuing debt instruments, and this implies that the tax status of a firm plays a central role in its financial policy (Graham, 1996:71). The firm's MTR, which is a precise definition of the firm's tax status, is positively correlated to the changes in leverage (the debt-to-firm value ratio (D/FV ratio).

Past empirical tests on the tax benefits of debt have produced mixed results. The findings by Cooper and Nyborg (2006:225); Fernadez (2004:163); Graham (2000:1933); Graham (2003:1075); Kemsley and Nissim (2002:2072); Korteweg (2010:2168); Masulis (1984:854); Nayar (2010:15); Scott (1977:1); and Van Binsbergen, Graham and Yang (2010:2089) indicate that firms value the debt interest tax shield, and the primary motive of issuing debt is to maximise the tax shield and reduce the firm's MTR. Their findings further indicate that tax shields are a substantial source of corporate value and they can add up to 10.0% of the firm's value. A recent study by Van Binsbergen, Graham and Yang (2011:55) indicated that the net benefit of debt could be 4%-13% of the firm's value. However, findings by Bloiun *et al.* (2010:211); Fama and French (2002:30); Kane, Marcus and McDonald (1984:852); and Miller (1977:263) indicate that the tax benefits of debt are overstated and that the tax-bankruptcy cost models cannot be used to explain the observed financial structures. If tax shields are so valuable, how do the tax theories account for the growing number of zero-leveraged and conservatively leveraged firms? These firms cannot just be leaving value on the table (Strabulaev & Yang, 2006:33). The existence of zero-leveraged firms casts doubt on the argument that firms value interest tax shields.

The interest rate tax shield is not the only tax shield benefit that accrues to a firm. Firms can also benefit from non-debt tax shields (NDTS) that derive from depreciation, employee share options, foreign tax credits and investment tax credits. DeAngelo and Masulis (1980:27) pointed out that these credits can be perfect substitutes for the debt interest tax shields.

According to Graham (2003:1075), a firm's total tax shield is the sum of the interest and non-debt tax shields, and this can be defined as:

$$Total\ tax\ shields = \sum_{i=0}^{n}(DTS, NDTS) \tag{3.48}$$

Where:

$NDTS\ is\ made\ up\ of employee\ stock\ options, foreign\ tax\ credits\ and\ depreciation$

The NDTSs are especially relevant to fast-growing firms that have huge capital expenditures, and capital structure theories postulate that these firms must use debt conservatively. This means that their low DTSs are substituted with the high NDTSs. On the other hand, mature firms have low capital expenditures and hence low NDTSs. The trade-off theory predicts that these firms should carry more debt so as to reduce their MTR. This therefore means that the low NDTS is substituted with the higher DTS. Thus, according to the trade-off theory, the NDTS increases as leverage decreases, and the DTS increases as leverage increases.

The pecking order theory predicts a higher leverage for smaller and fast-growing firms, as they tend to be unprofitable. This implies that these firms optimise both the DTS and the NTDS. On the other hand, this theory predicts lower leverage for mature and slow-growth firms, implying that these firms have a low NDTS and DTS. According to the pecking order theory, both the NDTS and the DTS increase with leverage and firm size, and there is no substitution effect.

3.7.9 Firm Access to the Capital Markets

A firm's leverage decision is also affected by its access to the capital market, and this access is dependent on the firm's size and its financial performance. Large firms are normally of a higher quality, tend to be more profitable, are well diversified, are highly competitive, have good collateral values and, in most cases, are rated by the credit rating agencies. These attributes make them very attractive to investors. Such firms have very good access to both the equity and bond markets, and this broadens their financing options. High-quality firms tend to be market-oriented and they raise most of their capital, including debt, from the capital markets. Medium-quality firms tend to be bank-oriented and they raise most of their debt capital from the bank. Low-quality firms depend on private debt for all their debt financing (Denis & Mihov, 2003:25). The orientation of a firm has a bearing on its borrowing capacity as well as its cost of borrowing. The implication is that market-oriented firms have significant financial flexibility. These firms benefit from cheap public and bank debt, and would thus be more highly leveraged than the medium- and low-quality firms. A firm's capital market orientation is also influenced by country-specific factors such as the stage of development of the stock market; corporate governance and investor protection laws; common or civil law origin; and corporate and banking relations. Generally, rich countries with well-developed stock markets tend to be more market-oriented than the less-developed poor countries (Antoniou *et al.,* 2008:86).

3.7.10 Peer or Industry Capital Structure

The empirical findings of studies done by Almazan and Molina (2002:35); Leary and Roberts (2010a:33); Mackay and Phillips (2005:1463); Schwartz and Aronson (1967:17); and Taggart (1977:1484) indicate that the financing patterns of firms follow those of their peers, and these researchers argue that this finding is consistent with the learning and reputation theory. The change in debt ratio will reflect a change in the peer or industry ratio. This is particularly more evident in small and medium firms with inexperienced managers. On general analysis, this argument is sound. Firms would strive to be like their peers, especially the best-performing ones. Even large firms mimic their peers. This mimicking of peer capital structure is likely to be more pronounced in highly competitive industries, illustrating that capital structure does affect the competitiveness of firms in a product market. Generally, managers have a tendency to replicate what their peers do, especially if it proves to be successful. This is likely to be reinforced by the fact that firms in the same industry can share analysts, bankers, credit rating agencies and auditors. This puts pressure on management to "*do as your peers have done"* and after all, firms use their peers to benchmark their performances on many fronts. Firms in an industry can be classified as leaders, innovators or followers. The followers are very likely to follow the capital structure of innovators and leaders, with the latter providing a "role model" for the other firms to follow. The minor differences will reflect the firm-specific constraints. Thus the financial policy is likely to follow the "legal precedents" of the industry.

In line with this argument, leverage ratios may have nothing to do with the trade-off or pecking order theories, but the firm may simply be following the capital structure of its peers. Industries by their nature have different operational and financial characteristics. Operational risk, profitability, asset structure, growth opportunities and growth rate vary between industries, and managers adopt capital structures that accommodate these industry characteristics. According to Ronn and Senbet (1995:1393), the debt structure of a firm depends on the industry, with low-risk and solvent industries opting for higher leverage. High risk industries opt for lower leverage. Thus the risk profile of the industry affects the cost of debt capital to the firms, and this ultimately affects the stock of debt that the firm issues.

3.7.11 Managerial Factors: Compensation, Discretion and Entrenchment

Agency problems, which give rise to agency costs, arise when the interests of the managers are in conflict with those of the shareholders. As Jensen and Meckling (1976:305) pointed out in their agency theory, managers want to maximise their managerial rents and consumption of perquisites while increasing the size of assets under their control. The magnitude of the agency costs arising from this conflict of interest depends on:

- The structure of management compensation
- The level of insider ownership
- The level of managerial entrenchment.

In most firms, the remuneration of senior executives is linked to the firm's performance, with the performance being measured in terms of profitability and growth rate (Mehran, 1995:179). This implies that management will earn extra material rents by growing the firm size as well as by improving the firm's profitability. In this situation, managerial preferences will always dominate the firm's financing decisions, as managers seek to maximise their compensation and reputation. The capital structure will reflect managerial preferences and not shareholder preferences. Managers will adopt a capital structure that maximises their wealth (Blanzeko, 1987:841).

Agrawal and Mandelker (1987:823) and Kim and Sorensen (1986:142) established that there is a positive association between the level of insider ownership and the level of debt. Debt levels tend to increase with the level of insider ownership. The practical implication of this is that managers are reluctant to issue equity when they hold shares in the firm. The principal explanation that is advanced for this financing behaviour is that managers fear diluting their shareholding, and hence they rely heavily on debt to finance new projects. Stultz (1990:23) argued that use of debt also increases the voting power of managers, as they also act as the agents or proxies of bondholders. Managers will only issue equity when borrowing costs become unfavourable to the firm. This financing behaviour of managers implies that the agency costs of debt decline with an increase in insider ownership. But empirical findings by Jensen, Solberg and Zorn (1992:261), which support the modified pecking order hypothesis, contradict the above findings. While agreeing that financial decisions and the level of insider ownership are interdependent, they established that firms with higher levels of insider ownership use less debt and more equity. This conflict further demonstrates the complexity of a firm's financing decisions.

Financing decisions are also affected by the level of managerial entrenchment, which directly defines the managers' discretionary powers. Entrenched managers choose a financing mix that enhances their interests (Pindado & De la Torre, 2011:223). Highly entrenched managers tend to be powerful and they avoid the use of debt, as it reduces their discretionary powers. But those that hold equity will use debt, as it increases their voting power (Stulz, 1990:23). The managerial discretion and entrenchment problem is severe in firms that generate excess free cash flows. Managers in such firms want to fully utilise their discretionary powers in the application of the excess free cash flow. As explained earlier, this may even mean investing in NPV-negative projects that destroy value. According to Berger, Ofek and Yermack (1997:1436) and Jensen (1986:323), this problem can be resolved effectively by forcing such managers to issue debt. Debt commits the firm to making regular interest payments and this effectively disciplines the entrenched managers. The problem can also be resolved by awarding managers share options, as this will force them use more debt so as to avoid diluting their holdings. Debt, in this case, would further increase their voting powers (Stulz, 1990:23), as they also act as proxies for bondholders. The evidence on managerial entrenchment is, however, inconclusive (Lemmon & Zender, 2001:1).

The impact of the managerial factors illustrates the importance and relevance of behavioural factors with regard to corporate financing. These factors are complex and difficult to quantify, but that does not justify their exclusion from the explanation of trends in corporate financing. They are dependent on the type of manager, the type of firm being managed, and the manager’s background and situation. The general assumption is that managers are bounded rationally and make decisions under uncertainity (Arce, Cook & Kieschnick, 2011:22). The ultimate use of managerial discretion is unavoidable. Managers have to lead and they are empowered by the shareholders to make strategic decisions, including decisions concerning the financing of operations.

In summary, the firm-specific determinants of corporate financing patterns are diverse and they are too complex to model into a single financing equation. As explained, these factors derive from different theories which are conflicting on many fronts. It is therefore difficult to reconcile them and incorporate them into a single model that can fully explain the observed corporate financing patterns. In many cases, these factors are used to validate a theory or differentiate it from its rivals. But empirical evidence of such validation and differentiation tests has been inconsistent. It is important to note that country-specific factors also play a role on the overall financing decision.

3.8 THE COUNTRY-SPECIFIC DETERMINANTS OF CAPITAL STRUCTURE

The determinants of capital structure are not only restricted to firm-specific characteristics, but they extend to country-specific characteristics as well. Countries vary in many respects, with the main sources of variation being the differences in tax regimes, legal systems, levels of corruption, institutional differences, risks, sophistication of capital markets, and corporate governance systems. All these factors influence the country-specific operating environments, and thus capital structures around the world are expected to vary to reflect these differences (Bancel & Mittoo, 2004:131). Globalisation has increased the interdependence of global economies. Changes in the economic fortunes of one major country or market can now be directly channeled to the rest of the countries in the same block or/and to the rest of the world. For example, Deesomsak, Paudyal and Pescetto (2004:404) found that the Asian financial crisis of 1997 influenced the capital structures of firms in that region. Other good examples of these effects are the 2008 US subprime crises which sparked the Eurozone sovereign debt crisis (Arghyrou & Tsoukalas, 2011:174). The effects of these crises have not been restricted to their regions of origin, but they have spread to the rest of the world, including developing countries such as South Africa. These events illustrate the level of interconnectedness of global capital markets, with changes in the global macro-economic factors directly affecting the local macro-economic environments (Naude, 2009:4). The interaction of the country-specific and global factors with the firm-specific factors ultimately determines the financing choices of a firm.

3.8.1 Country Macro-economic Conditions and Business Cycles

Changes in a country's macro-economic variables define the country's business cycles - that is, peak (boom), contraction (recession), trough (bottom) and expansion (growth) cycles (Akhtar, 2011:1). These business cycles in turn affect the firm's performance as well as its access to and cost of capital. The findings of Akhtar (2011:5) indicate that a firm's profitability and growth rate are higher during expansion and peak periods. This improved growth translates to a higher demand for financing during expansion periods, as the firm has to finance its growth options. According to the trade-off theory, the financing will be such that the firm maintains its optimal or target capital structure. The growth and peak cycles present firms with better opportunities to correct deviations from their target ratios, as both profitability and the stock market performance tend to be higher during these periods than in recessionary cycles. The findings of Hackbarth, Miao and Morellec (2006:543) indicate that credit spreads are higher in recession cycles than in boom cycles, and this implies that debt is more costly during recession cycles. Also, the performance of the stock market is lower during recession cycles.

Choe *et al.* (1992:23) investigated the impact of business cycles on firm financing, and their findings indicate that business cycles play a major role in share returns. As expected, returns are high during boom periods and very low during depression periods. The state of the capital markets and the shares and bond returns has an important bearing on the financing decisions. The market timing theory predicts an increase in equity issuance during periods of high share returns, implying that firms will issue more equities during boom cycles than during recession cycles. Furthermore, the impact of these business cycles depends on whether the firm is financially constrained or not (Halling & Zechner, 2011:25). The findings of these researchers indicate that the negative impact of the cycles can be up to four times greater for financially constrained firms. They further confirm that a firm's book leverage follows a pro-cyclical pattern, and this corresponds with the trade-off models. Consistent with the time varying model, the researchers also established that market leverage follows a counter-cyclical pattern; these findings are similar to those of Hackbarth *et al.* (2006:543). The difference between book and market leverage is mainly due to the differences in the market values of securities in each cycle. Prices are high during boom cycles and they decline during recession cycles. But findings from Korajczyk and Levy (2003:104) indicate that even though market leverage is counter-cyclical, there is little evidence that macro-economic conditions have a significant impact on unconstrained firms. This is a valid argument, because these firms can still finance their growth options, as they have access to capital even during recession cycles. The authors estimated that the changes in these conditions only account for 22%-24% of the changes in observed leverage.

Firms require adequate financial flexibility in order to overcome the negative effects of business cycles. There is empirical evidence that firms with greater financial flexibility suffer fewer disruptions in their operations during an economic crisis (Bancel & Mittoo, 2011:214). Firms build financial flexibility by retaining a larger proportion of the earnings and reducing their leverage ratios during the boom cycles. This ensures that they maintain a higher proportion of reserves (cash holdings) and unutilised borrowing capacity, and they can utilise these sources of finance to overcome the negative effects of depression. Akhtar (2011:22) provided evidence that firms have a permanent portion of internal funds. The permanent capital provides them with the financial flexibility that they require to mitigate the negative effects of a depression. This implies that firms will lower their leverage ratios during a boom cycle and increase these ratios during a depression. This financing behaviour is consistent with the pecking order theory. However, Hackbarth *et al.* (2006:543) provided empirical evidence to the contrary. Their findings indicate that firms borrow more during boom or peak cycles. In some cases, the borrowing can be up to 40% more than in recession cycles. As boom cycles are associated with increased profitability, this financing pattern is consistent with the trade-off theory. Firms face higher marginal tax rates during boom cycles, as their profits are higher then than during a recession, and they can reduce their effective tax rates by increasing their debt interest. These findings provide further evidence of the conflict between the two leading theories of capital structure.

Business cycles also affect a firm's speed of adjustment towards the target leverage. Research by Drobetz *et al.* (2007:24) and Hackbarth *et al.* (2006:543) provided evidence that the adjustment speed is higher when macro-economic conditions are favourable. That is, the speed is higher when the interest rates are low and the performance of the stock market is high. The adjustment speed is lower during periods of recession, and financially constrained firms exhibit lower adjustment speeds than their counterparts in all cycles. The unconstrained firms benefit from their financial flexibility which makes all sources of financing available to the firm.

The adjustment speeds of these firms are less likely to be very dependent on business cycles.

3.8.2 The Structure, Performance and Regulation of the Capital Markets

According to Antoniou *et al*. (2008: 59), countries can be classified as being either stock market-oriented (for example the US and the UK) or bank-oriented (for example France, Japan and Germany). This orientation is influenced by the country's level of development of its stock market, its investment banking relations, its corporate governance practices, and the nature of investor protection laws. Firms domiciled in stock market-oriented countries raise most of their finance through the stock markets whilst those operating in bank-oriented countries raise most of their finance through banks. According to Demirguc-Kunt and Levine (1999:36) and Levine (2002:423), the main distinguishing features between market orientation and bank orientation are the legal, corporate governance and investor protection laws, creditor protection laws and the level of corruption. Their findings indicate that common-law countries tend to be market-oriented, as they offer investors the best protection through good corporate governance practices. Firms operating in such countries normally find it easier to raise equity capital and therefore tend to be conservatively leveraged or zero-leveraged (Bessler, Drobetz, Haller & Meier, 2011:33). Countries with French Civil laws tend to be bank-based, as they offer minimal investor protection, and hence their capital markets are less developed (La Porta, Lopez-de-Silanes, Shleifer & Vishny, 1997:1149). The harmonisation of accounting and corporate governance systems may see the Civil-law countries improve their investor protection laws and hence move towards a market orientation. As explained above, there are obvious advantages for firms operating in countries with developed market-based capital markets. The speeds of adjustment also vary between civil- and common-law countries, with the former exhibiting higher adjustment speeds.

Generally, the performance of the stock market is positively associated with the country's macro-economic cycles. The market returns are high during peak and growth phases and low during recession phases. The findings of Demirguc-Kunt and

Maksimovic (1999:333) indicate that debt levels are closely related to the liquidity of the stock market. Large and mature firms operating in countries with active stock markets tend to carry a higher proportion of long-term debt. These firms are normally credit rated and they can therefore raise cheaper long-term debt, as opposed to more expensive short-term debt. Small firms normally rely on the bank for debt financing, and it is not surprising that small firms operating in countries with a large banking sector carry a higher proportion of long-term debt.

The factors that determine capital structure are numerous and very complex. Some of the factors, especially the behavioural factors, cannot be measured; they depend on management preferences. It is generally difficult to integrate these into a single model that can be used to predict an ideal capital structure for a firm.

In conclusion, it should be noted that Graham and Harvey (2002:11-16) conducted a survey on how firms make security issuance decisions, and they identified the factors that are very relevant to the financing decision. These factors are presented in Table 3.10 below.

Table 3.10: The Determinants of Financial Policy

Factors that affect the decision to issue debt (ranked highest to lowest)	Factors that affect the decision to issue ordinary shares (ranked highest to lowest)
▪ Financial flexibility ▪ Credit rating ▪ Earnings and cash flow volatility ▪ Insufficient internal funds ▪ Level of interest rates ▪ Interest tax savings ▪ Transaction costs and fees ▪ Equity under/over-valuation ▪ Comparable firm debt levels ▪ Bankruptcy/distress costs ▪ Customer/supplier comfort ▪ Change in share price ▪ Underinvestment concerns ▪ Debt retirement costs ▪ Debt issuance costs ▪ Conveying of a favourable impression ▪ Investors' taxes on income ▪ Reducing attractiveness as a takeover target ▪ Production threat to rivals ▪ Committing free cash flows ▪ Accumulation of profits ▪ Bargaining chip with employees	▪ Earnings per share dilution ▪ Magnitude of equity under-/over-valuation ▪ Recent share price increase, resulting in "high" selling price ▪ Provision of shares for employee bonus/option schemes ▪ Maintenance of a target debt-to-equity ratio ▪ Dilution of the holdings of certain shareholders ▪ Shares being the "least risky" source of funds? ▪ Sufficiency of recent profits to fund activities ▪ Similar amount of equity as same-industry firms ▪ Favourable investor impression vs issuing debt ▪ Lack of other available sources of funds ▪ Shares being the cheapest source of funds? ▪ Investor taxes on equity income

3.9 THE COUNTRY-SPECIFIC DETERMINANTS OF CAPITAL STRUCTURE: TESTS ACROSS THE GLOBE

3.9.1 The Country-Specific Factors

As discussed above, capital structures around the world are likely to differ as country-specific factors come into play. Although the global macro-economic performance has an effect on the local economy, it is the local macro-economic factors that remain an important determinant of both firm performance and leverage. The structure, complexity, liquidity and performance of capital markets differ across countries. Country-specific factors as well as the structure of the capital markets influence the degree of market orientation of firms. The structure, liquidity and performance of capital markets have a direct impact on the capital structure and quality of firms (Atkin & Glen, 1992:387). According to Agarwal and Mohtadi (2004:68), equity issuance is favoured by a developed and liquid stock market whilst debt issuance is favoured by a developed banking sector. The implication is that the size and number of banks are positively associated with higher debt issuance and higher firm leverage. Although accounting and auditing practices are converging as more countries adopt the International Financial Reporting Accounting Standards (IFRS) and the International Auditing and Assuarance Standards (IAAS), differences in business practices still persist. Countries have different corporate governance and legal systems, and these have a direct effect on investor and creditor protection levels. Tax structures and capital investment incentives also differ across countries. In their survey of 39 developed and developing countries, Fan, Titman and Twite (2012:23) found that the major determinants of both the debt ratios and the debt maturity profiles of firms are: legal and tax systems, the size of the insurance industry, corruption levels, and the preferences of capital suppliers. Their survey also indicated that firms operating in corrupt countries are highly leveraged and issue more short-term debt. Firms operating in countries with an explicit bankruptcy code and/or advanced insurance industries issue more long-term debt and also tend to be highly leveraged. The main benefit of debt, according to the trade-off theory, is the interest tax shield. The prediction of the theory is that firms operating in countries that offer higher tax benefits of debt will be highly leveraged. The size of the government bond markets also has an impact on the level of debt that firms can raise. The findings of Fan *et al.* (2012:23) also indicate that firms operating in countries with large government bond markets tend to be less leveraged, as the corporate bond activity is crowded out by the government bonds which are less risky for investors.

The competitiveness and profitability of firms also differ across countries. These country differences have both a direct and indirect effect on firm-specific factors that determine the leverage of the firm (De Jong, Kabir & Nguyen, 2008:1968). The orientation of a firm to any of the capital structure theories is therefore an interaction between the country-specific and firm-specific factors. According to the market timing theory, firms listed in countries with developed and well-performing stock markets will be less leveraged, as they will issue more equity. And according to the agency theory, firms operating in countries with high agency costs, as reflected by poor corporate governance practices and corruption tendencies, will have higher debt so as to minimise these agency costs. High leverage disciplines management, thus reducing the agency costs of free cash flow. In line with the widely surveyed US firms, firms across the globe show mixed preferences for both the pecking order and trade-off theories, with most firms adopting the dynamic versions of these theories. Thus the main country-specific factors that affect corporate leverage can be summarised as:

Lev = f (economic environment; level of sophistication of financial markets; corporate governance practices; legal systems and tax systems; levels of corruption; borrower lender relationships; and level of investor and bondholder protection).

Antoniou *et al.* (2008:86) investigated the determinants of capital structure in both market-oriented (US and UK) and bank-oriented firms (Germany, Japan and France). Their study identified a number of variables that affect the capital structures of firms. In both economies, they found that leverage can be modelled in terms of firm-specific factors as:

$$Lev = f(+TAN + SIZE - \Uparrow P - GO - SPP) \qquad (3.49)$$

Where:

TAN = Tangible assets

$SIZE$ = Firm size measured by the natural log of sales

P = Firm profitability measured by the return of assets (ROA) ratio

GO = Growth opportunities measured by the market-to-book (MTB) ratio

SPP = Share Price Performance

The results of their study confirm that firms do have target capital structures towards which they adjust at varying speeds. The French firms are the quickest to adjust towards the target, while Japanese firms are the slowest. They summarised the country-specific factors that determine corporate financial policy as being those contained in equation 3.50.

$$Lev = f(MEE; CG; L; T; BLR; ECM; IBP) \quad (3.50)$$

MEE = State of the macro-economic environment

CG = Corporate governance systems

L = Legal systems

T = Tax systems

ECM = Exposure to capital markets

BLR = Borrower-lender relationships

IBP = Level of investor protection

The total factors affecting the firm's capital structure and speed of adjustment are therefore expressed as:

$$Lev = f(country - specific\ factors + firm - specific\ factors)$$
$$Lev = f(MEE; CG; L; T; BLR; ECM; IBP)(+TAN + SIZE - \Uparrow P - GO - SPP)$$

A study by Drobetz and Wanzenried (2006:947) established that the speed of adjustment towards a target capital structure depends on both the firm-specific factors (growth opportunities, size, and the spread between actual and target leverage) and macro-economic factors (these are closely linked to the economy's business cycles: the term spread, the short-term interest rate, the default spread and the Treasury Bill of Eurodollar spread (TED spread). Legal traditions, financial traditions and institutional factors also affect the speed, size and frequency of adjustment (Oztekin & Flannery, 2012:88). The speed of target adjustment will also vary across countries, reflecting the differences in country characteristics. Countries with high-quality firms, good investor protection laws, favourable institutional features, and stable or growing economies will exhibit a higher speed of adjustment. According to Oztekin and Flannery (2012:88), these features lower the adjustment costs and hence facilitate faster and more frequent adjustments. Given these country differences, it is expected that heterogeneity in capital structures and speeds of adjustment will persist across the globe.

3.9.2 Selected Tests on Country-Specific Factors

A number of studies have been conducted to test the impact of country-specific factors, and most results confirm the importance of these factors. Kester (1986:15) studied the differences in capital structures between US and Japanese manufacturing firms and concluded that, after adjusting for accounting differences, there was not a significant difference in leverage between US and Japanese firms. Rajan and Zingales (1995:1458), using cross-sectional studies, investigated the determinants of capital structure in the industrialised group 7 countries (G7 countries which are France, Germany, Italy, Japan, United Kingdom, United States and Canada). Their study specifically looked at whether factors that determine capital structure in the US apply in the G7 countries, and their findings were that these factors are indeed applicable in these countries; there were not any significant differences between the countries. Their estimated regression model was as follows:

$$Lev = \alpha + \beta_1 TAN + \beta_2 MTB + \beta_3 LOG\_SALES + \beta_4 ROA + \varepsilon_i \qquad (3.51)$$

Where:

TAN = Tangible assets

MTB = Market-to-book ratio

LOG_SALES = Natural Log of Sales

ROA = Return on Assets

Their findings established that tangibility is positively correlated to leverage for all countries. They also found that the market-to-book ratio is negatively correlated to the leverage ratio in all the countries other than Italy; size and profitability are positively correlated to leverage in all the countries other than Germany, where they are negatively correlated. It must be noted that these studies were focused on developed countries, which are largely expected to have well-developed capital markets, larger and more profitable firms, stable macro-economic environments, and relatively good investor protection laws. Most of these countries are therefore capital market oriented.

Hirota (1999:226) investigated the determinants of capital structure in Japanese firms, and his findings were that the capital structure determinants for Japanese firms were not only limited to the factors identified by the theories of capital structure, but that institutional and regulatory characteristics of Japanese capital markets also played a significant role. These factors represent the country-specific factors that shape the financial policy of a firm. The importance of these factors was further emphasised by Wald (1999:184) who attributed the varying correlations to the differences in tax policies, agency problems, bankruptcy costs, information asymmetries, and shareholder/creditor conflicts.

De Miguel and Pindado (2001:77), in their study of Spanish firms, established that Spanish firms provide evidence of both the trade-off and pecking order theories at work, and neither of these theories dominates the other. In a similar study, Delcoure (2007:414) investigated the determinants of capital structure in Central and Eastern European (CEE) transitional countries, and found that the traditional capital structure theories are portable and they are relevant to these countries. They further established that none of the theories (pecking order, trade-off or agency theory) are applicable in their pure form. The modified versions perform better, with most firms following the modified pecking order theory. Furthermore, the financing policy conforms to the country-specific factors such as banking systems, legal systems (especially with reference to shareholder and bondholder protection) and corporate governance systems.

These findings are consistent with those of Gaud, Jani, Hoesli and Bender (2005:67) who investigated the capital structure of Swiss firms. Their study of 104 listed Swiss firms provided empirical evidence that the Swiss firms follow the “old pecking order” theory as well as the trade-off theory of corporate financing, with more evidence supporting the latter. The study also established that Swiss firms are much slower than other European firms in adjusting their capital structures, which they argue is a reflection of institutional as well as country-specific factors. Beattie, Goodacre and Thomson (2006:1431) conducted a survey on UK Corporate Financing, and the findings of their survey confirms the heterogeneity of capital structure policies, with 50% of the firms confirming the use of the trade-off theory, although 60% claimed to follow the pecking order theory. Most of the respondents did not see these theories as being exhaustive or mutually exclusive; other factors must be considered, especially the country-specific factors such as institutional differences.

In another study of leverage trends in the UK firms, Brierley and Bunn (2005:364) argued that UK firms generally follow the trade-off theory of financing, and recent changes in leverage can largely be explained with reference to changes in the macro-economic variables, such as inflation and interest rates, which demonstrate country-specific factors. In another study of debt-equity choice in Europe, Gaud, Hoesli and Bender (2005:28) used 5,000 European firms to look at the determinants of capital structure. Their study provided empirical evidence that capital structure cannot be solely explained with reference to the pecking order or trade-off theories; there is a need to incorporate corporate governance systems as well as market timing. The relevance and importance of corporate governance systems was also confirmed by the findings of Wanzenried (2006:713) in his study of UK and European firms. The UK and Western European firms are more market-oriented, as these countries are developed and richer. They are generally characterised by better corporate governance systems. In a survey of 313 CFOs of European firms, Brounen, De Jong and Koedijk (2004:71) found that these CFOs value financial flexibility, and the importance of national influences is minimal. This may be due to the harmonised legal and corporate governance systems in the EU block; these make the countries homogeneous, and hence the importance of national factors diminishes. In a similar survey of 16 European countries, Bancel and Mitoo (2004:103) found that European firms value financial flexibility and earnings per share dilution. These factors, together with the institutional environment, are the primary determinants of corporate financing. Legal systems are only important in debt financing, and they confirm the relevance of the trade-off theory.

In another study, Wiwattanakantang (1999:401) investigated the determinants of capital structure in listed Thai non-financial firms. He established that profitability, tangibility, taxes and growth were significant determinants of leverage in Thai firms. Additionally, governance mechanisms and share structure ownership have an impact on a firm’s financial policy. There is a negative correlation between leverage and ownership concentration; this implies that large shareholders monitor management. The study by Prasad, Green and Murinde (2001:1) confirmed that Thai and

Malaysian firms follow both the pecking order and "reversed pecking order" theories of corporate financing. In a similar study of South Korean firms, Fattouh, Scaramozzino and Harris (2001:17) also established clear evidence of heterogeneity in the capital structure of the firms, and strong evidence of heterogeneity in the determinants of capital structure. The importance of firm-specific and country-specific factors was also demonstrated by Deesomsak, Paudyal and Pescetto (2004:403) in their study concerning the determinants of the capital structures of firms in different countries with different legal, financial, and institutional environments. The sampled firms for this particular study were from Thailand, Malaysia, Singapore and Australia. The basic determinants were applicable in all of these countries, with firms adjusting for the country-specific factors. Again, these countries had developing or emerging economies; their economic systems had largely similar characteristics. In a survey of Hong Kong firms, Fan and So (2004:827) provided evidence that firms in Hong Kong prefer the pecking order theory and that they do not value tax benefits or the signalling of security issuances. The current market conditions are a major determinant in security choice, with managers issuing more equity during recession periods.

Chen (2004:1348), in his study regarding the determinants of the financial policies in Chinese firms, established that neither the trade-off theory nor the pecking order theory can provide an explanation for the financing behaviour of Chinese firms or other firms that operate in transitional economies. He presented evidence suggesting that Chinese firms follow what he terms a "new pecking order" (retained profits, equity, and then long-term debt). He argued that this indicates that factors specific to China and a transitional economy are different from those specific to the Western developed world where the "old pecking order" might be applicable. Haung and Song (2006:14) studied 1,200 Chinese listed firms and pointed out that the determinants of capital structure in these firms are consistent with the current financial theory, except that Chinese firms carry much lower long-term debt. In particular, leverage is positively correlated to firm size and tangible assets, and it is negatively correlated to profitability, non-debt tax shields, growth options and the level of internal ownership. This implies that Chinese firms follow both the pecking order and trade-off theories. Similar results were presented by Qian, Tian and Wirjanto (2009:662). Their study of Chinese firms provided evidence that leverage is also positively correlated with state shareholding, and negatively correlated with earnings volatility. They further asserted that firms exhibit dynamic capital structures with slower speeds of adjustment towards their targets. In a study of the determinants of capital structure in South Korean firms, Fattouh *et al.* (2001:1) pointed out the heterogeneity of both the determinants of leverage and the leverage between firms. They argued that these variations can be best explained by the agency theory.

In a study of corporate financing in developing countries, Singh (1995:2) provided evidence that firms in developing countries follow what he termed the "reverse pecking order". The firms used more external sources of finance than internal sources and issued more equity than debt. The use of more external funds can be explained with reference to the lower profitability of these firms. However, the issuing of more equity than debt is puzzling. The expectation is that these firms would issue more debt than equity, since their capital markets are less developed, thus they tend to be more bank-oriented. In a study to further investigate these findings, Yartey (2006:20) pointed out that the stock market is an important source of financing for Ghanaian firms. Although the firms finance most of their growth in assets through short-term debt (Abor, 2008:27), the stock market still remains an important source of both debt and equity.

Lastly, Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001:118) investigated whether capital structure is portable across countries. Their study compared the capital structures of developing countries from Africa, Latin America, Asia and Eastern Europe, and contrasted their capital structures with those of developed Western countries. Their findings indicated that the same capital structure factors apply across countries, but there are persistent differences between countries; this is a reflection of the influence of country-specific factors. Eldomiaty (2007:36) investigated the determinants of capital structure in Egyptian firms, and his results confirmed earlier predictions that no single theory can explain the financing behaviour of firms, even in emerging economies. The trade-off and pecking order theories are complementary and they are the best descriptors of corporate financing in Egypt. His study indicates that there are no significant differences in the financing of firms between different countries. In another study of Egyptian firms, Dawood, Moustafa and El-Hennawi (2011:96) identified firm size, profitability, liquidity and business risk as the main determinants of corporate financing, and they established that Egyptian firms follow the modified pecking order theory. These studies are salient regarding the effects of asset tangibility, firm growth rate and Non-debt tax shields on the debt policies of Egyptian firms. Gwatidzo and Ojah (2009:1) investigated the financing patterns of five African countries, namely Ghana, Kenya, Nigeria, South Africa and Zimbabwe, and they found that leverage ratios in these countries match those of other emerging countries, notably Mexico, Thailand, Brazil, South Korea, Malaysia and Turkey. The firms follow a pecking order theory of financing and they issue more short-term debt when faced with an internal funds deficiency.

In line with earlier predictions about the importance of country-specific factors, the test results from the above-described empirical studies confirm the impact and importance of country-specific factors in the overall determination of the firm's capital structure. The testing methods are similar to those used to test for the effects of the firm-specific factors. The objectives of the tests have been limited to testing for the relationship between leverage and country-specific factors. The test results were used to determine whether firms follow a particular theory of capital structure, and the results have provided supporting evidence for all the theories. The test results, however, still do not quantify the effects of the changes in each factor on the firm's leverage ratio.

What do the results of these studies imply about the capital structure of South African firms?

3.10 THE IMPLICATIONS FOR SOUTH AFRICAN FIRMS

There are very limited empirical studies on the theories that explain the capital structure of South African firms. The main studies are those of Negash, Lemma, Mans, Erusmus and de Vries. Negash (2001:40) used 63 firms listed on the JSE to investigate the effects of tax shields and bankruptcy costs on capital structure. The findings of the study indicated that there is a significant potential gain from leverage over an infinite period but this is nullified when capital losses due to liquidation and financial distress costs are invoked. The results of the study support Modigliani and Miller's 1963 arguments of optimal capital structure. It is however a very limited test of the static trade-off theory as it only looks at the tax and bankruptcy factors and neglects other important determinants of capital structure such as firm and characteristics.

In another study, Negash (2002:27) used 64 industrial firms listed on the JSE to test the static trade off theory. The results of the study indicated that leverage is negatively correlated to the tax rate, but uncorrelated to the non-debt tax shields (NDTS). Leverage is determined by cash flows, asset tangibility, size, actual tax paid and its own lagged values. However, the study has several weaknesses. Firstly it makes use of ordinary least squares (OLS) regression, which is rarely used in modern capital structure research work. It shuns the modern panel data estimators such as the system generalised method of moments (GMM), the Arellano and Bond (1991) estimator, Blundell and Bond (1998) estimator, Random effects Tobit estimator, random and fixed effects panel data estimators. Secondly, the study makes no attempt to explain how these factors affect the capital structure of South African firms. Thirdly, it does not test for the validity of the dynamic trade-off theory and other capital structure theories. It does not estimate the speed of target adjustment by the firms, which is a further test of the validity of the dynamic trade-off theory.

In another study, Wu and Negash (2002) used the Shyam-Sunder and Myers (1999) method to test for the pecking order and static trade-off theories in industrial firms listed on the JSE. The study documented that both models are applicable to JSE industrial firms. This study is however very limited in several respects: It does not specify the size of the sample and the regression method used. The study omits the firm-specific factors that determine leverage and differentiate the various theories from each other. It does not relate to the dynamic trade-off, modified pecking order and the speed of target adjustment. Furthermore, the presentation of the paper is very difficult to follow and it remains unpublished to date.

A more recent and relevant study on capital structure theories was done by Lemma and Negash (2011:323). The study used 152 firms listed on the JSE to examine the firm-specific factors that affect leverage and related the findings to the theories of capital structure. The study documented that capital structure is negatively correlated to profitability, liquidity, growth opportunities and business risk. There is positive correlation between leverage and industry factors. However, there are a number of weaknesses in the study. Although the study included manufacturing, mining and retail firms in the sample, the discussed findings relate to the whole sample of eight industries studied; thus industry heterogeneity is ignored. The study used an unusual regression model of exploratory factor analysis (EFA). Modern capital structure research normally uses the advanced panel data methods such as the Arellano and Bond (1991), Blundell and Bond (1998), random effects Tobit, random effects and fixed effects estimators. These estimators give more consistent results and the results can be compared with the findings of earlier studies. The study only tested for the static trade-off model which has been replaced by the dynamic trade-off theory which specifies the speed of adjustment towards target leverage. It makes no attempt to estimate the speed of adjustment for the firms.

Other studies on this topic were done by Mans and Erasmus (2011) and De Vries and Erasmus (2012). In their study, Mans and Erasmus (2011:29) used a total of 320 industrial firms listed on the JSE to investigate the impact of economic and firm-specific factors on the firms' financing decisions. The study used the time series regression procedure to test these effects. The study documented that the effect of economic changes on capital structure are indirect and take time to show their true impact. Also the trade-off and pecking order theories are not mutually exclusive. Firms do deviate from their leverage targets. The study has a number of weaknesses. It does not clearly define what industrial firms are, it merely states that there are 320 industrial firms listed on the JSE. It uses only the time series regression procedure and it ignores other prominent and sophisticated procedures such as the system generalised method of moments (GMM), the Arellano and Bond (1991) estimator, the Blundell and Bond (1998) estimator, random effects Tobit estimator, random effects and fixed effects estimators. The study only used profitability measures (return on assets (ROA) and return on equity (ROE)) to test for the effects of firm-specific factors. It ignored a host of other firm-specific factors that determine leverage. It also ignored the dynamic trade-off theory by not estimating the speed of target adjustment for the firms.

De Vries and Erasmus (2012) extended the study of Mans and Erasmus (2011). Their study investigated the combined effect of macro-economic and firm-specific factors on leverage. Unlike the Mans and Erasmus (2011) study, they used a number of firm-specific variables which included profitability, asset structure, business risk, liquidity, growth and firm size. The study found that the significant determinants of leverage are growth rate; profitability; asset structure; size and interest rates, (De Vries and Erasmus, 2012:13). However, there are a number of weaknesses in the study. This study did not relate these findings to the current capital structure theories. The same weaknesses of the Mans and Erasmus (2011) study above apply to this study as well. The studies described above have made an attempt to study the capital structure of South African firms but they suffer several limitations.

Most of the studies in emerging economies have been concentrated on Asian countries like China, Malaysia, Thailand and South Korea, and a few African countries, notably Ghana and Egypt. Even if these countries are grouped together with South Africa as emerging economies, each country still retains its uniqueness. The countries have different macro-economic variables, legal systems and investor protection laws, tax systems, corporate governance systems, and levels of capital market development. The size, liquidity and performance of the stock markets are also different. The capital structure of South African firms would largely be determined by the macro-economic variables described in Section 2.2, together with the firm-specific factors described above. A firm's capital structure would be a balance of all the factors, with the ultimate financing decision being determined by the uniqueness of the firm and the discretion of management.

3.11 CORPORATE FINANCING, CAPITAL STRUCTURE AND FIRM VALUATION

3.11.1 The Interaction of the Investment, Financing and Payout Decisions

The trade-off theory argues that a firm's value is maximised at a point where the WACC is minimised. The theory seeks to minimise the cost of each source of finance, thus minimising the firm's WACC of the sources of capital. The theory asserts that this minimisation of the WACC, if achieved, will result in maximising the value of the firm. This approach brings the WACC to the valuation model. The valuation process involves discounting the firm's current and future free cash flows (FCFs) with the minimal WACC. This approach, although correct, makes an assumption that the forecast FCFs will be financed in the same financial structure as the current earnings. That is, business and financial risks will remain the same.

This may, however, not be the case if the firm has financial constraints which reflect higher agency costs of underinvestment. The balanced approach should strive for an optimal financial policy that balances the minimisation of the cost of capital with the optimal generation of FCFs without incurring the agency costs of underinvestment. Thus there are two factors to consider in a firm's value maximisation: the lowest WACC as well as the achievement of optimal FCFs. As explained in Section 3.3, an optimal capital structure would enable the firm to attain these two objectives which are rarely in conflict. The optimal capital structure should not only minimise the WACC, but it should also afford the firm adequate financial flexibility to carry out its business plan, as well as to deal with unexpected capital demands. Achieving financial flexibility while maximising firm value should be the ultimate goal of any financing decision. The firm must maintain this slack so as to quickly raise capital at a reasonable cost in order to finance any opportune investments that may arise. From this argument, it follows that, in order to maximise firm value, management would need a financing policy that:

- Minimises the overall cost of capital (this means a balanced mix between debt, which is cheaper than equity, and equity capital)

- Offers the firm adequate financial flexibility to carry out its business plan without suffering any financing restrictions
- Enables the firm to invest in all the positive NPV-opportunities that it has
- Enables the firm to avoid underinvestment and overinvestment problems.

Patrick (1998:77) calls this kind of capital structure a balanced capital structure, and it is firm-specific. According to Damodaran (2006:339), the building blocks for maximising the value of the firm are the investment, financing and distribution decisions. There is a degree of overlap between the firm's financing, investment and payout decisions. The investment decision will depend on both the financing and the payout policy of the firm, with the two variables determining the amount of capital available to finance any investments options. The investment decision involves identifying NPV-positive growth opportunities for the firm. These growth opportunities have to pass the firm's hurdle discount rate, which is the weighted average cost of capital of the firm. As described above, the hurdle rate depends on the firm's leverage ratio. A lower hurdle rate increases the value of growth options for the firm, as it increases the stock of NPV-positive options. Both the financing mix and the distribution policies affect the availability and the cost of capital to the firm. The firm's aim is to minimise the cost of each source of finance and the overall cost of capital. A firm can increase its equity capital by either retaining its internally-generated profits (meaning that the firm must have a conservative dividend or buyback policy), or by issuing new equity. Thus the dividend policy plays a major role in the management of internally generated equity. According to the pecking order theory, firms prefer to use internal funds in financing their growth options. In cases where there is an internal deficit, they will raise external financing in accordance with the financing hierarchy, starting with the least resistance. The interaction of the investment, financing and payout policies is illustrated in Figure 3.4 below (Damodaran, 2006:339):

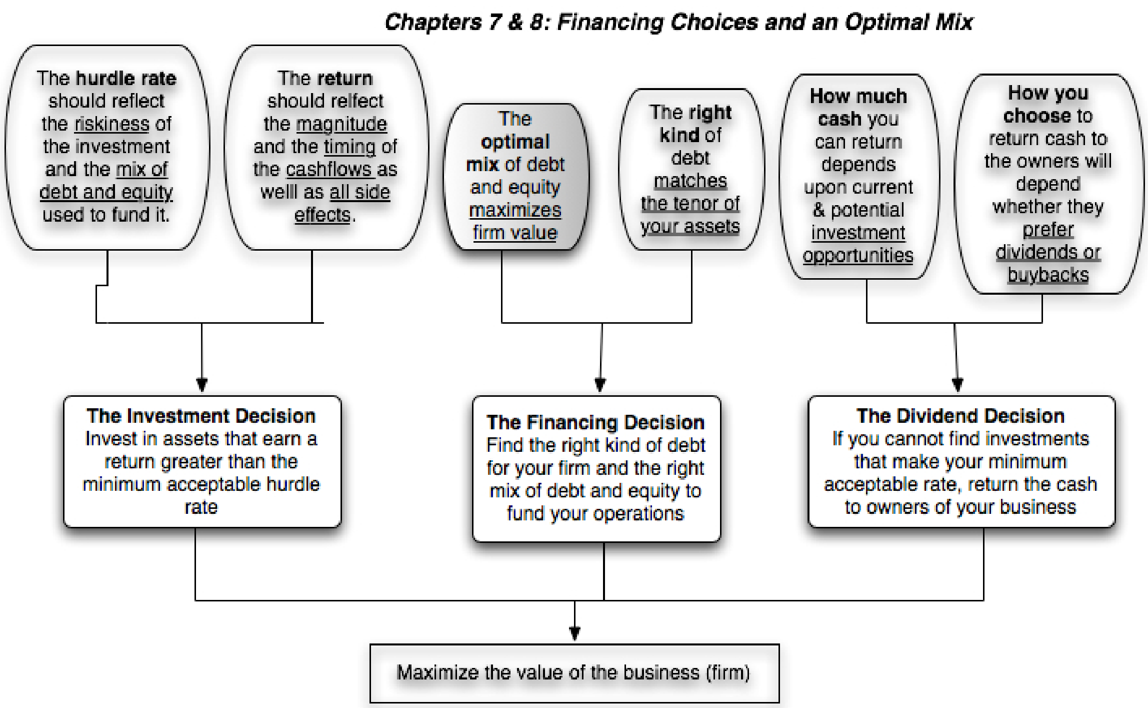


Figure 3.4: The Interaction of the Investment, Financing and Payout Decisions

(Adapted from Damodaran, 2006:339)

The questions that then arise are the following: When exactly does the firm approach the external capital markets to raise capital? Does it approach them after it has exhausted (drawn down) all its internal reserves, or when it has reached a certain threshold of internal reserves? What informs such a threshold, if it exists? When it goes to external markets, which securities does it sell first? Will it target a certain security class, or will it sell a mixture of securities? These questions relate to the capital structure decision and are at the core of this research. The financing, investment and distribution policies are inter-linked, and they must be balanced in order to maximise firm value. There are various ways of determining firm value, and these are described below. The bulk of the valuation methods depend on the firm's profitability (free cash flow generation) as well as its WACC. The firm's WACC derives from its costs of debt and equity, which are the main sources of long-term finance.

3.11.2 Capital Structure and Financing Sources

McGuigan *et al.* (2009:434) defined capital structure as "*the amount of permanent short-term debt, long-term debt, preferred shares, and common equity used to finance the firm*". In practice, the sources considered are normally long-term sources and these are split into equity and debt sources. Capital structure therefore refers to the mix of these two sources of finance, while the leverage ratio refers to the ratio of the market value of debt to the market value of the firm.

From the above discussion, it is clear that a firm's investment programme can be financed by:

- Internal funds (retained earnings), or
- Outside equity, or
- Outside debt, or
- A mixture of two or all of the above sources.

The choice of the source of financing defines the firm's financing policy, and it ultimately defines its capital structure. The capital structure decisions of firms are complex; that is why Myers (1984: 575) termed this debate a "*puzzle*". How do firms decide on a source of finance, and how do they decide on the mix of sources? Empirical research has produced a number of theories that attempt to explain the financing behaviour of firms, but evidence on these is conflicting and inconclusive, and the theories cannot be consistently applied to all firms. At its simplest analysis, the choice is likely to be affected by the firm's capacity to raise such capital as well as the cost of capital. But in practice, this decision is more complex, as the firm has to balance a number of factors which can be broadly classified as macro-economic and firm-specific factors.

3.11.3 The Cost of Debt Capital

According to Lumby and Jones (2004:397), debt capital is less risky and less expensive than equity capital. They argue that unlike equity capital, debt is redeemable, meaning that loans must be repaid at their expiry terms. Again, unlike equity holders, debt holders are guaranteed a return on their investment, and this return is in the form of regular interest payments which a firm cannot afford to default on. Equity holders are not guaranteed any dividends or capital growth on their investment. Any return to equity holders is at the discretion of management. It is management that decides when to pay dividends and when to do share repurchases. Furthermore, debt is ranked higher than equity in the distribution of both returns and capital when the firm is liquidated. Debt interest must be paid first before any dividends can be paid to equity holders; and in cases where the firm is in liquidation, the liquidators must first settle all the firm's liabilities before they can return any excess capital to the equity holders. This implies that debt holders have some insurance/security in the form of the firm's assets which serve as collateral. Equity holders therefore have a higher risk of exposure than debt holders, and they will therefore demand a higher return to compensate them for the increased risk exposure. This explains why equity is more expensive for the firm than debt.

Corporate debt holders' returns come in the form of interest payments from the firm. The interest constitutes the capital rent that the firm must pay for using these borrowed funds. According to Elton, Gruber, Agrawal and Mann (2001:247); Palepu, Healy, Bernard and Peek (2007:413); and Van Binsbergen, Graham and Yang (2010:2089), the main determinants of this rental price are:

- The current market risk-free rate (R_f)
- The lender's cost of borrowed funds (C_f) - The yield must cover this cost.
- The lender's cost of administering the loan and servicing the loan (C_a) - This includes the cost of issuing the loan.
- The premium for exposure to default risk (D_r) - This includes financial distress and agency costs.
- The risk premium (RP_m) - This is the lender's profit margin for taking a risk in holding corporate debt rather than a risk-free government bond.
- The provision for income tax charges (IT) - Corporate debt holders pay tax on the interest they receive, whereas holders of government bonds do not pay tax on the interest earned.

Excluding the general macro-economic conditions where the firm operates, the price of corporate debt can therefore be modelled as:

$$K_d = f[\![(R_f), (C_f), (C_a), (D_r), (RP_m), IT]\!] \tag{3.52}$$

The factors $(C_f), (C_a), (D_r), (RP_m)$ and (IT) are normally grouped together as loan or debt spread, δ_d.

This debt spread is defined as:

$$\delta_d = (C_f) + (C_a) + (D_r) + (RP_m) + IT \tag{3.53}$$

Elton, *et al*. (2001:251) also defined the spread as:

$$\delta_d = Taxes + Default\ Risk + Return\ Premium \tag{3.54}$$

But the return premium prices in taxes and the expected default losses. Cooper and Davydenko (2007:90) defined the promised yield as:

$$Promised\ Yield = Expected\ Default\ Loss + Expected\ Return\ Premium \tag{3.55}$$

Meaning that:

$$Cost\ of\ Debt = Promised\ Yield - Yield\ Equivalent\ of\ Expected\ Default\ Loss \tag{3.56}$$

This equation omits the risk-free rate which is the base rate for all corporate borrowing. Equation 3.56 can be adjusted to incorporate the risk free rate as:

$$Cost\ of\ Debt =$$
$$Risk - free\ rate + Promised\ Yield - Yield\ Equivalent\ of\ Expected\ Default\ Loss$$

In summary, the price of debt is defined as:

$$K_d = R_f + \delta_d \tag{3.57}$$

Ruback (2002:89) adopted the CAPM in pricing debt:

$$K_d = R_f + \beta_d R_p \tag{3.58}$$

That is, where debt is risk-free, $\beta_d = 0$; then the cost of debt (K_d) will be equal to the risk-free rate, R_f. But corporate debt is not risk-free; investors require a return premium to compensate them for the risk.

Elton, *et al.* (2001:247) argued that the spread reflects not only the default risk, but also all the factors defined in equation 3.52 above. They presented evidence which points out that the default risk only accounts for 17.8% of the spread, while taxes account for 36.1% and the risk premium accounts for 46.17%. Thus the main driver of the spread is the risk premium that is demanded by holders to compensate them for holding corporate debt. This risk premium is largely of a systematic nature, with only a small portion being idiosyncratic. The risk is positively correlated to the leverage ratio. The implication of this analysis is that debt-holders will increase their required rate of return if they are faced with an increase in default risk. This increase in turn increases the overall spread of the loan, thereby increasing the cost of the loan to the firm. That is, as the firm's leverage increases, its debt spread is expected to rise, thereby causing a downgrade in credit rating and thus forcing the cost of the loan to increase as well.

In South Africa, corporate debt is mainly priced with reference to either the Prime rate or the Johannesburg Inter Bank Rate (JIBAR). Thus the cost of corporate debt can be defined as:

$$K_d = PRIME \ \pm Spread \qquad (3.59)$$

$$K_d = JIBAR \ \pm Spread \qquad (3.60)$$

The JIBAR base rate is usually regarded as the most appropriate measure, with most listed debt being priced on a JIBAR basis. The spread incorporates the default risk as well as the lender's costs and return. Most banks load the issue and administration costs of the loan upfront; the spread then only represents the pricing of the default risk premium. This can either be negative or positive, depending on the credit rating of the borrowing firm as well as the general market demand for credit.

A foreign currency-denominated loan would be priced differently from a domestic loan, as the foreign borrower has to price in the currency, country and jurisdiction risk premiums. According to Peter and Grandes (2005:4), the cost of a foreign currency denominated loan is defined as:

$$Cost\ of\ foreign\ currency\ denominated\ bond = Risk\ free\ rate + Total\ Risk\ Premium \quad (3.61)$$

Where the total risk premium is defined as:

$$Total\ Risk\ Premium = Currency\ risk\ Premium + Country\ Risk\ Premium\ (Default + Jurisdiction\ risk\ premiums) \quad (3.62)$$

The above equations define the pre-tax cost of debt to the firm, and it precisely reflects the expected rate of return that the lender expects from the loan. The size of the debt spread will depend on the creditworthiness of the borrower, which is measured by the borrower's credit rating. The default risk simply measures the probability that the borrower will default on both interest and capital payments; it measures the credit quality of the borrower. A higher default risk will translate to a higher spread and, conversely, a lower risk will translate to a smaller spread that lowers the cost of debt. Lenders use credit ratings to assess and quantify this default risk. The credit rating simply assesses the creditworthiness of the borrowing firm. The rating can be done internally (most banks have their own rating departments) or by the credit rating agencies which are preferred for public listed debt securities.

According to Palepu *et al.* (2007:414), this rating depends on:

- Profitability measures: return on net capital - This assesses the overall profitability of the firm. Profitable firms generate stable cash flows.
- Profitability and leverage: interest cover and cash flow to non-current debt - This measures the times when interest is covered by earnings. It measures the likelihood of interest payment cover. This is an integral measure of creditworthiness; a lower cover increases the default risk.
- Firm size: sales and total assets - Total assets are preferred, because they can be used as collateral to the debt.

- Riskiness of profit stream: volatility of profits - Where profits are highly volatile, firms are likely to default, and hence default risk is positively correlated to profit volatility.

The credit rating agencies such as Moody's, Standard and Poor, and Fitch have standardised the credit rating formulas that they use to rate corporate as well as sovereign debts. Moody's formulas for rating global mining firms and global packaged goods firms are presented in Table 3.11 below.

Table 3.11: Moody's Rating Formula and Global Packaged Goods Firms

Mining Firms	Global Packaged Goods Firms
Reserves (mining firms): (8.00%)	Scale and diversification: **(16.36%)**
Cost efficiency & profitability: (17.00%)	Franchise strength & growth potential: **(16.36%)**
Financial policies: (17.00%)	Distribution and pricing power: **(5.4%)**
Financial strength: (25.00%)	Cost efficiency & profitability: **(16.36%)**
Business diversity & size: (33.00%)	Financial strategy and credit metrics: **(45.45%)**
"Other" liabilities adjustments: (0.00%)	

(http://www.moodys.com/research/Index-of-Fundamental-Rating-Methodologies--PBC_127479)

It is worth noting that in both cases, the financial performance of the firms contributes to over 58% of the rating criteria (59% for mining firms and 61.81% for packaged goods firms). The score from the formula is converted into a rating which is linked to an interest rate spread schedule. For example, Standard and Poor uses the table presented below (Table 3.12) to allocate ratings:

Table 3.12: Typical Standard and Poor Credit Rating Scale

Rating	Spread	Large Firms		Small Firms	
		If interest cover ratio is		If interest cover ratio is	
		>	≤ to	>	≤ to
D	15.00%	-100000	0.199999	-100000	0.499999
C	12.00%	0.20	0.649999	0.50	0.799999
CC	10.00%	0.65	0.799999	0.80	1.249999
CCC	8.00%	0.80	1.249999	1.25	1.499999
B-	5.25%	1.25	1.499999	1.50	1.999999
B	5.00%	1.50	1.749999	2.00	2.499999
B+	3.75%	1.75	1.999999	2.50	2.999999
BB	3.35%	2.00	2.249999	3.00	3.499999
BB+	3.00%	2.25	2.499999	3.50	3.999999
BBB	1.60%	2.50	2.999999	4.00	4.499999
A-	1.10%	3.00	4.249999	4.50	5.999999
A	1.00%	4.25	5.499999	6.00	7.499999
A+	0.85%	5.50	6.499999	7.50	9.499999
AA	0.65%	6.50	8.499999	9.50	12.499999
AAA	0.50%	8.50	100000	12.50	100000

(www.bondsonlene.com)

The interest rate cover ratio decreases with an increase in the cost and amount of debt held by the firm. It is negatively correlated to both the cost and amount of debt employed by the firm. The ratio is, however, positively correlated to firm profitability. The implication is that those firms wishing to maintain a target rating will also need to maintain a target debt policy. Such a target debt ratio will be adjusted in line with variations in the cost of borrowing and the firm’s profitability. The amount of debt will be reduced when the cost of borrowing increases with no change in profit levels; and it will also be reduced when the firm’s profitability declines with no change in interest rates.

In conclusion, the cost of debt to the firm depends on the credit rating of the firm. Firms with higher credit ratings incur lower loan spreads than those with poor or lower ratings. The rating of corporate debt has serious implications for the financing policies of firms. It is plausible that financial managers would aim to keep borrowing costs at a minimum, and in order to achieve this, they would have to aim for the highest credit rating. Thus credit ratings have an impact on the overall corporate financing decisions of the firm. A credit downgrade is not always positively welcomed by markets.

The principal benefits of debt to the firm have been discussed above. The highlighted benefits are as follows:

- Debt is less risky and therefore cheaper than equity capital.
- The cost of debt is further discounted by the tax shield that arises from the tax deductibility of debt interest.
- As shown by evidence, debt is effective in reducing the agency costs of overinvestment in value firms that generate excess free cash flows.

As postulated by the trade-off theory, the introduction of debt will reduce the overall costs of capital to an optimal level of gearing which coincides with the minimum WACC for the firm. The value of the firm is maximised at this level of leverage. Any debt beyond this level destroys the value of the firm.

3.11.4 The Cost of Equity Capital

The cost of equity capital to the firm is equal to the rate of return expected by the holders of equity instruments. This rate, according to Modigliani and Miller (1963), is expected to be lowest when the firm has zero debt - that is, when it is all equity financed. This point represents the lowest financial risk exposure by the holders of equity instruments. This financial risk index is expressed as beta, and it is statistically estimated as: (Brealey *et al.*, 2008:196)

$$(Market\ beta)\beta_{iM} = \frac{cov(R_i, R_M)}{\sigma^2\ (R_M)} \tag{3.63}$$

Where:
$cov(R_i, R_M)$ = covariance between share and market returns
$\sigma^2\ (R_M)$ = variance of returns on the market
Thus the risk premium that equity holders will demand for investing in the firm's securities is defined as:

$$Equity\ Return\ Premium = \beta_{iM}\left[E(R_m) - E\left(R_f\right)\right] \quad (3.64)$$

From this, Lintner (1965:13) and Sharpe (1964:441) constructed the CAPM which defines the total expected return for equity securities as:

$$E(R_i) = R_f + \beta_{iM}\left[E(R_m) - E\left(R_f\right)\right] \quad (3.65)$$

The CAPM defines the cost of equity to the firm. The all equity beta is also called unlevered or asset beta, and it represents the lowest level of financial risk to the equity holders. It can be thought of as the “risk-free rate” for equity holders. As the firm introduces debt into its capital structure, its financial risk is expected to increase, and this is reflected in the increase in the firm’s beta index. The equity holders will demand a higher risk premium to compensate them for the increase in financial risk exposure. The following Sharpe-Lintner Capital Asset Pricing Model (CAPM) is the most commonly used model to estimate the cost of equity capital:

$$K_e = R_f + \beta_i\left(R_m - R_f\right) \quad (3.66)$$

Where:
$\beta_i = equity\ beta$
$\left(R_m - R_f\right) = equity\ risk\ premium(ERP)$

Thus the driver of the firm’s cost of equity capital is the share’s systematic risk.

The use of the CAPM is not without controversy. Various studies have documented anomalies in this model. The returns predicted by this model are found to differ from actual returns. There are two primary estimates in this model: the beta and the equity risk premium, and these happen to be the main drivers of predicting equity returns. According to Welch (2000:502), there is no uniform formula or agreement on how to calculate the equity risk premium (ERP); various estimates are used, and this results in a false consensus on how to determine the ERP (Welch, 2000:525). The estimation of beta does not include all project risks; it specifically excludes the risk embedded in project options, and this is cited as the main cause for the anomalies in using the CAPM (Da, Guo & Jagannathan, 2011:2). The risk premium is not the only determinant of share returns. Other documented determinants of share returns are presented in Table 3.13 below.

Table 3.13: Other Determinants of Share Returns

Factor	Reference
Firm size	Banz, 1981
Earnings-to-price ratio	Basu, 1983
The book-to-market value of equity	Rosenberg, Reid and Lanstein, 1985
The cash flow-to-price ratio sales growth	Lakonshok, Shleifer and Vishny, 1994
Past returns	De Bondt and Thaler, 1985; Jagadeesh and Titman, 1993
Past earnings announcement surprise	Ball and Brown, 1968

The CAPM excludes all these factors. Nevertheless, besides the weaknesses of the CAPM, Da *et al.* (2011:2) argued that this model still remains relevant and that it provides a useful hurdle rate for evaluating future projects. They still recommend the use of the model, but suggest that the real options embedded in the project must be evaluated separately; this will give an accurate NPV figure.

The alternative to the CAPM is the three-factor model that was developed by Fama and French (1997:175):

$$R_{it} - R_{ft} = \alpha_i + \beta_{iM}\left(R_{Mt} - R_{ft}\right) + \beta_{is}SMB_t + \beta_{ih}HML_t + \varepsilon_{it} \qquad (3.67)$$

Where:

R_{it} = portfolio's expected rate of return

R_{ft} = risk-free rate

α_i = regression constant

β_{is} = regression coefficient of the market capitalization

β_{ih} = regression coefficient of the book-to-market factor

$(R_{Mt} - R_{ft})$ = market factor

SMB_t = small (market capitalization) minus big

HML_t = high (book-to-market factor) minus low

However, this model is not widely used in practice; the CAPM still dominates. A recent survey by Welch (2008:1) established that 75.0% of finance academics recommend the CAPM model. In another survey of US CFOs, Graham and Harvey (2001:201) documented that 73.5% of the CFOs use the CAPM as the main tool for calculating the cost of equity. Firms will normally implement only those projects with the largest positive NPV, thus there is already a large pricing premium incorporated into the derivation of the hurdle rate (Jagannathan, Meier & Tarhan, 2011:3). This makes the CAPM the best estimator of the cost of equity capital.

Where the firm is all-equity financed, the CAPM then becomes:

$$K_e = R_f + \beta_u(R_m - R_f) \tag{3.68}$$

Where:

β_u = ungeared beta

And as the firm introduces debt into its capital structure, its beta index becomes levered; it increases to reflect the increased financial risk that the firm's shareholders have to bear, and the CAPM becomes:

$$K_e = R_f + \beta_g(R_m - R_f) \tag{3.69}$$

Where:

β_g = geared beta

Hamada (1972:443) derived the following equation that links geared beta (β_g) with ungeared beta (β_u):

$$\beta_g = \beta_u\left[1 + \frac{D}{E}(1 - T)\right] \tag{3.70}$$

Where:

D= book value of debt

T= corporate tax rate

E= market value of equity

Thus where D=0 $\beta_g = \beta_u$

And thus the ungeared beta (β_u) is calculated as:

$$\beta_u = \frac{\beta_g}{\left[1 + \frac{D}{E}(1 - T)\right]} \tag{3.71}$$

The share's systematic risk measured by β is positively correlated to the firm's debt-to-equity ratio; debt increases the firm's cost of equity. The CAPM for a geared firm can be expressed as:

$$K_e = R_f + \beta_u \left[1 + \frac{D}{E}(1 - T)\right] \times \left(R_m - R_f\right) \tag{3.72}$$

This can be re-written as:

$$K_e = R_f + \beta_u \left[1 + \frac{D}{E}(1 - T)\right] \times (ERP) \tag{3.73}$$

However, these relationships assume that corporate debt is risk-free; in other words, that the cost of debt is equal to the risk-free rate. But it is well known that corporate debt is never risk-free; it is subject to default risk, and therefore it will have a beta value. Thus the equations must be modified to incorporate the risk factor of corporate debt. Connie (1980:1035) adjusted the above equation to incorporate the debt risk factor, and the final equation is:

$$\beta_L = \beta_U \left\{1 + (1 - T) \times \frac{D}{S_L}\right\} - \beta_{debt} \times (1 - T)\frac{D}{S_L} \tag{3.74}$$

Where:

D = corporate debt

S_L = levered equity

β_{debt} = debt beta

The unlevered beta (β_U) can be calculated from:

$$\beta_U = \frac{\beta_L + \beta_{debt} \times (1-T)\frac{D}{S_L}}{\left\{1 + (1-T) \times \frac{D}{S_L}\right\}} \qquad (3.75)$$

This equation now incorporates the price of risky debt. This price is irrelevant when the firm has zero debt, but it becomes relevant when risky debt is introduced into the capital structure of the firm.

Cohen (2008:64) defined β_{debt} as:

$$\beta_{debt} \equiv \frac{R_D - R_D^*}{r_{pm}} \qquad (3.76)$$

Where:

R_D = cost of debt

R_D^* = the risk-free rate

r_{pm} = the market equity risk premium

However, Cohen (2008:68) argued that Connie's equation is also flawed; the adjustment incorporates debt beta, which has persistently been deemed questionable, and this model cannot locate the optimal capital structure of the firm. The main weakness of this model is that it relies on a questionable beta index, and it is incapable of locating the optimal capital structure/minimum WACC for the firm. It does incorporate the default risk of risk debt, but the index is questionable. In fact, practitioners do not use this approach for these reasons.

Cohen (2008:66) suggested that the first step is to determine the cost of "idealised" debt:

$$D^* = \frac{R_D D}{R_D^*} \qquad (3.77)$$

Where:

D^* = idealised or "virtual" riskless debt

R_D^* = the risk-free rate

The unlevered value of the firm is then calculated as:

$V_L^* = E + D^* \times (1 - T)$

Thus the Hamada equation is adjusted to:

$\beta_L = [1 + (1 - T)\phi^*]$

Where:

βL = unlevered beta

ϕ^* = the adjusted leverage

The leverage spread is then calculated as:

$$Spread\ (\mu) = \frac{R_D}{R_D^*} \times \phi = \frac{R_D}{R_D^*} \times \frac{D}{E} \qquad (3.78)$$

This equation can then be used to generate the WACC and locate the optimal capital structure for the firm. Cohen (2008:66) used this equation to estimate the firm's optimal leverage.

The dividend valuation model can also be used to estimate the cost of equity (Ryan, 2007:154):

$$r = k_e = \frac{d_0}{p_0}(1 + g) + g \qquad (3.79)$$

Where:

r = return on equity

d_0 = dividend paid last year

p_0 = ordinary share price at the beginning of the period

This equation would be appropriate where the firm pays a dividend; this enables 'g' to be computed and hence the cost of equity can be calacaluated.

3.11.5 The Weighted Average Cost of Capital and the Valuation of the Firm

The preceding sections defined the costs of both equity and debt capital, with the overall cost of capital to the firm being the market-weighted cost of the various sources of capital. As explained above, the sources are normally grouped into debt and equity. This is merely for the purpose of simplicity; in practice, there are various classes of equity and debt, each with its own cost. The weighted average cost of capital is therefore calculated as:

$$WACC = W_1 r_1 + W_2 r_2 + \cdots \ldots W_n r_n \qquad (3.80)$$

Where:

W = book or market weighting of each source of capital

For a firm, the sources are normally debt and equity, and hence the simplified WACC is calculated as:

$$WACC = W_e K_e + W_d K_d \qquad (3.81)$$

According to Ryan (2007:209), this equation can be further expanded as:

$$W_e + W_d = 1 \Rightarrow W_e = 1 - W_d$$

Thus:

$WACC = K_e \times (1 - W_d) + W_d K_d$ and $K_d = R_f + \delta_d$

Substituting this,

$$WACC = K_e \times (1 - W_d) + W_d \times (R_f + \delta_d)$$

This equation simplifies to:

$$WACC = K_e - W_d (K_e - R_f - \delta_d)$$

From the CAPM, $K_e - R_f = \beta_i (ERP)$

Thus the WACC equation is:

$$WACC = R_f + \beta_i(ERP) \times (1 - W_d) - TW_d R_f - TW_d \delta_d + W_d \delta_d \qquad (3.82)$$

This equation in represented in Figure 3.5 below.

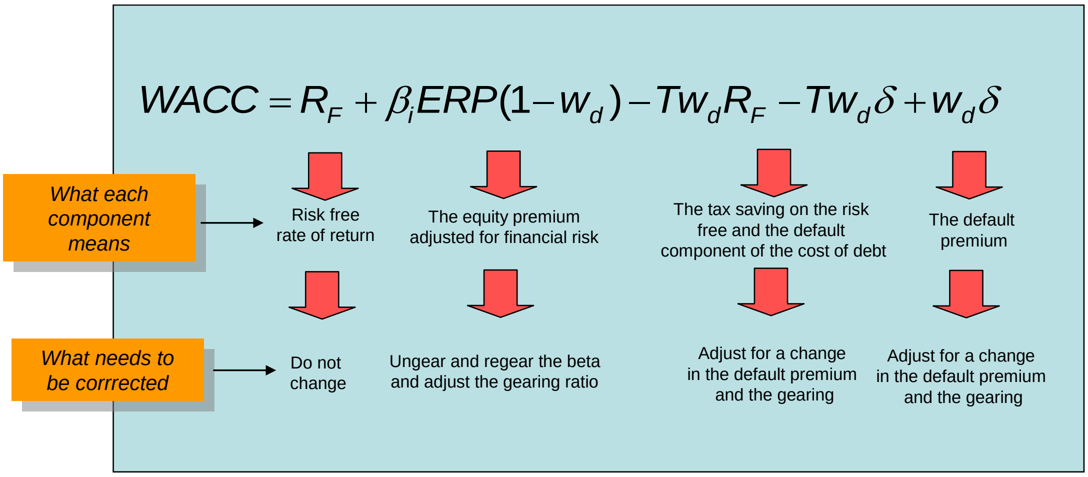


Figure 3.5: The Meaning and Corrections of the Premium Version of the WACC
(Ryan, 2007:154)

This equation implies that the firm's WACC is linked to the tax benefits of debt, as well as the default risk premium. At zero leverage, the firm's cost of capital is simply defined as:

	Risk-free rate	**Equity premium**	**Tax saving on Risk-free rate**	**Tax saving on default premium**	**Default premium**
$\boldsymbol{WACC =}$	$\boldsymbol{R_f}$	$\boldsymbol{+\beta_i(ERP)}$	**0**	**0**	**0**

The minimum WACC occurs at a point where the tax saving on both the risk-free rate and the default premium just offsets the default risk premium. According to Shackelton (2009:120), the optimal capital structure coincides with WACC minimisation and value maximisation, and this point is defined as:

$$V\frac{\partial R_V}{\partial X} = (r - R_V)\frac{\partial V}{\partial\, X}$$

$$(V \neq 0) \qquad \frac{\partial y}{\partial x} = 0 \Rightarrow \frac{\partial R_V}{\partial X} = 0$$

Where:

V = firm value

X = face value of debt yields

Thus the first step in firm value maximisation is to minimise the WACC; the second step is to maximise the FCF. Again, this approach assumes that the firm is not constrained by its capital structure from investing in the NPV positive projects that are available to it. This enables the firm to maximise its FCFs.

According to Modigliani and Miller's capital relevance and trade-off theories (Brealey *et al*., 2008:503), the optimal value of the firm is defined as:

$$\boldsymbol{V = D + E = \bar{V} + PV(interest\ tax\ shield) - PV(costs\ of\ financial\ distress)}$$

In reality, this equation relates to the market values of both debt and equity, that is:

$$\boldsymbol{V = D_{mv} + E_{mv} = \bar{V} + PV(interest\ tax\ shield) - PV(costs\ of\ financial\ distress)}$$

Where:

D_{mv} = *total market value of debt*

E_{mv} = total market value of equity

At this point of leverage, firm value is maximised and the WACC is minimised, and firms will therefore, according to the static trade-off theory, alter their capital structures so as to reach this target mix of debt and equity. This mix is dynamic, and the financing arrangement of the firm is to achieve this ultimate target. Thus, should the current ratio be lower than the target, the firm will issue more debt, as it will not be fully capturing the benefits of the tax shields. Should the current ratio be much higher than the target, the firm will have more debt, and it will therefore either retire the debt or issue more equity so as to come back to this target. Further questions would therefore be: If firms adjust to their target capital structures, how frequently do they adjust, and at what speed does this adjustment happen? Does the optimal capital structure always coincide with the observed target ratio, and is it plausible to gear up to the tipping point? These questions are discussed at the end of the chapter.

There are various firm valuation methodologies, but the main ones are the Discounted Cash Flows (DCFs) technique; the Adjusted Present value (APV); the

Refined Economic Value Added (REVA) ; and the Economic Value Added (EVA). These methodologies relate to the cost of each source of capital, as well as the overall cost of capital and the firm's profitability. Minimum WACC lowers the discount rate, and optimal profitability ensures optimal firm value. The optimal capital structure must therefore correspond to the optimal profitability in order to maximise firm value. But which factors lead to optimal profitability? How can the financing policy ensure that profitability is optimised? The optimal capital structure must provide adequate financial flexibility so that the firm is not constrained; it can then realise all the NPV projects that are available to it.

Ruback (2002:93-94) defined the free cash flow valuation model as:

$$V_{FCF} = \frac{FCF}{WACC} = \frac{FCF+\tau K_d D}{K_a} = \frac{CCF}{K_a} = V_{CCF} \qquad (3.83)$$

Where:

V_{FCF} = firm value using free cash flow

FCF = free cash flow

$\tau K_d D$ = interest tax shield

CCF = capital cash flows

V_{CCF} = firm value using capital cash flow

K_a = expected asset return

Bacidore, Boquist, Milbourn and Thakor (1997:15) defined two other firm valuation measures: REVA and EVA.

$$EVA = NOPAT - K_w(NA) = NOPAT - WACC \times NA \qquad (3.84a)$$

$$REVA = NOPAT_t - K_w(MV_{t-1}) \qquad (3.84b)$$

Where:

EVA = Economic Value Added

REVA = Refined Economic Value Added

NOPAT = Net operating profit after tax

K_w = WACC

MV_{t-1} = is the total market value of the firm's assets at the end of period (t – 1) (beginning of period t). MV_{t-1} is given by the market value of the firm's equity plus the book value of the firm's total debt less non-interest-bearing current liabilities, all at the end of period (t – 1)

NA = Adjusted book value of capital at beginning of period.

Inselbag and Kaufold (1997:116) defined the adjusted present value as:

$V_{L,t} = V_{U,t} + DVTS_t$

Where:

$V_{L,t}$ = value of levered firm

$V_{U,t}$ = value of unlevered firm

$DVTS_t$ = discounted value of the tax shields

But

$V_{U,t} = \sum_{i=t+1}^{\infty} \frac{C_i}{(1+r_A)^{i-t}}$

$\sum_{i=t+1}^{\infty} \frac{C_i}{(1+r_A)^{i-t}}$ = present value of the firm’s cash flows

C_i = firm’s future cash flows

r_A = firm’s cost of equity

Therefore,

$$V_{L,t} = \sum_{i=t+1}^{\infty} \frac{C_i}{(1+r_A)^{i-t}} + DVTS_t \qquad (3.85)$$

Booth (2002:96) argued that the APV method is unreliable. The DCF method, on the other hand, gives more accurate firm values. The valuation of a firm is therefore linked to its capital structure, implying that the financing policy is relevant to firm valuation. As postulated by the trade-off theory, there is an optimal debt ratio where the value of the firm is maximised. The postulate may need to be adjusted to incorporate financial flexibility. The price or cost of financial flexibility is therefore the difference between the ideal optimal capital structure and the observed capital structure. This study terms this difference the “discounted value premium”.

Thus the firm's financing objective would be to maximise its value through WACC minimisation and financial flexibility maximisation.
The importance and implications of the surveyed literature are discussed below.

3.12 CAPITAL STRUCTURE THEORIES: A CRITICAL COMMENT

Starting with the seminal work of Modigliani and Miller in 1958, this chapter presented a review of the development of the capital structure theories. The post-Modigliani and Miller (1958) empirical work has focused on identifying factors that determine corporate leverage. The question as to what determines capital structure has intrigued financial economists for several years, but the available empirical evidence is still inconclusive. The past research on this topic has, to date, failed to derive a precise mathematical model that can be used to predict the value-maximising capital structure of a firm. Instead, most of the evidence has remained qualitative in nature. Although various determinants of corporate leverage have been identified, these are still to be integrated into a single model that can be applied by practitioners in the field. As Barclay and Smith (1999:9) noted: "t*he greatest barrier to progress in solving the puzzle has been the difficulty of devising conclusive tests of the competing theories*"

They further suggested several reasons as to why empirical methods in corporate finance lag behind those of capital markets. The cited reasons are: capital structure decision models are less precise in quantifying all the identified variables; some of these variables are very difficult to measure; and the competing theories are not mutually exclusive. The point of departure is to define what an optimal capital structure is. Can the optimal capital structure be defined only in terms of the minimisation of the firm's WACC? There are conflicting views on this definition. Opler *et al.* (1997:21) advocated a capital structure model that would optimise shareholder value, while Patrick (1998:67-68) advocated a balanced capital structure which takes into account the minimisation of the WACC and risk, and the maximisation of financial flexibility. Such a capital structure enables the firm to carry out value-maximising strategies without any constraints. This is a much broader and more meaningful definition of an optimal capital structure. An optimal capital structure must give the firm enough flexibility to realise its growth options so as to maximise its current and future free cash flows. Minimisation of the WACC is just one part of the corporate valuation equation. The biggest contributor to firm value is the amount of FCFs that it generates. An optimal capital structure must therefore allow for the maximisation of the FCFs as well. An optimal capital structure must also enable the firm to survive unfavourable business conditions without losing significant value.

The sources of long-term finance are usually:

- **Retained earnings**: This amount is dependent on the profitability, cash flow generation and distribution policy of the firm. All these relate to the financial performance aspects of the firm.
- **External debt**: This can be in the form of bonds and bank borrowings. This option is more attractive for rated firms, as it gives them a cheaper option of financing. The debt capacity and cost of borrowing are greatly influenced by the current interest rates, as well as the firm's credit record and its credit rating. The credit rating is driven by the firm's financial performance and its future prospects.
- **External equity**: This is the most expensive source of finance for all firms. The issuance of equity depends on the returns of the firm's shares. Firms generally follow the market timing model in the issuance of equities. This involves issuing equities only when the share prices are high, as this maximises the net issuance proceeds and reduces the incidence of potentially unsuccessful or deeply discounted issuances that would decrease the firm's future equity-raising chances.

The first financing objective should be to minimise the firm's weighted average costs of capital through a selection of the cheapest sources available. The second objective should be to retain some financial flexibility, and this involves retaining some currency from each source. This gives the firm some slack to tap into the unused reserves for each source. A financially flexible firm thus has untapped borrowing reserves and it is still able to raise equity capital without abnormal costs being charged by the capital markets. The ultimate goal is to minimise the cost of capital whilst retaining adequate financial flexibility. A lower WACC maximises the value of growth options by lowering the hurdle rate.

There is little disagreement about which factors determine capital structure. The challenge has been to integrate these factors into a single theory that can both explain and predict the ultimate mix of debt and equity for the firm. Such a theory would be adjusted for country- and sector-specific factors. However, firms do differ in size, age, operational strategies, management styles, as well as financial performance. They retain their uniqueness. This is to be expected, as some of these factors define the competitive advantage of the firm. Would it be reasonable to expect such a theory, given the number of factors that affect capital structure decisions? The trade-off theory postulates that firms want to maximise tax shields and minimise financial and agency costs; a firm has an optimal capital structure which corresponds to WACC minimisation and value maximisation. The empirical evidence described above suggests that although value maximisation is the primary objective of all firms, not all firms follow the trade-off theory.

Furthermore, for those that do follow the theory, most of the aforesaid empirical studies are silent as to whether the identified target is an optimal one. In most cases, the empirical tests on target capital structure do not refer to the optimal ratio, but rather to the target ratio. Thus firms may have a target debt ratio which is not necessarily the optimal ratio as defined by the trade-off theory. There may be other reasons why firms follow the target ratio, and these may have nothing to do with the trade-off theory hypothesis. For example, firms may just follow a target ratio similar to that of its peers because the market prefers stability or the firm is targeting a certain credit rating. Firms may follow a target ratio simply to satisfy market stability and to create enough financial flexibility. Some of the empirical findings described above show that the tax benefits of debt are normally overstated. If debt benefits are at the levels projected theoretically, how then does the trade-off theory account for under-leveraging by corporations? And how can the theory explain the mystery of the growing number of zero-leveraged firms? The presence of these leverage patterns simply casts doubt on the viability of the optimal capital structure that is advocated by the trade-off theory.

From a practical point of view, it is unattractive to gear up to the theoretical optimal target; there are risks. The business operating environment has a lot of uncertainties and cannot always be accurately forecast. Managers make most of their decisions based on probabilities; they face uncertainty. A good example is the 2008-2009 global financial crises. Even large, sophisticated firms, which use advanced state-of-the art forecasting systems and operate in advanced economies, could not predict this recession, and hence most of them had to be bailed out by their respective governments. Even some of the financial institutions that carried very high investment grade credit ratings had to be bailed out. Given such uncertainties, there is a very high risk in operating at the tipping point. According to Shackelton (2009:120), *"the temptation of walking close to the edge of a cliff to enjoy the view is tempered by the cost and probability of falling off the cliff!"* Thus firms, especially financially unconstrained ones, will try to avoid operating at this tipping point, as this moves them closer to their insolvency barriers. According to Kantor and Holdsworth (2010:117), firms will leave a very safe margin between actual leverage and leverage coinciding with their insolvency barriers. They will need flexibility to accommodate operating uncertainties both in terms of risk and opportunity. The need for maintaining financial flexibility and minimising the costs of capital cannot be wished away. It is unimaginable that firms would gear to their theoretical optimal levels. This tilts the argument towards the pecking order model that postulates for the maximisation of the financial slack.

However, the pecking order model is not perfect either; past empirical evidence supports this hypothesis. Firms cannot be expected to exhaust their internal funds before they go out to borrow, or to exhaust their borrowing capacities before moving on to issuing equity. There must always be a healthy reserve of each source of financing. These "currencies" increase the firm's financial flexibility. Firms should always maintain a "buffer" level of internal funds, and they should keep their borrowing and equity-raising-capacity options open for unforeseen operational realities. Above all, profitable firms are expected to pay a fair return to shareholders for their contributions to the firm. Management cannot concentrate on paying down debt at the expense of returning capital to shareholders. The theory also assumes that firms would want to maintain an adequate financial flexibility or slack. The question is: how much is this slack? The theory does not define or quantify the optimal slack. A further implication of the pecking order theory is that profitable firms with less growth options are expected to have zero leverage. But in practice mature firms, which happen to be very profitable, rarely have zero-leverage ratios. It cannot be expected that firms would deplete their internal cash reserves before they raise debt to their optimal debt capacity and then only turn to equity. From a practical point of view, firms can be expected to maintain balanced sources of funds and also to maintain a reasonable slack in each source of finance. Furthermore, the pecking order model does not reconcile with the agency theory and the market timing theory. Firms with excess free cash flows face higher agency costs of over-investment. How do firms balance these costs with the optimisation of the financial slack? Furthermore, regarding security issuance choice, there is a strong body of empirical evidence that firms follow the market timing and signalling theories on security issuance decisions. This implies that firms do not follow a financing hierarchy as hypothesised by the pecking order theory. Instead, they time the market in deciding which securities to sell. Finally, as explained above, the evidence on testing the pecking order theory against the trade-off theory is sometimes mixed, with neither of the theories dominating. This inconclusiveness led Myers (2008:217) to conclude that the two theories are not rivals, but rather complement each other. Findings from Mukherjee and Mahakud (2012:53) and Ramjee and Gwatidzo (2012:52) confirm that the two theories are complementary, and these researchers advocate the modified pecking order theory as the best descriptor of corporate financing.

One of the arguments of this study is that an optimal capital structure cannot only be defined in terms of WACC minimisation or financial slack maximisation, but also in terms of a balanced financial structure that will enable the firm to deliver superior financial performance. It is financial results that matter in valuation. Such an optimal capital structure would protect the firm from "*falling off the cliff*", and give the firm enough flexibility to exercise all its NPV-positive growth options. Such a structure is aligned with the firm's overall strategy and it meets the definition of an efficient and effective capital structure. The capital structure decision is a financial decision, and it therefore makes sense that the financing decision has to be linked to the key financial performance measures of the firm. These key financial performance measures are both measurable and predictable through financial forecasts. This approach involves identifying the key financial performance measures that management monitors and then linking these to the leverage ratio through a mathematical model. This model need not be only a regression model such as the ones described in the above empirical studies which only predict the correlation between leverage and some of the factors. It should also be a predictive model that quantifies the exact relationship between leverage and these measures. The model could then be used to score the firm's capital structure against other financial variables, with the highest score being awarded to the best-performing firm. Such a scoring model would predict the best or optimal capital structure for firms in a given sector. This approach has been used in credit ratings as well as in the financial distress prediction models. The envisaged model would be based on quantifiable financial factors and it would be applicable universally, given the homogeneity in financial performance reporting across the globe.

3.13 SUMMARY

This chapter provided an overview of the development of the capital structure theories. The chapter discussed the basis of these theories, their shortcomings, and empirical evidence justifying each of the leading theories. The pecking order and trade-off theories were identified as the two leading theories that provide the best description of corporate financing. The chapter also provided a discussion on the impact of the country-specific and global financial factors on the financing patterns of firms. The chapter ended with a critical comment on the leading theories.

The next chapter will present the methodology followed in this thesis.

CHAPTER 4
RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter begins with a description of the properties of panel data, followed by a brief discussion of the statistical properties of the panel data estimators that were used in this thesis. This is followed by a description of the models to be tested and the testing methodologies that were followed. The last part of the chapter outlines the data collection and processing procedures, the structure of the final datasets that were used, and a definition of the dependent and explanatory variables. This empirical research was divided into three parts:

- The first part of the study involved testing the validity of the trade-off and pecking order theories in the South African context. It extended the test on the validity of the trade-off theory by estimating the speed of target adjustment for the sample of manufacturing, mining and retail firms listed on the Johannesburg Stock Exchange.
- The second part of the study developed and tested models that link a firm's leverage to its key financial performance metrics.
- The last part of the study involved further tests on the validity of the trade-off theory by estimating the discounted value premium for the sample of manufacturing, mining and retail firms listed on the Johannesburg Stock Exchange.

For each part, the study developed the hypothesis and models to be tested and then described the testing methods that were used. The final sample consisted of a total of 96 manufacturing, mining and retail firms listed on the Johannesburg Stock Exchange for the period 2000-2010. The sample specifically excluded financial firms, as their capital structures are regulated; they depend largely on borrowed funds and have low asset bases. The selected sectors are key drivers of the South African economy, and hence an understanding of their financing policies is of importance to both financial analysts and academics.

4.2 THE NATURE OF PANEL DATA

Panel data refer to the pooling of observations on a cross-section of subjects over several time periods; that is, each subject is observed over repeated periods of time (Baltagi, 2009:1). This represents a special case of clustered samples. The panel is constructed by observing a large number of subjects over a time period (T) which is usually a minimum of two years. These panels can either be balanced or unbalanced. An unbalanced panel has missing observations. The structure of data used in this research meets the definition of unbalanced panel data. The sample consisted of a total of 96 JSE-listed manufacturing, mining and retail firms which were observed over a minimum time period of six years.

Financial panel data can be very challenging to work with, as it has special features. According to Elsas and Florysiak (2011a:6), financial data are typically unbalanced and dynamic, and has dependent variables that take time to adjust. In most cases, these variables are also fractional in nature. There are very limited econometric estimators that can accommodate these special features of financial panel data. The usual estimators can be very biased. However, apart from these estimation complexities, there are several advantages of using panel data in experimental research.

4.2.1 Advantages and Disadvantages of Panel Data

The main advantages of using panel data in experimental research are that they offer the researcher an increased sample size, and that they enable the researcher to control for unobserved heterogeneity among the subjects. Panel data give the researcher a large number of data points, which increases the degree of freedom and reduces collinearity (Hsiao, 2005:3). Panel data also allow the researcher to distinguish within-group correlations from between-group correlations. In panel data, subjects retain their heterogeneity, which can be studied separately, as some estimators accommodate these individual effects. Furthermore, as panel data combine both cross-sectional and time series effects, they improve the estimation efficiency of the two types of datum and it broadens the scope of inference. Panels are more informative than cross-sections, as they reflect dynamics and Granger causality across variables. Lastly, panel data also enable the application of special models such as the partial adjustment and Tobit models, which are very important in modern capital structure research.

There are, however, some limitations of panel data. The main drawbacks of using panel data are heterogeneity and sample selectivity biases. Panel data also suffer autocorrelation, multicollinearity and attrition. These limitations can be addressed by the choice of the estimator used.

4.3 REVIEW OF PANEL DATA ESTIMATORS

There are a limited number of estimators that can be employed in the modelling of panel data, and these vary in their sophistication. The estimators are mainly differentiated by the way they approach solutions to the problems of heteroskedasticity, autocorrelation and multicollinearity. Panel data estimators fall into three categories, that is:

- Static panel estimators
- Dynamic panel estimators
- Tobit type estimators

The various estimators used to handle the above statistical errors are discussed in detail below. Static estimators include: pooled Ordinary Least Squares (OLS) regression, fixed effects and random effects estimators. In these models, the dependent variable does not exhibit temporal autocorrelation, and least squares linear regression models are used. Both fixed and random effects estimators can be applied as either one-way or two-way error component regression models. Dynamic panel estimators use the lagged dependent variable as an additional explanatory variable; this makes them efficient estimators in dynamic panels. Censored or Tobit estimators specify the lower limit, the upper limit, or both limits for the dependent variable. This implies that Tobit estimators can either be single-censored or double-censored, depending on the nature of the dependent variable. Furthermore, Tobit models can either be static, with fixed effects, or they can be dynamic.

4.3.1 Static Panel Models

The static panel models take the form of:

$$y_{it} = \alpha + X'_{it}\beta + u_{it} \qquad i = 1, \dots \dots .., N; t = 1, \dots \dots ., T \tag{4.1}$$

Where:

y_{it} = the dependent variable. In this case, it represents debt values (BDR, BDR-lagged, MDR and MDR-lagged) or changes in debt issued (ΔD).

α = the intercept

X'_{it} = the matrix of observed explanatory variables whose coefficient is β. In this study, these variables are contained in Table 4.4.

u_{it} = the error term

In one-way estimators, the error term (u_{it}) combines both the subject-specific cross-sectional individual effects and the idiosyncratic error. The two-way estimators add the unobserved time series effects to the error term. That is:

In one-way error component models, the error term is decomposed into:

$$u_{it} = \mu_i + v_{it} \tag{4.2}$$

Where:

μ_i = the unobserved cross-sectional (individual) effects. This is also called unobserved heterogeneity effects or the latent variable (Wooldridge, 2010:285). The treatment of these effects is what distinguishes random effects models from fixed effects models.

v_{it} = the idiosyncratic error

In two-way error component models, the error term includes the unobserved time series effect as well. Thus it is decomposed into:

$$u_{it} = \mu_i + \lambda_t + v_{it} \tag{4.3}$$

Where:

λ_i = the unobserved time series effects

Thus the one-way error component estimators can be specified as:

$$y_{it} = \alpha + X'_{it}\beta + \mu_i + v_{it} \quad (4.4)$$

The two-way error component model can be specified as:

$$y_{it} = \alpha + X'_{it}\beta + \mu_i + \lambda_t + v_{it} \quad (4.5)$$

According to Baltagi (2009:13), the one-way error component model can also be expressed in a vector form:

$$y = \alpha l_{NT} + X\beta + u = Z\delta + u \quad (4.6a)$$

Where:

$$Z\delta = [l_{NT}, X] \quad (4.6b)$$

y = the dependent variable

αl_{NT} = is a vector of ones of dimension NT

X = a matrix of variables $Z\delta$

u = error term

The errors can also be expressed in a vector form:

$$u = Z_\mu \mu + v \quad (4.7)$$

Where:

Z_μ = is a selector matrix

v = remainder disturbance

$$Z_\mu = I_N \otimes l_T$$

Where:

I_N =identity matrix of dimension N

l_T = is a vector of ones of dimension T

$\otimes$ = the kroneker product

The handling of heterogeneity effects and autocorrelation are the main decision criteria in the choice of an estimator. Panel data estimators attempt to account for the correlation between the observable and non-observable variables (Arellano, 2003:7).

4.3.1.1 The Pooled Regression Model (OLS Estimation)

The pooled OLS estimators assume that X'_{it} is uncorrelated to both μ_i and v_{it}; the model allows for both the firm fixed effects and the idiosyncratic errors which vary between firms and over time. The pooled OLS model takes the form of equation 4.4 above. The drawback of this estimator is that it suffers from the problem of unobserved heterogeneity. This can be resolved through differencing out the firm specific error (μ_i). That is:

$$y_{i2} = \alpha + X'_{i2}\beta_2 + \mu_i + v_{i2} \tag{4.8}$$

Where:

y_{i2} = dependent variable in time period 2

X'_{i2} = vector of explanatory variables in time period 2

β_2 = regression coefficient of explanatory variables in time period 2

v_{i2} = remainder disturbance in time period 2

$$y_{i1} = \alpha + X'_{i1}\beta_1 + \mu_i + v_{i1} \tag{4.9}$$

Where:

y_{i1} = dependent variable in time period 1

X'_{i1} = vector of explanatory variables in time period 1

β_1 = regression coefficient of explanatory variables in time period 1

v_{i1} = remainder disturbance in time period1

Subtracting equation 4.9 from 4.8 yields:

$$\Delta y_i = X'_i\beta + v_i \tag{4.10}$$

Where:

Δy_i = change in dependent variable

X'_i = vector of dependent variables

β = regression coefficient of explanatory variables

v_i = remainder disturbance

This differenced equation can also be expressed in the general form as:

$$y^*_{it} = X'_{it}\beta + v_{it} \tag{4.11}$$

This differencing eliminates the *time-constant unobserved heterogeneity* (μ_i), leaving only the idiosyncratic error (v_{it}). The OLS assumption that there is no autocorrelation can easily be violated with multi-period data, thus rendering the estimator biased. The Generalised Least Squares (GLS) or Huber-White estimators can be used to correct this bias.

4.3.1.2 Fixed Effects Estimators

Fixed effects estimators assume that the sample is nonrandom and that the subjects have constant slopes but different cross-sectional intercepts. Fixed effects models do allow for arbitrary dependence between the unobserved heterogeneity (μ_i) and the explanatory variables (X_{it}); that is, the models exclude assumptions about the collinearity between explanatory variables and the error components. Arellano (2003:12) summarised the fixed effects assumptions as:

Assumption 1:

$$E(u_{it} \mid X'_i\mu_i) = 0 \quad (t = 1, \ldots\ldots T) \tag{4.12}$$

Assumption 2:

$$Var(v_i \mid X'_i\mu_i) = \sigma^2 I_T \quad (t = 1, \ldots\ldots T) \tag{4.13}$$

Where

E= conditional expectation

There are basically two types of fixed effects model:

- The one-way error component estimators
- The two-way error component estimators

Unlike the one-way error component models, the two-way error component models incorporate the time series error into the error components.

Fixed effects estimators make use of one of the following: the least squares with dummy variables (LSDV) approach; the within-group effects approach; or the between group effects approach.

The LSDV estimator introduces a dummy (D) for every *i*-observation of the independent variable, and thus the one-way error component model is transformed into:

$$y_{it} = X'_{it}\beta + D_i\mu_i + v_{it} \tag{4.14}$$

Where:

D_i = Dummy variable

This transformation is made possible by first substituting model 4.7 into model 4.6 to obtain:

$$y = \alpha l_{NT} + X\beta + Z_\mu\mu + v = Z\delta + Z_\mu\mu + v \tag{4.15}$$

This model is then pre-multiplied by the Q matrix which effectively removes the individual effects. The resulting model is then inverted to yield the following estimator:

$$Q_y = QX_\beta + Q_v \tag{4.16}$$

Where:

$Q = \alpha l_{NT} - P$, where P and Q are idempotent matrices

This model can be expressed in a matrix form, resulting in an estimator of the form:

$$\hat{\beta}_{LSDV} = (X'Q\,X\,)^{-1}(X'Qy) \qquad (4.17)$$

Where:

$\hat{\beta}_{LSDV}$ = regression coefficient of the LSDV

Bruno (2005:476) defined the LSDV estimator as:

$$\delta_{LSDV} = \left(W'A_sW\right)^{-1}W'A_sy \qquad (4.19)$$

Where:

$y\ and\ W$ = the (NT_1) and (NT_k) matrices of stacked observations

$A_s = S(I - D(D'SD)^{-1}D')S$. It is the symmetric and idempotent (NT_NT) matrix wiping out individual means and selecting usable observations.

$$A_s = S(I - D(D'SD)^{-1}D')S \qquad (4.20)$$

Where:

$D = I_N \otimes\ l_T$ = is the $NT\ x\ N$ (NT_N) matrix of individual dummies

$S = diag(S_i) = NT\ x\ NT$ =it is the block-diagonal matrix

Introducing the dummy variable does not, however, eliminate the problem of time-constant heterogeneity. The LSDV estimator is only practical when the number of observations (N) is small. The main drawback of the LSDV estimator is the large loss of degrees of freedom (Arellano, 2003:15) and since the Q transformation removes the time-invariant variables, it cannot be used to estimate time-invariant variables. However, the LSDV is the best linear unbiased estimator (BLUE) for the model specified in equation 4.15.

The within-groups estimator is obtained by subtracting the between transformation equation from the error-components model. The between transformation equation is obtained by averaging the error components equation over time.

The one-way error-components equation is:

$$y_{it} = \alpha + X'_{it}\beta + \mu_i + v_{it} \quad (4.21a)$$

And its average over time is:

$$\bar{y}_i = \alpha + \bar{X}'_i\beta + \mu_i + \bar{v}_i \quad (4.21b)$$

Where:

$$\bar{y}_i = \frac{1}{T}\sum_{t=1}^{T} y_{it}$$

$$\bar{X}'_i = \frac{1}{T}\sum_{t=1}^{T} X'_{it}$$

$$\bar{v}_i = \frac{1}{T}\sum_{t=1}^{T} v_{it}$$

Subtracting equation 4.21b from equation 4.21a gives the within-groups estimator:

$$y_{it} - \bar{y}_i = \beta_1\left(X'_{it} - \bar{X}'_i\right) - v_{it} - \bar{v}_i \quad (4.22)$$

According to Dougherty (2006:412), the within-groups estimator can also be expressed as:

$$y_{it} - \bar{y}_i = \sum_{j=2}^{k} \beta_j \left(X'_{itj} - \bar{X}'_{ij}\right) + \delta(t - \bar{t}) + v_{it} - \bar{v}_i \quad (4.23)$$

This transformation eliminates the time-constant unobserved heterogeneity, leaving only the within-groups variation.

According to Baltagi (2009:16), the unobserved heterogeneity can also be eliminated by using the method of first-differencing, yielding the following first differences regression estimator (Dougherty, 2006:413):

$$\Delta y_{it} = \sum_{j=2}^{k} \beta_j \, \Delta X_{ijt} + \delta + v_{it} - v_{i,t-1} \quad (4.24)$$

This is the architecture of the difference-in-difference estimator. The parameters of this model can be estimated through an OLS estimator which is consistent, since $E(\tilde{X}_{it}\tilde{v}_{it}) = 0$. The model will be biased if $E(\tilde{X}_{it}\tilde{v}_{it}) \neq 0$.

According to Arellano (1987:432), the performance of the within-groups estimator can be improved through robust estimation of standard errors. The robust variance-covariance matrix of the coefficient $\hat{\beta}_{WG}$ is estimated using the estimator of the form: (Baltagi, 2009: 16 and Arellano, 1987:432)

$$\widetilde{Var}(\hat{\beta}_{WG}) = \left(X^{+\prime}X^{+}\right)^{-1}\left[\sum_{i=1}^{N} X_i^{+\prime}\hat{u}_i^{+}\hat{u}_i^{+\prime}X_I^{+}\right]\left(X^{+\prime}X^{+}\right)^{-1} \quad (4.25a)$$

Where:

$$X_i^{+\prime} = (I_T - \bar{J}_T)X_i \quad (4.25b)$$

J_T = is a matrix of ones of dimensions T

Experiments by Hansen (2007:616) showed that, regardless of the behavior of the time series, the robust errors are consistent as long as $N \rightarrow \infty$.

The between-groups model is specified as:

$$\bar{y}_i = \alpha + \beta\bar{X}_{it} + \bar{v}_i \quad (4.26)$$

$$\hat{\beta}_{FE} = \left(\sum_t (X_{it} - \hat{\lambda}\bar{X}_i)(X_{it} - \hat{\lambda}\bar{X}_i)'\right)^{-1}\left(\sum_{i,t}((X_{it} - \hat{\lambda}\bar{X}_i)(y_{ij} - \hat{\lambda}\bar{y}_i)'\right) \quad (4.27)$$

The restriction on the dummy variable coefficients is such that $\sum_{i=1}^{N} \mu_i = 0$; this is to avoid the dummy variable trap or multicollinearity. This model can then be estimated using the GLS to yield β.

The effects of time-constant covariates cannot be estimated with the fixed effects estimators; these are all eliminated during the transformation process. The estimators are only effective if there are variations in the exogenous explanatory variables. The F-test, which is a Chow test with restricted residual sums of squares (RSSS), can be used to test for the fixed effects (Baltagi, 2009:15). The fixed effects model can be implemented in the Statistical Analysis Software (SAS) as either *Fixed*

One Way Estimates or *Fixed Two Way Estimates* for the two-way models using PROC PANEL. In Stata, this is implemented as one of the following: *xlogit* (for logit models), *xtnbreg* (for binomial models), *xtpoisson* (for Poisson models), or *xtreg* (for fixed effects).

4.3.1.3 Random Effects Models

Random effects models assume the following:

- The v_i are random variables and $Cov(X_{it}, v_i) = 0$ (Cov is the covariance); the estimators allow for zero correlation between unobserved heterogeneity and the observed explanatory variables (Wooldridge, 2010:286). The estimator will be biased if $Cov(X_{it}, v_i) \neq 0$. This assumption, however, results in serially correlated error terms (u_{it}).
- The u_{it} are serially uncorrelated and have constant unconditional variance across t.
- The μ_i is random and independent of u_{it}. Also, u_{it} is independent and identically distributed (IID). That is, $\mu_i \sim IID(0, \sigma_\mu^2), v_{it} \sim IID(0, \sigma_v^2)$. This resolves the problem of loss of degrees of freedom that is suffered by the fixed effects estimators. The exogenous variables (X_{it}) are independent of μ_i and u_{it} for all i and t.

These assumptions can be expressed as:

Assumption 1:

$$E(v_i \mid X'_i \mu_i) = 0 \quad (t = 1, \ldots\ldots T) \tag{4.28}$$

Assumption 2:

$$rank\ \left(E\left(X_i' \Omega^{-1} X_i\right)\right) = K; \tag{4.29}$$

$where\ \Omega \equiv E\ (v_i v_i')$= the unrestricted variance estimator

With the random effect structure matrix being:

$$\Omega = \sigma_u^2 I_T + \sigma_c^2 j_T j_T' \tag{4.30}$$

Assumption 3:

$$E\left(u_i u_i^{'} \,|X_i, c_i\right) = \sigma_u^2 I_T \quad (4.31a)$$

$$E(c_i^2|X_i) = \sigma_c^2 \quad (4.31b)$$

Where:

c_i= unobserved effect

σ_u^2= the second unique characteristic root of the unrestricted variance estimator (Ω) multiplicity N(T-1)

σ_c^2= the first unique characteristic root of the unrestricted variance estimator (Ω) multiplicity N

I_T= vector of ones of dimension T

This assumption can be broken down to:

$$E(u_{it}^2) = \sigma_u^2, t = 1,2, \ldots. -. T \quad (4.32)$$

$$E(u_{it}u_{is}) = 0 \; all \; t \neq s \quad (4.33)$$

$$E\left(v_i v_i^{'} \,|X_i\right) = E(v_i v_i^{'}\,) \quad (4.34)$$

Where:

u_{it}^2 = the root of the error component

These assumptions enable the efficient estimation through the Feasible Generalised Least Squares (FGLS).

The random effects estimator is derived from the one-way error components model and this is defined as:

$$(y_{it} - \theta\bar{y}_i) = \beta_0(1-\theta) + \beta_1(X_{it} - \theta\bar{X}_i) + \{(1-\theta)v_i + (u_{it} - \theta\bar{u}_i)\} \quad (4.35)$$

Where:

$$\theta = 1 - \sqrt{\frac{\sigma_u^2}{T\sigma_v^2 + \sigma_u^2}} \quad (4.36)$$

In cases where θ =1, the random effects estimator is reduced to a fixed effects estimator, and when θ = 0, the estimator is reduced to a pooled OLS estimator; the estimator is therefore only efficient when 0 $< \theta > 1$.

The estimator can also be derived from the two-way error components model:

$$y_{it} = \alpha + X'_{it}\beta + \mu_i + \lambda_t + v_{it} \tag{4.37}$$

$$\mu_i \sim N(0, \sigma_\mu^2);\ \lambda_t \sim N(0, \sigma_\lambda^2);\ v_i \sim N(0, \sigma_v^2) \tag{4.38}$$

$$E(X'_{it}\mu_i) = 0 \tag{4.39}$$

The most common random effects estimator is the Wallace and Hussein estimator. The model first estimates the pooled OLS and then uses the residuals to estimate the variance components.

This then transforms the original model into:

$$y_{it} - \hat{\theta} y_i = (X_{it}\hat{\theta}\bar{X}_i)\beta + v_{it} \tag{4.40}$$

Wooldridge (2010:294) specified the random effects estimator as:

$$\hat{\beta}_{RE} = \left(\sum_{i=1}^{N}(X_i'\hat{\Omega}^{-1}X_i)\right)^{-1}\left(\sum_{i=1}^{N}(X_i'\hat{\Omega}^{-1}y_i)\right) \tag{4.41}$$

But:

$$\hat{\Omega} \equiv \hat{\sigma}_u^2 I_T + \hat{\sigma}_c^2 j_T j_T' \tag{4.42}$$

With the consistent estimator of σ_v^2 being:

$$\hat{\sigma}_v^2 = \frac{1}{(NT-K)}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{v}_{it}^2 \tag{4.43}$$

The transformed model can be estimated using the Feasible Generalized Least Squares (FGLS) estimator. The most common statistical packages that can be used to implement these estimators are the Statistical Analysis Software (SAS) and Stata. For example, the random effects model can be implemented in SAS as either *Fuller or Battese Variance Components (RanTwo)* or *Wansbeek and Kapteyn Variance Components (RanTwo)*. In Stata, this is implemented as one of the following: *xlogit* (for logit models), *xtnbreg* (for binomial models), *xtpoisson* (for Poisson models), or *xtreg* (for both GLS and Maximum Likilihood (ML) random effects).

4.3.1.4 Fixed Effects Estimation versus Random Effects Estimation

The main advantage of the random effects estimators is that they retain both the observed individual heterogeneity and the n-degrees of freedom in the regression model. Fixed effects estimators, on the other hand, drop this heterogeneity and also lose n-degrees of freedom (Dougherty, 2006:418). This renders random effects models more attractive than fixed effects models. The Hausman-Wu test for random effects is used to decide whether to use fixed or random effects estimators.The test takes the following form:

$$H_0: E(u_{it}|X_{it}0) = 0 \quad (4.44)$$

$$H_1: E(u_{it}|X_{it}0) \neq 0 \quad (4.45)$$

Where:
H_0 = null hypothesis
H_1 = alternative hypothesis

If the null hypothesis is rejected, then the fixed effects estimators should be used instead of the random effects. On the other hand, the Breusch and Pagan Test (Lagrange Multiplier test) is used to decide whether to use the classical OLS instead of either fixed or random effects models. This test is as follows:

$$H_0: E[u_{it}\, u_{is}] = 0 \quad (4.46)$$

$$H_1: E[u_{it}\, u_{is}] \neq 0 \quad (4.47)$$

The OLS model is not used where the test static exceeds the critical value.

The static models do take into account the nature of panel data, but they ignore the lagged dependent variable. Exclusion of lagged dependent variables leads to a correlation between the error term and the explanatory variables (the endogeneity problem); and this leads to a bias in the estimators. The models do not take into account the fractional nature of the dependent variable. The fixed effects estimators can handle unbalanced data panels. The static models, however, cannot handle dynamic panel data, as they do not automatically incorporate a lagged dependent variable as one of the explanatory variables.

4.3.2 Dynamic Panel Data Estimators

These models include a lagged dependent variable as one of the explanatory variables. The general dynamic panel model is stated as:

$$y_{it} = \delta y_{i,t-1} + X'_{it}\beta + u_{it} \quad i = 1, \ldots\ldots, N \; t = 1, \ldots\ldots, T \qquad (4.48)$$

Assuming that the model follows a one-way error components model,

$u_{it} = \mu_i + v_{it}$

Where:

$\mu_i \sim IID\left(0, \sigma_\mu^2\right) \quad and \quad v_{it} \sim IID(0, \sigma_v^2)$

Where:

IID = independent and identically distributed

These models are independent of each other. The models are characterised by autocorrelation which results from the lagged dependent variable and heterogeneity among the subjects. That is, $y_{i,t-1}$ is correlated with the error term. The OLS cannot therefore be used to estimate this model, as it will be biased and inconsistent (Baltagi, 2009:147). Both the fixed effects (within-estimator) and the random effects GLS are also biased in dynamic panel data sets. The dynamic panel estimators make use of the difference and system Generalised Methods of Moments (GMM) estimation technique. The GMM estimators are especially suitable for large panels with many subjects that exhibit heteroskedasticity and autocorrelation. Thus the GMM estimators relax the assumption that the error term and explanatory variables are orthogonal. The leading dynamic panel special estimators are:

- The Arellano and Bond Estimator
- The Arellano and Bover Estimator
- The Ahn and Schmidt Moment Conditions
- The Blundell and Bond Estimator
- The Keane and Runkle Estimator

The most widely used estimators are the Arellano and Bond Estimator; the Arellano and Bover Estimator; and the Blundell and Bond Estimator.

4.3.2.1 The Arellano and Bond Estimator

The Arellano and Bond estimator is designed for datasets with many panels and few periods. It assumes that there is no autocorrelation in the idiosyncratic errors. The estimator transforms all regressors through first-differencing, and then uses the GMM technique to fit the models. This estimation method is called the difference GMM. Stata implements this estimator as the *xtabond*. There are two versions of the estimator: a one-step version and a two-step version:

The one-step estimator is defined as follows:

$$\hat{\delta}_1 = \left[(\Delta y_{-1})' W\left(W' (I_N \otimes G)W\right)^{-1} W' (\Delta y_{-1})\right]^{-1} \times \left[(\Delta y_{-1})' W\left(W' (I_N \otimes G)W\right)^{-1} W' (\Delta y)\right] \tag{4.49}$$

Where:

W = the matrix of instruments

G = is a (T-2) x (T-2) matrix

The two-step estimator is defined as:

$$\hat{\delta}_1 = \left[(\Delta y_{-1})' W\hat{V}_N^{-1} W' (y_{-1})\right]^{-1} [(y_{-1})' W V_N^{-1} W' (\Delta y)] \tag{4.50a}$$

Where:

$$V_N = \sum_{i=1}^{N} W_i' (\Delta v_i)(\Delta v_i)' W_i \tag{4.50b}$$

With the consistent estimate of $var\hat{\delta}_2$ being given by the first term in the above equation,

$$\widehat{var}\hat{\delta}_2 = \left[(\Delta y_{-1})' \, W\hat{V}_N^{-1}W' \, (y_{-1})\right]^{-1} \quad (4.51a)$$

Where:

$$V = plim \sum_{i=1}^{N}(\tilde{X}_i' \, \Omega_i \tilde{X}_i)/N \quad (4.51b)$$

The orthogonality restrictions are formulated as:

$$E\left[y_{i,1}\left(u_{i,3} - u_{i,2}\right)\right] = 0 \quad (4.52)$$

$$E(y_{i,1}u_{i,2}) = 0 \quad (4.53)$$

$$E(y_{i,2}u_{i,3}) = 0 \quad (4.54)$$

In models with exogenous variables, the one-step model becomes:

$$\binom{\hat{\delta}}{\hat{\beta}} = \left([\Delta y_{-1}, \Delta X]' \, WV_N^{-1}W' \, [\Delta y_{-1}, \Delta X]\right)^{-1}\left([\Delta y_{-1}, \Delta X]' \, WV_N^{-1}W' \, \Delta y\right) \quad (4.55)$$

The two-step model becomes:

$$\binom{\hat{\delta}}{\hat{\beta}} = \left([y_{-1}^{+}, X^{+}]' \, W^{+}V_N^{-1}W' \, [y_{-1}^{+}, X^{+}]\right)^{-1}([y_{-1}^{+}, X^{+}]' \, W^{+}V_N^{-1}W' \, y^{+}) \quad (4.56)$$

4.3.2.2 The Arellano and Bover and the Blundell and Bond Estimator

The Arellano and Bover estimator assumes that there is no autocorrelation with the idiosyncratic errors. It further assumes that the panel-level effects are not correlated with the lagged dependent variable. It is defined as:

$$\hat{\eta} = \left[W' \, \bar{H}' \, M\left(M' \, \bar{H}\bar{\Omega}\bar{H}' \, M\right)^{-1}M' \, \bar{H}W\right]^{-1} W' \, \bar{H}' \, M\left(M' \, \bar{H}\bar{\Omega}\bar{H}' \, M\right)^{-1}M' \, \bar{H}y \quad (4.57a)$$

$$\Omega^{+} = \bar{H}\bar{\Omega}\bar{H}'$$

Where:

$$W = (W_1', \dots \dots \dots \dots .. W_N')' \quad (4.57b)$$

$$y = (y_1', \dots \dots \dots \dots .. y_N')' \quad (4.57c)$$

$$M = (M_1', \dots \dots \dots \dots .. M_N')' \quad (4.57d)$$

$$\overline{H} = I_N \otimes H \tag{4.57e}$$

$$\overline{\Omega} = I_N \otimes \Omega \tag{4.57f}$$

With

$$\hat{\Omega}^{+} = \sum_{i=1}^{N} \hat{u}_i^{+} \hat{u}_i^{+\,\prime} /N) \tag{4.58}$$

Blundell and Bond (1998) extended the Arellano and Bond/Arellano and Bover estimators by introducing additional moment conditions to the estimators; these moment conditions are only valid if the initial condition $E[v_i \Delta y_{i2}] = 0$ holds for all values of subjects. It effectively resolves the earlier model's inefficiencies which resulted from weak instruments. Their work yielded an extended GMM estimator which introduces the lagged first differences of the series as an additional instrument to the model. This additional instrument eliminates the problem of weak lagged instruments and thus significantly improves the efficiency of the estimator (Blundell & Bond, 1998:138).

Behr (2003:14) specified the resulting estimator as:

$$\hat{\gamma}_1^{GMM-SYS} = \left[XW\hat{V}_N^{-1}W^{\prime} X\right]^{-1} [X^{\prime} W\hat{V}_N^{-1}W^{\prime} y] \tag{4.59}$$

Stata implements the Arellano and Bover/Blundell and Bond estimators as *xtdpdsys*.

4.3.3 Fixed Effects and Random Effects Estimators versus Dynamic Panel Estimators

Although the fixed effects and random effects estimators take into account the nature of panel data (heterogeneity), they suffer from problems with endogeneity, and this renders them biased. They can deal with unbalanced panels, but they cannot deal with dynamic panels, as they do not incorporate a lagged dependent variable. Dynamic panel or GMM estimators, on the other hand, do resolve the endogeneity bias and they can deal with dynamic panels, as they incorporate the lagged dependent variable as one of the explanatory variables. The inclusion of the lagged dependent variable renders dynamic panel estimators very useful in capital structure research. Capital structure adjustments take time to occur, and this is consistent with the presence of adjustments costs. The presence of adjustment costs results in the infrequent issuing of securities.

The principal drawback of the static and dynamic panel estimators described above is that they are biased, as they fail to censor the dependent variable. In capital structure research, they fail to incorporate the fractional nature of the debt ratios and the fact that these occur between 0 and 1, and this makes these estimators severely biased. This problem of bias is resolved by using dynamic Tobit estimators.

4.3.4 Censored and Truncated Panel Data Models

Tobit estimators are applicable to censored panel data. These are data where the dependent variable has an absolute minimum value, a maximum value, or both. This type of datum is common in financial research; for example, debt ratios lie between 0 and 1 and they are fractional in nature.

The basic Tobit Model specified by Heckman and MaCurdy (1980:50) takes the form:

$$y_{it}^* = X_{it}\beta + \alpha_i + \varepsilon_{it} \tag{4.60}$$
$$y_{it} = \max\{y_{it}^*, c\}$$

The Tobit estimator can be either single-censored or double-censored. Tobit models make use of fixed effects as opposed to random effects; these can either be static or dynamic. There are two types of Static Tobit model: Type 1 and Type 2. A typical Type 1 static Tobit model is specified as:

$$y_{it}^* = \beta X_{it}^{'} + \mu_i + v_{it} \tag{4.61}$$

With $v_{it} \sim IID(0, \sigma_v^2)$ and

$$y_{it} = y_{it}^* \; if \; y_{it}^* > 0 \tag{4.62}$$
$$= 0 \; otherwise$$

This estimator suffers heterogeneity bias as it is retained, and this results in inconsistency in the estimation of β and σ_v^2. This bias can be resolved by using the log likelihood instead (Heckman & MaCurdy, 1980:67). On the other hand, Honore (1992:554) suggested the use of trimmed least absolute deviations and trimmed least squares GMM estimators which are consistent and asymptotically normal.

Kyriazidou (1997:1340) described a typical Type 2 Tobit model as:

$$y_{1it}^{*} = \beta_1 X_{1it}^{'} + \mu_{1i} + v_{1it} \tag{4.63}$$
$$y_{2it}^{*} = \beta_2 X_{2it}^{'} + \mu_{2i} + v_{2it}$$

Where it is observed that:

$$\begin{aligned} y_{1it} &= 1 \quad if\ y_{it}^{*} > 0 \\ &= 0\ otherwise \\ y_{2it} &= y_{2it}^{*} \quad if\ y_{1it}^{*} = 1 \\ &= 0\ otherwise \end{aligned} \tag{4.64}$$

This model can be estimated with a two-step Heckman procedure with which β_1 is estimated in the first step; β_2 is estimated by applying the OLS to the first differences (Arellano and Honore, 2001:3276). Arellano and Honore further conceded that Tobit 3, 4 and 5 models may be obtained by trivially modifying the above models. The single-censored dynamic Tobit model with fixed effects was considered by Kyriazidou (2001:543) and Honore (1993:59):

$$y_{1it}^{*} = \beta X_{1it}^{'} + \lambda y_{i,t-1} + \mu_i + v_{1it} \tag{4.65}$$

With
$y_{it} = \max\{0, y_{it}^{*}\}\, for\ i = 1, \ldots, N; \quad t = 1, \ldots, T$

The main drawback of all these Tobit models is that they are not double-censored estimators; hence they are of limited application to research on capital structure where the dependent variable is fractional and lies between 0 and 1. Loudermilk

(2007:462) proposed a dynamic double-censored Tobit estimator that accommodates fractional dependent variables. This type of estimator is consistent with both the fractional nature of the dependent variable and the unobserved heterogeneity of the subjects.

The proposed two-limit dynamic Tobit model is:

$$y_{it}^{*} = \gamma z_{it} + g(y_{i,t-1})\rho + c_i + u_{it} \quad (4.66)$$
$$(u_{it}|(z_i, y_{i,t-1}, \ldots\ldots.. y_{i0}, c_i) \sim N(0, \sigma_u^2))$$

Where:

$$y_{it} = \begin{cases} 0 & if\ y_{it}^{*} \leq 0 \\ y_{it}^{*} & if\ 0 < y_{it}^{*} < 1 \\ 1 & if\ y_{it}^{*} \geq 1. \end{cases}$$

This estimator requires that the fixed effects distribution depend on the balanced panels, thus the estimator is inapplicable to unbalanced panels. Elsas and Florysiak (2011a:9) suggested changing the assumptions of the fixed effects distribution to depend on the expected values of the exogenous variables, and this makes the resulting Tobit estimator applicable to unbalanced panels as well. The main drawback of both the static and dynamic Tobit estimators is that, when applied to experiments where the dependent variable has maximum and minimum values, they do not address this nature of the variable. A classic example of such an experiment is the research on capital structure. It is normal for debt ratios to lie between 0 and 1; they are fractional in nature. None of the above estimators fully addresses the fractional nature of debt ratios in this type of experiment. Elsas and Florysiak (2011a:2) proposed ‘dynamic panel data with fractional dependent variable’ (DPF) estimator to remedy this problem. The DPF estimator is basically a Tobit model that is double-censored. It relies on the latent approach to account for debt ratios, and it allows for the lagged dependent variable. Stata implements the random effects Tobit estimator as *xttobit*.

The application of these estimators in the modelling of the capital structure of South African firms is discussed in the next section.

4.4 THE CURRENT RESEARCH

The current research uses these panel data tools to test for the valididy of the trade-off and pecking order theories in the context of South African manufacturing, mining and retail firms.

4.4.1 PART A: CAPITAL STRUCTURE THEORIES AND FIRM-SPECIFIC CAPITAL STRUCTURE DETERMINANTS

4.4.1.1 The Firm-specific Determinants of Capital Structure

Empirical tests on both the trade-off and pecking order theories have identified a number of important firm-specific factors that affect a firm's financing decision. According to both theories, the reliably important determinants of leverage are: asset tangibility, firm size, financial distress, profitability, growth rate, non-debt tax shields, earnings volatility, capital expenditure, dividends, current portion of long-term debt, changes in working capital, and cash flow from operations (Ali Ahmed & Hisham, 2009:62; Booth *et al.,* 2001:118; Bradley, Jarrell & Kim, 1984:859; Chaplinksky & Niehaus, 1993:55; De Angelo & Masulis, 1980:26; Frank & Goyal, 2009:26; Huang & Song, 2006:22; Marsh, 1982:135; Rajan & Zingales, 1995:1453; Shyam-Sunder & Myers, 1999:224; Smith & Watts, 1992:280; Titman & Wessels, 1988:17; and Wald, 1999:161). This research proposes additional leverage variation explanatory variables. The additional variables are mainly the firm's key financial performance indicators which are: the firm's Economic Value Added (EVA), share price, price earnings ratio, earnings retention rate and liquidity. These are very important measurable financial performance indicators for a firm.

This research adopted the earlier variables in testing for the validity of both the trade-off and pecking order theories. It then developed a model of the relationship between leverage and the firm's key financial performance indicators. The selected key financial performance indicators included: the firm's Economic Value Added (EVA), share price, price earnings ratio, earnings retention rate, liquidity, asset tangibility, firm size, financial distress, profitability, growth rate, capital expenditure, and cash flow from operations. The reasons for choosing these variables for empirical analysis are discussed below. The next section discusses the hypotheses for Part A of the study.

4.4.1.2 Hypotheses for the Correlations between Leverage, Changes in Debt Issued and the Firm Specific Capital Structure Determinants

The hypotheses for the predicted correlations between leverage and the firm-specific capital structure determinants identified in section 4.4.1.1 are explained below. The correlations serve as a test for the validity of each theory.

- **Asset tangibility**

Hypothesis 1: Trade-off theory. *Asset tangibility (ASSET) is positively correlated to both leverage (LEV) and changes in new debt issued* (ΔD_{it}).

Hypothesis 2: Pecking order theory. *Asset tangibility (ASSET) is negatively correlated to both leverage (LEV) and changes in new debt issued* (ΔD_{it}).

The stock and quality of a firm's tangible assets are direct measures of the security that the firm can offer to existing and potential debt holders. A firm with higher stocks of tangible assets offers lenders increased collateral and this in turn increases the firm's debt capacity and lowers its cost of debt; this makes debt finance more attractive to the firm. The prediction of the trade-off theory is that asset tangibility (ASSET) is positively correlated to both leverage (LEV) and changes in new debt issued (ΔD_{it}).

According to the pecking order theory, firms with lower quality tangible assets face the increased agency costs of managers consuming more perquisites. These agency costs can be reduced by increasing the firm's leverage. The increased leverage forces bondholders to monitor management behaviour in order to protect their investment, as these firms have lower collaterals. Thus the monitoring costs are higher in firms with lower collaterals. Firms with poor quality assets may therefore voluntarily choose to increase their leverage in order to limit the consumption of perquisites by management, and this implies a negative correlation between asset tangibility and leverage.

- **Firm size**

Hypothesis 3: Trade-off theory. *Firm Size (SIZE) is positively correlated to both Leverage (LEV) and changes in new debt issued (ΔD_{it}).*

Hypothesis 4: Pecking order theory. *Firm Size (SIZE) is negatively correlated to both Leverage (LEV) and changes in new debt issued (ΔD_{it}).*

In general, large firms tend to be more profitable and have higher stocks of tangible assets in place than small firms. They offer more security to lenders, and this increases their debt capacities and lowers their costs of debt, making debt an attractive form of external financing. According to the trade-off theory, firm size (SIZE) is positively correlated to both Leverage (LEV) and changes in new debt issued (ΔD_{it}). But according to the pecking order theory, large firms tend to be more profitable and have fewer growth options. The pecking order theory further asserts that all firms have sticky dividends and thus retain more of the retained earnings to finance growth options. The limited growth options of large firms can therefore be financed by the retained earnings, with the excess profits being applied to reducing existing debt so as to increase the firm's financial slack. This implies that internal debt decreases with an increase in firm size. The theory therefore predicts a negative correlation between firm size (SIZE) and both Leverage (LEV) and changes in new debt issued (ΔD_{it}).

- **Financial distress**

Hypothesis 5: Trade-off theory. *Leverage and new debt issued are negatively correlated to financial distress.*

Hypothesis 6: Pecking order theory. *Leverage and new debt issued are negatively correlated to financial distress.*

The financial distress ratio is a direct measure of a firm's risk of defaulting on its current debt. The cost increases with an increase in the financial distress ratio, whilst the firm's debt capacity decreases with an increase in the financial distress ratio. The implication of these relationships is that firms with higher distress ratios will have smaller debt capacities and unattractive borrowing terms. Thus leverage (LEV) and changes in new debt issued (ΔD_{it}) will increase as the firm's financial distress (FDIST) ratio decreases. Both leverage and new debt issued are negatively correlated to financial distress.

- **Profitability and cash flow from operations**

Hypothesis 7: Trade-off theory. *Leverage (LEV) and changes in new debt issued (ΔD_{it}) are positively correlated to firm profitability (PROF).*

Hypothesis 8: Pecking order theory. *Leverage (LEV) and changes in new debt issued (ΔD_{it}) are positively correlated to firm profitability (PROF).*

Hypothesis 9: Trade-off theory. *Leverage (LEV) is positively correlated to cash flow from operations.*

Hypothesis 10: Pecking order theory. *Leverage (LEV) is negatively correlated to cash flow from operations.*

Profitable firms generate excess cash flows and this increases their likelihood of suffering from overinvestment problems. Profitable firms tend to be mature firms with limited growth options. Thus they face the problem of what to do with the excess cash: Should they use this to pay off debt, or return it to shareholders in the form of dividends or share buybacks? Or should they invest it in projects with low returns or negative NPVs? The financing policies of profitable and mature companies are driven by the need to limit overinvestment problems and to maximise the firm's interest debt shields. Mature and profitable firms face attractive borrowing terms and have higher debt capacities. The trade-off theory predicts that, in order to maximise firm values, profitable firms must return the excess capital to the shareholders. To move towards the optimal capital structure, they must substitute equity for debt. This effectively reduces the agency costs of overinvestment. The increased debt brings in the benefit of the debt interest tax shield, which increases firm value. Leverage (LEV) and changes in new debt issued (ΔD_{it}) are positively correlated to firm profitability (PROF) and cash flow from operations (CFO).

On the other hand, the pecking order theory asserts that firms have sticky dividend policies; they retain most of their internally-generated cash flows to finance the available growth options. The residual cash flow after financing the growth options is either retained internally or it is used to pay down debt so as to increase the firm's financial slack. Because external finance directly reflects an internal funds deficiency, depending on the firm's capital expenditure, profitable firms are expected to use minimal or no external funds. Leverage (LEV) therefore decreases with an increase in the firm's profitability (PROF) and cash flow from operations (CFO); change in new debt issued (ΔD_{it}) also decreases with an increase in profitability (PROF) and cash flow from operations (CFO).

- **Firm growth rate**

Hypothesis 11: Trade-off theory. *Growth rate (MTB) is negatively correlated to both leverage (LEV) and changes in new debt issued (ΔD_{it}).*

Hypothesis 12: Pecking order theory. *Growth rate (MTB) is negatively correlated to both leverage (LEV) and changes in new debt issued (ΔD_{it}).*

The financial policies of high-growth firms are mainly driven by the need to preserve financial flexibility and overcome problems associated with underinvestment. High-growth firms are normally small, unprofitable firms with low stocks of quality tangibles. Such firms also have increased non-debt tax shields that derive from increased capital expenditures. The debt interest tax shield is therefore substituted by the non-debt tax shields. The combination of low profitability and high non-debt tax shields makes debt financing unattractive to high-growth firms. Thus, according to the trade-off theory, high-growth firms are expected to be less leveraged. The trade-off theory therefore implies that a firm's growth rate (MTB) is negatively correlated to both leverage (LEV) and changes in new debt issued (ΔD_{it}).

According to the pecking order theory, the main driver of leverage is the internal funds deficiency. High-growth firms face increased internal funds deficiencies which derive from their increased capital expenditures. Since high-growth firms tend to be small and unprofitable firms; they suffer higher internal funds deficiencies. This results in their having higher leverages, as they follow the pecking order in financing the deficit. The pecking order theory therefore predicts a positive correlation between the firm's growth rate (MTB) and both leverage (LEV) and changes in new debt issued (ΔD_{it}).

- **Non-debt tax shields**

Hypothesis 13: Trade-off theory. *The NDTS is negatively correlated to both leverage (LEV) and changes in new debt issued (ΔD_{it}).*

A firm with higher levels of NDTS should use less debt, because the benefit of the interest tax shield is already captured in the NDTS. The NDTS and debt interest shields serve the same purpose of reducing the taxable income. Firms with higher capital expenditures, which are mostly high growth firms, have higher NDTS. The presence of the NDTS supports the assertion of the trade-off theory that high growth firms should use less debt and more equity as this cures the problem of underinvestment. The NDTS is therefore negatively correlated to both leverage (LEV) and changes in new debt issued (ΔD_{it}).

- **Earnings volatility**

Hypothesis 14: Trade-off theory. *Earnings volatility (VOL) is negatively correlated to both leverage (LEV) and changes in new debt issued (ΔD_{it}).*

Hypothesis 15: Pecking order theory. *Earnings volatility (VOL) is negatively correlated to both leverage (LEV) and changes in new debt issued (ΔD_{it}).*

Earnings volatility increases the firm's financial risk, and this in turn increases its cost of debt and reduces its debt capacity. Firms with highly volatile earnings should use less debt and rely more on equity, as they face unfavourable borrowing terms. Thus the firm's borrowings should decrease with an increase in earnings volatility. Both theories therefore predict a negative correlation between earnings volatility (VOL) and both leverage (LEV) and changes in new debt issued (ΔD_{it}).

- **Dividends**

Hypothesis 16: Trade-off theory. *Leverage (LEV) and changes in debt issued (ΔD_{it}) increase with increasing dividends (DIV).*

Hypothesis 17: Pecking order theory. *Leverage (LEV) increases with increasing dividends (DIV) and changes in debt issued (ΔD_{it}) decrease with decreasing dividends (DIV).*

The increase in dividends is normally preceded by an increase in profitability. According to the trade-off theory, the financing policy of profitable firms is driven by the need to maximise the debt interest tax shield, which increases firm value. Profitable firms increase the interest tax shields by increasing the dividends and share buybacks so as to pay out capital and replace it with debt. Dividends are therefore positively correlated to both leverage and changes in debt issued.

According to the pecking order theory, firms have sticky dividend policies and they only increase dividends when they have enough financial slack. Dividends deplete internal funds, reduce financial slack and increase internal funds deficiency. Firms first issue debt to cover any internal funds deficiency, thus an increase in dividends increases leverage. Leverage (LEV) increases with increasing dividends (DIV), and changes in debt issued (ΔD_{it}) decrease with decreasing dividends (DIV). Dividends are positively correlated to leverage and changes in debt issued.

- **Capital expenditure and Changes in working capital**

Hypothesis 18: Trade-off theory. *Leverage (LEV) and changes in net debt issued (ΔD_{it}) are negatively correlated to capital expenditure (CAPEX).*

Hypothesis 19: Pecking order theory. *Leverage (LEV) and changes in net debt issued (ΔD_{it}) are positively correlated to capital expenditure (CAPEX).*

Hypothesis 20: Pecking order theory. *Changes in net debt issued (ΔD_{it}) are positively correlated to changes in working capital (ΔWC).*

From the perspective of the trade-off theory, capital expenditure is positively correlated to non-debt tax shields. Firms with higher capital expenditures enjoy higher non-debt tax shields which are perfect substitutes for the debt interest tax shield. Thus the benefit of the interest tax shields diminishes with an increase in capital expenditure, and this renders debt financing unattractive for high-growth firms. Capital expenditure is therefore negatively correlated to both leverage and changes in new debt issued (ΔD_{it}).

On the other hand, the pecking order theory asserts that firms with large capital expenditures face increased internal fund deficiencies which force them to raise external finance, with debt finance being the preferred choice. Changes in new debt issued (ΔD_{it}) increase with an increase in capital expenditure (CAPEX) and changes in working capital (ΔWC). Leverage (LEV) is positively correlated to capital expenditure (CAPEX) and changes in working capital (ΔWC).

- **Repaid long-term debt**

Hypothesis 21: Pecking order theory. *Long-term debt repaid is negatively correlated to changes in new debt issued (ΔD_{it}).*

According to the pecking order theory, firms use excess cash flows to repay their long-term debt so as to increase their financial slack. The firms are likely to discontinue this payment if faced with internal funds deficits, and are likely to issue more debt instead. Repaid long-term debt (R) therefore decreases with an increase in changes in new debt issued (ΔD_{it}).

- **Firm value (EVA) and Share price (P)**

Hypothesis 22: Trade-off theory. *EVA is negatively correlated to leverage.*

Hypothesis 23: Market-timing theory. *Leverage is negatively correlated to share price.*

The Economic Value Added (EVA) of a firm is derived from its NOPAT, WACC and NA, and the predictions of the trade-off theory are that the WACC decreases with an increase in leverage up to an optimal leverage point and then increases thereafter. However, firms rarely gear to the optimal level. The EVA decreases with an increasing WACC; it is inversely proportional to the WACC. The EVA is also negatively correlated to leverage.

As share prices rise, a firm is bound to issue more equity, as it can raise more finance than issuing debt. This is consistent with the market timing theory. According to the theory, firms issue equity when the stock market is high and issue debt when the stock market is low. Thus leverage declines with an increase in share price. On the other hand, firms with declining share prices would find it difficult to convince the market to accept new share offers, and hence they would rely on unattractive loans to finance their operations. Leverage is therefore negatively correlated to share price. It must, however, be noted that the predictions of the signalling theory state the opposite. According to the signalling theory, an increase in leverage should lead to an increase in share price. Firms will only issue debt when faced with good future prospects which will enable them to service the debt. Management signal the future by issuing debt, and investors read this signal. According this theory, the share price should therefore be positively correlated to leverage.

- **Price earnings per share (P/E).**

Hypothesis 24: *There is a negative correlation between leverage (LEV) and the price earnings ratio (P/E).*

A firm's price earnings ratio is derived from its share price and earnings per share (EPS). The EPS depends on the earnings attributable to equity holders, and on the firm's share price. The EPS will increase if the earnings attributable to equity holders rise, or if the number of outstanding shares decreases. Leverage increases the interest payable, thereby decreasing the earnings attributable to equity holders and thus reducing the EPS. The reduced EPS is detrimental to the shareholders and this may result in a decline in the firm's share price, which effectively reduces the firm's price earnings ratio. There is a negative correlation between leverage (LEV) the price earnings ratio (P/E).

- **Earnings retention rate (RR)**

Hypothesis 25: Pecking order theory. *Leverage (LEV) is negatively correlated to the earnings retention rate (RR).*

The Earnings Retention Rate has a direct impact on the cash retained within the firm and hence the firm's internal funds deficits. According to the pecking order theory, firms have sticky dividends and this means that they have a high retention rate. This enables them to reduce their internal funds deficits and hence require less external finance. As the external finance is raised in a pecking order with debt being the first choice, the reduced deficit translates to reduced debt finance for the firm. Leverage (LEV) therefore decreases with an increasing retention rate (RR).

- **Liquidity (LIQ)**

Hypothesis 26: *Leverage (LEV) is negatively correlated to liquidity (LIQ).*

Liquidity is measured by the current ratio, which is defined as: current assets divided by current liabilities. The current liabilities include the current portion of borrowings. An increase in borrowings will therefore reduce the firm's liquidity by reducing the current ratio. Leverage (LEV) is therefore negatively correlated to liquidity (LIQ).

4.4.1.3 Hypothesis for Speed of Adjustment towards Target Leverage

- **Speed of Adjustment**

Hypothesis 27: Dynamic Trade-off theory. *Manufacturing, mining and retail firms all have a target leverage towards which they adjust over time.*

If the speed of adjustment is zero, then firms have no leverage targets and therefore do not follow the trade-off theory. But in cases where the speed of adjustment is greater than zero, firms have leverage targets that they adjust to; this supports the dynamic trade-off theory. In a perfect market, firms would maintain their target or optimal ratios; but in the imperfect market, firms will only partially adjust, as they face information asymmetries, transaction costs and adjustment costs. Firms have leverage targets that they adjust to at a slow speed; the speed of target adjustment is reduced by market frictions resulting from information asymmetries, transaction costs and adjustment costs. This speed varies between economic sectors.

Table 4.1 below summarises the hypotheses for the trade-off theory tests.

Table 4.1: Testing the Trade-off Theory on JSE-Listed Firms: Summary of the Hypotheses

Factor	Hypothesis
Leverage correlations: models 1,2,3 & 4	
ASSET = asset tangibility	Tangibility has a positive effect on leverage
SIZE = firm size	Size has a positive effect on leverage
FDIST = financial distress	Financial distress has a negative effect on leverage
PROF = firm profitability	Profitability has a positive effect on leverage
CFO= cash flow from operations	Cash flow from operations is positively correlated to leverage.
MTB = firm growth rate	Growth rate has a negative effect on leverage
NDTS = non-debt tax shields	Non-debt tax shields have a negative effect on leverage
VOL = volatility	Volatility has a negative effect on leverage
DIV = dividend	Dividend is positively correlated to leverage
CAPEX = capital expenditure	Capital expenditure is negatively correlated to leverage
Correlations with changes in net debt issued: model 5	
ASSET = asset tangibility	Tangibility has a positive effect on net debt issued
SIZE = firm size	Size has a positive effect on net debt issued
FDIST = financial distress	Financial distress has a negative effect on net debt issued
PROF = firm profitability	Profitability has a positive effect on net debt issued
CFO= cash flow from operations	Cash flow from operations is positively correlated to net debt issued.
MTB = firm growth rate	Growth rate has a negative effect on net debt issued
NDTS = non-debt tax shields	Non-debt tax shields have a negative effect on net debt issued
VOL = volatility	Volatility has a negative effect on net debt issued
DIV = dividend	Dividend is positively correlated to net debt issued
CAPEX = capital expenditure	Capital expenditure is negatively correlated to net debt issued
∆WC = changes in working capital	Net debt issued is negatively correlated to ∆WC
R = long-term debt repaid	No prediction

Table 4.2 below summarises the hypotheses for the pecking order theory tests:

Table 4.2: Testing the Pecking Order Theory on JSE-Listed Firms: Summary of the Hypotheses

Factor	Hypothesis
Leverage correlations: models 1,2,3 &4	
ASSET = asset tangibility	Tangibility has a negative effect on leverage
SIZE = firm size	Size has a positive effect on leverage
FDIST = financial distress	Financial distress has a negative effect on leverage
PROF = firm profitability	Profitability has a negative effect on leverage
MTB = firm growth rate	Growth rate has a positive effect on leverage
CFO= cash flow from operations	Cash flow from operations is negatively correlated to leverage.
NDTS = non-debt tax shields	No prediction
VOL = volatility	Volatility has a negative effect on leverage
DIV = dividend	Dividend is positively correlated to leverage
CAPEX = capital expenditure	Capital expenditure is positively correlated to leverage
Correlations with changes in net debt issued: model 5	
ASSET = asset tangibility	Tangibility has a negative effect on net debt issued
SIZE = firm size	Size has a positive effect on net debt issued
PROF = firm profitability	Profitability has a negative effect on net debt issued
FDIST = financial distress	Financial distress has a negative effect on net debt issued
CFO = cash flow from operations	Cash flow from operations is negatively correlated to changes in net debt issued
MTB = firm growth rate	Growth rate has a positive effect on net debt issued
VOL = volatility	Volatility has a negative effect on net debt issued
DIV = dividends paid	Dividends have a positive effect on net debt issued
CAPEX = capital expenditure	Capital expenditure has a positive effect on net debt issued
∆WC = changes in working capital	∆WC is positively correlated to net debt issued
R = long-term debt repaid	Long-term debt repaid is negatively correlated to net debt issued

Table 4.3 below summarises the hypotheses for the tests on the relationships between leverage and the firm's key financial performance indicators.

Table 4.3: Leverage and Key Financial Performance Metrics: Summary of the Hypotheses

Factor	Hypothesis
Category 1: Firm Value, Size & Growth	
Firm size (SIZE)	Size has a positive effect on leverage
Firm's growth rate (MTB)	Growth rate is negatively correlated to leverage
Firm value (EVA)	Firm value is positively correlated to leverage
Share price (P)	Share price is negatively correlated to leverage
Stock market performance (P/E)	The P/E ratio has a negative effect on leverage
Firm's capital expenditure (CAPEX)	Capital expenditure is positively correlated to leverage
Category 2: Profitability and Cash Flow Generation	
Firm profitability (PROF)	Profitability has a positive effect on leverage
Firm's cash flow from operations (CFO)	CFO is negatively correlated to leverage
Category 3: Financial Stability Measures	
Asset tangibility (ASSET)	Tangibility has a positive effect on leverage
Financial distress (FDIST)	Financial distress has a negative effect on leverage
Earnings retention rate (RR)	Earnings retention rate is negatively correlated to leverage
Liquidity (LIQ)	Liquidity has a negative effect on leverage

4.4.1.4 The Leverage Specification Model: MDR and BDR Models

The leverage model for both the trade-off and pecking order theories follows the basic error-component regression model specified in equation 4.1 above; that is:

$$y_{it} = \alpha + X'_{it}\beta + u_{it} \qquad i = 1, \dots \dots .., N; t = 1, \dots \dots ., T$$

As the present year's leverage is a function of the previous year's explanatory variables, this model can be transformed as follows:

$$y_{it+1} = \alpha + X'_{it}\beta + u_{it+1} \qquad i = 1, \dots \dots .., N; t = 1, \dots \dots ., T \qquad (4.67)$$

Incorporating and extending the work of Frank and Goyal (2009:14) and Hovakimian and Li (2011:35), the leverage specifications of the capital structure models can be expressed as:

$$LEV_{i,T} = \alpha + \beta X'_{i,T} + \varepsilon_{i,T} \qquad (4.68)$$

$$LEV_{i,T+1} = \alpha + \beta X'_{i,T} + \varepsilon_{i,T+1} \quad (4.69)$$

Where:

$LEV_{i,T}$ = leverage measured in both book values (BDR) and market values (MDR)

$X'_{i,T}$ = a vector of the firm-specific factors that determine leverage.

Models 4.68 and 4.69 are both static models, as they do not include the lagged dependent variable as an additional explanatory variable. Their parameters can only be estimated by using dynamic panel estimators, as these can automatically include the lagged dependent variable as an additional explanatory variable. Static panel estimators are unsuitable, as they assume a static leverage for the firms. The presence of leverage adjustment costs causes firms to allow their leverage ratios to temporarily deviate from their desired target ratios (Drobetz and Wanzenried, 2006:941). Firms do correct these deviations, but the corrections happen over time. Thus a dynamic model is more suitable in explaining the capital structure of firms, as it takes into account this partial adjustment process. The above models can be converted into dynamic models by including the lagged dependent variable as an additional explanatory variable. The dynamic models are as follows:

$$LEV_{i,T} = \alpha + \beta_0 LEV_{i,T-1} + \beta X'_{i,T} + \varepsilon_{i,T} \quad (4.70)$$

$$LEV_{i,T+1} = \alpha + \beta_0 LEV_{i,T} + \beta X'_{i,T} + \varepsilon_{i,T+1} \quad (4.71)$$

These models can all be estimated by using both the static and dynamic panel estimators. The dynamic panel estimators such as the Arellano and Bond estimator and the Blundell and Bond estimator automatically incorporate the lagged dependent variable as an additional explanatory variable.

In this research, leverage was defined in terms of both book values (BDR) and market values (MDR). Past empirical work by Bessler, Drobetz and Kazemieh (2011:23); Frank and Goyal (2003a:1); Frank and Goyal (2003b:221); and Shyam-Sunder and Myers (1999:224) identified the most important firm-specific determinants of leverage as:

- Profitability (ROE)

- Firm size (SIZE)
- Asset tangibility (ASSET)
- Non-debt tax shields (NDTS)
- Growth opportunities (MTB)
- Earnings volatility (VOL)
- Internal funds deficiency (DEF)
- Financial distress costs (FDIST)
- Capital expenditure or investment (CAPEX)
- Dividends paid (DIV)

These vectors can be incorporated into models 4.70 and 4.71, yielding the following dynamic models:

(4.72)

$$MDR_{i,T} = \beta_0 MDR_{i,T-1} + \beta_1 ASSET_{i,T} + \beta_2 SIZE_{i,T} + \beta_3 FDIST_{i,T} + \beta_4 ROE_{i,T} + \beta_5 MTB_{i,T} + \beta_6 NDTS_{i,T} + \beta_7 VOL_{i,T} + \beta_8 CAPEX_{i,T} + \beta_9 DIV_{i,T} + \varepsilon_{i,T}$$

(4.73)

$$BDR_{i,T} = \beta_0 BDR_{i,T-1} + \beta_1 ASSET_{i,T} + \beta_2 SIZE_{i,T} + \beta_3 FDIST_{i,T} + \beta_4 ROE_{i,T} + \beta_5 MTB_{i,T} + \beta_6 NDTS_{i,T} + \beta_7 VOL_{i,T} + \beta_8 CAPEX_{i,T} + \beta_9 DIV_{i,T} + \varepsilon_{i,T}$$

(4.74)

$$MDR_{i,T+1} = \beta_0 MDR_{i,T} + \beta_1 ASSET_{i,T} + \beta_2 SIZE_{i,T} + \beta_3 FDIST_{i,T} + \beta_4 ROE_{i,T} + \beta_5 MTB_{i,T} + \beta_6 NDTS_{i,T} + \beta_7 VOL_{i,T} + \beta_8 CAPEX_{i,T} + \beta_9 DIV_{i,T} + \varepsilon_{i,T+1}$$

(4.75)

$$BDR_{i,T+1} = \beta_0 BDR_{i,T} + \beta_1 ASSET_{i,T} + \beta_2 SIZE_{i,T} + \beta_3 FDIST_{i,T} + \beta_4 ROE_{i,T} + \beta_5 MTB_{i,T} + \beta_6 NDTS_{i,T} + \beta_7 VOL_{i,T} + \beta_8 CAPEX_{i,T} + \beta_9 DIV_{i,T} + \varepsilon_{i,T+1}$$

These models can be linked to the partial adjustment models and this enables the joint determination of correlation and the firm's speed of adjustment towards target leverage.

4.4.1.5 The Partial Adjustment Model Specifications

As explained above, firms do deviate from their target leverage ratios, but they correct these deviations over time. According to Drobetz and Wanzenried

(2006:947), the speed of adjustment depends on both the firm-specific factors (growth opportunities, size and the spread between actual and target leverage) and macro-economic factors (these are closely linked to the economy's business cycles: the term spread, the short-term interest rate, the default spread and the TED spread). Legal and financial traditions as well as institutional factors also affect the speed, size and frequency of adjustment (Oztekin & Flannery, 2012:88). The speed of target adjustment varies across countries, reflecting the differences in these factors. Countries with high-quality firms, good legal systems, favourable institutional features and stable or growing economies will exhibit higher speeds of adjustment. According to Oztekin and Flannery (2012:88), these features lower adjustment costs and hence facilitate faster and more frequent adjustments.

The target adjustment tests are discriminatory tests that determine whether firms follow the pecking order theory or the trade-off theory. The speed of adjustment is the telling factor between the two theories. If the speed of adjustment is zero, then firms have no leverage targets and therefore do not follow the trade-off theory. But in cases where the speed of adjustment is greater than zero, firms have leverage targets that they adjust to; this supports the trade-off theory, although in its dynamic form and not in its static form (Leary and Roberts, 2005:2613). In a perfect market, firms would always maintain their target or optimal ratio, but in the imperfect market, firms will only partially adjust, as they face information asymmetries, transaction costs and adjustment costs. The partial adjustment model is used to estimate the firm's speed of adjustment towards its predetermined target leverage.

Chambers (1996:21) presents the partial adjustment model as:

$$y_t^* = X_t^{'}\beta + u_t \qquad (1) \qquad\qquad (4.76)$$

$$y_t - y_{t-1} = \alpha(y_t^* - y_{t-1}) + e_t, 0 < \alpha < 1 \qquad (2)$$

Where:

e_t = error term

When equation 1 is substituted into equation 2, the following model is obtained:

$$y_t = (1-\alpha)y_{t-1} + \alpha X_t^{'}\beta + v_t \qquad (4.77)$$

Where:

y_t^* = the firm's target leverage

Flannery and Rangan (2006:472); Hovakimian and Li (2010:4); and Hovakimian and Li (2011:35) defined the firm's target leverage as:

$$BDR_{i,T+1} = \alpha_i + \beta X_{i,T} + \varepsilon_{i,T+1} \tag{4.78}$$

This ratio varies across firms and industries, reflecting the heterogeinity in firm-specific variables, $(X_{i,T})$. The ratio is best described as dynamic rather than static. The target ratio can then be defined as:

$$BDR_{i,T+1}^* = \hat{\beta} X_{i,T} \tag{4.79}$$

This assumes a perfect capital market, which implies that firms will always adjust frequently and fully towards their target ratios. But in practice, firms face information asymmetries, transaction costs and adjustment costs; they will therefore infrequently and partially adjust their capital structures towards their leverage ratios. For the trade-off hypothesis to hold, $\beta \neq 0$.

The leverage partial adjustment model was obtained from the partial adjustment model in equation 4.76 by substituting *y* for BDR and MDR, thus:

$$BDR_{i,T} - BDR_{i,T-1} = \alpha + \lambda\left(BDR_{i,T}^* - BDR_{i,T-1}\right) + \varepsilon_{i,T} \tag{4.80}$$

$$MDR_{i,T} - MDR_{i,T-1} = \alpha + \lambda\left(MDR_{i,T}^* - MDR_{i,T-1}\right) + \varepsilon_{i,T} \tag{4.81}$$

The speed of adjustment can be estimated by using the two-step method of first estimating the target leverage using equation 4.79 and substituting the results into equations 4.80 and 4.81, and then using a suitable estimator to get the speed of adjustment. The alternative method is to reduce the two-step process to a one-step process by substituting equation 4.78 into equations 4.80 and 4.81 to yield an equation equivalent to equation 4.77; this reduces to:

$$BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T} \quad (4.82)$$

$$MDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T-1} + \varepsilon_{i,T} \quad (4.83)$$

This version of the partial adjustment model was also used by Drobetz and Wanzenried (2006:944). But Flannery and Rangan (2006:472); Hovakimian and Li (2010:4); Hovakimian and Li (2011:35); and Elsas and Florysiak (2011b:186) used the following one-step partial adjustment model:

$$BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + \varepsilon_{i,T} \quad (4.84)$$

$$MDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T} + \varepsilon_{i,T+1} \quad (4.85)$$

In theory, these models should all be equivalent, as they are all dynamic models, and they should yield the same results.

This research project aimed to test for this equivalence in the models.

The final one-step models used for the traditional variables are:

(Model 1)

$$BDR_{i,T+1} = \beta_0 + (1-\lambda)BDR_{i,T} + \lambda\beta_2 ASSET_{i,T} + \lambda\beta_3 SIZE_{i,T} + \lambda\beta_4 FDIST_{i,T} + \lambda\beta_5 ROE_{i,T} + \lambda\beta_6 MTB_{i,T} + \lambda\beta_7 NDTS_{i,T} + \lambda\beta_8 VOL_{i,T} + \lambda\beta_9 CAPEX_{i,T} + \lambda\beta_{10} DIV_{i,T} + \varepsilon_{i,T+1}$$

(Model 2)

$$BDR_{i,T} = \beta_0 + (1-\lambda)BDR_{i,T-1} + \lambda\beta_2 ASSET_{i,T} + \lambda\beta_3 SIZE_{i,T} + \lambda\beta_4 FDIST_{i,T} + \lambda\beta_5 ROE_{i,T} + \lambda\beta_6 MTB_{i,T} + \lambda\beta_7 NDTS_{i,T} + \lambda\beta_8 VOL_{i,T} + \lambda\beta_9 CAPEX_{i,T} + \lambda\beta_{10} DIV_{i,T} + \varepsilon_{i,T}$$

(Model 3)

$$MDR_{i,T+1} = \beta_0 + (1-\lambda)MDR_{i,T} + \lambda\beta_2 ASSET_{i,T} + \lambda\beta_3 SIZE_{i,T} + \lambda\beta_4 FDIST_{i,T} + \lambda\beta_5 ROE_{i,T} + \lambda\beta_6 MTB_{i,T} + \lambda\beta_7 NDTS_{i,T} + \lambda\beta_8 VOL_{i,T} + \lambda\beta_9 CAPEX_{i,T} + \lambda\beta_{10} DIV_{i,T} + \varepsilon_{i,T+1}$$

(Model 4)

$$MDR_{i,T} = \beta_0 + (1-\lambda)MDR_{i,T-1} + \lambda\beta_2 ASSET_{i,T} + \lambda\beta_3 SIZE_{i,T} + \lambda\beta_4 FDIST_{i,T} + \lambda\beta_5 ROE_{i,T} + \lambda\beta_6 MTB_{i,T} + \lambda\beta_7 NDTS_{i,T} + \lambda\beta_8 VOL_{i,T} + \lambda\beta_9 CAPEX_{i,T} + \lambda\beta_{10} DIV_{i,T} + \varepsilon_{i,T}$$

(Model 5)

The detailed process of deriving this model is outlined in section 4.4.1.6 below.

$$\Delta D_{i,T} = \beta_0 + \beta_1 DD_{i,T} + \beta_2 ASSET_{i,T} + \beta_3 SIZE_{i,T} + \beta_4 FDIST_{i,T} + \beta_5 ROE_{i,T} + \beta_6 MTB_{i,T} + \beta_7 NDTS_{i,T} + \beta_8 VOL_{i,T} + \beta_9 DIV_{i,T} + \beta_{10} CAPEX_{i,T} + \beta_{11} \Delta WC_{i,T} + \beta_{12} R_{i,T} - \beta_{13} C_T + \varepsilon_{i,T}$$

The final one-step models used for the KFPI variables are:

(Model 6)

$$BDR_{i,T+1} = \beta_0 + (1-\lambda)BDR_{i,T} + \lambda\beta_2 ASSET_{i,T} + \lambda\beta_3 FDIST_{i,T} + \lambda\beta_4 RR_{i,T} + \lambda\beta_5 LIQ_{i,T} + \lambda\beta_6 SIZE_{i,T} + \lambda\beta_7 MTB_{i,T} + \lambda\beta_8 EVA_{i,T} + \lambda\beta_9 P_{i,T} + \lambda\beta_{10} P/E_{i,T} + \lambda\beta_{11} ROE_{i,T} + \lambda\beta_{12} CAPEX_{i,T} + \lambda\beta_{13} CFO_{i,T} + \varepsilon_{i,T+1}$$

(Model 7)

$$BDR_{i,T} = \beta_0 + (1-\lambda)BDR_{i,T-1} + \lambda\beta_2 ASSET_{i,T} + \lambda\beta_3 FDIST_{i,T} + \lambda\beta_4 RR_{i,T} + \lambda\beta_5 LIQ_{i,T} + \lambda\beta_6 SIZE_{i,T} + \lambda\beta_7 MTB_{i,T} + \lambda\beta_8 EVA_{i,T} + \lambda\beta_9 P_{i,T} + \lambda\beta_{10} P/E_{i,T} + \lambda\beta_{11} ROE_{i,T} + \lambda\beta_{12} CAPEX_{i,T} + \lambda\beta_{13} CFO_{i,T} + \varepsilon_{i,T}$$

(Model 8)

$$MDR_{i,T+1} = \beta_0 + (1-\lambda)MDR_{i,T} + \lambda\beta_2 ASSET_{i,T} + \lambda\beta_3 FDIST_{i,T} + \lambda\beta_4 RR_{i,T} + \lambda\beta_5 LIQ_{i,T} + \lambda\beta_6 SIZE_{i,T} + \lambda\beta_7 MTB_{i,T} + \lambda\beta_8 EVA_{i,T} + \lambda\beta_9 P_{i,T} + \lambda\beta_{10} P/E_{i,T} + \lambda\beta_{11} ROE_{i,T} + \lambda\beta_{12} CAPEX_{i,T} + \lambda\beta_{13} CFO_{i,T} + \varepsilon_{i,T+1}$$

(Model 9)

$$MDR_{i,T} = \beta_0 + (1-\lambda)MDR_{i,T-1} + \lambda\beta_2 ASSET_{i,T} + \lambda\beta_3 FDIST_{i,T} + \lambda\beta_4 RR_{i,T} + \lambda\beta_5 LIQ_{i,T} + \lambda\beta_6 SIZE_{i,T} + \lambda\beta_7 MTB_{i,T} + \lambda\beta_8 EVA_{i,T} + \lambda\beta_9 P_{i,T} + \lambda\beta_{10} P/E_{i,T} + \lambda\beta_{11} ROE_{i,T} + \lambda\beta_{12} CAPEX_{i,T} + \lambda\beta_{13} CFO_{i,T} + \varepsilon_{i,T}$$

These are all dynamic models. This research used models to test for the correlation between the dependent variables and the independent variables. All the above models were further used to derive the estimates of the firm's speed of adjustment. If λ= 1, it means that the adjustment process is completed within a year meaning that the firm is always at its target leverage. If λ < 1, then the firm takes more than a year to adjust to the target leverage. Finally, if λ > 1, the firm over-adjusts by making more adjustment than is necessary and it still deviates from its target leverage, (Drobetz & Wanzenried, 2006:944 and Qian, Tian & Wirjanto, 2009:664).

The leverage model based on internal funds deficiency is specified below.

4.4.1.6 The Leverage Specification Model: Changes in the Net Debt Issued Model

The regression model for this test was also derived from the error-component model specified in equation 4.1 above. The model uses changes in debt as the dependent variable.

According to Shyam-Sunder and Myers (1999:224), firms rarely issue equity post-their initial public offerings (IPOs), but rather rely on retained internal funds to fund growth. They argued that a firm will only consider outside financing once it has exhausted its internal funds and that external funds (debt and equity) reflect an internal funds deficiency. Firms will issue debt to finance any internal funds deficiency, with equity issuances only being considered in extreme circumstances. This financing approach defines the basis of the pecking order model.

Thus the pecking order model can be derived from the following model:

$$DEF_{i,T} = DIV_{i,T} + CAPEX_{i,T} + \Delta WC_{i,T} + R_{i,T} - CFO_T \equiv \Delta D_{i,T} + \Delta E_{i,T} \quad (4.86)$$

Since $\Delta E_{i,T} = 0$ (firms rarely issue equity post IPOs; they rely on retained earnings and debt financing), and incorporating the current portion of long-term debt as part of deficit financing (Frank and Goyal (2003b:221), the above model can be re-written as:

$$\Delta D_{i,T} = \alpha + \beta DEF_{i,T}^{SSM} + \varepsilon_{i,T} \quad (4.87)$$

Where:

$$DEF_{i,T}^{SSM} = DIV_{i,T} + CAPEX_{i,T} + \Delta WC_{i,T} + R_{i,T} - CFO_T$$

The above model 4.87 can be extended to incorporate the important firm-specific determinants of leverage; that is:

$$\Delta D_{i,T} = \mu_0 + \mu_1 PROF_{i,T} + \mu_2 MTB_{i,T} + \mu_3 SIZE_{i,T} + \mu_4 ASSET_{i,T} + \mu_5 VOL_{i,T} + \mu_6 DIV_{i,T} + \mu_7 CAPEX_{i,T} + \mu_8 \Delta WC_{i,T} + \mu_9 R_{i,T} - \mu_{10} CFO_T + \varepsilon_{i,T} \quad (4.88)$$

This model differs from the trade-off model in equation 3.32 which was presented by Ali Ahmed and Hisham (2009:61). Their model only focuses on cash flows and neglects other important firm-specific leverage factors identified by the pecking order theory. The above model, on the other hand, incorporates these factors. Model 4.78 also extends the model developed by Frank and Goyal (2003b:224) by incorporating earnings volatility (VOL).

In contrast to the pecking order theory, the trade-off theory asserts that a firm can issue either debt or equity to finance its internal funds deficiency, and the security issuance decision is largely affected by the magnitude and direction of the current target deviation spread. This internal funds deficiency can be financed entirely by debt, entirely by equity, or by a mixture of debt and equity; the financing choice is largely influenced by the firm’s deviation distance from the target capital structure. The internal funds deficiency is therefore defined by equation 4.89:

$$DEF_{i,T} = DIV_{i,T} + CAPEX_{i,T} + \Delta WC_{i,T} + R_{i,T} - CFO_T \equiv \Delta D_{i,T} + \Delta E_{i,T} \quad (4.89)$$

This can be re-written as:

$$DEF_{i,T} = \Delta D_{i,T} + \Delta E_{i,T} \Rightarrow \Delta D_{i,T} = DEF_{i,T} - \Delta E_{i,T} \quad (4.90)$$

In terms of the trade-off theory, the difference $DEF_{i,T} - \Delta E_{i,T}$ may be defined as the firm's debt deficiency $(DD_{i,T})$, instead of its internal funds deficiency; thus equation 4.89 can be re-written as:

$$\Delta D_{i,T} = DD_{i,T} = DIV_{i,T} + CAPEX_{i,T} + \Delta WC_{i,T} + R_{i,T} - CFO_T \quad (4.91)$$

This model implies that the increase in debt issued is only necessary when the firm wants to increase its leverage to the optimal or target level; it is only underleveraged firms that issue debt, as this brings them closer to the target leverage. The underleveraged firms will not issue equity, but will only issue debt; that is:

$$\Delta D_{i,T} = \beta_0 + \beta_1 DD_{i,T} + \beta_2 ASSET_{i,T} + \beta_3 SIZE_{i,T} + \beta_4 FDIST_{i,T} + \beta_5 PROF_{i,T} + \beta_6 MTB_{i,T} + \beta_7 NDTS_{i,T} + \beta_8 VOL_{i,T} + \varepsilon_{i,T} \quad (4.92)$$

This model also differs from the trade-off model in equation 25 which was presented by Ali Ahmed and Hisham (2009:62). The flaw in their model is that it assumes that the financing deficit can only be covered by debt issuances; this assumption is incorrect under the trade-off hypothesis. As explained above, the trade-off theory asserts that the issuance decision is largely influenced by the deviation spread from the optimal target ratio. Firms can therefore issue equity or debt, or do dual issuances so as to maintain the optimal leverage, and this financing behaviour is described in the model above.

Models 4.91 and 4.92 were consolidated to give the following model for changes in debt issued:

(Model 5)

$$\Delta D_{i,T} = \beta_0 + \beta_1 DD_{i,T} + \beta_2 ASSET_{i,T} + \beta_3 SIZE_{i,T} + \beta_4 FDIST_{i,T} + \beta_5 ROE_{i,T} + \beta_6 MTB_{i,T} + \beta_7 NDTS_{i,T} + \beta_8 VOL_{i,T} + \beta_9 DIV_{i,T} + \beta_{10} CAPEX_{i,T} + \beta_{11} \Delta WC_{i,T} + \beta_{12} R_{i,T} - \beta_{13} CFO_T + \varepsilon_{i,T}$$

In this study, the speed of adjustment was estimated in two stages: the first stage entailed using the traditional variables and the second stage incorporated the firm's key financial performance indicators (KFPI). The first stage incorporated some adjustments to the definition of the vector $(X_{i,T})$ given by Elsas and Florysiak (2011b:184); Flannery and Rangan (2006:476); and Hovakimian and Li (2010:36), and the final definition of vector $(X_{i,T})$ incorporated the explanatory variables contained in Table 4.4 below. The Table 4.4 below lists the traditional variables used for stage one and the KFPI variables used for stage two.

Table 4.4: Capital Structure Explanatory Variables

Traditional Variables for Vector X	KFPI Variables for Vector X
Firm size	Firm size
Asset tangibility	Asset tangibility
Growth rate	Growth rate
Profitability	Profitability
Capital expenditure or investment	Capital expenditure or investment
Non-debt tax shields	Earnings retention rate
Earnings volatility	Liquidity
Financial distress	Financial distress
Dividend	Economic value added
	Share price
	Price earnings ratio
	Cash flow from operations

The variables excluded from the traditional list are liquidity, depreciation, and research and development. Liquidity was included in the KFPI. South African firms rarely disclose research and development expenditure, and this variable was therefore excluded. Past empirical work has adopted earnings volatility as a measure of financial risk, and for the sake of consistency, this study adopted the same measure instead of using the liquidity ratio. Furthermore, this research included financial distress as an additional measure of risk.

4.4.1.7 Testing Methodology: BDR, MDR, Changes in Debt Issued and Speed of Adjustment Models on Stata 12

Panel 1 data were used to test models 1, 2, 3, 4 and 5, whilst panel 2 data were used to test models 6, 7, 8 and 9. This research used the one-step method to estimate the speed of adjustment of all the firms. The one-step method is less cumbersome and more suitable for the above models. Models 1, 3, 6 and 8 were the primary models and they were all estimated using the following estimators:

- GLS random effects estimator
- ML random effects estimator
- Fixed effects estimator
- Time series estimator (the Prais-Winsten regression)
- Arellano and Bond estimator
- Blundell and Bond estimator
- Random effects Tobit estimator.

Model 5 was estimated using the GLS random effects, ML random effects, fixed effects, time series, Arellano and Bond, and Blundell and Bond estimators. Models 2, 4, 7 and 9 are supplementary models which the study used to test for the consistency of the all models which are used to estimate capital structure. The final determination of correlation and speed of adjustment was based on the results of the primary models. These supplementary models were estimated using only the Arellano and Bond (1991), and the Blundell and Bond (1998) estimators. In line with past research on this subject, this research used both static and dynamic panel estimators. The benefits and drawbacks of these various estimators were outlined at the beginning of this chapter.

In partial adjustment models 1, 2, 3, 4, 5, 6, 7, 8 and 9, the error term may be correlated to the lagged dependent variables, thus the fixed and random effects models may produce biased and inconsistent parameters. According to Drobetz and Wanzenried (2006:945), partial adjustment models may suffer problems of endogeneity of the explanatory variables. The shocks that affect leverage, for example economic shocks, may also affect some of the regressors such as profitability and firm size thus violating the assumption that all regressors are strictly exogenous (Drobetz *et al*, 2007:7). Furthermore, the explanatory variables may also be correlated with past and current values of error components. The treatment of these potential endogenous variables depends on the partial adjustment model being fitted. The partial adjustment models used by Elsas and Florysiak (2011b:186); Flannery and Rangan (2006:472); Hovakimian and Li (2010:4) and Hovakimian and Li (2011:35) are salient regarding the existence of potential endogenous variables and their impact on model specification. This may be due to the fact that these models specify that the next year's target leverage depends on the historical explanatory variables which cannot be affected by the current and future economic shocks. In this study, models 1, 3, 6 and 8 are therefore unlikely to suffer any misspecification due to problems caused by potential endogenous variables.

In the partial adjustment models used by Drobetz and Wanzenried (2006:947); Drobetz *et al* (2007:7) and Qian *et al* (2009:669), current leverage is explained by the current regressors. These models are therefore likely to suffer misspecification due to the existence of potential endogenous variables. Drobetz *et al (2007: 10)* suggested that this problem could be resolved by using the second lag of all (endogenous and exogenous) variables (in all levels) as additional instruments. This solution makes the dynamic panel data estimators, the two-step Arellano and Bond (1991) estimator and the Blundell and Bond (1998) estimator ideal estimators for fitting the partial adjustment models 2, 4, 7 and 9. These estimators allow for heteroskedasticity across firms by first-differencing the models to remove any firm-specific effects, thereby avoiding any correlation between unobservable firm-specific characteristics and the independent variables.

The study attempted to implement this solution in fitting models 2, 4, 7 and 9 but the parameters obtained were inconsistent and downward biased compared to the parameters of models 1, 3, 6 and 8. This may be due to the small sample size used in the study. The final solution was to assume no endogeneity and apply the one-step estimation method used to fit models 1, 3, 6 and 8 and this produced parameter estimates closer to the parameters of models 1, 3, 6 and 8. The validity of the instruments was tested using the Sargan test with a null hypothesis that the over identifying restrictions are valid. The test indicates whether these instruments are independent of the residuals.

The potential for obtaining consistent parameter estimates for partial adjustment models 1-8 in the presence of endogenous right-hand side variables makes both the Arellano and Bond (1991) and Blundell and Bond (1998) estimators invaluable in the context of capital structure research (Qian *et al* 2009:669). The main limitation of these estimators is that they are still biased because they ignore the fractional nature of the fractional dependent variable.

According to Elsas and Florysiak (2011a:6), most of the estimators used in capital structure research are severely biased, because they ignore the fractional nature of the dependent variable. This research used the random effects Tobit estimator as the least biased estimator of the speed of adjustment. It is equivalent to the DPF estimator proposed by Elsas and Florysiak (2011a:7). The random effects Tobit estimator uses the single-step model and it censors debt ratios between 0 and 1. Debt ratios lie between 0 and 1, and are thus fractional in nature. In panel 1, only 1.2% of the MDR observations were greater than 1, and 0.31% of the BDR observations were greater than 1. In panel 2, 1.16% of the MDR observations were greater than 1, and all the BDR observations were less than 1. This makes the random effects Tobit model a more suitable estimator of the speed of adjustment for both samples.

This censored model was derived from model 4.66 above and it was specified as:

$$MDR_{it} = \begin{cases} 0 & if\ MDR_{it}^* \leq 0 \\ MDR_{it}^* & if\ 0 < MDR_{it}^* < 1 \\ 1 & if\ MDR_{it}^* \geq 1. \end{cases} \tag{4.94}$$

And

$$BDR_{it} = \begin{cases} 0 & if\ BDR_{it}^* \leq 0 \\ BDR_{it}^* & if\ 0 < BDR_{it}^* < 1 \\ 1 & if\ BDR_{it}^* \geq 1. \end{cases} \tag{4.95}$$

The random effects Tobit estimator combines this model together with the one-step model above to estimate the speed of adjustment. This was the main estimator used in this research. The study did, however, also make use of other estimators to prove that some of the estimators used in capital structure research are biased. These additional estimators also provide robustness test for the random effects Tobit model. In cases where the correlations were inconclusive, the net correlation was used to determine the ultimate correlation of the variable. The random effects Tobit estimator provided the true speed of adjustment for the firms. The time series estimator (the Prais-Winsten regression) was included to enable the determination of the panel's Durbin-Watson's statistic.

The Stata 12 statistical package was used to test all the above models. This is a more suitable package than SAS and Statistical Package for the Social Sciences (SPSS), as it can accommodate all the estimators and it has special options to deal with some statistical errors such as heteroskedasticity. The confidence level of estimation was set at 95% for all the estimators. To control for heteroskedasticity, the robust standard error type option was used in all the estimators except the ML random effects model and the random effects Tobit model. These models do not have the robust option for standard errors. The Gauss-Hermite quadrature integration option was used for the random effects Tobit estimator. In the case of the time series model, the Durbin-Watson method of computing autocorrelation; the Cochrane-Orcutt transformation; and the robust standard error type with the $1/(1-h)^{\wedge 2}$ bias correction options were used in implementing the estimator. These are the best estimator options for controlling both autocorrelation and heteroskedasticity.

As with most economic variables, collinearity is a problem in all the models. It is only the dynamic panel estimators that can deal with collinearity, as they automatically eliminate one of the two or three variables that exhibit collinearity. In this research, the variance inflation factors (VIFs) were used to detect both multicollinearity and collinearity. Variables with VIFs greater than ten may indicate either multicollinearity or collinearity problems. Such variables were identified through a test run and then eliminated from the models. All the remaining variables had VIFs that were smaller than ten, and in most cases, they were significantly smaller than ten. The following variables had VIFs greater than ten and were therefore removed from the above models:

- In panel 1 models 1, 2, 3 and 4: earnings volatility (VOL) and firm size (SIZE)
- In panel 1 model 5: debt deficiency (DD), firm size (SIZE) and cash flow from operations (CFO_t)
- In panel 3 models 6, 7, 8 and 9: firm size (SIZE) and firm growth rate (MTB).

The models were all tested on the full sample and in each of the three sectors. The speeds of adjustment were also estimated for the full sample and in each of the three sectors.

The test results of these models, together with the descriptive statistics, are presented and discussed in Chapters 5 and 6.

4.4.2 PART B: ESTIMATING THE DISCOUNTED VALUE PREMIUM OF MANUFACTURING, MINING AND RETAIL FIRMS

In this part of the research study, further testing was performed to investigate the validity of the trade-off and pecking order theories in the South African context by estimating the discounted value premium of South African manufacturing, mining and retail firms.

4.4.2.1 The Discounted Value Premium

The trade-off theory asserts that firms have an optimal capital structure where firm value is maximised; this defines the firm's optimal debt ratio. This optimal capital structure coincides with the firm's minimum weighted average cost of capital (WACC). A question that arises is: do firms gear up to this optimal level? The central argument in this study is that the optimal capital structure is theoretical; firms do not gear up to this theoretical optimal level. The observed leverage level is lower than the theoretical optimal level suggested by the trade-off theory. This leverage slack represents the firm's discounted value premium, and the magnitude of this premium has a bearing on the validity of the trade-off theory. Persistent small value premiums may imply that firms adopt financing policies that keep them closer to the optimal capital structure, thus validating the predictions of the trade-off theory. On the other hand, large value premium discounts may imply that firms value financial flexibility and pay less attention to the optimal capital structure targets. The argument for maintaining financial flexibility as a financing policy is consistent with the assertions of the pecking order theory. The discounted value premium, which is defined in equation 4.98, represents the price that the firm pays for its financial flexibility.

$$DV_{premium} = FV_{optimal} - FV_{current} \quad (4.98)$$

The hypotheses used in the second part of this study are:

- **Hypothesis 28**:

  $DV_{premium} = 0 \; when \; growth \; in \; earnings \; is \; assumed \; to \; be \; zero$

  Left hand side hypothesis: *Ha: mean < 0*

  Null hypothesis: H_0*: mean = 0*

  Right hand side hypothesis: *Ha: mean > 0*

- **Hypothesis 29**:

  $DV_{premium} = 0 \; when \; growth \; in \; earnings \; is \; assumed \; to \; be \; perpetual$

  Left hand side hypothesis: *Ha: mean < 0*

  Null hypothesis: H_0*: mean = 0*

  Right hand side hypothesis: *Ha: mean > 0*

In this study, the discounted value premium was calculated using the Damodaran optimal capital structure estimator. This estimator, which is described below, extends the estimation developed by Ehrhardt and Brigham (2006:471) by incorporating the debt default risk in the estimation of the cost of capital.

4.4.2.2 The Damodaran Optimal Capital Structure Estimator

The Damodaran estimator uses the following inputs to estimate the firm's optimal capital structure:

- Earnings before interest, taxes and depreciation (EBIDTA)
- Depreciation and amortisation
- Capital expenditure
- Interest expense on debt
- Tax rate on ordinary income
- Number of shares outstanding
- Share price
- Share beta
- Book value of debt
- Current long-term government bond rate
- Equity risk premium
- Country default spread
- Firm size.

The input sheet for this model is contained in Appendix 9. All the inputs except the tax rate and the country default risk premiums were obtained from the McGregor BFA database. The estimator first calculated the interest cover ratio which was then used to estimate the firm's default spread from the credit ratings tables. The default spread was then added to the current long-term government bond rate to obtain the cost of debt. Ehrhardt and Brigham (2006:471) do not incorporate this default risk in their estimation model, hence their estimator is flawed. This estimation of the cost of debt was repeated for each debt level that the firm chose; the default risk premium, and hence the cost of debt, increases with gearing.

The firm's discounted value premium was estimated as follows:

1. Debt was gradually increased from 0% to 90% in units of 10%. As explained above, an increase in debt raises the default risk premium and hence increases the cost of debt. The default risk premiums were estimated from the

Standard and Poor's rating tables. Table 3.11 contains an example of such a table. The cost of debt was calculated from the following model:

$$K'_d = \left(R_f + \ default\ spread\right) \times (1 - T)$$

The statutory corporate tax rate obtained from the South African Revenue Services (SARS) was used in this model.

2. As the debt levels increase, the financial risk of the firm increases, thereby increasing the equity risk, and this results in an increase in the firm's share beta. The estimator therefore calculated the new share beta. The adjusted beta was estimated from the following equation:

$$\beta_L = \beta_U\left(1 + \phi\ (1 - T)\right)$$

The unlevered beta (β_U) can be calculated from:

$$\beta_U = \frac{\beta_L + \beta_{debt} \times (1 - T)\frac{D}{S_L}}{\left\{1 + (1 - T) \times \frac{D}{S_L}\right\}}$$

Where:

D = corporate debt

S_L = levered equity

β_{debt} = debt beta

Cohen (2008:64) defined β_{debt} as:

$$\beta_{debt} \equiv \frac{R_D - R_D^*}{r_{pm}}$$

Where:

R_D = cost of debt

R_D^* = the risk-free rate

r_{pm} = the market equity risk premium

Once the new share beta had been calculated, the cost of equity was then estimated from the CAPM:

$$K_e = R_f + \beta_L \times (R_m - R_f)$$

3. The firm's weighted average cost of capital (WACC) was then estimated for each level of leverage as:

$$WACC = K'_d \times \frac{D}{D+E} + K_e \times \frac{E}{E+D}$$

4. The firm value was then estimated from the following equation:

$$V_{Firm} = \frac{EBIT}{WACC}$$

5. The optimal capital structure corresponded to the firm's lowest WACC. The discounted value premium was then calculated using equation 4.98. This represents the firm's leverage slack, which defines its financial flexibility. The discounted value premium is therefore the price that the firm pays for retaining its financial flexibility. That is,

$$Value\ of\ Financial\ Flexbility = DV_{premium} = FV_{optimal} - FV_{current} \qquad (4.99)$$

This value is expected to be higher in firms that follow the pecking order theory as such firms target low leverage. The value will be lower for firms that follow the trade-off theory, as these firms tend to have higher leverage. The Damodaran estimator yields two firm values: firm value assuming no growth and firm value when assuming perpetual growth.

The outputs from this estimator were:

- The current and optimal debt ratio, the debt ratio, the WACC, the share value, the firm value assuming no growth, and the firm value assuming perpetual growth

An example of an output sheet is contained in Appendix 10.

The actual discounted value premium when growth in earnings is assumed to be zero and when growth in earnings is assumed to be perpetual was calculated for all the firms for the period 2006-2010. The change ratio for each year was calculated together with the mean for the full sample and for the three sectors. This data were then used to estimate the mean discounted value premium for the full sample and for each of the three sectors. The discounted value premium data were then used to construct the panel 3 dataset which was used to test hypotheses 20 and 21 above. A simple T-test was used to test the hypotheses, and this test was implemented on Stata 12.

The test results, together with the descriptive statistics, are presented and discussed in Chapter 7.

4.4.3 THE DATA SOURCES AND THE SAMPLE

4.4.3.1 Data Sources

All the financial data used in this research were drawn from the McGregor BFA database (http://www.mcgregorbfa.com/). This comprehensive database contains financial information on all the firms listed on the Johannesburg Stock Exchange from 1972 to date. This information includes published and audited complete annual financial statements; interim financial statements; firm statutory data; annual reports; dividend history; financial models; historical and current price data; and a comprehensive set of key financial ratios for all JSE-listed firms. The database is used by equity analysts, lenders, investors, and all South African premier universities. The financial statements, reports on calculated ratios, and reports on the financial models can all be downloaded in MS Excel format as either "*as published*" or "*standardized"* formats. The foreign currency denominated financial statement variables used in this research were translated into Rands using the appropriate exchange rate.

The historical exchange rates were obtained from the South African Reserve Bank database and the country rating was obtained from the Moody's database. The share betas, market risk premium and current long-term government bond rate were all obtained from the WACC and CAPM Financial Models of the McGregor BFA database. The research used the R157 government bond as the risk-free security. This rate changes throughout the year, and the applicable rate depends on the year-end of the firm. The R153 bond was terminated in 2005. Because of the stability of the South African financial system, the market risk premium was assumed to be the same for the 5-year period from 2006-2010.

This research used the standardised version of the financial statements and ratios as the primary source of data. These statements make it possible to meaningfully compare the financial data of sampled firms.

4.4.3.2 Standardised Financial Statements

In order to make meaningful comparisons between the results of different companies, it was necessary to use standardised financial statements for the sampled companies. The reason for standardising the financial statements was purely because companies apply accounting conventions (International Accounting Standard (IAS) 8: *Accounting Policies, Changes in Accounting Estimates and Errors)*, and therefore Generally Accepted Accounting Practices and International Accounting Standards (IASs) and International Financial Reporting Standards (IFRSs), in different ways and according to different interpretations. This makes it impossible for any researcher to analyse, interpret and compare the financial results and financial positions of different companies. The term “standardisation” is used, as items in the balance sheet, income statement and cash flow statement, as well as other quantitative information obtained from published financial statements were analysed and categorised in a consistent manner. The standardisation process made the following specific adjustments to the published financial statements of the companies:

4.4.3.2.1 Goodwill or Cost of Control, and Intangible Assets

International Financial Reporting Standard (IFRS) 3: *Business Combinations* allow companies to include these items in the financial statements at cost or re-valuation less the aggregate amounts written off or provided for as amortisation. In the published balance sheet, these items are normally disclosed as part of the non-current assets of companies. In the standardised balance sheet, however, they were deducted from ordinary shareholders' equity to reflect the real value of equity and thus be comparable with the equity of companies not showing goodwill or cost of control and/or intangible assets. In the standardised income statement, all impairment, amortisation and amounts written off as goodwill and/or intangible assets were therefore not disclosed as separate amounts or as part of extraordinary items (as in the published financial statements), but were shown as supplementary information.

4.4.3.2.2 Deferred tax

The IAS 12: *Income Taxes* allow companies to account, either fully or in part, for deferred tax in their financial statements. In the published balance sheet, deferred tax assets are normally disclosed as part of the non-current assets of the company, while deferred tax liabilities are disclosed as non-current liabilities. These are, however, not tangible assets or liabilities, and in the standardised balance sheet, the distributable reserves were adjusted with the net amount of deferred tax – as if deferred tax were not written off at all. The cumulated deferred tax was, however, disclosed as supplementary information to the standardised balance sheet. In the published income statement, deferred tax is disclosed as part of the taxation of the company on the face of the income statement, but because deferred tax can be, and is, treated differently by companies, it was removed from the standardised income statement. The amount of deferred tax written off in the income statement was, however, shown as supplementary information to the standardised income statement.

4.4.3.2.3 Profit or Loss from Associated Companies

In the published income statement, profit or loss from associated companies and/or other equity-accounted investments may be included in 'profit before tax'. This is in accordance with the requirements of IAS 29: *Investments in Associates and Joint Ventures.* In order for the pre-tax profit of all companies to be comparable, whether the companies have equity-accounted investments or not, the profit or loss from these investments were not included in the standardised income statement. The standardised retained profit was adjusted with these amounts, and it was disclosed as supplementary information to the standardised income statement. Equity accounted profit or loss from associated companies was therefore removed from the income statement and only the dividends, as income from investments, were shown. Because equity accounting is treated differently by companies, this standardisation procedure made the comparison of the financial results between companies possible.

4.4.3.2.4 Turnover or Revenue

The reporting procedures for revenue are contained in the IAS 18: *Revenue.* In the standardised income statement, only the relevant revenue for the specific type of company was included in turnover. For example, interest received or dividends received were not shown as part of the turnover of a manufacturing company, so that the turnovers of all the manufacturing companies would be comparable.

4.4.3.2.5 Taxation

In the standardised income statement, only current taxes, both foreign and local, were disclosed so that the 'profit after tax' of all companies would be comparable. This is in accordance with the requirements of IAS 12: *Income Taxes*. All deferred tax and prior year tax adjustments were disclosed as supplementary information to the standardised income statement and retained profit was adjusted accordingly.

4.4.3.2.6 Dividends

In the standardised income statement, the total dividend for the year or period under review was disclosed, and retained profit was adjusted accordingly. Although IAS 1: *Presentation of Financial Statements* does not require profit distributions to be disclosed as part of the Income Statement, this disclosure was still part of the standardised income statement. The dividends payable on ordinary shares were in fact calculated from information available in the annual report, and represent the dividend declared from profits for the year or period under review.

All these changes enabled a fair, quick and consistent comparison of financial statements between companies. There is a lot of controversy on how to deal with scaling problems raised by Easton and Sommers (2003:25). In their discussion paper, Akbar and Stark (2003:71) argue that none of the suggested deflators are entirely successful in eliminating scale effects. The thesis avoided dwelling on this controversy and used the data as is. All ratios used were calculated per firm so as to avoid the undue influence of large firms.

4.4.3.3 The Sample

This research was based on manufacturing, mining and retail firms continuously listed on the Johannesburg Stock Exchange for four or more consecutive years during the period 2000-2010. The sectors are defined in Table 4.5 below. This definition was based on the notation used by Profile's September 2011 Stock Exchange Handbook.

Table 4.5: Definition of Economic Sectors

Manufacturing Sector	Mining Sector	Retail Sector
Hlth-Hlth-Pharm-Pharm	Mats-Res-Mng-Plat	Servs-Retl-GenR-Ret
Hlth-Health-Hequip-provs	Mats-Res-Mng-Gold	Goods-P&Hse-Leis-Celec
Mats-Chem-Chem-Spec	Mats-Res-Mng-Mng	Servs-Retl-GenR-Home
Goods-F&Bev-Gfood-Farms	Mats-Res-Mng-Nfrr	Servs-Retl-GenR-Drug
Inds-Const-Const-Mats	Mats-Res-Mng-Coal	Servs-Retl-GenR-SpecR
Inds-IndGS-Elec-Equip	Mats-Res-Mng-Alum	Servs-Retl-GenR-Shops
Mats-Res-Metal-Steel	Mats-Res-Mng-Steel	Goods-P&Hse-House-Furn
Inds-IndGS-GInd-pack	Mats-Res-Mng-Gems	Servs-Trv&L-Trv&L-Rest
Inds-IndGS-Eng-Mech		
Goods-F&Bev-Gfood-fprds		
Goods-F&Bev-Gfood-Brwrs		
Goods-F&Bev-Gfood-Tobac		
Inds-IndGS-Eng-Vehicles		
Goods-F&Bev-Bev-Vints		
Inds-IndGS-Eng-Elec-Elect		
Goods-Aut&P-Parts		
Mats-Res-F&Ppr-Paper		
Oil&G-Oil&G-Oil-Oil		
Mats-Res-F&Ppr-Forst		
Mats-Res-Metal-Alum		

The firms were grouped according to economic sectors, with each sector having three subgroups defined according to firm size. The subgroups were: large firms, medium firms and small firms. Firm market capitalisation was used as a proxy for firm size, with the sizes being defined as:

- Large firms (with market capitalisation >R20,000m)
- Medium firms (with market capitalisation R1,000m-R20,000m)
- Small firms (with market capitalisation <R1,000m)

Initially, three panel data samples were constructed. These were as follows:

- ***Panel 1 data sample***: This was the main sample that was used to test for the validity of the pecking order, static trade-off and dynamic trade-off theories. It consisted of 42 manufacturing, 24 mining and 21 retail firms with complete data for four or more consecutive years during the period 2000-2010. The selected period was chosen so as to maximise the size and balance of the panel so as to obtain reasonable estimates of all the parameters being tested. Firms with less than 4 years of continuous data were removed from the sample as these would have reduced the balance of the panel. There were a total of 954 observations for the period. The structure of the sample and the final explanatory variables used are contained in Table 4.6 below.

- ***Panel 2 data sample***: This sample was used to test for the relationship between leverage and the firm's key financial performance variables and to test for the effect of these variables on the firm's speed of target adjustment. This sample consisted of 49 manufacturing, 24 mining and 23 retail firms with complete data for two or more consecutive years during the period 2005-2010. The time period of the sample was restricted by data available on Economic Value Added (EVA) variable. The McGregor BFA's EVA history goes as far as 2004. The shorter period however increased the number of firms in each sector and it also significantly increased the balance of the panel. The sample had a total of 449 observations for the period 2005-2010. The structure of the sample and the final explanatory variables used are contained in Table 4.7 below.

- ***Discounted value premium sample***: This sample was used estimate the discounted value premium of manufacturing, mining and retail firms. The final sample consistsed of 47 manufacturing, 31 mining and 20 retail firms. The time period of the sample was restricted to 2006-2010 so as to improve the balance of the panel. The sample consisted of only firms with complete data for four or more consecutive years during the period 2006-2010. Firms with less than 4 years consecutive data were removed from the sample. The sample had a total of 489 observations for the period. The structure of the sample and the data points are contained in Table 4.8 below.

These datasets were then tested for outliers and multicollinearity as detailed below.

4.4.3.4 Data Collection and Processing: Outliers

The Cook's Distance test was used to identify outliers and other observations which exhibited a large degree of influence on the parameters in panel data sets 1 and 2. The test was done as part of the ridge regression procedure that also tests for multicollinearity between the explanatory variables. There are generally different opinions as to which cut-off values to use for spotting highly influential points. The rule of thumb is generally to use an operational guideline of $D > 1$ or $D_i > 4/n$, but this is merely a guideline. This research relied on the ridge regression procedure to identify outliers and other influential data points. This procedure automatically detected and isolated outliers and influential data points. The identified outlier observations are contained in Appendix 11. All the identified outlier observations were deleted to yield the final panel data sets described above.

The ridge regressions were performed for each of the three variables: BDR, MDR and changes in debt issued; as well as for the two panels. This test yielded five sub-panel datasets which were derived from the two main panels. The structures of the main panels, together with the data set on discounted value premium, are described below.

4.4.3.5 The Final Samples

The final samples consisted of three panel data sets with firms grouped according to their economic sectors. The samples are presented in Tables 4.6, 4.7 and 4.8 below.

Table 4.6: Panel Data Set 1: Manufacturing, Mining and Retail Firms: 11-Year Data

Time: 2000-2010 (11 Years)	Number of Firms			
Sector	**Large**	**Medium**	**Small**	**TOTAL**
Manufacturing	5	21	16	**42**
Mining	10	8	6	**24**
Retail	7	8	6	**21**
TOTAL	**22**	**37**	**28**	**87**
Exogenous Explanatory Variables: asset tangibility, firm size, financial distress, profitability, growth rate, non-debt tax shields, earnings volatility, capital expenditure, dividends, debt deficiency, current portion of long-term debt, changes in working capital, and cash flow from operations.				

Table 4.7: Panel Data Set 2: Manufacturing, Mining and Retail Firms: 6-Year Data

Time: 2005-2010 (6 Years)	Number of Firms			
Sector	**Large**	**Medium**	**Small**	**TOTAL**
Manufacturing	5	26	18	**49**
Mining	8	9	7	**24**
Retail	7	10	6	**23**
TOTAL	**20**	**45**	**31**	**96**
Exogenous Explanatory Variables: asset tangibility, firm size, financial distress, profitability, growth rate, capital expenditure, cash flow from operations, Economic Value Added (EVA), share price, price earnings ratio, earnings retention rate, and liquidity.				

Table 4.8: DVP Data Set: Manufacturing, Mining and Retail Firms: 5-Year Data

Time: 2006-2010 (5 Years)	Number of Firms			
Sector	**Large**	**Medium**	**Small**	**TOTAL**
Manufacturing	5	26	16	**47**
Mining	13	10	8	**31**
Retail	7	10	3	**20**
TOTAL	**25**	**46**	**27**	**98**
Data Points: **Actual and percentage changes in debt ratio, WACC, firm value assuming no growth, and firm value assuming perpetual growth.**				

4.4.3.6 Definition of the Dependent Variables

The dependent variables used in this study are the market-to-debt ratio, the book-to-debt ratio and changes in new debt issued. The definitions of the standardised financial statement line items that were used to calculate the variables used in this study together with samples of standardised non-gold and gold financial statements are contained in Appendices 12, 13 and 14.

Debt Ratios: Market-to-Debt Ratio (MDR) and Book-to-Debt Ratio (BDR)

According to Flannery and Rangan (2006:471); Hovakimian and Li (2011:35); and Oztekin & Flannery (2012:90), the debt ratios are defined as follows:

The Market-to-Debt Ratio (MDR) is defined as:

$$MDR_{i,T} = \frac{Long\ term\ debt + short\ term\ debt}{Long\ term\ debt + short\ term\ debt + market\ capitalisation}$$

$$MDR_{i,T} = \frac{D_{i,T}}{D_{i,T} + S_{i,T} \times P_{i,T}}$$

The Book-to-Debt Ratio (BDR) is defined as:

$$BDR_{i,T} = \frac{Long\ term\ debt + short\ term\ debt}{Total\ assets}$$

$$BDR_{i,T} = \frac{D_{i,T}}{TA_{i,T}}$$

This research study used the same definitions.

Changes in Debt Issued (∆D)

Shyam-Sunder and Myers (1999:224) defined changes in debt issued as:

$$DEF_{i,T} = DIV_{i,T} + X_{i,T} + \Delta WC_{i,T} + R_{i,T} - C_T$$

This research adopted the same definition.

4.4.3.7 Definition of the Explanatory Variables

This study used the following explanatory variables: asset tangibility, firm size, financial distress, profitability, growth rate, non-debt tax shields, earnings volatility, capital expenditure, dividends, debt deficiency, current portion of long-term debt, change in working capital, cash flow from operations, Economic Value Added (EVA), share price, price earnings ratio, earnings retention rate, and liquidity. As with the dependent variables, the relevant definitions of the standardised financial statement line items that were used to calculate the variables used in this study together with samples of standardised non-gold and gold financial statements are contained in Appendices 12, 13 and 14.

Firm Growth Rate (MTB): Lemmon *et al.* (2008:1606) defined the Market-to-book ratios as:

$$MTB = \frac{Market\ equity + Total\ debt + Preferred\ stock - Deferred\ taxes\ \&\ inve.tax\ credits}{Total\ assets}$$

In this study, the growth rate (MTB) was defined as:

$$MTB = \frac{Market\ equity + Total\ debt + Preferred\ stock - Deferred\ taxes}{Total\ assets}$$

Cash Flow from Operations (CFO): Frank and Goyal (2003b:221) defined cash flow from operations as:

Cash flow after interest and tax *= income before extraordinary items + depreciation and amortisation + extraordinary items + deferred taxes + equity in net loss – earnings + other funds from operations + gain (loss) from sales of property, plant and equipment (PPE) and other investments*

In this research, cash flow from operations was simply defined as cash after operations. The definitions of the following variables are consistent with the definitions used by Frank and Goyal (2003b:221); Shyam-Sunder and Myers (1999:224); Flannery and Rangan (2006:471); Hovakimian and Li (2011:35); Oztekin and Flannery (2012:90); Elsas and Florysiak (2011b:191); Chang and Dasgupta (2009:1782); and Drobetz and Wanzenried (2006:951).

The definitions used for this study are the following:

Asset Tangibility: The fixed assets scaled up by the total assets.

Firm Size: The natural logarithm of the total assets.

Financial Distress: This study adopted the the De la Rey (1981) financial distress ratio as the proxy for financial distress.

Profitability: The ratio (ROE). This ratio was obtained from the McGregor BFA database under Financial Ratios. McGregor calculates this from actual values based on Standardised Financial statements. The ratio has already been annualised and it is calculated as:

$$Return\ on\ equity\ (ROE) = \left(\frac{Profit\ after\ taxation}{Total\ owners\ interest}\right) \times 100$$

The total owners' interest is calculated as: *ordinary share capital paid, plus the distributable and non-distributable reserves, less the cost of control of subsidiaries and intangible assets*. It represents the equity of the ordinary shareholders of the

Company in the total assets of the Group, with the exclusion of the cost of control and the intangible assets.

Firm growth rate: Market-to-book ratio.

Non-debt Tax Shields: The depreciation charge scaled up by the total assets.

Earnings Volatility (measured in R'millions (R'm): The standard deviation of profit before tax.

Dividends (measured in R'm): The actual dividends, ordinary dividends and preference dividends paid during the year.

Capital Expenditure (measured in R'm): The sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries.

Changes in Working Capital (measured in R'm): change in operating working capital + change in cash and cash equivalents + change in current debt.

Current Portion of Long-Term Debt (measured in R'm): The current portion of long-term debt.

Economic Value Added (EVA) (measured in R'm): The firm's EVA was obtained from the McGregor BFA database under Financial Models Value Performance Indicators. It was calculated as:

$EVA = \ Spread \ \times CE$

Where: $Spread = {}^{ROCE}/_{WACC}$; $ROCE = {}^{NOPAT}/_{CE}$; CE = capital employed; ROCE= return on capital employed; WACC= the weighted average cost of capital; and NOPAT = net operating profit after tax.

Share Price (measured in Cents): The firm's share price at the end of the financial year.

Stock Market Performance: The Price Earnings Ratio (P/E). This ratio was obtained from the McGregor BFA database under Financial Ratios. McGregor BFA calculates this from actual values based on Standardised Financial statements. The ratio has already been annualised and it is calculated as:

$$P/_E\,ratio = \frac{Share\ price\ at\ company\ financial\ year\ end}{Headlines\ earnings\ per\ share}$$

Earnings Retention Rate: The Earnings Retention Rate (RR). This ratio was obtained from the McGregor BFA database under Financial Ratios. McGregor BFA calculates this from actual values based on Standardised Financial statements. The ratio has already been annualised and it is calculated as:

$$Earnings\ retention\ rate = \left(\frac{Retained\ profits}{Profit\ to\ ordinary\ and\ preference\ shareholders}\right) \times 100$$

Liquidity: The current ratio (LIQ). This ratio was obtained from the McGregor BFA database under Financial Ratios. McGregor BFA calculates this from actual values based on Standardised Financial statements. The ratio has already been annualised and it is calculated as:

$$Current\ ratio = \frac{Total\ current\ assets}{Total\ current\ liabilities}$$

Internal Funds Deficiency (measured in R'm): The sum of dividends paid, changes in working capital, debt interest paid and current portion of long-term debt, less cash flow from operations. (The empirical definition is: $\Delta D_{it} = a + b_{PO}DEF_{it} + e_{it}$)

The definitions of the explanatory variables are summarised in Table 4.9 below.

Table 4.9: Summary Definition of the Capital Structure Explanatory Variables

Factor	Proxy
ASSET= asset tangibility	Ratio of fixed assets to total assets
SIZE = firm size	Natural log of total assets
FDIST = financial distress	the De la Rey (1981) financial distress ratio
PROF = firm profitability	Return on equity
CFO = cash flow from operations	Cash flow from operations after interest and taxes
MTB = firm growth rate	Market-to-book ratio
NDTS = non-debt tax shields	Ratio of depreciation charge to total assets
VOL = earnings volatility	Standard deviation of profit before tax
DIV = dividends paid	Dividends paid
CAPEX = capital expenditure	Ratio of firm's annual CAPEX to total assets
∆WC = changes in working capital	Change in operating working capital + change in cash and cash equivalents + change in current debt
Ri,t = current portion of long-term debt	Current portion of long-term debt
EVA = Economic Value Added	Economic Value Added
P = ordinary share price	Share price at company year end
P/E = stock market performance	Price Earnings ratio
RR = earnings retention rate	Earnings Retention Rate ratio
LIQ = liquidity	Current ratio
DEF = internal funds deficiency	$DIV_t + I_t + \Delta W_t + R_t - C_t = \Delta D_t + \Delta E_t$

4.5 SUMMARY

The first part of this discussed the advantages and disadvantages of panel data in the context capital structure research. It reviewed the strengths and weaknesses of the random effects, fixed effects, Arellano and Bond, Blundell and Bond and the random effects Tobit estimators. The second part of the chapter outlined the test hypothesis of the study and developed the models to be tested. The models are based on three depended variables which are the BDR, MDR and changes in debt issued. The models make use of two sets of explanatory variables. The first set is made up of the traditional variables and the second set consists of the firm's financial performance indicator variables. The data sampling techniques, the testing methodology of the models together with the handling of possible statistical errors is discussed in detail. The chapter also outlines the method used to estimate the discounted value premium of the sampled firms. It ends up with a summary of definition of all the variables used in the study.

The next chapter presents the descriptive statistics of the data as well as the results of the empirical study of the capital structure of South African firms.

CHAPTER 5
RESULTS ANALYSIS: TRADE-OFF vs. PECKING ORDER THEORY

5.1 INTRODUCTION

This chapter presents and discusses the empirical findings of the tests for the validity of the trade-off and pecking order theories. The test results for target adjustment speeds are also discussed. The chapter begins with a brief discussion of the variations in leverage ratios for the full sample. This is followed by a brief discussion of the debt and equity raised by the firms over the period 2000-2010. The remainder of the chapter presents and discusses the empirical findings of the study. The findings are grouped into: findings for the full sample, findings for the manufacturing firms, findings for the mining firms, and lastly findings for the retail firms. These findings relate to the partial models 1, 2, 3 and 4, and the modified pecking order model 5. These have been discussed in the preceding chapter and were tested using panel 1 data.

5.2 VARIATIONS IN THE BDR AND MDR OF MANUFACTURING, MINING AND RETAIL FIRMS: 2000-2010

The variations for both the BDR and the MDR are shown in Figures 5.1 and 5.2 below. These graphs are based on the mean BDR and MDR for the full sample of manufacturing, mining and retail firms, calculated from panel 1 data. The source data are contained in Appendix 15.

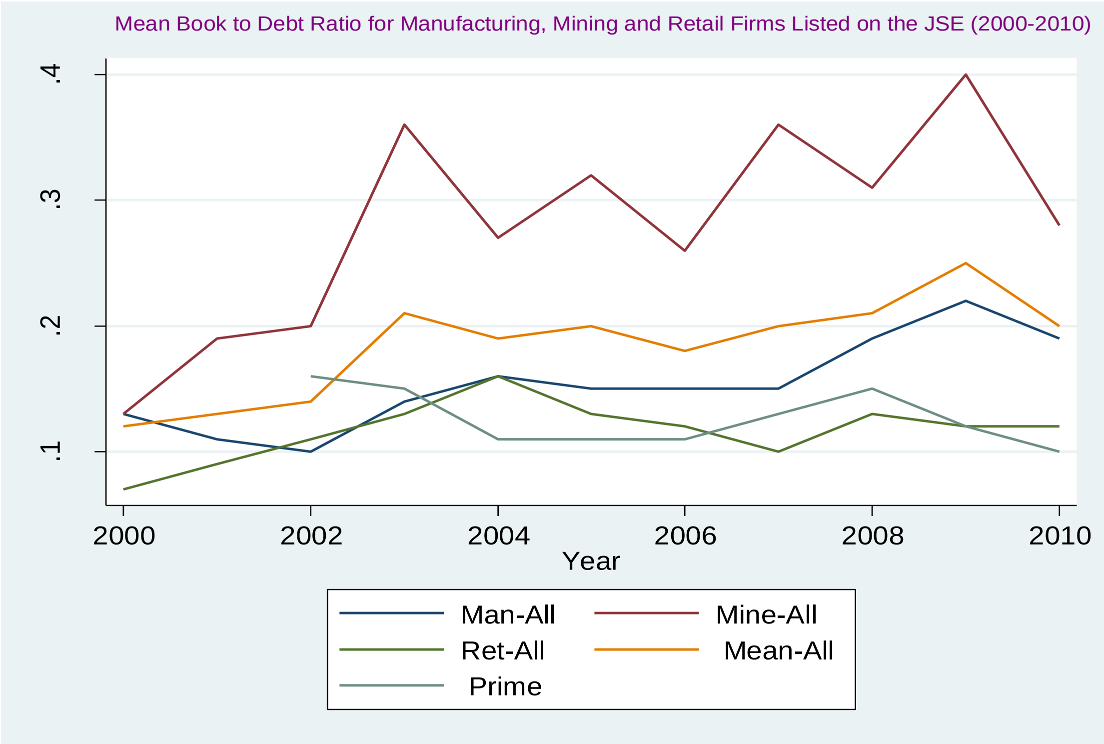


Figure 5.1: Mean Book-to-debt Ratios of the Firms: 2000-2010

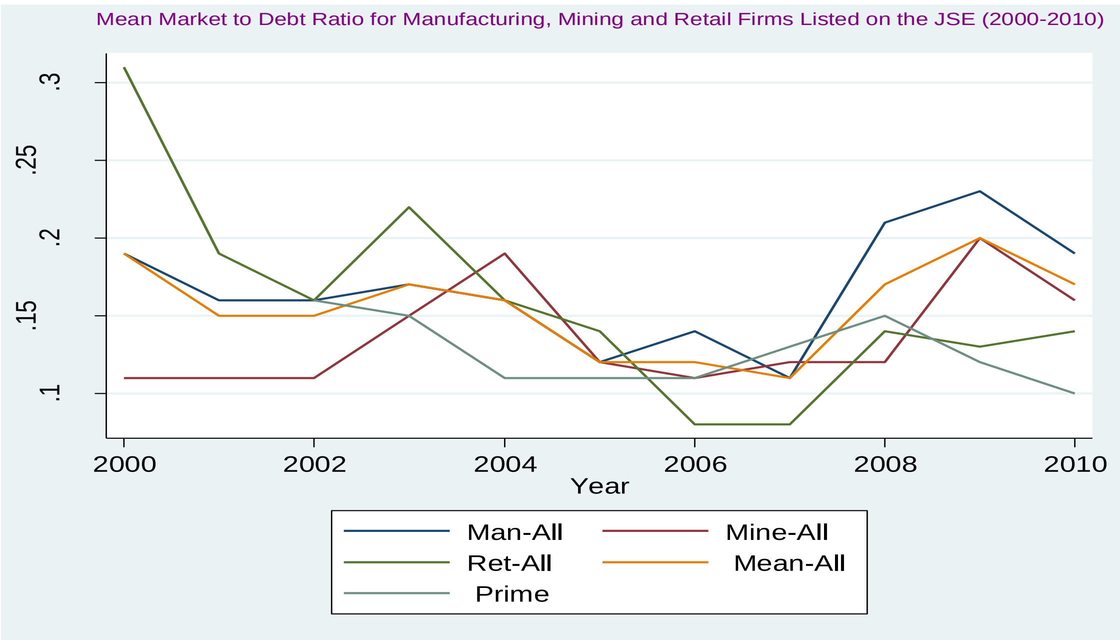


Figure 5.2: Mean Market-to-debt Ratios of the Firms: 2000-2010

Legend: *Man-All = mean BDR/MDR of all manufacturing firms; Ret-All = mean BDR/MDR of all retail firms; Mine-All = mean BDR/MDR of all mining firms; Mean-All = the mean BDR/MDR of the entire sample; and Prime = the prime rate.*

Although there are variations in the book-to-debt ratios over the period, the ratios of all the sectors increased steadily from 2000 until 2008. This indicates increased use of debt by the firms. The ratios declined sharply in 2008, however, as firms cut down on debt. This decline coincided with the 2008/2009 slowdown which resulted from the global financial crisis. Mining firms consistently had the highest book-to-debt ratios over the period. Manufacturing firms had the next highest book-to-debt ratios, while retail firms had the lowest book-to-debt ratios. A high BDR means that the firm has more debt in its capital structure.

The market-to-debt ratios follow a different pattern to the book-to-debt ratios. The ratios declined from 2000 until 2007. They then started increasing again in the period 2007-2009 and declined thereafter. The ratios are thus counter-cyclical. Retail firms had the fastest decline in MDR and as a result had the lowest market-to-debt ratios.

Both the BDR and the MDR vary with firm size. Appendix 16 shows this variation for all the sectors.

5.3 THE FINANCING PATTERNS OF THE MANUFACTURING, MINING AND RETAIL FIRMS: 2000-2010

The mean debt and equity raised by the firms during the period 2000-2010 are shown in Figures 5.3 and 5.4 below. The source data for the graphs are contained in Appendix 17.

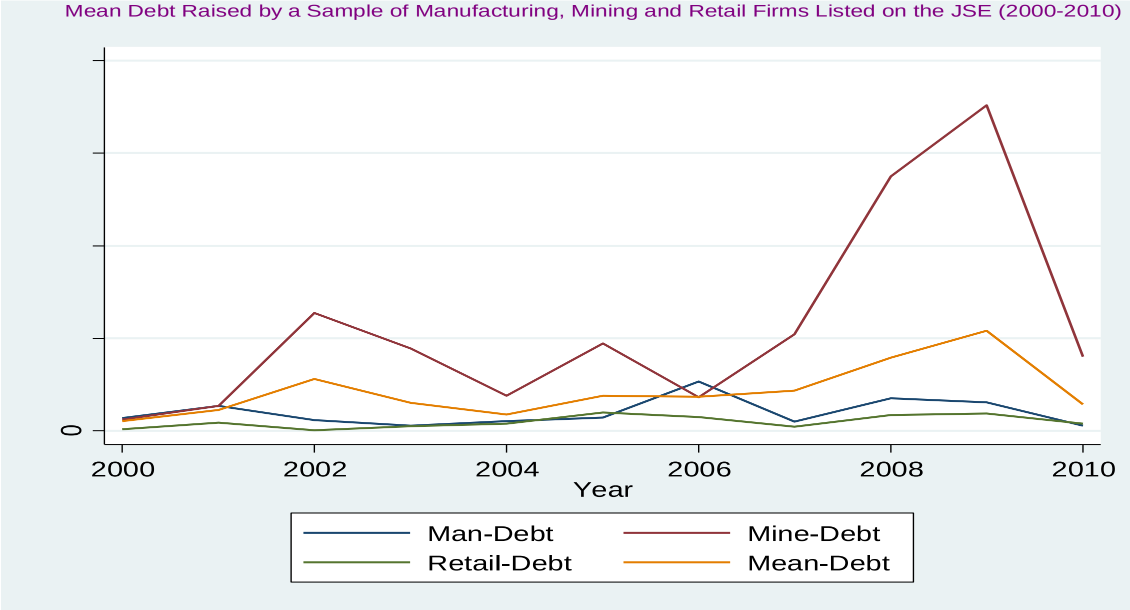


Figure 5.3: Mean Debt Raised by the Firms: 2000-2010

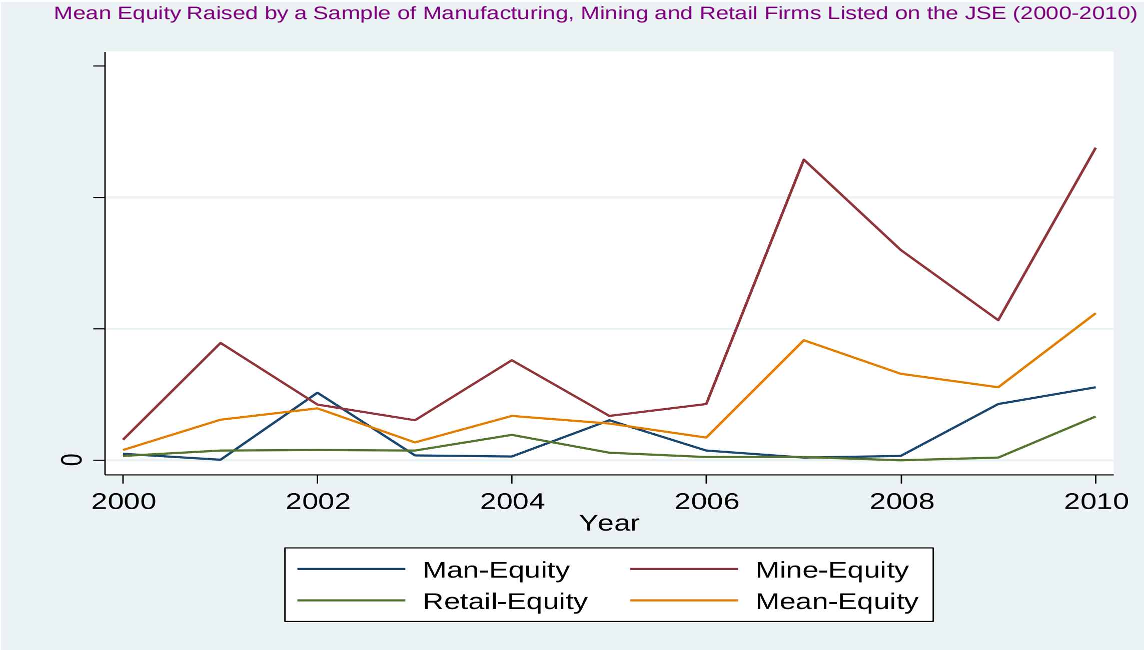


Figure 5.4: Mean Equity Raised by the Firms: 2000-2010

Legend: *Man-Debt (equity) = mean debt (equity) of all manufacturing firms; Retail-Debt (Equity) = mean debt (equity) of all retail firms; Mine-Debt (Equity) = mean debt (equity) of all mining firms; Mean- Debt (Equity) = the mean debt (equity) of the entire sample.*

The mining firms consistently raised more debt and equity than both the manufacturing and retail firms over the period 2000-2010. The equity raised by the mining firms peaked in 2007 and declined sharply in the period 2008-2009. On the other hand, the debt that was raised by the mining firms increased significantly in the period 2007-2009 and declined thereafter. The period 2007-2009 coincided with the recession caused by the global financial crisis. Appendix 18 shows the mean debt and equity raised by all sizes of manufacturing, mining and retail firms during the period 2000-2010. All the firms, except for the retail firms in the period 2002-2006, consistently raised more debt than equity; this partly explains the steady rise in debt ratios over the period.

5.4 PANEL 1: FULL SAMPLE SUMMARY STATISTICS

This study uses three data sets which are labelled Panel 1, Panel 2 and the Discounted Value Premium data sets. Panel 1 data are used to fit models 1, 2, 3, 4, and 5, whilst Panel 2 data are used to fit models 6, 7, 8 and 9. The Discounted Value Premium data are used to test for the existence of the discounted value premium in South African manufacturing, mining and retail firms.

The Panel 1 sample consists of 42 manufacturing, 24 mining and 21 retail firms with complete data for four of more consecutive years during the period 2000-2010. The summary of statistics for the full sample is presented in Table 5.1, while Tables 5.5, 5.9 and 5.13 present the summaries of the statistics for the manufacturing, mining and retail firms respectively.

Table 5.1: Panel 1 Summary of Statistics for the Full Sample

The Panel 1 sample consists of 42 manufacturing, 24 mining and 21 retail firms with complete data for four or more consecutive years during the period 2000-2010. There are a total of 954 observations for the period. The sector summary statistics are contained in Tables 5.5, 5.9 and 5.13 below, and the firm size summary statistics are contained in Appendix 19. Extreme outlier observations in all explanatory variables were indentified through ridge regression and removed from the sample. The ridge procedure was not used for the dependent variables, bdr, mdr and change in debt issued. The extended definitions of variables are contained in section 4.4.3.7.

Changes in working capital (wc_t) (R'm): the changes in working capital
Cash flow from operations (c_t) (R'm): the cash ex-operations
Actual dividend paid (div_t) (R'm): the actual ordinary dividends and preference dividends paid during the year
Capital expenditure (capex) (R'm): the sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries
Long-term debt repaid (r_t) (R'm): the current portion of long-term debt
Asset tangibility (asset): the fixed assets scaled up by the total assets
Firm size (size): the natural logarithm of total assets
Non-debt tax shields (ndts): the depreciation charge scaled up by the total assets
Firm growth rate (mtb): the sum of the market equity, preferred shares and the total debt less the deferred taxes; this is scaled up by the total assets
Financial distress (fdist): the De la Rey (1981) financial distress ratio
Firm profitability (roe): the profit after taxation scaled up by total owners' equity
Earnings volatility (vol) (R'm): the standard deviation of profit before tax
Book-to-debt ratio (bdr): the total debt scaled up by the total assets
Market-to-debt ratio (mdr): the total debt scaled up by the sum of the total debt and the firm market capitalisation
Change in debt issued (d_change_t) (R'm): the sum of: dividend paid, capital expenditure, changes in working capital and long-term debt repaid, less cash flow from operations

Variable	Obs.	Mean	SD	Min.	Max.
Changes in working capital (**wc_t**)(R'm)	954	-148,794	1,569,738	-2.37e+07	3.10e+07
Cash flow from operations (c_t) (R'm)	954	2,553,333	1.13e+07	-4,782,000	1.52e+08
Actual dividend paid (div_t) (R'm)	954	676,357.3	2,784,357	-118	4.49e+07
Capital expenditure (capex) (R'm)	954	1,934,108	8,060,384	-1'314'627	1.06e+08
Long-term debt repaid (r_t) (R'm)	953	903,241	4,324,026	0	7.64e+07
Asset tangibility (asset)	954	0.303	0.246	0	0.996
Firm size (size)	954	14.21	2.14	8.13	20.12
Non-debt tax shields (ndts)	954	0.081	0.081	0	0.475
Firm growth rate (mtb)	954	1.62	1.86	-0.109	28.92
Financial distress (fdist)	954	0.904	3.41	-31.31	44.76
Firm profitability (roe)	954	-1.80	1,614.89	-47,548.1	12,555.81
Earnings volatility (vol) (R'm)	954	1,888,478	7,388,199	629.66	6.52e+07
Book-to-debt ratio (bdr)	954	0.164	0.229	0	2.74
Market-to-debt ratio (mdr)	947	0.144	0.198	0	1
Change in debt issued (d_change_t)(R'm)	954	4,657,16.2	2,942,458	-1,783,600	5.25e+07
# Obs. Market-to-debt ratio =0	198 (20.75%)				
# Obs. Market-to-debt ratio =1	12 (1.27%)				
# Obs. Market-to-debt ratio >1	0 (0%)				
# Obs. Book-to-debt ratio = 0	205 (21.49%)				
# Obs. Book-to-debt ratio = 1	16 (1.68%)				
# Obs. Book-to-debt ratio> 1	3 (0.31%)				

The mean book-to-debt ratio (BDR) of the sample is 0.16, with a standard deviation of 0.23; and the mean market-to-book ratio (MDR) of the sample is 0.14, with a lower standard deviation of 0.197. The BDR is more volatile than the MDR. All these leverage ratios are much lower than those of the Compustat firms' samples used in previous studies. For example, the sample used by Elsas and Florysiak (2011a:44) had a mean MDR of 0.27 and a mean BDR of 0.25; the sample used by Hovakimian and Li (2010:5) had a mean BDR of 0.25 and a mean MDR of 0.22; and the sample used by Flannery and Rangan (2006:474) had a mean MDR of 0.28 and a mean

BDR of 0.25. On average, the South African manufacturing, mining and retail firms have lower leverage ratios than their US and European counterparts. This means that they rely more on equity financing and they use less debt. Since 2000, the Johannesburg Stock Exchange has registered very good share returns (see Chapter 2, Section 2.3), and this may be one of the explanations for the observed low leverage.

The observed leverage ratios also vary between the sectors. Mining firms have the highest mean BDR of 0.25, with a standard deviation of 0.33. Manufacturing firms have the next highest mean BDR of 0.15, with a standard deviation of 0.165. Retail firms have the lowest mean BDR of 0.093, with a standard deviation of 0.146. The MDR follow a different trend, however, with the manufacturing firms having the highest mean MDR and the retail firms having the lowest mean MDR. The MDR ratios are also lower than the book-to-debt ratios for the mining firms and the retail firms. This means that when leverage is measured in terms of book-to-debt ratios, the findings indicate that mining firms use more debt than manufacturing and retail firms, with retail firms using the least debt finance. Furthermore, mining firms exhibit the highest variations in debt ratios, whereas retail firms have the most stable debt ratios. These variations reflect the financing choices and frequencies for the firms, and they have an impact on the firms' speeds of adjustment. Large variations in leverage ratios (as reflected by high deviations) indicate frequent security issuances, and this increases the speed of adjustment.

The zero leverage phenomenon is persistent in all the sectors. Of the observations for the full sample, 21.49% have book-to-debt ratios equal to zero, and 20.75% have market-to-debt ratios equal to zero. These are zero-leveraged observations which indicate severe under-leveraging in terms of the trade-off theory. Of the observations that have zero BDR leverage, 18.00% are from the manufacturing sector, 28.14% are from the mining sector, and 20.27% are from the retail sector. Of those with zero MDR leverage, 17.65% are from the manufacturing sector, 26.24% are from the mining sector, and 20.27% are from the retail sector. These are all observations made when the firms had no debt in their capital structures. The zero-leveraged observations are much higher than the 15% observed by Bessler, Drobetz, Haller and Meier (2011:33) when they studied firms from the G7 countries. They argued that this financing behaviour is consistent with firms operating in countries with a capital-market-oriented financial system, a common law origin, high creditor protection, and a dividend imputation tax system. The existence of a higher proportion of zero-leveraged observations in this study casts doubt on the validity of the trade-off theory.

The observed debt ratios are also fractional in nature. Of the book-to-debt ratios for all the sectors, 99.69% lie between 0 and 1, with only 0.31% of the sample observations having book-to-debt ratios of more than 1. This confirms the fractional nature of these ratios. The market-to-debt ratios all occur between 0 and 1.

As expected, South African firms are much smaller than their European and US counterparts. The mean sample size for this study is 14.21. The Elsas and Florysiak (2011a:44) sample, however, had a mean size of 23.09; and the Flannery and Rangan (2006:474) sample had a mean size of 18.27. The mean firm size varies from sector to sector. The mining firms are the largest, and the manufacturing firms are the smallest. This variation is expected to be replicated in the findings concerning the target speed of adjustment, as this is positively correlated to firm size (Drobetz & Wanzenried, 2006:948).

5.5 PANEL 1 EMPIRICAL RESULTS: TRADE-OFF VERSUS PECKING ORDER THEORY

The empirical findings of the tests for the validity of both the trade-off and pecking order theories and the target adjustment speeds are discussed below. The results for the full sample are discussed first, followed by the results for the manufacturing, mining and retail firms. The results relate to the regression models 1, 2, 3, 4 and 5.

5.5.1 Panel 1 Results for the Full Sample: Trade-off Theory versus Pecking Order Theory

This section discusses the empirical results for the full sample. The correlation results and target adjustment speed results for models 1, 2, 3 and 4 are discussed first. The results for model 5 are discussed in the last part of the section.

5.5.1.1 Model 1, 2, 3 and 4 Correlation Results: Full Sample

The correlation test results for models 1, 2, 3 and 4 are contained in Tables 5.2 and 5.3 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. The confidence level of estimation is set at 95% for all the estimators. To control for heteroskedasticity, the robust standard error type option is used in all the estimators except the Generalised Least Squares Random Effects (GLS RE) model and the random effects Tobit model. These models do not have the robust option for standard errors. The Gauss-Hermite quadrature integration option is used for the random effects Tobit estimator. In the time series model, the Durbin-Watson method of computing autocorrelation; the Cochrane-Orcutt transformation; and the robust standard error type with the $1/(1-h)^{\wedge 2}$ bias correction option are used in implementing this estimator. These are the best estimator options for controlling for both autocorrelation and heteroskedasticity. The Hausman test statistic Chi2 is 81.94 and Prob>Chi2 is 0.0000 for BDR and the test statistic's Chi2 is 183.40 and Prob>Chi2 is 0.0000 for MDR. This statistic soundly rejects the null hypothesis that the GLS RE estimator is consistent ($p < 0.05$) and confirms the fixed effects model as a more consistent estimator in both cases. The individual effects appear to be correlated with the regressors. The extra orthogonality conditions imposed by the GLS RE estimator are invalid. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. The Hausman test only tests for the consistency of the GLS RE and fixed effects models. It is inapplicable to the other models used in this study. In both BDR and MDR regressions, the Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond and Blundell and Bond models. In cases where the estimators give coefficients with different directions, the ultimate correlation is determined by the direction of the majority of the coefficients. In a situation where there is no clear direction from the estimators, the result is classified as inconclusive.

Actual dividend paid: The actual dividend paid has a weak positive correlation with the BDR in model 1, and a weakly negative correlation with the BDR in model 2. All the correlations are insignificant at 10%, thus making the dividend a weak predictor of the BDR in both models. The correlation results of model 3 are mixed, with the Maximum Likelihood Random Effects (ML RE), and Fixed Effects (FE) estimators predicting a weak negative correlation between the actual dividend paid and the MDR. The Time Series (TS), Arellano and Bond (A&B), Blundell and Bond (B&B) and Random Effects (RE) Tobit estimators predict a weak positive correlation between the actual dividend paid and the MDR. The Model 4 results predict a weak negative correlation between the actual dividend paid and the MDR. The dividend paid is positively correlated to leverage, although some estimators and the results from models 2 and 4 confirm a negative correlation between the actual dividend paid and the MDR. These findings are consistent with the predictions of both the trade-off and pecking order theories. Hypotheses 16 and 17 are thus accepted. According to the trade-off theory, firms will only increase dividends if they want to replace internal equity with debt so as to increase the firm's interest debt shield, which directly adds to the firm's overall value (Barclay & Smith, 2005:10). The pecking order theory argues that an increase in dividends increases the firm's internal funds deficit (Shyam-Sunder & Myers, 1999:224). This deficit can only be financed in a pecking order fashion, with debt being the first choice, and hence an increase in dividends is directly proportional to an increase in debt or leverage. In this study, the dividend correlations confirm the validity of both the trade-off and pecking order theories in South African manufacturing, mining and retail firms. These correlations are similar to those of Ali Ahmed and Hisham (2009:63), Kayhan and Titman (2007:28) and Shyam-Sunder and Myers (1999:242).

Capital expenditure: All the estimators in models 1 and 2, except for the B&B estimator in model 1, predict a positive correlation between capital expenditure and the BDR. The coefficients are, however, insignificant in all cases. In model 3, all the estimators except the FE, A&B and B&B estimators confirm a positive correlation between the MDR and capital expenditure. The results of model 4 show a highly significant positive correlation between capital expenditure and the MDR. Capital expenditure is therefore positively correlated to both the BDR and the MDR. The results confirm the predictions of the pecking order theory. Hypothesis 19 is thus accepted, thereby rejecting hypothesis 18. For the South African manufacturing, mining and retail firms in this study, leverage increases with an increase in the firm's capital expenditure. This implies that the firms follow the pecking order theory in financing their capital expenditures. As a firm's capital expenditure grows, so does its internal funds deficit. The pecking order theory argues that this deficit is financed in a pecking order, with debt being the first source of external finance chosen (Myers, 1984:576 and Myers & Majluf, 1984:219). That is, firms issue debt before considering equity issuances, and this increases their leverage. The argument of the trade-off theory that the firm does not need the interest debt tax shield, as it has the non-debt tax shields deriving from the increased capital expenditure, is thus rejected in this case. Ali Ahmed and Hisham (2009:63); Kayhan and Titman (2007:28); and Shyam-Sunder and Myers (1999:242) found similar correlations between leverage and capital expenditure.

Asset tangibility: In model 1, all the estimators predict a weak negative correlation between asset tangibility and the BDR. The coefficients are, however, insignificant at 1%, 5% and 10%. The results of model 2 predict a weak positive correlation with the BDR. Both models 3 and 4 predict a weak negative correlation between asset tangibility and the MDR. Asset tangibility is therefore negatively correlated to both the BDR and the MDR. This correlation confirms the pecking order hypothesis while rejecting the trade-off hypothesis. Hypothesis 1 is therefore rejected and hypothesis 2 is accepted. The firms' debt levels increase with decreasing asset tangibility. This finding is consistent with the pecking order argument that firms with poor-quality assets voluntarily opt for higher leverage so as to reduce the agency costs resulting from managers consuming perquisites (Bessler, Drobetz & Kazemieh, 2011:24). The increased debt levels increase bondholder monitoring costs, as the bondholders effectively monitor managers so as to protect their investments. The trade-off theory predicts a positive correlation which is rejected in this test. The leverages of the manufacturing, mining and retail firms are inversely proportional to asset tangibility. A number of past empirical studies notably those by Ali Ahmed and Hisham (2009:63); Fan, Titman and Twite (2012:39); Frank and Goyal (2009:26); Mukherjee and Mahakud (2012:51); and Rajan and Zingales (1995:1453) found similar results.

Non-debt tax shields: All the estimators in model 1 and 2, except for the TS estimator, confirm a negative correlation between non-debt tax shields and the BDR. The coefficients of the A&B, B&B and RE Tobit estimators are all significant at 5%. The FE coefficient is significant at 10%. The results of models 3 and 4 show a weak negative correlation between non-debt tax shields and the MDR. Non-debt tax shields are therefore negatively correlated to both the BDR and the MDR, and they are significant predictors of the BDR. These results confirm the trade-off hypothesis. Hypothesis 13 is thus accepted. The findings of Ali Ahmed and Hisham (2009:63) and Kayhan and Titman (2007:28) confirmed similar results. The firms' leverages decrease with an increase in their non-debt tax shields. According to De Angelo and Masulis (1980:27), non-debt tax shields are perfect substitutes for debt interest tax shields. Thus firms with higher non-debt tax shields would have less of an appetite for debt, as the benefit of debt finance would already be captured by the non-debt tax shields. Such firms would therefore issue less debt and rely more on equity financing; hence there is an inverse relationship between non-debt tax shields and leverage. The pecking order theory is silent on the effect of non-debt tax shields on leverage.

Firm growth rate: This is a significant predictor of firm leverage. Both models 1 and 3 predict a positive correlation between firm growth rate and both the BDR and the MDR, with all the estimators except the ML RE estimator predicting significant correlations. Model 2 predicts a weak negative correlation between growth rate and the BDR, but model 4 predicts a strong negative correlation. As the results of models 1 and 3 are significant, firm growth rate is positively correlated to leverage. These results reject the trade-off hypothesis while confirming the pecking order hypothesis.

Hypothesis 11 is thus rejected while hypothesis 12 is accepted. These results contradict the findings of Ali Ahmed and Hisham (2009:63); Fan, Titman and Twite (2012:39); Frank and Goyal (2009:26); Mukherjee and Mahakud (2012:51); Lemma and Negash (2011:323 and Rajan and Zingales (1995:1453), who found a negative correlation between growth rate and leverage. Studies by Lang, Ofek and Stulz (1996:27) and Eriotis (2007:329), also found a negative correlation; this supports the pecking order theory. The results show that the firms' leverages are directly proportional to their growth rates. The implication is that firms finance their growth options via debt, as opposed to equity, and this financing behaviour is consistent with the pecking order theory of corporate financing. When faced with an internal funds deficit, firms issue debt first before considering equity issuances (McGuigan *et al.*, 2009:453).

Financial distress: In model 1, all the estimators except the A&B estimator and the B&B estimator predict a significant negative correlation between financial distress and the BDR. The results of Model 2 show an insignificant negative correlation. Both models 3 and 4 predict a strong negative correlation between financial distress and the MDR. There is a significant negative correlation between financial distress and the firm's leverage, and financial distress is a significant predictor of both the BDR and the MDR in the full sample. These results confirm the validity of both theories, and hypotheses 5 and 6 are thus accepted. Leverage decreases with an increase in financial distress. Distressed firms find it difficult to attract debt finance, as investors are unwilling to extend more credit, due to the increased default risk (Gilson, 1997:189). This decreases the firm's debt capacity while increasing the cost of borrowing. Distressed firms therefore rely more on equity financing, and hence the inverse relationship between financial distress and leverage.

Firm profitability: The results of model 1 predict a positive correlation between profitability and the BDR, with both the ML RE and RE Tobit estimators predicting a significant positive correlation at 5%. Model 2 predicts a weak negative correlation between profitability and the BDR.

Model 3 predicts a positive correlation between profitability and the MDR, with the results of the FE, A&B and B&B estimators being significant at 1%. Model 4 predicts a weak negative correlation between profitability and the MDR. Profitability is positively correlated to firm leverage. It is a significant predictor of the MDR. The positive correlation implies that the firms' leverages increase with an increase in firm profitability. This financing behaviour is consistent with the trade-off theory hypothesis. These results therefore confirm the validity of the trade-off theory in the full sample, and hypothesis 7 is thus accepted. The results reject hypothesis 8 of the pecking order theory and this hypothesis is therefore rejected. The leverages of the manufacturing, mining and retail firms increase with an increase in profitability, implying that profitable firms use more debt. According to the trade-off theory, profitable firms face increased tax payable and they can reduce this through the use of debt interest tax shields or non-debt tax shields (Shivdasani & Zenner, 2005:30). In the absence of non-debt tax shields, firms use interest tax shields, as the two are perfect substitutes (De Angelo & Masulis, 1980:27). The results imply that profitable manufacturing, mining and retail firms use debt interest tax shields to reduce their tax bills. The firms must therefore increase their leverage in order to optimise their debt interest tax shields. The trade-off theory further confirms that tax shields add a significant amount of value to a firm's overall value. Surprisingly, a number of studies have found negative correlations between leverage and profitability. Studies by Fan, Titman and Twite (2012:39); Frank and Goyal (2009:26); Kayhan and Titman (2007:28); Mukherjee and Mahakud (2012:51); Lemma and Negash (2011:323 and Rajan and Zingales (1995:1453) found that profitability is negatively correlated to leverage, implying that European and US firms tend to follow the pecking order theory.

The results for the full sample show that non-debt tax shields, growth rate and financial distress are significant determinants of firm leverage in manufacturing, mining and retail firms. Consistent with the findings of Mukherjee and Mahakud (2012:53) and Myers (2008:239), the results for the full sample support both theories. Both theories are supported by the correlations in dividend paid and financial distress. The correlations of capital expenditure, asset tangibility and firm growth rate support the pecking order theory, whilst the correlations of the non-debt tax shields and profitability support the trade-off theory. These results further confirm the assertion that these two theories are complementary.

A further analysis of the results indicates that the correlation results largely depend on the dependent variable used, the model fitted, and the choice of estimator. The estimators do not give consistent results for the same models. The RE Tobit estimator is the least biased estimator. This is because, unlike other estimators, it takes into account the fractional nature of both the BDR and the MDR (Elsas & Florysiak, 2011a:7). This highlights the bias of the estimators. Furthermore, the results of the BDR and the MDR regressions are different for the same variable, confirming that the correlation is also influenced by the choice of the dependent variable. The MDR regressions give more consistent results, but the BDR coefficients are much stronger than the MDR coefficients.

The results of the speed of adjustment estimates for the full sample are discussed below.

5.5.1.2 Model 1, 2, 3 and 4 Speed of Adjustment Results: Full Sample

The speed of adjustment estimation results of models 1, 2, 3 and 4 are contained in Tables 5.2 and 5.3 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, the Durbin-Watson statistics together with the Sargan test statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. As explained in section 5.5.1.1 above, the GLS RE estimator is inconsistent and hence its results were excluded in the determination of the ultimate average and range of speed of target adjustment. The full results are discussed below.

All the estimators' lagged BDR and MDR coefficients are positive and significant at 1%, 5% and 10% for all the models. This indicates that firms have target leverages towards which they adjust over time. For models 1 and 2, the speed of adjustment varies between 38.70% (1.42 years) and 81.15% (0.42 years), with the average speed being 67.22% (0.67 years). This means that on average, 67.22% of the target deviation spread is covered in one year. The half-life is 0.67 years on average. On average, it takes 0.67 years to close the gap between the actual debt ratio and the target by 50% provided that the firms maintain the same adjustment speed. The variation in speeds of adjustment is due to the bias of the estimators. In models 3 and 4, the speeds of adjustment vary between 32.49% (1.76 years) and 70.46% (0.57 years), and there is an average speed of 54.95% (0.95 years). Thus the MDR regressions yield slower speeds of adjustment compared to the BDR. The true speed of adjustment for the full sample, as predicted by the RE Tobit estimator, is 57.64% (0.81 years) for the BDR and 42.44% (1.25 years) for the MDR.

The predicted target adjustment speeds are closer to the 65.5% (for total debt: TDR) and 80.2% (for long-term debt: LTR) estimated by Ramjee and Gwatidzo (2012:60). Other studies indicated lower adjustment speeds for US and European firms. Antoniou, Guney and Paudyal (2008:78) used the dynamic GMM estimator and estimated the adjustment speed to be 32% (MDR) for firms in France, Germany, Japan, the UK and the US. Flannery and Rangan (2006:479) used the Fama and MacBeth method and estimated the adjustment speed for US firms to be 34.4% (MDR). Elsas and Florysiak (2011a:41) used the dynamic panel data with a fractional dependent variable (DPF) estimator and estimated the adjustment speed to be 26.30% (MDR). Huang and Ritter (2009:268), using the mean differencing OLS estimator, found that the adjustment speed for US firms was 17% for the BDR and 23.2% for the MDR. Lastly, Hovakimian and Li (2011:33) estimated the unbiased speed of target adjustment to be 5.5%-7.4% (BDR) for US firms. All these estimates are much lower than those of the South African manufacturing, mining and retail firms. The higher speed for South African firms implies that these firms reach their targets much faster than their counterparts from developed countries.

According to Drobetz and Wanzenried (2006:947), the main drivers of the target adjustment speed are the target deviation spread, business cycles, interest rates, and firm-specific factors. The magnitude of the deviation spread is a function of capital-raising costs such as legal, bank, and accounting fees. According to Ramjee and Gwatidzo (2012:61), South African firms face lower adjustment costs than their European and US counterparts. The lower target adjustment costs reduce their target deviation spread, as they can frequently adjust their capital structure.

Furthermore, as explained in Chapter 2, the returns from the Johannesburg Stock Exchange were very good over the period 2000-2010. Except for the few negative growth cycles, the South African macro-economic environment remained relatively stable over this period. Thus all the determinants of target speed of adjustment were positive for South African firms, and hence there was a higher speed of adjustment.

As with the correlation results discussed in Section 5.5.1.1 above, the speed of adjustment is affected by the dependent variable used (BDR or MDR), the estimator used and the model fitted.

The correlation results of the modified pecking order model are discussed below.

Table 5.2: Panel 1 BDR Regression Output and Speeds of Adjustment: Full Sample

Regression results for the partial adjustment models 1 and 2:

$$BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \ldots\ldots\ldots\ldots\ldots\ldots [Model\ 1]$$

$$BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T} \ldots\ldots\ldots\ldots\ldots\ldots [Model\ 2]$$

Where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. Model 2 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The variables determining the firm's long-run target leverage and the speed of adjustment are: ***div_t; capex; asset; ndts; mtb; fdist and roe***, and these are defined in Section 4.4.3.7 and in Table 5.1. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random Effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 81.94 and Prob>Chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 1	ML Random Effects Model 1	Fixed Effects Model 1	Time Series Model 1	Arellano and Bond (1991) Model 1	Arellano and Bond (1991) Model 2	Blundell and Bond(1998) Model 1	Blundell and Bond (1998) Model 2	Random Effects Tobit Model 1
Actual dividend paid (div_t)	2.356e-09 (0.30)	4.227e-09 (1.00)	5.500e-09 (0.58)	2.526e-09 (0.41)	1.287e-08 (0.94)	-2.058e-09 (-0.65)	1.259e-08 (0.95)	-1.117e-09 (-0.33)	6.350e-09 (1.51)
Capital expenditure (capex)	8.357e-10 (0.35)	6.963e-10 (0.47)	5.712e-10 (0.32)	6.959e-10 (0.40)	2.511e-10 (0.17)	2.179e-09 (1.57)	-1.297e-10 (-0.08)	2.472e-09 (1.44)	1.594e-10 (0.11)
Asset tangibility (asset)	-0.030 (-0.98)	-0.045 (-1.17)	-0.075 (-1.06)	-0.029 (-1.17)	-0.276 (-1.12)	0.170 (0.93)	-0.116 (-0.68)	0.227 (1.36)	-0.060 (-1.35)
Non-debt tax shields (ndts)	-0.022 (-0.33)	-0.159 (-1.47)	-0.509* (-1.83)	0.011 (0.20)	-0.185 (-0.35)	-0.496** (-2.01)	-0.140 (-0.28)	-0.680** (-2.17)	-0.266** (-2.10)
Firm growth rate (mtb)	0.023*** (2.62)	0.026*** (7.17)	0.028** (2.32)	0.023** (2.06)	0.020** (2.17)	-0.013 (-1.10)	0.022** (2.52)	-0.012 (-0.95)	0.022*** (5.66)
Financial distress (fdist)	-0.008*** (-2.62)	-0.008*** (-4.23)	-0.007** (-2.450	-0.009* (-1.73)	0.002 (0.56)	-0.008 (-1.20)	0.002 (0.59)	-0.008 (-1.19)	-0.006*** (-3.00)
Firm profitability (roe)	0.000 (1.27)	0.000** (2.36)	0.000 (1.10)	0.000 (1.04)	0.000 (1.04)	-0.000 (-0.30)	0.000 (1.02)	-0.000 (-0.40)	0.000** (2.21)
BDR Coefficient (1- λ) bdr/bdr_t1 L1	0.585*** (4.66)	0.393*** (10.08)	0.245** (2.16)	0.613*** (6.90)	0.212*** (2.80)	0.189** (2.24)	0.272*** (3.54)	0.276*** (3.89)	0.423*** (11.76)
Implied speed of adjustment (λ)	41.53%	60.72%	75.52%	38.70%	78.81%	81.15%	72.76%	72.44%	57.64%
Implied half-life	1.29 years	0.74 years	0.49 years	1.42 years	0.45 years	0.42 years	0.53 years	0.54 years	0.81 years
Obs.	865	865	865	774	685	772	774	861	865
R^2	0.48	-	0.361	0.52	-	-	-	-	-
Wald Chi2	651.21	505.31	16.52	17.45	20.68	44.12	109.35	221.80	259.88
Prob > Chi2	0.00	0.00	0.00	0.00	0.008	0.00	0.00	0.00	0.00
Durbin-Watson	2.07	2.07	2.07	2.06	2.07	2.07	2.07	2.07	2.07
Sargan (df)					66.30 (44)	91.24 (44)	91.35 (43)	115.65	

Table 5.3: Panel 1 MDR Regression Output and Speeds of Adjustment: Full Sample

Regression results for the partial adjustment models 3 and 4:

$$MDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots\dots\dots\dots\dots [Model\ 3]$$

$$MDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T-1} + \varepsilon_{i,T} \dots\dots\dots\dots\dots [Model\ 4]$$

Where λ is the adjustment speed on the lagged market-to-debt ratio (MDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. Model 4 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators.The variables determining the firm's long-run target leverage and the speed of adjustment are: ***div_t; capex; asset; ndts; mtb; fdist and roe,*** and these are defined in Section 4.4.3.7 and in Table 5.1. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 183.40 and Prob>Chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators.

	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
Variables	GLS Random Effects Model 3	ML Random Effects Model 3	Fixed Effects Model 3	Time Series Model 3	Arellano and Bond (1991) Model 3	Arellano and Bond (1991) Model 4	Blundell and Bond (1998) Model 3	Blundell and Bond (1998) Model 4	Random Effects Tobit Model 3
Actual dividend paid (div_t)	-3.706e-10 (-0.18)	-1.775e-10 (-0.05)	-1.143e-10 (-0.06)	5.766e-11 (0.03)	2.268e-09 (0.83)	-2.113e-09 (-0.81)	2.901e-09 (1.06)	-1.273e-09 (-0.51)	7.542e-10 (0.19)
Capital expenditure (capex)	5.546e-10 (0.82)	4.025e-10 (0.34)	-3.030e-11 (-0.05)	3.573e-10 (0.45)	-3.882e-10 (-0.710	2.338e-09*** (3.58)	-6.113e-10 (-0.80)	2.399e-09*** (2.88)	5.022e-10 (0.35)
Asset tangibility (asset)	-0.009 (-0.37)	-0.007 (-0.29)	-0.04 (-0.72)	-0.010 (-0.49)	-0.072 (-0.49)	-0.057 (-0.60)	-0.054 (-0.28	-0.064 (-0.57)	-0.027 (-0.75)
Non-debt tax shields (ndts)	-0.020 (-0.34)	-0.065 (-0.86)	-0.482* (-1.80)	-0.011 (-0.18)	-0.499 (-1.13)	-0.027 (-0.06)	-0.582 (-1.15)	-0.223 (-0.61)	-0.124 (-1.14)
Firm growth rate (mtb)	0.004* (1.80)	0.004 (1.53)	0.006** (2.62)	0.004* (1.69)	0.011*** (2.82)	-0.023*** (-3.29)	0.009*** (2.61)	-0.025*** (-2.91)	0.008** (2.32)
Financial distress (fdist)	-0.006*** (-3.36)	-0.007*** (-4.44)	-0.007*** (-3.38)	-0.007*** (-3.22)	-0.003 (-1.27)	-0.007*** (-2.82)	-0.002 (-0.78)	-0.008*** (-3.12)	-0.007*** (-3.95)
Firm profitability (roe)	2.896e-06*** (3.54)	3.438e-06 (1.26)	4.385e-06*** (4.83)	2.883e-06 (1.11)	8.349e-06*** (9.16)	-5.426e-07 (-0.67)	8.901e-06*** (10.43)	-6.311e-07 (-0.72)	8.616e-06 (1.36)
MDR Coefficient (1- λ) mdr/mdr_t1 L1	0.653*** (12.67)	0.569*** (13.97)	0.379*** (4.35)	0.675*** (11.61)	0.352** (2.18)	0.295** (2.36)	0.407*** (2.69)	0.351*** (2.97)	0.576*** (13.73)
Implied speed of adjustment (λ)	34.66%	43.08%	62.09%	32.49%	64.85%	70.46%	59.28%	64.89%	42.44%
Implied half-life	1.63 years	1.23 years	0.71 years	1.76 years	0.66 years	0.57 years	0.77 years	0.66 years	1.25 years
Obs.	858	858	858	768	680	767	769	856	858
R^2	0.49	-	0.389	0.50	-	-	-	-	-
Wald Chi2	-	553.87	91.00	29.63	151.03	83.04	203.52	50.74	252.25
Prob > Chi2	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durbin-Watson	1.99	1.99	1.99	2.08	1.99	1.99	1.99	1.99	1.99
Sargan (df)					150.13	-164.33	181.79	191.78 (53)	

5.5.1.3 Model 5 Correlation Results (Changes in Debt Issued): Full Sample

The test results of model 5 are presented in Table 5.4 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of the table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 17.08 and Prob>Chi2 is 0.0019. As explained in section 5.5.1.1 above, this statistic soundly rejects the null hypothesis that the GLS RE estimator is consistent and it confirms the fixed effects model as a more consistent estimator in this case. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. The Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for both the Arellano and Bond and Blundell and Bond models.

Asset tangibility*:* Asset tangibility has a significant negative correlation to changes in debt issued. All the estimators except the FE estimator predict a significant negative correlation for the full sample. The results are consistent with the predictions of the pecking order theory. Hypothesis 1 is therefore rejected and hypothesis 2 is accepted. The results imply that as the stocks of tangibles for firms in the full sample decrease, the firms respond by issuing more debt, and this financing behaviour is consistent with the pecking order hypothesis. Ali Ahmed and Hisham (2009:63); Fan, Titman and Twite (2012:39); Frank and Goyal (2009:26); Mukherjee and Mahakud (2012:51); and Rajan and Zingales (1995:1453) found similar correlations between asset tangibility and changes in debt issued. The pecking order theory asserts that firms with poor quality assets face the increased agency costs of managers consuming perquisites. The firms can reduce these costs by voluntarily increasing their leverage. The increased leverage forces bondholders to monitor management activities, and this effectively reduces the agency costs associated with low and poor-quality tangible assets (Bessler, Drobetz & Kazemieh, 2011:24). The manufacturing, mining and retail firms follow this financing pattern which is consistent with the pecking order theory.

Financial distress: Financial distress is a weak predictor of changes in debt issued for all sectors, and the correlations are mixed. The TS estimator predicts a weak positive correlation between financial distress and changes in debt issued, whilst the other estimators predict a weak negative correlation. Financial distress is negatively correlated to changes in debt issued. The results are consistent with the predictions of both the trade-off and pecking order theories. Hypotheses 5 and 6 are therefore accepted. Changes in debt issued decreases with an increase in financial distress. Distressed firms find it difficult to attract debt finance, as investors are unwilling to extend more credit due to the increased default risk (Gilson, 1997:189). This decreases the firm’s debt capacity while increasing the cost of borrowing. Distressed firms therefore rely more on equity financing, and hence there is an inverse relationship between financial distress and changes in debt issued.

Profitability: Profitability is a weak predictor of changes in debt issued, with only the ML RE estimator predicting an insignificant negative correlation. The rest of the estimators predict a weak negative correlation for the full sample. Although the results tend to be mixed, profitability is positively correlated to changes in debt for the full sample. The positive correlation implies that the firms issue more debt as their profitability increases. This financing behaviour is consistent with the trade-off hypothesis. These results therefore confirm the validity of the trade-off theory in the full sample, and hypothesis 7 is accepted. Hypothesis 8 is thus rejected in the full sample. The change in debt issued for manufacturing, mining and retail firms increases with an increase in profitability, implying that profitable firms issue more debt. These results contradict the findings of Ali Ahmed and Hisham (2009:63) and Shyam-Sunder and Myers (1999:242) who found that profitability is negatively correlated to changes in debt. According to the trade-off theory, profitable firms face increased tax payable and they can reduce this through the use of debt interest tax shields or non-debt tax shields. In the absence of non-debt tax shields, firms use interest tax shields, as the two are perfect substitutes. In this case, the results imply that profitable manufacturing, mining and retail firms use debt interest tax shields to reduce their tax bills (De Angelo & Masulis, 1980:27). The trade-off theory further confirms that tax shields add a significant amount of value to a firm's overall value (Graham, 2000:1933).

Firm growth rate: All the estimators predict a weak negative correlation between growth rate and changes in debt issued. The A&B estimator yields a correlation coefficient that is significant at 10%. Firm growth rate is therefore negatively correlated to changes in debt issued, although a higher proportion of the correlation coefficients are insignificant. Ali Ahmed and Hisham (2009:63); Fan, Titman and Twite (2012:39); Mukherjee and Mahakud (2012:51); and Rajan and Zingales (1995:1453) found similar results. The results reject the pecking order hypothesis while confirming the trade-off hypothesis. Hypothesis 12 is thus rejected while hypothesis 11 is accepted. According to the trade-off theory, high growth firms have higher non-debt tax shields which come from increased depreciation charges (De Angelo & Masulis, 1980:27). The non-debt tax shields are perfect substitutes for the debt interest tax shields. The presence of non-debt tax shields therefore makes debt finance unattractive, as its benefit is already captured. High growth firms will therefore rely more on equity financing than debt. This financing behaviour implies an inverse relationship between changes in debt issued and growth rate. The financing behaviour of the firms in the full sample is consistent with this hypothesis. High growth firms also tend to be small and unprofitable (Stewart *et al.*, 2005:40). Their taxable profits may not fully offset both the debt interest tax shields and the non-debt tax shields, and hence the firms are forced to reduce interest to the minimum.

Non-debt tax shields: All the estimators except the B&B estimator predict a negative correlation between non-debt tax shields and changes in debt issued, with only the FE estimator having a coefficient that is significant at 10%. Thus there is a negative correlation between changes in debt issued and non-debt tax shields. These results confirm the trade-off hypothesis.

Hypothesis 13 is thus accepted. Changes in debt issued decrease with an increase in the firms' non-debt tax shields. According to De Angelo and Masulis (1980:27), non-debt tax shields are perfect substitutes for debt interest tax shields. Thus a firm with higher non-debt tax shields will have less of an appetite for debt, as the benefit of debt finance is already captured by the non-debt tax shields. Such a firm will therefore issue less debt and rely more on equity financing, and hence the inverse relationship between non-debt tax shields and leverage. Ali Ahmed and Hisham (2009:63) found similar results. The pecking order theory is silent on the effect of non-debt tax shields on leverage. The results from the full sample of firms confirm the trade-off hypothesis on non-debt tax shields.

Actual dividend paid: All the estimators except the RE Tobit estimator predict a positive correlation between the actual dividend paid and changes in debt issued. The majority of the coefficients show a positive correlation with changes in debt issued. This is consistent with the predictions of both the trade-off and pecking order theories. Hypotheses 16 and 17 are thus accepted. According to the trade-off theory, a firm will only increase dividends if it wants to replace internal equity with debt so as to increase its interest debt shield, which directly adds to the firm's overall value (Stewart *et al.*, 2005:40). The pecking order theory argues that an increase in dividends increases the firm's internal funds deficit (Myers & Majluf, 1984:220). This deficit can only be financed in a pecking order fashion, with debt being the first choice, and hence an increase in dividends is directly proportional to an increase in debt or leverage. Ali Ahmed and Hisham (2009:63); Kayhan and Titman (2007:28); and Shyam-Sunder and Myers (1999:242) found similar correlations between the actual dividend paid and changes in debt issued. The dividend correlations confirm the validity of both the trade-off and pecking order theories in South African manufacturing, mining and retail firms.

Capital expenditure: The results from the full sample show a positive correlation between capital expenditure and changes in debt issued, with all estimators having coefficients that are significant at 1%. Capital expenditure is a strong predictor of changes in debt issued for the full sample. It is positively correlated to changes in debt issued. The results confirm the predictions of the pecking order theory. Hypothesis 19 is accepted, thus rejecting hypothesis 18. For the South African manufacturing, mining and retail firms, changes in debt issued increase with an increase in the firms' capital expenditures. This implies that firms follow the pecking order theory in financing their capital expenditures. As a firm's capital expenditure grows, so does its internal funds deficit. Firms follow the pecking order theory in financing this deficit. That is, they issue debt first before considering equity issuances, and this increases their leverage (Myers & Majluf, 1984:220). The argument of the trade-off theory that a firm does not need the interest debt tax shield, as it has the non-debt tax shields deriving from the increased capital expenditure, is thus rejected in this case. These results are similar to those of Ali Ahmed and Hisham (2009:63); Kayhan and Titman (2007:28); and Shyam-Sunder and Myers (1999:242), that also confirmed the pecking order theory as the best descriptor of the correlations in capital expenditure.

Changes in working capital: The results from the full sample show a significant positive correlation between changes in working capital and changes in debt issued. All the estimators except the TS estimator yield positive coefficients that are significant at 1%. These results are consistent with the pecking order hypothesis. Hypothesis 20 is thus accepted. An increase in working capital may result in an increase in internal funds deficit, and this deficit can only be financed by either external short-term debt or equity. According to the pecking order theory, all external financing follows a pecking order, with debt being issued first. An increase in working capital will therefore lead to an increase in changes in debt issued, as firms issue debt before equity in financing their internal funds deficits (Myers, 2008: 235). The firms in the full sample exhibit this behaviour in financing changes in working capital. These results are consistent with the findings of Kayhan and Titman (2007:28) and Shyam-Sunder and Myers (1999:242) who also documented the fact that changes in working capital are consistent with the predictions of the pecking order theory.

Long-term debt repaid: The sample shows a significant negative correlation between long-term debt repaid and changes in debt issued. The ML RE, FE and A&B coefficients are all significant at 1%. Long-term debt repaid is therefore negatively correlated to changes in debt repaid. The results are consistent with the pecking order hypothesis, and hypothesis 21 is accepted. Ali Ahmed and Hisham (2009:63); Kayhan and Titman (2007:28); and Shyam-Sunder and Myers (1999:242) found similar results. According to the pecking order theory, firms use excess cash flows to repay their long-term debt, so as to increase their financial slack. Firms are likely to discontinue these payments if faced with internal funds deficits, and will instead issue more debt to finance the deficits (Myers, 2008:235). Changes in debt issued are therefore inversely proportional to long-term debt repaid.

Asset tangibility, financial distress, capital expenditure and changes in working capital are significant determinants of changes in debt issued. The correlation results for financial distress and dividends paid confirm the validity of both theories. The results concerning asset tangibility, capital expenditure, changes in working capital and long-term debt repaid confirm the validity of the pecking order theory in explaining the financing behaviour of manufacturing, mining and retail firms. The results concerning profitability, growth rate and non-debt tax shields confirm the validity of the trade-off theory.

As with the BDR and MDR correlations described in Section 5.5.1.1 above, an analysis of these results indicates that the correlation results largely depend on the model fitted, as well as the estimator chosen. The estimators do not give consistent results for the same models. The results further confirm the validity and complementary nature of the two theories in explaining the financing behaviour of firms.

The next section discusses the results for the manufacturing firms.

Table 5.4: Panel 1 Changes in Debt Issued Regression Output: Full Sample

Regression results for model 5:

$$\Delta D_{i,T} = \beta_0 + \beta_1 ASSET_{i,T} + \beta_2 FDIST_{i,T} + \beta_3 ROE_{i,T} + \beta_4 MTB_{i,T} + \beta_5 NDTS_{i,T} + \beta_6 DIV_{i,T} + \beta_7 CAPEX_{i,T} + \beta_8 \Delta WC_{i,T} + \beta_9 R_{i,T} + c_{i,T} + \varepsilon_{i,t} \quad [Model\ 5]$$

Where $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T}$ is an error term. The variables determining the firm's changes in long-term debt issued are defined in Section 4.4.3.7 and in Table 5.9. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 17.08 and Prob>Chi2 is 0.0019. The Sargan test statistic is shown for both the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators	
	GLS Random Effects	ML Random Effects	Fixed Effects	Time Series	Arellano and Bond (1991)	Blundell and Bond (1998)
Asset tangibility (asset)	-432,736.31*** (-2.80)	-491,104.29* (-1.90)	-176240.43 (-0.63)	-722828.27** (-2.17)	-551617.59* (-1.94)	-2218941.8** (-2.57)
Financial distress (fdist)	1,583.627 (0.84)	-268.84 (-0.05)	-714.07 (-0.29)	526.58 (0.27)	-834.72 (-0.27)	-3545.18 (-0.78)
Profitability (roe)	-6.84** (-2.40)	-3.21 (-0.17)	0.985 (0.26)	2.44 (0.14)	9.01 (1.02)	7.20 (1.00)
Firm growth rate (mtb)	17,303.64 (1.12)	-14,243.35 (-0.64)	-20950.26 (-1.35)	-26383.18 (-1.00)	-33416.35* (-1.66)	-38610 (-1.16)
Non-debt tax shields (ndts)	-137,279.47 (-0.62)	-418,597.57 (-0.57)	-874700.64* (-1.96)	-362422.63 (-0.75)	-327812.18 (-0.71)	539966.52 (0.50)
Actual dividend paid (div_t)	-0.060 (-0.54)	0.025 (0.66)	0.121 (1.16)	0.010 (0.05)	0.192 (1.54)	-0.028 (-0.16)
Capital expenditure (capex)	0.340*** (4.84)	0.406*** (30.06)	0.448*** (6.61)	0.454*** (5.34)	0.519*** (7.72)	0.401*** (4.60)
Changes in working capital (wc_t)	0.752*** (4.53)	0.673*** (15.91)	0.659*** (4.50)	0.611** (2.28)	0.659*** (4.29)	0.683*** (4.95)
Long-term debt repaid (r_t)	-0.019 (-0.52)	-0.071*** (-4.80)	-0.095*** (-3.38)	-0.166* (-1.83)	-0.159*** (-2.89)	-0.045 (-0.71)
Obs.	945	945	945	854	768	855
R^2	0.75	-	0.713	0.769	-	-
Wald Chi2	399.67	1177.95	83.04	4.98	1665.98	435.09
Prob > Chi2	0.000	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.47	1.47	1.47	1.98	1.47	1.47
Sargan (df)					371.84 (44)	678.97(53)

5.5.2 Panel 1 Results for Manufacturing Firms: Trade-off Theory versus Pecking Order Theory

This section discusses the empirical results for the manufacturing firms. The results for models 1, 2, 3 and 4 are discussed first. The results for model 5 are discussed in the last part of the section. The summary of statistics for the manufacturing firms is contained in Table 5.5 below.

Table 5.5: Panel 1 Summary of Statistics for the Manufacturing Firms

The Panel 1 sample consists of 42 manufacturing firms with complete data for seven or more consecutive years during 2000 to 2010. There are a total of 461 observations for the period. Extreme outlier observations in all explanatory variables were identified through ridge regression and removed from the sample. The ridge procedure was not used for the dependent variables, bdr, mdr and change in debt issued. The extended definitions of variables are contained in Section 4.4.3.7.

Changes in working capital (wc_t) (R'm): the changes in working capital
Cash flow from operations (c_t) (R'm): the cash ex-operations
Actual dividend paid (div_t) (R'm): the actual ordinary dividends and preference dividends paid during the year
Capital expenditure (capex) (R'm): the sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries
Long-term debt repaid (r_t) (R'm): the current portion of long-term debt
Asset tangibility (asset): the fixed assets scaled up by the total assets
Firm size (size): the natural logarithm of total assets
Non-debt tax shields (ndts): the depreciation charge scaled up by the total assets
Firm growth rate (mtb): the sum of the market equity preferred shares and the total debt less the deferred taxes; this is scaled up by the total assets
Financial distress (fdist): the De la Rey (1981) financial distress ratio
Firm profitability (roe): the profit after taxation scaled up by total owners' equity
Earnings volatility (vol) (R'm): the standard deviation of profit before tax
Book-to-debt ratio (bdr): the total debt scaled up by the total assets
Market-to-debt ratio (mdr): the total debt scaled up by the sum of the total debt and the firm market capitalisation
Change in debt issued (d_change_t) (R'm): the sum of: dividend paid, capital expenditure, changes in working capital and long-term debt repaid, less cash flow from operations

Variable	Obs.	Mean	SD	Min.	Max.
Changes in working capital (wc_t)(R'm)	461	-67,107.34	748,253.7	-6,441,000	9,889,000
Cash flow from operations (c_t) (R'm)	461	1,326,595	3,951,412	-427,723	3.11e+07
Actual dividend paid (div_t) (R'm)	461	369,052.5	1,076,493	0	9,703,780
Capital expenditure (capex) (R'm)	461	951,865.9	3,016,895	-1,14,627	2.49e+07
Long-term debt repaid (r_t) (R'm)	461	554,498.3	1,928,689	0	2.03e+07
Asset tangibility (asset)	461	0.355	0.210	0.021	0 .992
Firm size (size)	461	14.15	2.00	8.56	19.02
Non-debt tax shields (ndts)	461	0.139	0.080	0.022	0.475
Firm growth rate (mtb)	461	1.11	0 .830	-0.109	5.41
Financial distress (fdist)	461	0.724	1.55	-7.76	10.37
Firm profitability (roe)	461	25.36	109.51	-762.78	1,719.02
Earnings volatility (vol) (R'm)	461	798,631.2	2,021,953	2,629.66	9,299,737
Book-to-debt ratio (bdr)	461	0.150	0.175	0	1
Market-to-debt ratio (mdr)	459	0.160	0.191	0	1
Change in debt issued (d_change_t)(R'm)	461	198,010.5	973,109.7	-174,200	1.28e+07
# Obs. Market-to-debt ratio =0	81 (17.65%)				
# Obs. Market-to-debt ratio =1	3 (0.65%)				
# Obs. Market-to-debt ratio >1	0 (0.00%)				
# Obs. Book-to-debt ratio = 0	83(18.00%)				
# Obs. Book-to-debt ratio = 1	2 (0.43%)				
# Obs. Book-to-debt ratio >1	0 (0.00%)				

5.5.2.1 Model 1, 2, 3 and 4 Correlation Results: Manufacturing Firms

The test results for models 1, 2, 3 and 4 are contained in Tables 5.6 and 5.7 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 45.08 and Prob>Chi2 is 0.0000 for BDR and the test statistic's Chi2 is 82.86 and Prob>Chi2 is 0.0000 for MDR. This statistic soundly rejects the null hypothesis that the GLS RE estimator is consistent ($p < 0.05$) and it confirms the fixed effects model as a more consistent estimator in both cases. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. The Hausman test only tests for the consistency of the GLS RE and FE models. It is inapplicable to other models used in this study. In both BDR and MDR regressions, the Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond and Blundell and Bond models. In cases where the estimators give coefficients with different directions, the ultimate correlation is determined by the direction of the majority of the coefficients. In a situation where there is no clear direction from all the estimators, the result is classified as inconclusive.

***Actual dividend paid**:* The model 1 results are mixed for the manufacturing firms. The ML RE, FE and RE Tobit estimators predict a negative correlation between the actual dividend paid and the BDR, whilst the A&B and B&B estimators predict a positive correlation. The results of models 2 and 4 confirm a positive correlation between the actual dividend paid and the MDR, with the coefficients of model 4 being significant at 5%. With the exception of the A&B and B&B estimators, the model 3 results show a negative correlation between the actual dividend paid and the MDR. There is a positive correlation between the actual dividend paid and the leverage in the manufacturing firms. The correlation results are similar to those of the full sample described in Section 5.5.1.1 above. They confirm the hypotheses of both the trade-off and pecking order theories on the effect of dividends on leverage. Both hypotheses 5 and 6 are therefore accepted. The leverages of the manufacturing firms increase with increasing dividends.

Capital expenditure: Capital expenditure is a significant predictor of both the BDR and the MDR in the manufacturing firms. The results of model 1 confirm a strong positive correlation between capital expenditure and the BDR; the results of model 2 show a weak negative correlation. The results of both models 3 and 4 show a positive correlation between capital expenditure and the MDR, with the coefficients of the FE and TS estimators being significant. Capital expenditure is therefore positively and significantly correlated to both the BDR and the MDR in the manufacturing firms. The correlation results on capital expenditure are similar to those of the full sample described in Section 5.5.1.1 above. They are consistent with the predictions of the pecking order hypothesis on capital expenditure. Hypothesis 18 is thus rejected and hypothesis 19 is accepted. In the manufacturing firms, leverage increases with capital expenditure.

Asset tangibility: In model 1, all the estimators except the TS and A&B estimators predict a negative correlation between asset tangibility and the BDR. The ML RE, and RE Tobit estimators predict a significant correlation for the manufacturing firms. The results of model 3 show a weak negative correlation between asset tangibility and the MDR, with only the A&B and B&B estimators predicting a positive correlation. The results of model 2 show a positive correlation between asset tangibility and BDR; the results of model 4 were mixed. Asset tangibility is therefore negatively correlated to both the BDR and the MDR, and it is a significant predictor of the BDR in the manufacturing firms. The correlation results on asset tangibility are similar to those of the full sample described in Section 5.5.1.1 above. They are consistent with the predictions of the pecking order hypothesis on asset tangibility. Hypothesis 1 is thus rejected and hypothesis 2 is accepted. The leverage of the manufacturing firms is inversely proportional to the firms' stocks and quality of assets.

Non-debt tax shields: In model 1, all the estimators except the TS and B&B estimators predict a negative correlation between the non-debt tax shields and the BDR. The model 2 results are mixed. All the results of models 3 and 4 show a negative correlation between the non-debt tax shields and the MDR, with the coefficients of the ML RE, TS and RE Tobit estimators being significant at 5%. Non-debt tax shields are therefore negatively correlated to both the BDR and the MDR. The results are similar to those of the full sample described in Section 5.5.1.1 above. They are consistent with the predictions of the trade-off theory on non-debt tax shields. Hypothesis 13 is therefore accepted. The leverage of manufacturing firms decreases with an increase in the firm's non-debt tax shields.

Firm growth rate: The results of models 1, 2 and 3 all confirm a positive correlation between firm growth rate and both the BDR and the MDR. The correlation is significant for the BDR. The results from model 4 confirm a significant negative correlation between growth rate and the MDR. Firm growth rate is positively correlated to leverage. As in the results from the full sample, described in Section 5.5.1.1 above, these results confirm the validity of the pecking order theory in explaining the effect of firm growth rate on the leverage of manufacturing firms. Consistent with the predictions of the pecking order theory, leverage is directly proportional to firm growth rate in the manufacturing firms. Hypothesis 12 is thus accepted, whilst hypothesis 11 is rejected.

Financial distress: The results for the manufacturing firms predict a strong negative correlation between financial distress and both the BDR and the MDR for all four of the models. There is a significant negative correlation between financial distress and the firm's leverage. Financial distress is a significant predictor of the BDR in the manufacturing firms. As in the results from the full sample, described in Section 5.5.1.1 above, these results confirm the validity of both theories, and hypotheses 5 and 6 are thus accepted. The leverage of manufacturing firms decreases with an increase in financial distress.

Firm profitability: Firm profitability is a significant predictor of the BDR in the manufacturing firms. All the estimators confirm a positive correlation for models 1 and 3, with most of the coefficients of model 1 being significant. The results for model 2 show a significant negative correlation between firm profitability and the BDR. The results for model 4 are mixed. Profitability is positively correlated to leverage. The correlation results are similar to those of the full sample described in Section 5.5.1.1 above. They are consistent with the predictions of the trade-off theory on profitability. Hypothesis 8 is thus rejected. In the manufacturing firms, leverage increases with an increase in firm profitability.

The significant determinants of leverage in the manufacturing firms are: asset tangibility, non-debt tax shields, firm growth, financial distress and profitability. The correlations regarding dividends paid and financial distress confirm the validity of both theories. The validity of the trade-off theory is further confirmed by the correlations regarding the non-debt tax shields and profitability. The correlations concerning capital expenditure, asset tangibility and growth rate confirm the validity of the pecking order theory in explaining the financing behaviour of manufacturing firms. The results further demonstrate the complementary nature of the two theories as found by Mukherjee and Mahakud (2012:53) and Myers (2008:239). As with the results from the full sample, described in Section 5.5.1.1 above, these results indicate that the correlation results largely depend on the dependent variable used, the model fitted and the estimator chosen.

The results of the speed of adjustment estimates for the manufacturing firms are discussed below.

5.5.2.2 Model 1, 2, 3 and 4 Speed of Adjustment Results: Manufacturing Firms

The speed of adjustment estimation results for models 1, 2, 3 and 4 are contained in Tables 5.6 and 5.7 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, the Durbin-Watson statistics together with the Sargan test statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. As explained in section 5.5.2.1 above, the GLS RE estimator is inconsistent and hence its results were excluded in the determination of the ultimate average and range of speed of target adjustment.

Manufacturing firms: For model 1, the TS estimator failed to estimate the speed of adjustment and for model 2, the A&B estimator yields an insignificant coefficient. For models 3 and 4, both the A&B and B&B estimators yield insignificant coefficients; the estimators thus fail to estimate the true speed of adjustment. In models 1 and 2, the speed of adjustment as confirmed by the significant coefficients varies between 44.99% (1.16 years) and 88.8% (0.32 years), with an average of 65.75% (0.71 years). The average speed in models 3 and 4 is 44.82% (1.29 years), and this varies between 28.28% (2.09 years) and 61.31% (0.73 years). The true speed of adjustment for the manufacturing firms is 45.08% (1.16 years) for the BDR and 44.59% (1.17 years) for the MDR. Although this is still higher than that of the European and US firms described in Section 5.5.1.1 above, it is lower than the speed of the full sample. As will be explained in Sections 5.5.3.3 and 5.5.4.3 below, the target speed of adjustment of the manufacturing firms is lower than that of the mining firms, but higher than that of the retail firms. The manufacturing firms adjust their capital structures less frequently than mining firms. This is mainly due to heterogeneity in the firm-specific factors.

As with the correlation results discussed in Section 5.5.1.1 above, the speed of adjustment is affected by the dependent variable used (BDR or MDR), the estimator used and the model fitted.

The next section discusses the correlation results for model 5.

Table 5.6: Panel 1 BDR Regression Output and Speeds of Adjustment: Manufacturing Firms

Regression results for the partial adjustment models 1 and 2:

$$BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots\dots\dots\dots\dots\dots [Model\ 1]$$

$$BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T} \dots\dots\dots\dots\dots\dots [Model\ 2]$$

Where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. Model 2 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The variables determining the firm's long-run target leverage and the speed of adjustment are: ***div_t; capex; asset; ndts; mtb; fdist and roe***, and these are defined in Section 4.4.3.7 and in Table 5.1. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 45.08 and Prob>chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 1	ML Random Effects Model 1	Fixed Effects Model 1	Time Series Model 1	Arellano and Bond (1991) Model 1	Arellano and Bond(1991) Model 2	Blundell and Bond (1998) Model 1	Blundell and Bond(1998) Model 2	Random Effects Tobit Model 1
Actual dividend paid (div_t)	-2.148e-08* (-1.96)	-1.752e-08* (-1.73)	-5.411e-09 (-0.530	1.079e-08 (0.76)	2.371e-08 (1.39)	3.686e-08** (2.21)	7.267e-09 (0.42)	2.749e-08 (1.36)	-9.815e-09 (-0.85)
Capital expenditure (capex)	1.343e-08** (2.44)	1.385e-08*** (3.90)	1.754e-08*** (3.96)	9.244e-09 (0.85)	1.546e-08*** (2.98)	-4.710e-09 (-0.39)	1.850e-08** (2.53)	-3.001e-09 (-0.32)	1.391e-08*** (3.30)
Asset tangibility (asset)	-0.074 (-1./60)	-0.086** (-2.15)	-0.063 (-0.65)	0.100 (0.50)	0.128 (1.12)	0.333** (2.03)	-0.046 (-0.59)	0.141 (1.22)	-0.108** (-2.05)
Non-debt tax shields (ndts)	-0.140* (1.72)	-0.181* (-1.88)	-0.258 (-1.29)	0.008 90.030	-0.006 (-0.02)	0.020 (0.08)	0.007 (0.020	-0.030 (-0.12)	-0.215 * (-1.81)
Firm growth rate (mtb)	0.017* (1.88)	0.019** (2.28)	0.018* (1.73)	0.007 (0.49)	0.001 (0.08)	0.015 (1.20)	0.007 (0.47)	0.028* (1.79)	0.025** (2.48)
Financial distress (fdist)	-0.019*** (-2.65)	-0.020*** (-4.63)	-0.021** (-2.19)	-0.017** (-2.09)	-0.017* (-1.73)	-0.009 (-1.59)	-0.014 (-1.35)	-0.009 (-1.49)	-0.024*** (-4.56)
Firm profitability (roe)	0.000*** (3.11)	0.000*** (9.12)	0.000*** (3.01)	0.000*** (3.01)	0.000*** (3.92)	-0.000** (-2.36)	0.001*** (3.63)	-0.000** (-2.28)	0.000*** (8.54)
BDR Coefficient (1- λ) bdr/bdr_t1 L1	0.625*** (7.22)	0.550*** (11.23)	0.408*** (4.80)	-0.099 (-1.05)	0.152*** (3.16)	0.112 (1.15)	0.351*** (4.02)	0.274** (2.16)	0.549*** (10.46)
Implied speed of adjustment (λ)	37.43%	44.99%	59.19%	-	84.77%	88.80%	64.89%	72.56%	45.08%
Implied half-life	1.47 years	1.16 years	0.77 years	-	0.37 years	0.32 years	0.66 years	0.54 years	1.16 years
Obs.	419	419	419	377	335	377	377	419	419
R^2	0.603	-	0.55	0.2525	-	-	-	-	-
Wald Chi2	569.69	370.68	31.31	2.31	47.40	73.05	348.04	92.14	322.53
Prob > Chi2	0.00	0.00	0.00	0.0201	0.00	0.00	0.00	0.00	0.00
Durbin-Watson	1.91	1.91	1.91	1.95	1.91	1.91	1.91	1.91	1.91
Sargan (df)					81.14 (35)	98.24 (44)	86.28 (43)	108.28 (53)	

Table 5.7: Panel 1 MDR Regression Output and Speeds of Adjustment: Manufacturing Firms

Regression results for the partial adjustment models 3 and 4:

$$MDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots\dots\dots\dots\dots\dots [Model\ 3]$$

$$MDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T-1} + \varepsilon_{i,T} \dots\dots\dots\dots\dots\dots [Model\ 4]$$

Where λ is the adjustment speed on the lagged market-to-debt ratio (MDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. Model 4 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The variables determining the firm's long-run target leverage and the speed of adjustment are: ***div_t; capex; asset; ndts; mtb; fdist and roe***, and these are defined in Section 4.4.3.7 and in Table 5.1. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 82.86 and Prob>chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 3	ML Random Effects Model 3	Fixed Effects Model 3	Time Series Model 3	Arellano and Bond (1991) Model 3	Arellano and Bond (1991) Model 4	Blundell and Bond (1998) Model 3	Blundell and Bond (1998) Model 4	Random Effects Tobit Model 3
Actual dividend paid (div_t)	-1.661e-08* (-1.70)	-1.400e-08 (-1.07)	-5.959e-09 (-0.79)	-1.931e-08** (-2.04)	3.767e-08* (1.80)	3.686e-08** (2.39)	2.434e-08 (1.43)	3.789e-08*** (2.75)	-3.758e-09 (-0.25)
Capital expenditure (capex)	6.084e-09* (1.73)	5.380e-09 (1.17)	6.750e-09* (1.96)	7.339e-09** (1.99)	4.193e-09 (0.60)	1.031e-09 (0.11)	1.752e-09 (0.26)	8.109e-10 (0.10)	4.046e-09 (0.74)
Asset tangibility (asset)	-0.074 (-1.36)	-0.075 (-1.49)	-0.029 (-0.300	-0.085** (-2.01)	0.206 (1.20)	-0.014 (-0.07)	0.350 (1.34)	0.182 (0.85)	-0.089 (-1.30)
Non-debt tax shields (ndts)	-0.256* (-1.82)	-0.294** (-2.39)	-0.381 (-1.28)	-0.232** (-2.16)	-0.281 (-0.77)	-0.120 (-0.35)	-0.375 (-0.94)	-0.241 (-0.68)	-0.355** (-2.31)
Firm growth rate (mtb)	0.004 (0.52)	0.007 (0.65)	0.013 (1.08)	0.004 (0.44)	-0.003 (-0.13)	-0.076*** (-3.53)	0.005 (0.22)	-0.074*** (-2.97)	0.020 (1.63)
Financial distress (fdist)	-0.0134 (-1.24)	-0.014** (-2.49)	-0.013 (-1.09)	-0.011 (-0.96)	-0.012 (-0.83)	-0.018** (-2.25)	-0.010 (-0.66)	-0.016* (-1.90)	-0.016** (-2.41)
Firm profitability (roe)	0.000 (1.16)	0.000 (1.20)	0.000 (1.09)	0.000 (0.26)	0.000 (1.25)	5.258e-06 (0.07)	0.000 (1.15)	-0.000 (-0.64)	0.000 (1.38)
MDR Coefficient (1- λ) mdr/mdr_t1 L1	0.620*** (5.86)	0.549*** (9.82)	0.389*** (2.88)	0.717*** (9.09)	0.086 (0.92)	0.112 (0.64)	0.259 (1.25)	0.222 (1.210	0.554*** (9.71)
Implied speed of adjustment (λ)	38.02%	45.11%	61.31%	28.28%	91.37%	88.21%	74.08%	77.76%	44.59%
Implied half-life	1.45 years	1.16 years	0.73 years	2.09 years	0.28 years	0.32 years	0.51 years	0.46 years	1.17 years
Obs.	416	416	416	373	331	373	374	416	416
R^2	0.473	-	0.426	0.578	-	-	-	-	-
Wald Chi2	179.78	251.79	8.06	33.21	11.81	36.25	87.52	89.93	145.75
Prob > Chi2	0.00	0.00	0.00	0.00	0.170	0.00	0.00	0.00	0.00
Durbin-Watson	2.13	2.13	2.13	1.99	2.13	2.13	2.13	2.13	2.13
Sargan (df)					105.98 (35)	105.61 (44)	110.60 (43)	127.51 (53)	

5.5.2.3 Model 5 Correlation Results (Changes in Debt Issued): Manufacturing Firms

The test results of model 5 are presented in Table 5.8 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of the table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 11.84 and Prob>Chi2 is 0.0370. This statistic rejects the null hypothesis that the GLS RE estimator is consistent ($p < 0.05$) and confirms the fixed effects model as a more consistent estimator in this case. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. The Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for both the Arellano and Bond and Blundell and Bond models

Asset tangibility*:* In the manufacturing firms, asset tangibility is negatively correlated to changes in debt issued. The ML RE coefficient is significant at 1%, 5% and 10%. The correlation results on asset tangibility are similar to those of the full sample described in Section 5.5.1.3 above. They are consistent with the predictions of the pecking order hypothesis on asset tangibility. Hypothesis 1 is therefore rejected and hypothesis 2 is accepted.

Financial distress: The correlation results are mixed, with the TS estimator predicting a weak positive correlation between financial distress and changes in debt issued, whilst the rest of the estimators show a weak negative correlation. Financial distress is negatively correlated to changes in debt issued. The correlation results are similar to those of the full sample described in Section 5.5.1.3 above. They confirm the validity of both theories. Both hypotheses 5 and 6 are thus accepted. The leverage of the manufacturing firms decreases with increasing financial distress.

Profitability: Profitability is positively correlated to changes in debt for the manufacturing firms, although the coefficients are insignificant. Leverage is directly proportional to the firm's profitability. The correlation results are similar to those of the full sample described in Section 5.5.1.3 above. They are consistent with the predictions of the trade-off theory on profitability. Hypothesis 8 is therefore rejected.

Firm growth rate: All the estimators predict a weak negative correlation between firm growth rate and changes in net debt issued. The correlation results on firm growth rate are similar to those of the full sample described in Section 5.5.1.3 above. They are consistent with the predictions of the trade-off hypothesis on firm growth rate. Thus hypothesis 12 is rejected and hypothesis 11 is accepted.

Non-debt tax shields: Non-debt tax shields are negatively correlated to changes in debt issued in the manufacturing firms. The coefficients of the ML RE, FE and TS estimators are all significant. The non-debt tax shields are a significant predictor of changes in debt issued in the manufacturing firms. The correlation results for the non-debt tax shields confirm the trade-off hypothesis. The results are similar to those of the full sample described in Section 5.5.1.3 above.

Actual dividend paid: The results of all the estimators confirm a negative correlation between the actual dividend paid and changes in debt issued, with the ML RE coefficient being significant at 1%, 5% and 10%. The correlation results reject both hypotheses 16 and 17. They reject both the pecking order and trade-off theories. The leverage of the manufacturing firms decreases with increasing dividends. These results are inconsistent with the finding of Ali Ahmed and Hisham (2009:63); Kayhan and Titman (2007:28); and Shyam-Sunder and Myers (1999:242).

Capital expenditure: The results for the manufacturing firms confirm a positive correlation between capital expenditure and changes in debt issued, with all estimators having coefficients that are significant at 1%, 5% and 10%. Capital expenditure is a strong predictor of changes in debt issued for the manufacturing firms. The correlation results on capital expenditure are similar to those of the full sample described in Section 5.5.1.3 above. They are consistent with the predictions of the pecking order hypothesis regarding the effect of capital expenditure on changes in debt issued. Hypothesis 18 is therefore rejected and hypothesis 19 is accepted.

Changes in working capital: The TS and A&B estimators predict a weak positive correlation between changes in working capital and changes in debt issued, whilst the rest of the estimators show a weak negative correlation. There is a negative correlation between the changes in working capital and the changes in debt issued. The results reject the pecking order hypothesis 20 and support the trade-off theory. Changes in working capital tend to be positively correlated to capital expenditure. The trade-off theory predicts a negative correlation between changes in working capital and capital expenditure. This implies that changes in working capital are also negatively correlated to changes in debt issued. In the manufacturing firms used in this study, changes in working capital increase with decreasing changes in debt issued, implying that this change in working capital is financed through equity sources. This violates the predictions of the pecking order model (Myers, 2008:235). These results contradict the findings of Kayhan and Titman (2007:28) and Shyam-Sunder and Myers (1999:242).

Long-term debt repaid: The ML RE estimators predict a weak positive correlation between long term debt repaid and changes in debt issued. The remainder of the estimators shows a negative correlation, with the coefficients of the A&B estimator and the B&B estimator being significant at 5% and 1% respectively. Long-term debt repaid is negatively correlated to changes in debt issued. The correlation results on long-term debt repaid are similar to those of the full sample described in Section 5.5.1.3 above. They are consistent with the predictions of the pecking order hypothesis regarding the effect of long-term debt repaid on changes in debt issued. Hypothesis 21 is thus confirmed.

In the manufacturing firms, the significant determinants of changes in debt issued are: asset tangibility, non-debt tax shields, capital expenditure and changes in working capital. The results on financial distress confirm the predictions of both theories whilst those of dividends paid reject both theories. The correlation results on asset tangibility, capital expenditure and long-term debt repaid confirm the validity of the pecking order hypothesis. On the other hand, the results on profitability, growth rate and non-debt tax shields confirm the trade-off hypothesis.

As with the correlations for the full sample, described in Section 5.5.1.3 above, an analysis of these results indicates that the correlation results largely depend on the model fitted as well as the choice of estimator used. The estimators do not give consistent results for the same models. The results further confirm the validity and complementary nature of the two theories in explaining the financing behaviour of firms.

The results for the mining firms are discussed below.

Table 5.8: Panel 1 Changes in Debt Issued Regression Output: Manufacturing Firms

Regression results for model 5:

$$\Delta D_{i,T} = \beta_0 + \beta_1 ASSET_{i,T} + \beta_2 FDIST_{i,T} + \beta_3 ROE_{i,T} + \beta_4 MTB_{i,T} + \beta_5 NDTS_{i,T} + \beta_6 DIV_{i,T} + \beta_7 CAPEX_{i,T} + \beta_8 \Delta WC_{i,T} + \beta_9 R_{i,T} + c_{i,T} + \varepsilon_{i,t} \quad [Model\ 5]$$

Where $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T}$ is an error term. The variables determining the firm's changes in long-term debt issued are defined in Section 4.4.3.7 and in Table 5.9. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 11.84 and Prob>Chi2 is 0.0370. The Sargan test statistic is shown for both the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators	
	GLS Random Effects	ML Random Effects	Fixed Effects	Time Series	Arellano and Bond (1991)	Blundell and Bond (1998)
Asset tangibility (asset)	-350217.79** (-2.39)	-350217.79*** (-2,81)	-415590.55 (-1.49)	-251622.64 (-1.39)	-258533.18 (-0.67)	-400093.13 (-1.29)
Financial distress (fdist)	-7996.80 (-0.81)	-7996.80 (-0.55)	454.37 (0.03)	-4244.94 (-0.37)	915.80 (0.06)	-376.82 (-0.02)
Profitability (roe)	148.54 (0.960	148.54 (0.79)	195.52 (1.54)	121.04 (0.43)	153.82 (0.72)	165.28 (0.66)
Firm growth rate (mtb)	-190.56 (-0.00)	-190.56 (-0.01)	-98460.51 (-1.36)	-8129.22 (-0.16)	-80766.40 (-1.52)	-96407.00 (-1.35)
Non-debt tax shields (ndts)	-548753.85*** (-2.71)	-548753.85* (-1.72)	-604996.55* (-1.87)	-579550.31** (-2.01)	-538862.69 (-1.12)	-1109271 (-1.49)
Actual dividend paid (div_t)	-0.227* (-1.93)	-0.227*** (-4.72)	-0.144 (-0.94)	-0.156 (-1.41)	-0.165 (-1.10)	-0.266 (-1.23)
Capital expenditure (capex)	0.247*** (7.41)	0.247*** (15.29)	0.378*** (4.92)	0.232*** (3.57)	0.240** (2.52)	0.203*** (3.04)
Changes in working capital (wc_t)	-0.075 (-0.43)	-0.075 (-1.64)	-0.020 (-0.16)	0.060 (0.72)	0.045 (0.92)	-0.046 (-0.64)
Long-term debt repaid (r_t)	0.013 (0.59)	0.013 (0.74)	-0.011 (-0.42)	-0.055 (-1.46)	-0.040** (-2.27)	-0.060*** (-2.68)
Obs.	456	456	456	412	370	412
R^2	0.53	-	0.511	0.321	-	-
Wald Chi2	1443.16	339.84	31.22	2.35	86.98	504.62
Prob > Chi2	0.000	0.000	0.000	0.014	0.000	0.000
Durbin-Watson	1.42	1.42	1.42	2.04	1.42	1.42
Sargan (df)					202.96 (44)	244.56 (53)

5.5.3 Panel 1 Results for Mining Firms: Trade-off Theory versus Pecking Order Theory

This section discusses the empirical results for the mining firms. The results of models 1, 2, 3 and 4 are discussed first. The results of Model 5 are discussed in the last part of the section. The summary of statistics for the mining firms is contained in Table 5.9 below.

Table 5.9: Panel 1 Summary of Statistics for the Mining Firms

The Panel 1 sample consists of 24 mining firms with complete data for four or more consecutive years during the period 2000-2010. There are a total of 263 observations for the period. Extreme outlier observations in all explanatory variables were identified through ridge regression and removed from the sample. The ridge procedure was not used for the dependent variables, bdr, mdr and change in debt issued. The extended definitions of variables are contained in Section 4.4.3.7.

Changes in working capital (wc_t) (R'm): the changes in working capital
Cash flow from operations (c_t) (R'm): the cash ex-operations
Actual dividend paid (div_t) (R'm): the actual ordinary dividends and preference dividends paid during the year
Capital expenditure (capex) (R'm): the sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries
Long-term debt repaid (r_t) (R'm): the current portion of long-term debt
Asset tangibility (asset): the fixed assets scaled up by the total assets
Firm size (size): the natural logarithm of total assets
Non-debt tax shields (ndts): the depreciation charge scaled up by the total assets
Firm growth rate (mtb): the sum of the market equity preferred shares and the total debt less the deferred taxes; this is scaled up by the total assets
Financial distress (fdist): the De la Rey (1981) financial distress ratio
Firm profitability (roe): the profit after taxation scaled up by total owners' equity
Earnings volatility (vol) (R'm): the standard deviation of profit before tax
Book-to-debt ratio (bdr): the total debt scaled up by the total assets
Market-to-debt ratio (mdr): the total debt scaled up by the sum of the total debt and the firm market capitalisation
Change in debt issued (d_change_t) (R'm): the sum of: dividend paid, capital expenditure, changes in working capital and long-term debt repaid, less cash flow from operations

Variable	Obs.	Mean	SD	Min.	Max.
Changes in working capital (wc_t)(R'm)	263	-385,626.9	2,801,565	-2.37e+07	3.10e+07
Cash flow from operations (c_t) (R'm)	263	6,474,161	2.04e+07	-4,782,000	1.52e+08
Actual dividend paid (div_t) (R'm)	263	1,681,860	4,968,502	0	4.49e+07
Capital expenditure (capex) (R'm)	263	5,041,574	1.44e+07	-881,692	1.06e+08
Long-term debt repaid (r_t) (R'm)	263	2,162,150	7,684,898	0	7.64e+07
Asset tangibility (asset)	263	0.323	0.332	0	0.996
Firm size (size)	263	14.47	2.65	8.13	20.12
Non-debt tax shields (ndts)	263	0.024	0.031	0	0.147
Firm growth rate (mtb)	263	2.69	2.93	0	28.92
Financial distress (fdist)	263	1.12	6.03	-31.31	44.76
Firm profitability (roe)	263	-145.64	2,955.04	-47,548.1	4,187.05
Earnings volatility (vol) (R'm)	263	5,132,145	1.33e+07	11,820.07	6.52e+07
Book-to-debt ratio (bdr)	263	0.250	0.333	0	2.74
Market-to-debt ratio (mdr)	263	0.138	0.179	0	1
Change in debt issued (d_change_t)(R'm)	263	1,240,536	5,369,074	-1,783,600	5.25e+07
# Obs. Market-to-debt ratio =0	69 (26.24%)				
# Obs. Market-to-debt ratio =1	1 (0.38%)				
# Obs. Market-to-debt ratio >1	0 (0.00%)				
# Obs. Book-to-debt ratio = 0	74 (28.14%)				
# Obs. Book-to-debt ratio = 1	14 (5.32%)				
# Obs. Book-to-debt ratio >1	3 (1.14%)				

5.5.3.1 Model 1, 2, 3 and 4 Correlation Results: Mining firms

The test results of models 1, 2, 3 and 4 are contained in Tables 5.10 and 5.11 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 50.18 and Prob>Chi2 is 0.0000 for BDR and the test statistic's Chi2 is 156.42 and Prob>Chi2 is 0.0000 for MDR. This statistic soundly rejects the null hypothesis that the GLS RE estimator is consistent ($p < 0.05$) and it confirms the fixed effects model as a more consistent estimator in both cases. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. In both BDR and MDR regressions, the Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond and Blundell and Bond models. In cases where the estimators give coefficients with different directions, the ultimate correlation is determined by the direction of the majority of the coefficients. In a situation where there is no clear direction from all the estimators, the result is classified as inconclusive.

***Actual dividend paid**:* There is a weak positive correlation between the actual dividend paid and both the BDR and the MDR in models 1 and 2; and a weak negative correlation between the actual dividend paid and both the BDR and the MDR in models 2 and 4. The correlations are insignificant at 10%, thus making the actual dividend paid a weak predictor of the BDR in both models. There is a positive correlation between the actual dividend paid and the leverage in the mining firms. The correlation results are similar to those of the full sample described in Section 5.5.1.1 above. They confirm the hypotheses of both the trade-off and pecking order theories on the effect of dividends on leverage. Both hypotheses 5 and 6 are therefore accepted. The leverages of the mining firms increase with increasing dividends.

Capital expenditure: In model 1, the TS and B&B estimators all predict a positive correlation between capital expenditure and the BDR, whilst the remainder of the estimators shows a negative correlation. The results from models 2 and 4 show a significant positive correlation between capital expenditure and the MDR. In model 3, all the estimators except the RE Tobit estimator predict a negative correlation. Capital expenditure is therefore negatively correlated to both the BDR and the MDR in the mining firms. These results confirm the trade-off hypothesis 18 and thus reject the pecking order hypothesis 19. The results are consistent with the findings of Frank and Goyal (2009:26), but they contradict the findings of Ali Ahmed & Hisham (2009:63); Kayhan & Titman (2007:28); and Shyam-Sunder & Myers (1999:242) which showed a positive correlation. The samples used in their research were, however, from mixed sectors, and not purely from the mining sector. In the mining firms in this study, leverage is inversely proportional to capital expenditure. According to the trade-off theory, firms faced with increased capital expenditure can substitute the debt interest tax shield with the non-debt tax shields which come directly from increased depreciation (DeAngelo and Masulis, 1980:27). This means that the firms will require less debt finance, as the benefit of debt is substituted by the non-debt tax shields. The firms may not have enough profits to write off both tax shields, and hence they forego the interest tax shield which is avoidable in this case. The firms therefore use less debt and more equity. The results of these tests confirm this financing behaviour in the South African mining firms.

Asset tangibility: In model 1, all the estimators predict a weak negative correlation between asset tangibility and the BDR. In the mining firms, only the TS estimator predicts a significant negative correlation. The results for model 2 showed a weak positive correlation between asset tangibility and the BDR, whilst the results for model 4 indicate a weak negative correlation. The results for model 3 are mixed, with the TS estimator showing a negative correlation. Asset tangibility is therefore negatively correlated to leverage, and it is a weak predictor of both the BDR and the MDR in the mining firms. As in the results for the full sample, described in Section 5.5.1.1 above, these results confirm the pecking order hypothesis while rejecting the trade-off hypothesis. Hypothesis 1 is thus rejected and hypothesis 2 is accepted. The leverage of the mining firms is inversely proportional to asset tangibility.

Non-debt tax shields: In model 1, all the estimators except the TS estimator predict a weak negative correlation between the non-debt tax shields and the BDR. The results for model 2 also show a weak negative correlation. With the exception of the TS estimator results, the results of models 3 and 4 confirm a negative correlation between the non-debt tax shields and the MDR. The coefficients are significant for the FE, A&B, B&B and RE Tobit estimators. Non-debt tax shields are therefore negatively correlated to both the BDR and the MDR, and are significant predictors of the MDR. The results are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.1 and 5.5.2.1 above. They are consistent with the predictions of the trade-off theory regarding non-debt tax shields. Hypothesis 13 is thus accepted. The leverage of the mining firms decreases with an increase in the firms' non-debt tax shields.

Firm growth rate: The results of both models 1 and 3 confirm a significant positive correlation between firm growth rate and both the BDR and the MDR. On the other hand, the results of both models 2 and 4 show a negative correlation which is significant for the MDR. Firm growth rate is a significant predictor of both the BDR and the MDR in the mining firms. It is positively correlated to both the BDR and the MDR in the mining firms. As in the results for the full sample and for the manufacturing firms, described in Sections 5.5.1.1 and 5.5.2.1 above, these results confirm the validity of the pecking order theory in explaining the effect of firm growth rate on the leverage of the mining firms. Consistent with the predictions of the pecking order theory, leverage is directly proportional to the firm growth rate in the mining firms. Hypothesis 12 is thus accepted whilst hypothesis 11 is rejected.

Financial distress: All the estimators except the A&B and B&B estimators predict a negative correlation between financial distress and the BDR, with most of the coefficients being significant. The results for model 2 predict a weak negative correlation. Both models 3 and 4 predict a strong negative correlation between financial distress and the MDR. There is a significant negative correlation between financial distress and the firm's leverage.

Financial distress is a significant predictor of the MDR in the mining firms. The correlations are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.1 and 5.5.2.1 above. The results confirm the validity of both theories, and hypotheses 5 and 6 are thus accepted. The leverage of the mining firms decreases with an increase in financial distress.

Firm profitability: In model 1, the ML RE, FE and RE Tobit estimators predict a negative correlation between profitability and the BDR, whilst the rest of the estimators predict a weak positive correlation with the BDR. Model 2 predicts a weak negative correlation. The results of models 3 and 4 all confirm a positive correlation between firm profitability and the MDR, with most of the coefficients being highly significant. Profitability is positively correlated to firm leverage. It is a weak predictor of the BDR, but it is a strong predictor of the MDR in the mining firms. The correlation results are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.1 and 5.5.2.1 above. They are consistent with the predictions of the trade-off theory on profitability. Hypothesis 8 is therefore rejected. In the mining firms, leverage increases with firm profitability.

The most significant determinants of leverage in the mining firms are the non-debt tax shields, growth rate and financial distress. The correlation results for both dividend paid and financial distress confirm the validity of both theories. Correlation results concerning capital expenditure, non-debt tax shields and profitability confirm the validity of the trade-off theory, whilst the correlation results concerning asset tangibility and growth rate confirm the validity of the pecking order theory. Similarly to the results for the full sample and for the manufacturing firms, discussed in Sections 5.5.1.1 and 5.5.2.1 above, these results further confirm the complementary nature of the trade-off and pecking order theories. As with the results for the full sample, described in Section 5.5.1.1 above, these results indicate that the correlation results largely depend on the dependent variable used, the model fitted and the estimator chosen.

The results of the speed of adjustment estimates for the full sample are discussed below.

5.5.3.2 Model 1, 2, 3 and 4 Speed of Adjustment Results: Mining Firms

The speed of adjustment estimation results for models 1, 2, 3 and 4 are contained in Tables 5.10 and 5.11 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, the Durbin-Watson statistics together with the Sargan test statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. As explained in section 5.5.3.1 above, the GLS RE estimator is inconsistent and hence its results were excluded in the determination of the ultimate average and range of speed of target adjustment. The full results are discussed below.

Mining firms: For the mining firms, only the FE estimator fails in model 1. The rest of the coefficients are significant at 5% and above. In models 1 and 2, the average speed of adjustment is 74.45% (0.52 years). The speeds of adjustment vary between 52.87% (0.92 years) and 82.59% (0.40 years). The mean speed of adjustment in models 3 and 4 is 53.53% (0.94 years) and the speed of adjustment varies between 37.34 (1.48 years) and 68.64% (0.60 years). The RE Tobit true speed of adjustment for the mining firms is 72.07% (0.54 years) for the BDR and 56.45% (0.83 years) for the MDR. Of the three sectors investigated, the mining firms exhibit the highest speeds of target adjustment. The speeds are even higher than those of the US and European firms as described in Section 5.5.1.2 above. These high speeds are the result of firm-specific factors. The descriptive statistics indicate that the mining firms have the highest growth rates and the highest capital expenditures. This implies that they are active in the capital market, and this enables them to frequently adjust their capital structures.

As with the correlation results discussed in Section 5.5.1.1 above, the speed of adjustment is affected by the dependent variable used (BDR or MDR), the estimator used and the model fitted. The results of model 5 are discussed below.

Table 5.10: Panel 1 BDR Regression Output and Speeds of Adjustment: Mining Firms

Regression results for the partial adjustment models 1 and 2:

$$BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots\dots\dots\dots\dots\dots [Model\ 1]$$

$$BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T} \dots\dots\dots\dots\dots\dots [Model\ 2]$$

Where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. Model 2 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The variables determining the firm's long-run target leverage and the speed of adjustment are: ***div_t; capex; asset; ndts; mtb; fdist and roe***, and these are defined in Section 4.4.3.7 and in Table 5.1. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 50.18 and Prob>Chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 1	ML Random Effects Model 1	Fixed Effects Model 1	Time Series Model 1	Arellano and Bond (1991) Model 1	Arellano and Bond (1991) Model 2	Blundell and Bond (1998) Model 1	Blundell and Bond (1998) Model 2	Random Effects Tobit Model 1
Actual dividend paid (div_t)	2.903e-09 (0.33)	5.292e-09 (0.78)	6.680e-09 (0.630	2.866e-09 (0.41)	1.429e-08 (1.01)	-2.179e-09 (-0.74)	1.496e-08 (1.13)	-2.138e-09 (-0.66)	6.053e-09 (0.93)
Capital expenditure (capex)	2.622e-10 (0.10)	-6.746e-11 (-0.03)	-2.624e-10 (-0.14)	2.506e-10 (0.13)	-3.305e-11 (-0.02)	3.887e-09** (2.47)	1.637e-10 (0.12)	4.171e-09* (1.75)	-3.115e-11 (-0.01)
Asset tangibility (asset)	-0.150* (-1.80)	-0.129 (-1.30)	-0.082 (-0.740	-0.186** (-2.09)	-0.443 (-1.31)	0.199 (0.67)	-0.357 (-1.37)	0.136 (0.64)	-0.101 (-1.06)
Non-debt tax shields (ndts)	0.507 (0.71)	-0.193 (-0.19)	-1.18 (-1.70)	0.956 (1.32)	-4.12* (-1.67)	-0.652 (-0.34)	-3.52* (-1.69)	-0.571 (-0.28)	-1.26 (-1.46)
Firm growth rate (mtb)	0.021* (1.95)	0.027*** (4.09)	0.031* (1.96)	0.022 (1.65)	.022867** (2.12)	-0.011 (-0.74)	0.024** (2.12)	-0.011 (-0.78)	0.026*** (4.33)
Financial distress (fdist)	-0.009** (-2.19)	-0.007** (-2.40)	-0.006* (-1.75)	-0.009* (-1.66)	0.002 (0.66)	-0.008 (-1.18)	0.002 (0.58)	-0.007 (-1.18)	-0.007** (-2,.24)
Firm profitability (roe)	5.572e-06 (0.11)	-1.335e-07 (-0.00)	-4.587e-06 (-0.10)	2.841e-06 (0.04)	6.803e-06 (0.13)	-2.688e-06 (-0.06)	9.775e-06 (0.17)	-6.138e-06 (-0.11)	-0.000 (-0.42)
BDR Coefficient (1- λ) bdr/bdr_t1 L1	0.471* * (2.49)	0.242*** (3.44)	0.125 (1.00)	0.471*** (3.29)	0.195*** (2.85)	0.209** (2.39)	0.174*** (2.69)	0.219*** (3.53)	0.279*** (4.25)
Implied speed of adjustment (λ)	52.93%	75.81%	87.47%	52.87%	80.55%	79.14%	82.59%	78.13%	72.07%
Implied half-life	0.92 years	0.49 years	0.33 years	0.92 years	0.42 years	0.44 years	0.40 years	0.46 years	0.54 years
Obs.	238	238	238	212	187	211	212	236	238
R^2	0.40	-	0.25	0.41	-	-	-	-	-
Wald Chi2	355.19	51.81	12.63	7.24	15.70	94.89	95.30	156.65	79.17
Prob > Chi2	0.00	0.00	0.00	0.00	0.047	0.00	0.00	0.00	0.00
Durbin-Watson	2.04	2.04	2.04	2.08	2.04	2.04	2.04	2.04	2.04
Sargan (df)					43.21 (35)	62.03 (44)	54.78 (43)	76.16 (53)	

Table 5.11: Panel 1 MDR Regression Output and Speeds of Adjustment: Mining Firms

Regression results for the partial adjustment models 3 and 4:

$$MDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots\dots\dots\dots\dots\dots [Model\ 3]$$

$$MDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T-1} + \varepsilon_{i,T} \dots\dots\dots\dots\dots\dots [Model\ 4]$$

Where λ is the adjustment speed on the lagged market-to-debt ratio (MDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. Model 4 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The variables determining the firm's long-run target leverage and the speed of adjustment are: ***div_t; capex; asset; ndts; mtb; fdist and roe***, and these are defined in Section 4.4.3.7 and in Table 5.1.T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 156.42 and Prob>Chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
Variables	GLS Random Effects Model 3	ML Random Effects Model 3	Fixed Effects Model 3	Time Series Model 3	Arellano and Bond (1991) Model 3	Arellano and Bond (1991) Model 4	Blundell and Bond (1998) Model 3	Blundell and Bond (1998) Model 4	Random Effects Tobit Model 3
Actual dividend paid	9.592e-10	9.208e-10	7.749e-10	1.447e-09	1.129e-09	-1.704e-09	1.849e-09	-2.070e-09	6.543e-11
(div_t)	(0.640	(0.27)	(0.430	(0.67)	(0.48)	(-0.59)	(0.95)	(-0.70)	(0.02)
Capital expenditure	1.217e-10	-1.160e-11	-5.288e-10	-9.842e-11	-8.423e-10	2.752e-09***	-2.942e-10	2.574e-09***	2.324e-10
(capex)	(0.24)	(-0.01)	(-0.87)	(-0.11)	(-1.36)	(5.09)	(-0.31)	(3.34)	(0.15)
Asset tangibility	-0.011	0.021	0.038	-0.007	0.048	-0.080	0.053	-0.042	0.027
(asset)	(-0.40)	(0.43)	(0.59)	(-0.14)	(0.36)	(-1.20)	(0.48)	(-0.65)	(0.38)
Non-debt tax shields	-0.022	-0.578	-1.89***	0.063	-2.675***	-0.604	-2.163***	0.060	-1.60**
(ndts)	(-0.06)	(-1.05)	(-2.85)	(0.12)	(-3.16)	(-0.57)	(-3.34)	(0.06)	(-2.50)
Firm growth rate	0.005**	0.006**	0.008***	0.006**	0.012***	-0.019***	0.011***	-0.020***	0.011***
(mtb)	(2.32)	(2.02)	(5.01)	(2.18)	(5.19)	(-4.10)	(7.35)	(-3.36)	(2.83)
Financial distress	-0.006***	-0.006***	-0.006***	-0.006***	-0.002	-0.006***	-.00181347	-0.007***	-0.006***
(fdist)	(-2.67)	(-3.91)	(-3.11)	(-2.65)	(-0.74)	(-3.67)	(-0.52)	(-5.72)	(-3.35)
Firm profitability	2.865e-06***	4.411e-06	6.018e-06***	3.165e-06	9.433e-06***	4.789e-07	9.621e-06***	5.071e-07	0.000
(roe)	(3.02)	(1.64)	(5.84)	(0.16)	(18.700	(0.95)	(17.46)	(0.84)	(0.64)
MDR Coefficient	0.640***	0.469***	0.314***	0.627***	0.432***	0.401***	0.539***	0.501***	0.436***
(1- λ) mdr/mdr_t1 L1	(6.96)	(5.74)	(4.97)	(4.86)	(2.73)	(3.33)	(3.83)	(5.28)	(5.23)
Implied speed of adjustment (λ)	36.00%	53.12%	68.64%	37.34%	56.79%	59.87%	46.15%	49.86%	56.45%
Implied half-life	1.55 years	0.91 years	0.60 years	1.48 years	0.83 years	0.76 years	1.12 years	1.0 years	0.83 years
Obs.	233	233	233	208	183	207	208	232	233
R^2	0.501	-	0.242	0.485	-	-	-	-	-
Wald Chi2	-	158.74	1338.43	12.14	926.16	110.11	476.41	279.75	64.93
Prob > Chi2	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.99	1.99	1.99	2.06	1.99	1.99	1.99	1.99	1.99
Sargan (df)					55.95 (35)	77.13 (44)	75.11 (43)	91.76 (53)	

5.5.3.3 Model 5 Correlation Results (Changes in Debt Issued): Mining Firms

The test results of model 5 are presented in Table 5.12 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of the table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 18.93 and Prob>Chi2 is 0.0008 ($p < 0.05$). This statistic soundly rejects the null hypothesis that the GLS RE estimator is consistent. It confirms the fixed effects model as a more consistent estimator in this case. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. The Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for both the Arellano and Bond and Blundell and Bond models.

Asset tangibility*:* The correlation results for asset tangibility are mixed, with the ML RE and FE estimators showing a positive correlation between asset tangibility and changes in debt issued. The remainder of the estimators shows a negative correlation, with the B&B coefficients being significant at 10%. Asset tangibility is negatively correlated to changes in debt. The correlation results on asset tangibility are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.3 and 5.5.2.3 respectively. They are consistent with the predictions of the pecking order hypothesis on asset tangibility. Hypothesis 1 is therefore rejected and hypothesis 2 is accepted.

Financial distress: The correlation results for financial distress are mixed. The TS estimator predicts a weak positive correlation between financial distress and changes in debt issued, whilst the rest of the estimators confirm a weak negative correlation. Financial distress is negatively correlated to changes in debt issued. The correlations results are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.3 and 5.5.2.3 respectively. They confirm the validity of both theories. Both hypotheses 5 and 6 are thus accepted. The leverage of the mining firms decreases with increasing financial distress.

Profitability: All the estimators predict a positive correlation between profitability and changes in debt issued. The coefficients are all insignificant at the levels of 1%, 5% and 10%. Profitability is positively correlated to changes in debt issued. Leverage is directly proportional to the firm's profitability. The correlation results are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.3 and 5.5.2.3 respectively. They are consistent with the predictions of the trade-off theory on profitability. Hypothesis 8 is therefore rejected. The trade-off hypothesis 7 is accepted.

Firm growth rate: The ML RE estimator shows a weak positive correlation between growth rate and changes in debt issued. All the other estimators confirm a weak negative correlation between firm growth rate and changes in debt issued. Firm growth rate is negatively correlated to changes in debt issued in the case of the mining firms. The correlation results on firm growth rate are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.3 and 5.5.2.3 respectively. They are consistent with the predictions of the trade-off hypothesis on firm growth rate. Thus hypothesis 12 is rejected and hypothesis 11 is accepted.

Non-debt tax shields: All the estimators predict a negative correlation between non-debt tax shields and changes in debt issued. The A&B and B&B coefficients are significant at 1% and 5 % respectively. The correlation results on non-debt tax shields confirm the trade-off hypothesis. The results are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.3 and 5.5.2.3 respectively.

Actual dividend paid: The actual dividend paid is positively correlated to changes in debt issued, with all the estimators confirming the correlation. Actual dividend paid is, however, a weak predictor of changes in debt issued in the mining firms. The correlation results are similar to those of the full sample described in Section 5.5.1.3 above. They confirm the hypotheses of both the trade-off and pecking order theories concerning the effect of dividends on leverage. Both hypotheses 16 and 17 are therefore accepted. The leverage of the mining firms increases with increasing dividends.

Capital expenditure: The results for the mining firms show a positive correlation between capital expenditure and changes in debt issued, with all estimators having coefficients that are significant at 1%, 5% and 10%. Capital expenditure is a strong predictor of the changes in debt issued in the mining firms. The correlation results on capital expenditure are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.3 and 5.5.2.3 respectively. They are consistent with the predictions of the pecking order hypothesis concerning the effect of capital expenditure on changes in debt issued. Hypothesis 18 is therefore rejected and hypothesis 19 is accepted.

Changes in working capital: The results show a significant positive correlation between changes in working capital and changes in debt issued. The changes in working capital are a significant predictor of the changes in debt issued in the mining firms. The correlation results on changes in working capital are similar to those of the full sample described in Section 5.5.1.3 above. They are consistent with the predictions of the pecking order hypothesis concerning the effect of changes in working capital on changes in debt issued. Hypothesis 20 is therefore accepted.

Long-term debt repaid: There is a significant negative correlation between long-term debt repaid and changes in debt issued. The correlation results on long-term debt repaid are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.3 and 5.5.2.3 respectively. They are consistent with the predictions of the pecking order hypothesis concerning the effect of long-term debt repaid on changes in debt issued. Hypothesis 21 is therefore accepted.

For the mining firms, non-debt tax shields, capital expenditure and changes in working capital are significant determinants of changes in debt issued. The results on financial distress and dividend paid confirm the predictions of both theories. The correlation results concerning asset tangibility, capital expenditure, changes in working capital and long-term debt repaid confirm the validity of the pecking order hypothesis. On the other hand, the results concerning profitability, growth rate and non-debt tax shields confirm the validity of the trade-off hypothesis.

As with the correlations for the full sample, described in Section 5.5.1.3 above, an analysis of these results indicates that the correlation results largely depend on the model fitted, as well as the choice of estimator. The estimators do not give consistent results for the same models. The results further confirm the validity and complementary nature of the two theories in explaining the financing behaviour of firms.

Table 5.12: Panel 1 Changes in Debt Issued Regression Output: Mining Firms

Regression results for model 5:

$$\Delta D_{i,T} = \beta_0 + \beta_1 ASSET_{i,T} + \beta_2 FDIST_{i,T} + \beta_3 ROE_{i,T} + \beta_4 MTB_{i,T} + \beta_5 NDTS_{i,T} + \beta_6 DIV_{i,T} + \beta_7 CAPEX_{i,T} + \beta_8 \Delta WC_{i,T} + \beta_9 R_{i,T} + c_{i,T} + \varepsilon_{i,t} \quad [Model\ 5]$$

Where $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T}$ is an error term. The variables determining the firm's changes in long-term debt issued are defined in Section 4.4.3.7 and in Table 5.9. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 18.93 and Prob>Chi2 is 0.0008. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

	Static Panel Estimators				Dynamic Panel Estimators	
Variables	GLS Random Effects	ML Random Effects	Fixed Effects	Time Series	Arellano and Bond (1991)	Blundell and Bond (1998)
Asset tangibility (asset)	-108297.09 (-0.74)	91078.3 (0.13)	428308.43 (0.75)	-28242.87 (-0.04)	-156548.12 (-0.38)	-1312841.2* (-1.83)
Financial distress (fdist)	2052.93 (0.72)	-152.52 (-0.01)	-184.50 (-0.04)	477.56 (0.17)	-3495.071 (-0.59)	-5867.28 (-0.72)
Profitability (roe)	-2.43 (-0.73)	3.94 (0.11)	8.22 (1.08)	2.98 (0.24)	8.83 (0.92)	8.29 (0.92)
Firm growth rate (mtb)	35487.32 (-1.52)	5087.44 (0.12)	-5451.60 (-0.35)	-18468.72 (-0.73)	-40477.02 (-1.46)	-29248.38 (-0.84)
Non-debt tax shields (ndts)	-4547756.6 (-0.97)	-7793996 (-1.17)	-5890952.8 (-1.42)	-14106104 (-1.51)	-8655479.7*** (-2.87)	-17120045** (-2.43)
Actual dividend paid (div_t)	0.005 (0.04)	0.087 (1.25)	0.170 (1.65)	0.103 (0.50)	0.214* (1.86)	0.051 (0.31)
Capital expenditure (capex)	0.336*** (4.16)	0.411*** (16.96)	0.449*** (6.21)	0.475*** (5.49)	0.505*** (6.74)	0.396*** (4.22)
Changes in working capital (wc_t)	0.954*** (5.92)	0.825*** (10.23)	0.800*** (7.75)	0.679*** (2.61)	0.795*** (7.00)	0.782*** (5.46)
Long-term debt repaid (r_t)	-0.011 (-0.21)	-0.075** (-2.74)	-0.099** (-2.80)	-0.196* (-1.94)	-0.143** (-2.44)	-0.052 (-0.90)
Obs.	260	260	260	235	212	236
R^2	0.78	-	0.74	0.81	-	-
Wald Chi2	2670.81	363.02	232.70	5.50	1258	11726.34
Prob > Chi2	0.000	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.54	1.54	1.54	1.91	1.54	1.54
Sargan (df)					154.67 (44)	240.38 (53)

5.5.4 Panel 1 Results for Retail Firms: Trade-off Theory versus Pecking Order Theory

This section discusses the empirical results for the retail firms. The results of models 1, 2, 3 and 4 are discussed first. The results of model 5 are discussed in the last part of the section. The summary of statistics for the retail firms is contained in Table 5.13 below.

Table 5.13: Panel 1 Summary of Statistics for the Retail Firms

The Panel 1 sample consists of 21 retail firms with complete data for nine or more consecutive years during the period 2000-2010. There are a total of 230 observations for the period. The ridge procedure was not used for the dependent variables, bdr, mdr and change in debt issued. The extended definitions of variables are contained in Section 4.4.3.7.

Changes in working capital (wc_t) (R'm): the changes in working capital
Cash flow from operations (c_t) (R'm): the cash ex-operations
Actual dividend paid (div_t) (R'm): the actual ordinary dividends and preference dividends paid during the year
Capital expenditure (capex) (R'm): the sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries
Long-term debt repaid (r_t) (R'm): the current portion of long-term debt
Asset tangibility (asset): the fixed assets scaled up by the total assets
Firm size (size): the natural logarithm of total assets
Non-debt tax shields (ndts): the depreciation charge scaled up by the total assets
Firm growth rate (mtb): the sum of the market equity preferred shares and the total debt less the deferred taxes; this is scaled up by the total assets
Financial distress (fdist): the De la Rey (1981) financial distress ratio
Firm profitability (roe): the profit after taxation scaled up by total owners' equity
Earnings volatility (vol) (R'm): the standard deviation of profit before tax
Book-to-debt ratio (bdr): the total debt scaled up by the total assets
Market-to-debt ratio (mdr): the total debt scaled up by the sum of the total debt and the firm market capitalisation
Change in debt issued (d_change_t) (R'm): the sum of: dividend paid, capital expenditure, changes in working capital and long-term debt repaid, less cash flow from operations

Variable	Obs.	Mean	SD	Min.	Max.
Changes in working capital (wc_t)(R'm)	230	-41,709.09	246,177.5	-1,943,838	1,304,638
Cash flow operations (c_t) (R'm)	230	528,760.4	778,328.1	-92,106	4,967,000
Actual dividend paid (div_t) (R'm)	230	142,532.5	233,492.8	-118	1,396,200
Capital expenditure (capex) (R'm)	230	349,543.4	833,136	-163,114	6,987,762
Long-term debt repaid (r_t) (R'm)	230	168,181	587,313.4	0	4,896,941
Asset tangibility (asset)	230	0.173	0.117	0.003	0.56
Firm size (size)	230	14.06	1.67	8.29	17.48
Non-debt tax shields (ndts)	230	0.029	0.016	0.001	0.074
Firm growth rate (mtb)	230	1.42	1.13	-0.074	5.59
Financial distress (fdist)	230	1.01	1.37	-3.38	8.36
Firm profitability (roe)	230	108.25	894.83	-844.8	12,555.81
Earnings volatility (vol) (R'm)	230	363,848.6	408,837.2	3,913.36	1,535,820
Book-to-debt ratio (bdr)	230	0.094	0.146	0	0.758
Market-to-debt ratio (mdr)	230	0.118	0.226	0	0
Change in debt issued (d_change_t)(R'm)	230	116,301.7	437,644.5	0	2,938,200
# Obs. Market-to-debt ratio =0	48 (20.27%)				
# Obs. Market-to-debt ratio =1	8 (3.48%)				
# Obs. Market-to-debt ratio >1	0 (0.00%)				
# Obs. Book-to-debt ratio = 0	48 (20.27%)				
# Obs. Book-to-debt ratio = 1	0 (0.00%)				
# Obs. Book-to-debt ratio> 1	0 (0.00%)				

5.5.4.1 Model 1, 2, 3 and 4 Correlation Results: Retail Firms

The test results for models 1, 2, 3 and 4 are contained in Tables 5.14 and 5.15 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is15.28 and Prob>Chi2 is 0.0092 for BDR and the test statistic's Chi2 is 42.48 and Prob>Chi2 is 0.0000 for MDR. This statistic rejects the null hypothesis that the GLS RE estimator is consistent ($p < 0.05$) and it confirms the fixed effects model as a more consistent estimator in both cases. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. In both BDR and MDR regressions, the Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond and Blundell and Bond models. In cases where the estimators give coefficients with different directions, the ultimate correlation is determined by the direction of the majority of the coefficients. In a situation where there is no clear direction from all the estimators, the result is classified as inconclusive.

Actual dividend paid: In model 1, all the estimators except the FE and RE Tobit estimators predict a negative correlation between the dividend paid and the BDR. The results of model 3 are mixed, with ML RE and A&B estimators predicting a negative correlation. The results of models 2 and 4 are mixed. The results are inconclusive. They reject the hypotheses of both the trade-off and pecking order theories on the effect of dividends on leverage. Both hypotheses 16 and 17 are therefore rejected.

Capital expenditure: Except for those of the A&B estimator, all the results of models 1 and 2 show positive correlations between capital expenditure and the BDR. The coefficients are highly significant for the ML RE and FE estimators. The results of both models 3 and 4 confirm a positive correlation between capital expenditure and the MDR, with the FE and A&B coefficients being significant at 5% and 10% respectively. Capital expenditure is a significant predictor of the BDR and the MDR in the retail firms. Capital expenditure is therefore positively and significantly correlated to both the

BDR and the MDR in the retail firms. The correlation results on capital expenditure are similar to those of the full sample and of the manufacturing firms described in Sections 5.5.1.1.and 5.5.2.1 above. They are consistent with the predictions of the pecking order hypothesis on capital expenditure. Hypothesis 18 is thus rejected and hypothesis 19 is accepted. In the retail firms, leverage increases with capital expenditure.

Asset tangibility: In model 1, both the RE Tobit estimator predicts a weak positive correlation between asset tangibility and the BDR, whilst the balance of the estimators shows a weak negative correlation. Asset tangibility is negatively correlated to the MDR in model 3. The results for model 2 show a weak negative correlation and the results for model 4 show a positive correlation, with both coefficients being significant at 10%. Asset tangibility is therefore negatively correlated to both the BDR and the MDR. It is a weak predictor of the BDR and the MDR in the retail firms. The results are similar to those of the full sample, and of the manufacturing and mining firms described in Sections 5.5.1.1, 5.5.2.1 and 5.5.3.1 above. They confirm the pecking order hypothesis while rejecting the trade-off hypothesis. Hypothesis 1 is thus rejected and hypothesis 2 is accepted. The leverage of the retail firms is inversely proportional to asset tangibility.

Non-debt tax shields: In model 1, all the estimators except the ML RE estimator predict a weak negative correlation between the non-debt tax shields and the BDR. The results of both models 2 and 4 show a negative correlation, with the model 4 coefficients being significant at 10%. With the exception of the FE estimator, all the estimators in model 3 show a negative correlation between non-debt tax shields and the MDR. Non-debt tax shields are therefore negatively correlated to both the BDR and the MDR. The results are similar to those of the full sample and of the manufacturing and mining firms described in Sections 5.5.1.1, 5.5.2.1 and 5.5.3.1 above. They are consistent with the predictions of the trade-off theory on non-debt tax shields. Hypothesis 13 is thus accepted. The leverages of the retail firms decrease with an increase in the firms' non-debt tax shields.

Firm growth rate: The results of model 1 confirm a negative correlation between firm growth rate and the BDR. The results for model 2 show a weak positive correlation. In model 3, the FE, TS and B&B estimators show a negative correlation, whilst the rest of the estimators show a positive correlation between firm growth rate and the MDR. The results of model 4 confirm a significant negative correlation. Firm growth rate is a weak predictor of the BDR and the MDR in the retail firms, and it is negatively correlated to leverage. These results reject the pecking order hypothesis while confirming the trade-off hypothesis. Hypothesis 12 is thus rejected while hypothesis 11 is accepted. These results are consistent with the findings of Ali Ahmed and Hisham (2009:63); Fan, Titman and Twite (2012:39); Frank and Goyal (2009:26); Mukherjee and Mahakud (2012:51); and Rajan and Zingales (1995:1453), and they confirm the predictions of the trade-off theory. According to the trade-off theory, high growth firms have higher non-debt tax shields which come from increased depreciation charges. The non-debt tax shields are perfect substitutes for the debt interest tax shields (DeAngelo & Masulis, 1980:27). The presence of non-debt tax shields therefore makes debt finance unattractive, as its benefit is already captured. High-growth firms will therefore rely more on equity financing than on debt. This implies an inverse relationship between the changes in debt issued and the growth rate. The financing behaviour of the firms in the retail sector is consistent with this hypothesis. High-growth firms also tend to be unprofitable. Their taxable profits may not fully offset both the debt interest and non-debt tax shields, and hence these firms are forced to reduce their interest to the minimum.

Financial distress: In model 1, all the estimators except the ML RE and TS estimators predict a weak negative correlation between financial distress and the BDR. The results of model 2 predict a significant negative correlation. Both models 3 and 4 predict a strong negative correlation between financial distress and the MDR. There is a negative correlation between financial distress and both the BDR and the MDR. Financial distress is a weak predictor of the BDR in the retail firms, but it is a significant predictor of the MDR in the retail firms. The correlations are similar to those of the full sample and of the manufacturing and mining firms described in Sections 5.5.1.1, 5.5.2.1 and 5.5.3.1 above. The results confirm the validity of both theories, and hypotheses 5 and 6 are thus accepted. The leverage of the retail firms decreases with an increase in financial distress.

Firm profitability: The results of models 1, 2 and 3 all confirm a positive correlation between firm profitability and both the BDR and the MDR. All the coefficients of models 1 and 2 are significant at 1% and 5%. The results of model 4 are mixed. There is a positive correlation between profitability and both the BDR and the MDR. The correlation is highly significant for the BDR. Profitability is a strong predictor of the BDR in the retail firms. On the other hand, it is a weak predictor of the MDR in the retail firms. Profitability is positively correlated to leverage. The correlation results are similar to those of the full sample and of the manufacturing and mining firms described in Sections 5.5.1.1, 5.5.2.1 and 5.5.3.1 above. They are consistent with the predictions of the trade-off theory on profitability. Hypothesis 8 is thus rejected. In the retail firms, leverage increases with an increase in firm profitability.

The most significant determinants of leverage in the retail firms are capital expenditure, financial distress and profitability. The correlation results for dividends paid reject the hypotheses of both theories, whilst the financial distress correlations confirm the validity of the theories. Capital expenditure and asset tangibility correlations confirm the validity of the pecking order theory in the retail firms. On the other hand, the correlation results concerning firm growth rate, non-debt tax shields and firm profitability confirm the validity of the trade-off theory. These results are similar to those of the full sample and of the manufacturing and mining firms. They further confirm the findings of Mukherjee and Mahakud (2012:51) and Myers (2008:239) that the trade-off and pecking order theories are complementary. As with the results for the full sample, described in Section 5.4.1.1 above, these results indicate that the correlation results largely depend on the dependent variable used, the model fitted, and the choice of estimator.

The results concerning the speed of adjustment estimates for the full sample are discussed below.

5.5.4.2 Model 1, 2, 3 and 4 Speed of Adjustment Results: Retail Firms

The speed of adjustment estimation results of models 1, 2, 3 and 4 are contained in Tables 5.14 and 5.15 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, the Durbin-Watson statistics together with the Sargan test statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. As explained in section 5.5.1.1 above, the GLS RE estimator is inconsistent and hence its results were excluded in the determination of the ultimate average and range of speed of target adjustment.

Retail firms: All the estimators in models 1 and 2 yield significant and positive correlations, but the FE, TS, A&B and B&B estimators all fail in models 3 and 4. Thus only the ML RE and RE Tobit estimators yield significant and positive correlations for these models. Model 4 cannot be estimated for the retail firms. In models 1 and 2, the mean speed of adjustment for the retail firms is 39.97% (1.63 years) and the range is between 23.38% (2.08 years) and 78.98% (0.44 years). The average speed of adjustment in model 3 is 43.54% (1.21 years) and the range is between 42.48% (1.25 years) and 44.60% (1.17 years). The true speed of adjustment for the retail firms in this sample is 28.42% (2.07 years) for the BDR and 42.48% (1.25 years) for the MDR. This is lower than the speed for the full sample and for the manufacturing and retail firms. It is, however, closer to the speeds of the US and European firms described in Section 5.5.1.2 above. The retail firms adjust their speeds less frequently. These firms have the lowest capital expenditures, and this implies that they may not be very active in the capital markets.

As with the correlation results discussed in Section 5.5.1.2 above, the speed of adjustment is affected by the dependent variable used (BDR or MDR), the estimator used and the model fitted.

Table 5.14: Panel 1 BDR Regression Output and Speeds of Adjustment: Retail Firms

Regression results for the partial adjustment models 1 and 2:

$$BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \dots\dots\dots\dots\dots\dots [Model\ 1]$$

$$BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T} \dots\dots\dots\dots\dots\dots [Model\ 2]$$

Where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. Model 2 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The variables determining the firm's long-run target leverage and the speed of adjustment are: ***div_t; capex; asset; ndts; mtb; fdist and roe***, and these are defined in Section 4.4.3.7 and in Table 5.1. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 15.28 and Prob>Chi2 is 0.0092. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 1	ML Random Effects Model 1	Fixed Effects Model 1	Time Series Model 1	Arellano and Bond (1991) Model 1	Arellano and Bond (1991) Model 2	Blundell and Bond (1998) Model 1	Blundell and Bond (1998) Model 2	Random Effects Tobit Model 1
Actual dividend paid (div_t)	-7.493e-09 (-0.36)	-7.747e-09 (-0.27)	6.112e-10 (0.03)	-5.732e-09 (-0.19)	-1.964e-08 (-0.37)	-5.353e-08* (-1.95)	-3.908e-09 (-0.10)	2.765e-09 (0.06)	1.085e-08 (0.30)
Capital expenditure (capex)	1.794e-08*** (4.13)	1.790e-08** (2.11)	2.298e-08*** (3.11)	2.008e-08 (1.62)	-7.448e-09 (-0.41)	6.503e-09 (0.39)	2.436e-09 (0.34)	2.037e-08** (2.14)	2.084e-08* (1.90)
Asset tangibility (asset)	0.004 (0.07)	-0.003 (-0.04)	-0.011 (-0.05)	-0.007 (-0.09)	-0.136 (-0.46)	-0.406* (-1,.72)	-0.080 (-0.23)	-0.319 (-1.52)	0.046 (0.46)
Non-debt tax shields (ndts)	0.231 (0.58)	0.139 (0.30)	-1.72 (-1.20)	0.301 (0.52)	-2.30 (-1.24)	-0.935 (-0.75)	-1.90 (-1.15)	-0.253 (-0.37)	-0.682 -0.91)
Firm growth rate (mtb)	-0.007 (-0.87)	-0.005 (-0.63)	-0.011 (-1.23)	0.002 (0.16)	-0.019 (-1.34)	0.007 (0.540	-0.009 (-0.75)	0.015 (0.93)	-0.004 (-0.37)
Financial distress (fdist)	0.006 (0.75)	0.004 (0.70)	-0.003 (-0.32)	0.000 (0.04)	-0.006 (-0.81)	-0.037** (-2.53)	-0.005 (-0.53)	-0.045*** (-3.06)	-0.001 (-0.18)
Firm profitability (roe)	0.000*** (8.46)	0.000*** (2.66)	0.000*** (6.39)	0.000** (2.39)	0.000*** (10.87)	0.000*** (7.61)	0.000*** (3.43)	0.000*** (6.93)	0.000** (2.34)
BDR Coefficient (1- λ) bdr/bdr_t1 L1	0.813*** (26.57)	0.764*** (11.35)	0.565*** (6.320	0.745*** (6.80)	0.210*** (5.19)	0.576*** (9.12)	0.510*** (5.43)	0.716*** (12.11)	0.716*** (9.61)
Implied speed of adjustment (λ)	18.74%	23.58%	43.51%	25.48%	78.98%	42.43%	48.97%	28.38%	28.42%
Implied half-life	3.34 years	2.58 years	1.21 years	2.36 years	0.44 years	1.26 years	1.03 years	2.08 years	2.07 years
Obs.	208	208	208	185	163	184	185	206	208
R^2	0.72	-	0.63	0.65	-	-	-	-	-
Wald Chi2	5609.45	259.23	1452.71	26.06	806.40	619.51	1625.47	2698.46	183.87
Prob > Chi2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durbin-Watson	1.95	1.95	1.95	1.97	1.95	1.95	1.95	1.95	1.95
Sargan (df)					74.74 (35)	68.82 (44)	98.65 (43)	97.46 (53)	

Table 5.15: Panel 1 MDR Regression Output and Speeds of Adjustment: Retail Firms

Regression results for the partial adjustment models 3 and 4:

$$MDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1} \ldots\ldots\ldots\ldots\ldots\ldots [Model\ 3]$$

$$MDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T-1} + \varepsilon_{i,T} \ldots\ldots\ldots\ldots\ldots\ldots [Model\ 4]$$

Where λ is the adjustment speed on the lagged market-to-debt ratio (MDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. Model 4 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The variables determining the firm's long-run target leverage and the speed of adjustment are: ***div_t; capex; asset; ndts; mtb; fdist and roe***, and these are defined in Section 4.4.3.7 and in Table 5.1.T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 42.48 and Prob>Chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 3	ML Random Effects Model 3	Fixed Effects Model 3	Time Series Model 3	Arellano and Bond (1991) Model 3	Arellano and Bond (1991) Model 4	Blundell and Bond (1998) Model 3	Blundell and Bond (1998) Model 4	Random Effects Tobit Model 3
Actual dividend paid (div_t)	-3.020e-08 (-1.14)	-1.634e-08 (-0.30)	6.570e-08 (1.28)	2.235e-08 (0.27)	7.024e-08 (1.39)	2.003e-08 (0.74)	-3.684e-08 (-0.35)	-1.961e-08 (-0.52)	2.188e-08 (0.34)
Capital expenditure (capex)	2.043e-08*** (3.54)	2.257e-08 (1.56)	3.177e-08** (2.62)	1.041e-08 (0.40)	1.261e-08* (1.93)	7.753e-09 (0.83)	1.296e-08 (1.09)	6.377e-10 (0.04)	2.633e-08 (1.45)
Asset tangibility (asset)	-0.087 (-0.66)	-0.131 (-1.00)	-0.535 (-1.03)	-0.736 (-1.09)	-0.533 (-0.92)	0.680* (1.93)	-0.394 (-0.73)	0.641* (1.81)	-0.076 (-0.47)
Non-debt tax shields (ndts)	-0.867 (-1.10)	-0.845 (-1.07)	0.548 (0.30)	-0.247 (-0.14)	-3.478 (-1.44)	-7.471** (-2.08)	-8.533* (-1.66)	-9.332** (-2.23)	-1.851* (-1.74)
Firm growth rate (mtb)	0.009 (0.79)	0.007 (0.50)	-0.002 (-0.120	-0.003 (-0.13)	0.011 (0.53)	-0.053** (-2.37)	-0.012 (-0.36)	-0.054** (-2.07)	0.020 (-1.02)
Financial distress (fdist)	-0.019 (-1.60)	-0.020* (-1.93)	-0.027** (-2.60)	-0.030 (-1.37)	-0.052*** (-3.73)	-0.048*** (-3.09)	-0.044*** (-3.24)	-0.045*** (-2.94)	-0.038*** (-2.75)
Firm profitability (roe)	1.193e-06 (0.40)	1.460e-06 (0.14)	3.154e-06 (0.85)	3.423e-06 (1.07)	4.160e-06 (1.05)	4.994e-07 (0.30)	3.467e-06 (0.76)	-1.741e-06 (-0.64)	2.532e-06 (0.21)
MDR Coefficient (1- λ) mdr/mdr_t1 L1	0.608*** (6.82)	0.554*** (6.77)	0.368 (1.61)	-0.235 (-1.31)	0.190 (0.75)	0.241 (1.35)	0.123 (0.49)	0.189 (1.10)	0.575*** (6.07)
Implied speed of adjustment (λ)	39.20%	44.60%	63.23%	-	80.98%	75.89%	87.26%	81.05%	42.48%
Implied half-life	1.39 years	1.17 years	0.69 years	-	0.42 years	0.49 years	0.34 years	0.42 years	1.25 years
Obs.	209	209	209	187	166	187	187	208	209
R^2	0.554	-	0.425	0.149	-	-	-	-	-
Wald Chi2	276.69	165.11	29,.52	0.75	96.19	73.18	429.10	94.59	96.96
Prob > Chi2	0.000	0.000	0.000	0.649	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.69	1.69	1.69	1.818662	1.69	1.69	1.69	1.69	1.69
Sargan (df)					97.61 (35)	99.90 (44)	136.17 (43)	145.74 (53)	

5.5.4.3 Model 5 Correlation Results (Changes in Debt Issued): Retail Firms

The test results of model 5 are presented in Table 5.16 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of the table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 6.26 and Prob>Chi2 is 0.1803. This statistic confirms the null hypothesis that the GLS RE estimator is consistent ($p > 0.05$). The fixed effects model is biased in this case. The results of the FE model were excluded in the determination of the ultimate correlation of each variable. The Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for both the Arellano and Bond and Blundell and Bond models.

Asset tangibility*:* All the estimators except the B&B estimator confirm a weak negative correlation between asset tangibility and changes in debt issued. Asset tangibility is negatively correlated to changes in debt issued. The correlation results on asset tangibility are similar to those of the full sample and of the manufacturing and mining firms described in Sections 5.5.1.3, 5.5.2.3 and 5.5.3.3 above. They are consistent with the predictions of the pecking order hypothesis on asset tangibility. Hypothesis 1 of the trade-off theory is thus rejected and hypothesis 2 is accepted.

Financial distress: The results of all the estimators confirm a weak negative correlation between financial distress and changes in debt issued. The correlation results are similar to those for the full sample and for the manufacturing and mining firms described in Sections 5.5.1.3, 5.5.2.3 and 5.5.3.3 above. They confirm the validity of both theories. Both hypotheses 5 and 6 are thus accepted. The leverages of the retail firms decrease with increasing financial distress.

Profitability: All the estimators except the FE and A&B estimators confirm a weak negative correlation between profitability and changes in debt issued. Thus profitability is negatively correlated to changes in debt issued. Ali

Ahmed and Hisham (2009:63); Kayhan and Titman (2007:28); and Shyam-Sunder and Myers (1999:242) found similar results. These results confirm the pecking order hypothesis; the trade-off hypothesis on profitability is rejected in the case of the retail firms. The changes in debt issued decrease with increasing firm profitability, and this means that profitable retail firms issue less debt. This financing behaviour corresponds with the predictions of the pecking order theory (Myers & Majluf, 1984:220). According to the perking order theory, firms have sticky dividend policies and they prefer internal finance to external finance (Myers, 2008:235). The main driver of external finance is the size of the firm's internal funds deficit. Following the arguments advanced by this theory, profitable firms face smaller or no internal funds deficits, and they require less external finance, which is raised in a pecking order with debt being the preferred choice. This therefore means that changes in debt issued decrease with increasing firm profitability. The retail firms in this study confirm this prediction.

Firm growth rate: Firm growth rate is negatively correlated to changes in debt issued in the retail firms. The correlation results on firm growth rate are similar to those of the full sample and of the manufacturing and mining firms described in Sections 5.5.1.3, 5.5.2.3 and 5.5.3.3 above. They are consistent with the predictions of the trade-off hypothesis on firm growth rate. Thus hypothesis 11 is accepted and hypothesis 12 is rejected.

Non-debt tax shields: All the estimators predict a negative correlation between non-debt tax shields and changes in debt issued. The correlation results on non-debt tax shields confirm the trade-off hypothesis. The results are similar to those of the full sample and of the manufacturing and mining firms described in Sections 5.5.1.3, 5.5.2.3 and 5.5.3.3 above.

Actual dividend paid: The correlation results are mixed, with the ML RE and TS estimators predicting a negative correlation between actual dividend paid and changes in debt issued. The net correlation between dividend paid and changes in debt issued is negative. The correlation results reject both hypotheses 16 and 17. They reject both the pecking order and trade-off theories. The leverage of the manufacturing firms decreases with increasing dividends. These results are inconsistent with the finding of Ali Ahmed and Hisham (2009:63); Kayhan and Titman (2007:28); and Shyam-Sunder and Myers (1999:242).

Capital expenditure: The results of all the estimators confirm a significant positive correlation between capital expenditure and changes in debt issued. Capital expenditure is a strong predictor of changes in debt issued in the retail firms. The correlation results on capital expenditure are similar to those of the full sample and of the manufacturing and mining firms described in Sections 5.5.1.3, 5.5.2.3 and 5.5.3.3 above. They are consistent with the predictions of the pecking order hypothesis on the effect of capital expenditure on changes in debt issued. Hypothesis 18 is thus rejected and hypothesis 19 is accepted.

Changes in working capital: Changes in working capital are negatively correlated to changes in debt issued. The ML RE and B&B coefficients are significant at 1% and 5%. As in the case of the manufacturing firms, the results reject hypothesis 20. These results are similar to those of the manufacturing firms discussed in Section 5.5.2.3 above. Working capital changes are inversely proportional to changes in debt. That is, an increase in working capital is followed by a decrease in debt issued, implying that this increase is financed through equity sources. This violates the predictions of the pecking order model on how an internal funds deficit is financed (Myers, 2008:235).

Long-term debt repaid: All the estimators confirm a negative correlation between long-term debt repaid and changes in debt issued. The A&B and B&B estimator coefficients are significant at 1% and 10% respectively. The correlation results on long-term debt repaid are similar to those of the full sample and of the manufacturing and mining firms described in Sections 5.5.1.3, 5.5.2.3 and 5.5.3.3 above. They are consistent with the predictions of the pecking order hypothesis on the effect of long-term debt repaid on changes in debt issued. Hypothesis 21 is therefore confirmed.

The most significant determinants of changes in debt in the retail firms are capital expenditure and changes in working capital. The results on financial distress confirm the predictions of both theories whilst those of actual dividends paid reject both theories. The correlation results on asset tangibility, profitability, capital expenditure and long-term debt repaid confirm the validity of the pecking order hypothesis. On the other hand, the results on growth rate and non-debt tax shields confirm the validity of the trade-off hypothesis.

As with the correlations for the full sample, described in Section 5.5.1.3 above, an analysis of these results indicates that the correlation results largely depend on the model fitted, as well as the choice of estimator. The estimators do not give consistent results for the same models.

Table 5.16: Panel 1 Changes in Debt Issued Regression Output: Retail Firms

Regression results for model 5:

$$\Delta D_{i,T} = \beta_0 + \beta_1 ASSET_{i,T} + \beta_2 FDIST_{i,T} + \beta_3 ROE_{i,T} + \beta_4 MTB_{i,T} + \beta_5 NDTS_{i,T} + \beta_6 DIV_{i,T} + \beta_7 CAPEX_{i,T} + \beta_8 \Delta WC_{i,T} + \beta_9 R_{i,T} + c_{i,T} + \varepsilon_{i,t} \quad [Model\ 5]$$

Where $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T}$ is an error term. The variables determining the firm's changes in long-term debt issued are defined in Section 4.4.3.7 and in Table 5.9. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. The Hausman test statistic Chi2 is 6.26 and Prob>Chi2 is 0.1803. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators	
	GLS Random Effects	ML Random Effects	Fixed Effects	Time Series	Arellano and Bond (1991)	Blundell and Bond (1998)
Asset tangibility (asset)	-83837.98 (-0.74)	-181390.62 (-0.74)	-813252.47 (-1.23)	-111830.55 (-0.70)	-615830.07 (-1.11)	313507.96 (0.85)
Financial distress (fdist)	-2023.60 (-1.47)	-2902.92 (-0.84)	-2940.80 (-0.90)	-2612.67 (-1.07)	-3591.05 (-1.27)	-16094.38 (-1.34)
Profitability (roe)	-2.69 (-0.62)	-1.05 (-0.06)	1.61 (0.47)	-0.437 (-0.07)	0.074 (0.01)	-22.47 (-0.83)
Firm growth rate (mtb)	-5887.83 (-0.75)	-12398.74 (-0.61)	-24858.72 (-1.68)	-11462.60 (-0.97)	-19539.64* (-1.68)	-45370.81 (-1.61)
Non-debt tax shields (ndts)	-1649764.7 (-1.57)	-2148102.8 (-1.41)	-2089593 (-1.03)	-2030588.7* (-1.86)	-1979298.7 (-1.36)	-10086596 (-1.39)
Actual dividend paid (div_t)	-0.151 (-1.02)	-0.078 (-0.75)	0.065 (0.35)	-0.174 (-1.10)	0.210 (0.64)	0.210 (0.59)
Capital expenditure (capex)	0.324*** (2.74)	0.344*** (9.80)	0.354** (3.28)	0.374*** (4.81)	0.369*** (3.95)	0.441*** (5.93)
Changes in working capital (wc_t)	-0.218*** (-3.64)	-0.172** (-2.13)	-0.116 (-1.23)	-0.213 (-1.16)	-0.276 (-1.63)	-0.283** (-2.10)
Long-term debt repaid (r_t)	0.047 (0.28)	-0.020 (-0.36)	-0.100 (-0.84)	-0.035 (-0.23)	-0.285*** (-2.75)	-0.234* (-1.67)
Obs.	229	229	229	207	186	207
R^2	0.58	-	0.466	0.493	-	-
Wald Chi2	48853.76	187.05	276.65	9.11	1967.58	2029.81
Prob > Chi2	0.000	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.65	1.65	1.65	2.01	1.65	1.65
Sargan (df)					132.32 (44)	195.57 (53)

5.6 SUMMARY

This chapter dealt with the presentation and discussion of the results obtained when testing the trade-off theory against the pecking order theory. According to Myers (2008:235), the two theories are complementary in explaining the financing behaviour of firms. The results of this study confirm the complementary nature of these two leading capital structure theories. The results are as follows:

- ***Full sample***: In the full sample, the most significant firm-specific predictors of leverage are non-debt tax shields, growth rate and financial distress. The significant determinants of changes in debt are asset tangibility, financial distress, capital expenditure and changes in working capital. The correlation results on asset tangibility, capital expenditure, firm growth rate, changes in working capital and long-term debt repaid are consistent with the pecking order theory, while the results on profitability, growth rate and non-debt tax shields confirm the validity of the trade-off theory.
- ***Manufacturing firms***: Asset tangibility, non-debt tax shields, capital expenditure, firm growth rate, financial distress, profitability and changes in working capital are the most significant predictors of both leverage and changes in debt issued. The pecking order theory is confirmed by the correlations on asset tangibility, capital expenditure, growth rate and long-term debt repaid. The correlations on profitability, growth rate and non-debt tax shields are consistent with the trade-off theory.
- ***Mining firms***: The significant predictors of leverage and changes in debt issued are non-debt tax shields, growth rate, capital expenditure, financial distress and changes in working capital. Correlations on capital expenditure, profitability, growth rate and non-debt tax shields are consistent with the trade-off theory, while correlations on asset tangibility, capital expenditure, growth rate, changes in working capital and changes in long-term debt repaid confirm the predictions of the pecking order theory.
- ***Retail firms***: The most important determinants of leverage and changes in debt issued are capital expenditure, financial distress, profitability and changes in working capital. The correlations on capital expenditure, asset tangibility and long-term debt repaid are in line with the pecking order

hypothesis, while correlations on growth rate and non-debt tax shields validate the trade-off theory.

The South African manufacturing, mining and retail firms have a positive speed of adjustment and this is further evidence in support of the dynamic trade-off theory. The firms have a target capital structure towards which they adjust over time. The speed of adjustment is higher for the mining firms and lower for the retail firms. The true speed of target adjustment for the full sample is 57.64% (0.81 years) for the BDR and 42.44% (1.25 years) for the MDR. The true speed of adjustment for the manufacturing firms is 45.08% (1.16 years) for the BDR and 44.59% (1.17 years) for the MDR. The RE Tobit true speed of adjustment for the mining firms is 72.07% (0.54 years) for the BDR and 56.45% (0.83 years) for the MDR. Retail firms have a target adjustment speed of 28.42% (2.07 years) for the BDR and 42.48% (1.25 years) for the MDR. These speeds are much higher than those of the European and US firms. This means that the South African firms adjust their capital structures more frequently than the European and US firms, as they face lower adjustment costs.

Finally, the correlations and the speeds of target adjustment are both affected by the dependent variable used (BDR or MDR), the estimator used, the model fitted and the sector of the firm. The random effects Tobit estimator is the least biased estimator, as it takes into account the fractional nature of the dependent variable.

The next chapter presents the results for models 6, 7, 8, and 9.

CHAPTER 6
RESULTS ANALYSIS: CAPITAL STRUCTURE AND KEY FINANCIAL PERFORMANCE VARIABLES

6.1 INTRODUCTION

Chapter 6 presents and discusses the empirical findings of the regression results for a model that incorporates the firm's key financial indicators. The results for target adjustment speeds are also discussed. The chapter begins with a brief description of the panel's summary statistics. This is followed by the presentation and discussion of the empirical findings of the study. The findings are grouped into four sections: those for the full sample, those for the manufacturing firms, those for the mining firms and lastly those for the retail firms. These findings relate to models 6, 7, 8 and 9 discussed in Chapter 4.

6.2 PANEL 2 SAMPLE: SUMMARY STATISTICS

The panel 2 sample is made up of 49 manufacturing, 24 mining and 23 retail firms with complete data for two or more consecutive years during the period 2005-2010. The descriptive statistics for the full sample are presented in Table 6.1, and the descriptive statistics for the individual sectors are presented in Tables 6.4, 6.7 and 6.10 below. Panel 2 is a sub-sample of panel 1, with only 7 additional manufacturing firms and 2 retail firms. The additional variables are: liquidity, price earnings, ordinary share price, retention rate and Economic Value Added. This sample was used to test for the relationship between leverage and the firm's key financial performance variables and to test for the effect of these variables on the firm's speed of target adjustment. The time period of the sample was restricted by data available on Economic Value Added (EVA) variable. The McGregor BFA's EVA history goes as far as 2004. The shorter period however increased the number of firms in each sector and it also significantly increased the balance of the panel. This section discusses the descriptive statistics of these additional variables. All the variables except the distribution of debt ratios follow the trends discussed in Chapter 5.

Table 6.1: Panel 2 Summary of Statistics for the Full Sample

The Panel 2 sample consists of 49 manufacturing, 24 mining and 23 retail firms with complete data for two or more consecutive years during the period 2005-2010. There are a total of 449 observations for the period. The sector summary statistics are contained in Tables 5.6, 5.7 and 5.8 below, and the firm size summary statistics are contained in Appendices 19 and 20. Extreme outlier observations in all explanatory variables were indentified through ridge regression and removed from the sample. The ridge procedure was not used for the dependent variables, bdr, mdr and change in debt issued. The extended definitions of variables are contained in Section 4.4.3.7.

Cash flow from operations (c_t) (R'm): the cash ex-operations
Capital expenditure (capex) (R'm): the sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries
Asset tangibility (asset): the fixed assets scaled up by the total assets
Firm size (size): the natural logarithm of total assets
Firm growth rate (mtb): the sum of the market equity, total debt and preferred shares, less deferred taxes; this is scaled up by the total assets
Financial distress (fdist): the De la Rey (1981) financial distress ratio
Liquidity (liq): the ratio of total current assets to total current liabilities
Price Earnings Ratio: the firm's year-end share price scaled up by the headlines earnings per share
Ordinary share price (p) (cents): the firm's share price at the end of the financial year
Earnings Retention Rate (rr): the ratio of retained profits to profit attributable to ordinary and preference shareholders
Firm profitability (roe): the profit after taxation scaled up by the total owners' equity
Economic Value Added (EVA) (R'm): the firm's spread multiplied by capital employed
Book-to-debt ratio (bdr): the total debt scaled up by the total assets
Market-to-debt ratio (mdr): the total debt scaled up by the sum of the total debt and firm market capitalisation

Variable	Obs.	Mean	SD	Min.	Max.
Cash flow from operations (c_t) (R'm)	607	3,068,700	1.36e+07	-4,782,000	1.52e+08
Capital expenditure (capex) (R'm)	607	2,163,953	9,046,433	-1,314,627	1.06e+08
Asset tangibility (asset)	607	0.314	0.237	0	0.984
Firm size (size)	607	14.40	2.19	5.95	20.12
Firm growth rate (mtb)	607	2.16	3.23	-0.109	55.98
Financial distress (fdist)	562	0.803	4.68	-49.16	44.76
Liquidity (liq)	607	1.88	1.88	0	25.13
Price earnings (p_e)	586	5.77	72.13	-1,103.43	468.33
Ordinary share price (p) (cents)	588	6,215.96	1,2084	2	110,551
Retention rate (rr)	607	115.31	758.64	-461.03	13,459.15
Firm profitability (roe)	607	51.00	579.37	-2,550.67	12,555.81
Economic Value Added (eva) (R'm)	569	182,463.3	5,088,213	-5.00e+07	6.47e+07
Book-to-debt ratio (bdr)	607	0.203	0.284	0	2.28
Market-to-debt ratio (mdr)	604	0.142	0.196	0	1
# Obs. Market-to-debt ratio =0	83 (13.74%)				
# Obs. Market-to-debt ratio =1	7 (1.16%)				
# Obs. Market-to-debt ratio >1	0 (0.00%)				
# Obs. Book-to-debt ratio = 0	86 (14.17%)				
# Obs. Book-to-debt ratio = 1	0 (0.00%)				
# Obs. Book-to-debt ratio> 1	15 (2.47%)				

The sample's mean book-to-debt and market-to-debt ratios are 0.20 (with a standard deviation of 0.28) and 0.14 (with a standard deviation of 0.196) respectively. The book-to-debt ratio in panel 2 is thus 25.00% higher than the ratio in panel 1 above, and it also has a higher volatility. This trend occurs in all three sectors. The book-to-debt ratios of the manufacturing, mining and retail firms in panel 2 are respectively 13.33%, 32.00% and 10.78% higher than the ratios in panel 1. The market-to-debt ratio of the retail firms in panel 2 is 17.08% lower than the ratio in panel 1. This result implies that book-to-debt ratios suffer time effects whilst market-to-debt ratios do not. This may explain why the market-to-debt ratio is a preferred measure of leverage in capital structure research; it does not suffer time effects.

As in panel 1, zero leverage is persistent in this panel, with 13.74% of the sample observations exhibiting zero leverage under the market-to-debt ratio and 14.17% of the sample observations exhibiting zero leverage under the book-to-debt ratio. Only 2.47% of the full-sample observations have a book-to-debt ratio greater than 1. Of the manufacturing observations, 12.76% and 13.36% exhibit zero leverage under market-to-debt and book-to-debt ratios respectively, with only 0.34% of the observations having a book-to-debt ratio greater than 1. The incidence of zero leverage is higher in the mining firms, with 15.25% and 15.73% of the observations having zero leverage under market-to-debt and book-to-debt ratios respectively. Only 1.69% of the mining observations have a book-to-debt ratio greater than 1. Of the retail observations, 1.46% has a book-to-debt ratio greater than 1.0. The retail observations also exhibit zero leverage, with 13.87% of the observations having zero leverage under both the market-to-debt and book-to-debt ratios. Leverage rarely reaches 1 in any of the cases. In the sample, only 1.16% of the observations have a market-to-debt leverage of 1; there are no observations that have a book-to-debt leverage of 1. Except for the extreme cases discussed above, the market-to-debt and book-to-debt ratios of the manufacturing, mining and retail firms in both panels 1 and 2 all lie between 0 and 1. This confirms the fractional nature of the debt ratios.

Further descriptive statistics concerning the data for panels 1 and 2 are contained in Appendices 19 and 20 respectively.

This summary contains descriptive statistics of the sample, with firms grouped according to firm size. In panel 1, both large and medium firms have a mean book-to-debt ratio of 0.18, and small firms have the lowest book-to-debt ratio of 0.13. However, the small firms have the highest market-to-book ratio of 0.18, with a standard deviation of 0.26. The medium firms follow with a market-to-book ratio of 0.14 and a standard deviation of 0.17. The large firms have the lowest and most stable market-to-debt ratio of 0.10, with a standard deviation of 0.13. Thus the large firms use less debt than the small firms when compared in market terms, but the small firms use less debt than the large firms when compared in book terms.

In panel 2, the market-to-debt ratios are similar to those of panel 1. However, the book-to-debt ratios of the large, medium and small firms are respectively 22.22%, 16.67% and 38.46% higher than those in panel 1. This further demonstrates the superiority of the market-to-debt measure of leverage over the book-to-debt measure.

6.3 PANEL 2 SAMPLE RESULTS: KEY FINANCIAL PERFORMANCE VARIABLES

The empirical findings of the regression model, together with the findings regarding target adjustment speed are discussed below. The results for the full sample are discussed first, followed by the results for the manufacturing, mining and retail firms. The results relate to models 6, 7, 8 and 9.

The capital expenditure, asset tangibility, financial distress and firm profitability correlations were discussed in Chapter 5. This chapter discusses the correlation results for cash flow from operations, liquidity, price earnings, share price, retention rate and Economic Value Added. In those instances when the estimators give coefficients with different directions, the ultimate correlation is determined by the direction of the majority of the coefficients. In a situation where there is no clear direction from the estimators, the result is classified as inconclusive. In models 6 and 7, some estimators fail, and the results of these are ignored in estimating the speed of adjustment. These are notably the TS estimator (for the full sample and for the manufacturing and mining firms) and the A&B estimator (for the full sample and for the manufacturing, mining and retail firms). In models 8 and 9, the following estimators fail: the FE estimator (for retail firms); the TS estimator (for the full sample and for the manufacturing, mining and retail firms); the A&B estimator (for the full sample and for the manufacturing, mining and retail firms); the B&B estimator (for the mining firms); and the RE Tobit estimator (for the retail firms).

6.3.1 Panel 2 Results for the Full Sample

This section discusses the empirical results for the full sample. The correlation results are discussed first, followed by the target speed of adjustment results.

6.3.1.1 Model 6, 7, 8 and 9 Correlation Results: Full Sample

The test results of models 6, 7, 8 and 9 for the full sample are contained in Tables 6.2 and 6.3 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. The confidence level of estimation is set at 95% for all the estimators. To control for heteroskedasticity, the robust standard error type option is used in all the estimators except the ML random effects model and the random effects Tobit model. These models do not have the robust option for standard errors. The Gauss-Hermite quadrature integration option is used for the random effects Tobit estimator. In the time series model, the Durbin-Watson method of computing autocorrelation, the Cochrane-Orcutt transformation, and the robust standard error type with the $1/(1-h)^{\wedge 2}$ bias correction options are used in implementing the estimator. These are the best estimator options for controlling both autocorrelation and heteroskedasticity.

The Hausman test statistic Chi2 is 57.88 and Prob>Chi2 is 0.0000 for BDR and the test statistic’s Chi2 is 8.20 and for Prob>Chi2, the data fails to meet asymptotic assumptions of Hausman test and hence no p-value estimate for MDR. This statistic soundly rejects the null hypothesis that the GLS RE estimator is consistent ($p < 0.05$) in the case of BDR. It confirms the fixed effects model as a more consistent estimator in the BDR case. The individual effects appear to be correlated with the regressors. The extra orthogonality conditions imposed by the GLS RE estimator are invalid. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. The Hausman test only tests for the consistency of the GLS RE and fixed effects models. It is inapplicable to the other models used in this study. In both BDR and MDR regressions, the Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond and Blundell and Bond models.

Cash flow from operations*:* For model 6, the TS, A&B and B&B estimators predict a positive correlation between cash flow from operations and the BDR; all the other estimators confirm a negative correlation. The results of models 7 and 8 indicate a weak negative correlation with both the BDR and the MDR. All the model 8 estimators except the TS estimator confirm a positive correlation with the MDR. The majority of the coefficients show a weak positive correlation with leverage. This is consistent with the predictions of the trade-off and agency theories. Hypothesis 9 is therefore accepted and hypothesis 10 is rejected. These results differ from those of Kayhan and Titman (2007:28) and Shyam-Sunder and Myers (1999:242) who found a negative correlation between cash flow from operations and leverage, which is consistent with the pecking order hypothesis. Leverage increases with an increase in cash flow. According to the agency theory, firms with excess cash are likely to suffer the agency costs of overinvestment and increased managerial rents (Jensen, 1986:323 and Stulz, 1990:23). The managerial rents are normally in the form of higher-than-market salaries, consumption of perquisites and transfer of assets. The theory argues that this problem can be eliminated by increasing the firm's leverage, as debt disciplines managers by forcing them to commit cash flows to the servicing of debt (Harvey, Lins & Roper, 2004:27 and Stulz, 1990:23). Leverage can be increased by reducing the firm's retention rate. The excess free cash flow is paid out in the form of dividends and share buybacks, and this equity portion is then replaced with debt (Harris & Raviv, 1991:300). The results from this study therefore imply a positive correlation between cash flow and leverage.

The excess free cash flows are a result of increased firm profitability in general. According to the trade-off theory, leverage is directly proportional to profitability. In order to maximise firm values, profitable firms should return the excess capital to the shareholders in the form of dividends and/or share buybacks, and then replace this portion of equity with debt. The increased debt brings the benefit of the debt interest tax shield which increases firm value (Barclay & Smith, 2005:10). The firms from the full sample follow this financing pattern which is consistent with the trade-off hypothesis. The trade-off and agency theories are therefore the best descriptors of the cash flow variable in the full sample.

Liquidity: The full-sample results of both models 6 and 7 confirm a negative correlation between liquidity and the BDR, with the RE Tobit and the A&B estimator results being significant at 10%. The model 8 results are mixed and therefore inconclusive, but the model 9 results predict a negative correlation. Leverage is negatively correlated to liquidity, and this confirms hypothesis 26. The firms' current ratios decrease with an increase in leverage, as additional debt increases a firm's current liabilities, which in turn reduce the overall ratio. In the financial statements, loan liabilities are split into current and non-current liabilities. The current portion of the loan is included in the total current liabilities when calculating the firm's current ratio. Therefore, an increase in the current portion of loans decreases the firm's current ratio, and hence there is an inverse relationship between leverage and liquidity. Dawood, Moustafa and El-Hennawi (2011:96) and Mahakud and Mukherjee (2011:69) documented similar results.

Price earnings: The results of models 6, 7, 8 and 9 confirm a negative correlation between price earnings and both the BDR and the MDR. Most of the correlation coefficients are, however, insignificant. This negative correlation is consistent with hypothesis 24, and hence the hypothesis is accepted. The firm's earnings per share, which is a key measure of shareholder return, decreases with an increase in firm leverage. An increase in the stock of debt increases the firm's interest payable and this reduces the earnings attributable to shareholders, thereby reducing the earnings per share. This implies that good quality firms use less debt so as to maximise their earnings per share. It contradicts the prediction of the signalling theory. According to the signalling theory, good quality firms signal their prospects by increasing their leverage, and thus the share price increases as investors read this signal (Miglo, 2007:85 and Miglo, 2011:178). The higher share price increases the firm's EPS. That is, according to the signalling theory, price earnings increase with an increase in the firm's leverage. In the full sample of manufacturing, mining and retail firms, leverage is inversely proportional to price earnings.

Ordinary share price: All the estimators except the B&B estimator and the RE Tobit estimator confirm a negative correlation between the ordinary share price and the BDR for model 6. The results of models 7 and 9 show a negative correlation between the ordinary share price and both the BDR and the MDR. The results of model 8 are mixed, with all the estimators except the ML RE estimator showing a positive correlation between the ordinary share price and the MDR. A majority of the estimators predict a negative correlation with leverage. Ordinary share price is also a significant predictor of leverage. The results confirm hypothesis 23. The leverages of the firms decrease with an increase in the share price and this is consistent with the predictions of the market timing theory. According to this theory, firms facing high share returns tend to rely more on equity financing than debt (Alti & Sulaeman, 2012:84; Baker & Wurgler, 2002:29; and Hovakimian, Hovakimian & Tehranian, 2004:539). It is beneficial for firms to issue equity when share prices are high, as it increases the net cash proceeds. Furthermore, rising share prices indicate good prospects for the firm. Firms facing poor share returns are expected to rely more on debt finance, as they would find it difficult to convince the market to accept new share offers. The results of this study reject the predictions of the signalling theory. The results for the full sample therefore confirm that firms issue equity when faced with increasing share returns and issue debt when faced with declining share returns.

Retention rate: The results of model 6 are mixed, with the FE and A&B estimator results showing a positive correlation between retention rate and the BDR; the remainder of the estimators shows a negative correlation between the retention rate and the BDR. The model 7 results show a positive correlation with the BDR. The results of models 8 and 9 confirm a negative correlation with the MDR. The retention rate is negatively correlated to leverage. Firms with higher retention rates use less debt. This is consistent with the pecking order theory, and hypothesis 25 is accepted. According to the pecking order theory, firms rely on internal funds for their capital expenditures. They only consider outside finance when faced with an internal funds deficit. Leverage is therefore a function of internal funds deficits (Shyam-Sunder & Myers, 1999:242). An increased internal funds deficit leads to an increase in leverage, as firms tend to finance their deficits in a pecking order, with debt finance being the first choice (Myers, 2008:235). The implication of this, which is confirmed by these results, is that firms with higher retention rates have smaller internal funds deficits and will therefore use less debt finance. This therefore implies a negative correlation between retention rate and leverage. This theory is the best descriptor of this variable in the full sample.

Economic Value Added: The results of models 6, 7 and 8 confirm a positive correlation between EVA and both the BDR and the MDR. The model 9 results are mixed. EVA is positively correlated to leverage, and this rejects the validity of the trade-off theory. Hypothesis 22 is therefore rejected. The EVA of the full sample increases with increasing leverage. This relationship cannot be explained by the trade-off theory. The results imply that the WACC increases with leverage, resulting in EVA decreasing with increasing leverage. The trade-off theory predictions are rejected in this case.

The most significant determinants of leverage in the full sample of manufacturing, mining and retail firms are liquidity, capital expenditure, financial distress, ordinary share price and financial distress. These had at least two coefficients that were significant at 1% and 5%. The coefficients of the remainder of the variables are all insignificant at 1%, 5% and 10%. The correlation results for cash flow are consistent with both the trade-off and agency theories, whilst the price earnings results contradict the signalling theory. The correlations on share price confirm the validity of the market timing theory and reject the signalling theory hypothesis. The retention rate correlation results confirm the pecking order theory. The EVA correlation results reject the trade-off theory hypothesis.

As in the panel 1 results discussed in Chapter 5, an analysis of these results indicates that the correlation results largely depend on the dependent variable used, the model fitted and the estimator chosen. The FE, B&B and RE Tobit estimators are more consistent than the other estimators. The RE Tobit estimator is the least biased estimator. This is because, unlike the other estimators, it takes into account the fractional nature of both the BDR and the MDR (Elsas & Florysiak, 2011a:7). The discrepancies in the correlation coefficients highlight the bias of the estimators. Furthermore, the BDR and MDR regressions give different results for the same variable, confirming that the correlations are also influenced by the choice of the dependent variable. The MDR regressions give more consistent results, but the BDR result coefficients are much stronger than the MDR coefficients.

The results of the speed of adjustment estimates for the full sample are discussed below.

6.3.1.2 Model 6, 7, 8 and 9 Speed of Adjustment Results: Full Sample

The speed of adjustment estimation results of models 6, 7, 8 and 9 are contained in Tables 6.2 and 6.3 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. As explained in section 6.3.1.1 above, the GLS RE estimator is inconsistent and hence its results were excluded in the determination of the ultimate average and range of speed of target adjustment.

***Full sample**:* All the estimators except the TS estimator and the A&B estimator give positive significant coefficients for the lagged BDR and MDR variables. This indicates that firms have target leverages towards which they adjust over time. The FE, TS and A&B estimators all fail to estimate the speed of adjustment for models 6 and 7. The TS estimator and the A&B estimator fail to estimate the speed of adjustment in models 8 and 9. The average speed of adjustment in models 6 and 7 is 57.81% (0.90 years). This means that on average, 57.81% of the target deviation spread is covered in one year. The half-life is 0.90 years on average. On average, it takes 0.90 years to close the gap between the actual debt ratio and the target by 50% provided that the firms maintain the same adjustment speed. The speeds of adjustment lie between 33.29% (1.71 years) and 75.39% (0.49 years). The mean speed of adjustment for models 8 and 9 is 39.71% (1.58 years). Models 8 and 9 speeds of target adjustment lie between 26.54% (2.25 years) and 57.17% (0.82 years). The true speed of adjustment is estimated as 64.20% for the BDR and 28.11% for the MDR. The BDR estimate is in line with the estimates of 65.5% (for total debt: TDR) and 80.2% (for long-term debt: LTR) provided by Ramjee and Gwatidzo (2012:60), but the MDR estimate is much lower than these estimates. The BDR true speed is much higher than the 57.64% estimated in Chapter 5, whilst the MDR true speed is much lower than the 42.44% estimated in Chapter 5. The deviation is due to the choice of the variables used. However, on average, these estimates are still higher than those of the US and European firms described in Chapter 5.

As with the speed of adjustment results discussed in Chapter 5, the speed of adjustment for panel 2 is affected by the dependent variable used (BDR or MDR), the estimator used and the model fitted.

Table 6.2: Panel 2 BDR Regression Output and Speeds of Adjustment: Full Sample

Regression results for the partial adjustment model 6: $BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1}$ and model 7: $BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T}$, where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. The key financial performance variables determining the firm's long-run target leverage and the speed of adjustment are defined in Section 4.4.3.7 and in Table 5.5 .T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. Model 7 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The Hausman test statistic Chi2 is 57.88 and Prob>Chi2 is 0.0000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 6	ML Random Effects Model 6	Fixed Effects Model 6	Time Series Model 6	Arellano and Bond (1991) Model 6	Arellano and Bond (1991) Model 7	Blundell and Bond (1998) Model 6	Blundell and Bond (1998) Model 7	Random Effects Tobit Model 6
Cash flow from operations (c_t)	-4.599e-10 (-042)	-4.440e-10 (-0.27)	-6.963e-10 (-062)	4.051e-10 (0.17)	6.248e-10 (0.25)	-2.789e-09 (-1.02)	2.807e-09 (0.86)	-2.504e-09 (-0.77)	-5.247e-10 (-0.36)
Capital expenditure (capex)	1.178e-09 (0.75)	1.185e-09 (0.56)	1.849e-09 (1.20)	1.562e-09 (0.63)	1.208e-09 (0.55)	3.314e-09** (2.29)	-1.209e-10 (-0.09)	4.297e-09* (1.91)	1.949e-09 (1.10)
Asset tangibility (asset)	0.031 (-0.60)	0.027 (-0.61)	0.158 (0.82)	-0.301 (-1.24)	0.084 (0.23)	0.275 (0.76)	-0.297 (-0.57)	0.232 (0.77)	0.036 (0.55)
Financial distress (fdist)	-0.002 (-0.39)	-0.002 (-0.79)	-0.002 (-0.29)	-0.002 (-0.42)	0.001 (0.25)	-0.003 (-0.32)	0.002 (0.23)	-0.003 (-0.42)	-0.003 (-1.64)
Liquidity (liq)	-0.006 (-1.01)	-0.006 (-1.00)	-0.003 (-0.34)	-0.006 (-0.96)	-0.025 (-1.53)	-0.022*** (-3.29)	-0.000 (-0.01)	-0.021** (-2.14)	-0.013* (-1.74)
Price earnings (p_e)	-3.109e-06 (-0.02)	-0.000 (-0.09)	-0.000 (-0.25)	-0.000 (-0.20)	-0.000** (-2.26)	-0.000 (-0.34)	-0.000 (-0.61)	-0.000 (-0.06)	-0.000 (-0.10)
Ordinary share price (p)	-1.274e-07 (-0.17)	-1.016e-07 (-0.13)	-2.965e-07 (-0.58)	-1.476e-06 (-0.88)	-2.176e-06 (-1.00)	-1.126e-06 (-1.00)	2.798e-07 (0.21)	-4.853e-07 (-0.28)	1.420e-07 (0.15)
Retention rate (rr)	-4.818e-06** (-2.07)	-4.361e-06 (-0.45)	2.240e-07 (0.23)	-1.014e-07 (-0.02)	5.727e-08 (0.08)	7.645e-07 (0.53)	-7.565e-07 (-0.66)	2.643e-07 (0.19)	-0.000 (-0.71)
Firm profitability (roe)	-0.000 (-0.57)	-0.000 (-1.56)	-0.000 (-0.30)	-0.000 (-0.53)	6.827e-06 (0.10)	0.000 (1.47)	-0.000 (-0.85)	0.000 (1.63)	-0.000 (-0.63)
Economic Value Added (eva)	1.071e-09 (0.73)	1.245e-09 (0.58)	3.052e-09** (2.26)	1.389e-09 (0.58)	2.146e-09* (1.88)	9.144e-10 (0.65)	6.371e-10 (0.30)	9.841e-10 (0.59)	2.415e-09 (1.22)
BDR Coefficient (1- λ) bdr/bdr_t1 L1	0.705*** (13.43)	0.667*** (10.43)	0.246*** (3.36)	-0.229 (-1.30)	-0.866 (-1.18)	0.165 (0.96)	0.416** (2.51)	0.423*** (5.61)	0.358*** (6.40)
Implied speed of adjustment (λ)	29.49%	33.29%	75.39%	-	-	83.53%	58.42%	57.74%	64.20%
Implied half-life	1.98 years	1.71 years	0.49 years	-	-	0.38 years	0.79 years	0.80 years	0.67 years
Obs.	452	452	452	349	265	356	365	457	452
R^2	0.584	-	0.439	0.074	-	-	-	-	-
Wald Chi2	-	388.53	3.72	0.53	29.65	96.58	82.03	91.39	71.24
Prob > Chi2	-	0.000	0.0002	0.880	0.002	0.000	0.000	0.000	0.000
Durbin-Watson	1.76	1.76	1.76	1.57	1.76	1.76	1.76	1.76	1.76
Sargan (df)					26.40 (5)	57.75 (9)	52.26 (6)	65.19 (13)	

Table 6.3: Panel 2 MDR Regression Output and Speeds of Adjustment: Full Sample

Regression results for the partial adjustment model 6: $BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1}$ and model 7: $BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T}$, where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. The key financial performance variables determining the firm's long-run target leverage and the speed of adjustment are defined in Section 4.4.3.7 and in Table 5.5 .T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. Model 7 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The Hausman test statistic Chi2 is -8.20 and Prob>Chi2 (data fails to meet asymptotic assumptions of Hausman test). The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 8	ML Random Effects Model 8	Fixed Effects Model 8	Time Series Model 8	Arellano and Bond (1991) Model 8	Arellano and Bond (1991) Model 9	Blundell and Bond (1998) Model 8	Blundell and Bond (1998) Model 9	Random Effects Tobit Model 8
Cash flow from operations (c_t)	5.946e-10* (1.94)	6.340e-10 (0.54)	2.492e-10 (0.62)	-2.669e-10 (-0.17)	4.579e-10 (0.32)	-4.194e-10 (-0.29)	3.159e-10 (0.19)	-1.289e-10 (-0.08)	7.315e-10 (0.56)
Capital expenditure (capex)	-7.838e-10** (-2.20)	-8.533e-10 (-0.57)	5.987e-11 (0.17)	4.762e-10 (0.35)	3.592e-11 (0.05)	3.064e-09*** (4.51)	-4.661e-10 (-0.36)	4.231e-09*** (3.03)	-8.489e-10 (-0.54)
Asset tangibility (asset)	-0.033 (-0.84)	-0.034 (-0.91)	-0.028 (-0.35)	-0.142 (-1.13)	-0.170 (-1.16)	0.194 (1.28)	0.196 (0.67)	-0.014 (-0.09)	-0.028 (-0.59)
Financial distress (fdist)	-0.002** (-2.16)	-0.002 (-1.54)	-0.004*** (-2.82)	-0.005** (-2.29)	-0.005** (-2.44)	-0.003 (-1.26)	0.001 (0.26)	-0.006** (-2.01)	-0.002 (-1.54)
Liquidity (liq)	-0.004 (-1.36)	-0.004 (-0.86)	0.000 (0.10)	0.001 (0.36)	0.006* (1.69)	-0.002 (-0.82)	0.004 (0.99)	-0.003 (-1.10)	-0.009 (-1.42)
Price earnings (p_e)	-0.000 (-0.92)	-0.000* (-1.79)	-0.001 (-1.50)	-0.000* (-1.74)	-0.001* (-1.85)	-0.000 (-0.94)	-0.001 (-1.14)	-0.000 (-1.25)	-0.000* (-1.87)
Ordinary share price (p)	-2.384e-07 (-0.77)	-2.921e-07 (-0.46)	5.015e-07 (1.25)	3.740e-07 (1.01)	6.864e-07 (1.30)	-9.743e-07 (-1.91)	8.898e-07* (1.14)	-1.404e-06** (-2.05)	4.673e-08 (0.06)
Retention rate (rr)	-2.688e-06** (-2.45)	-2.895e-06 (-0.41)	-1.216e-06 (-0.60)	-2.540e-06 (-0.71)	-2.740e-06 (-1.00)	-3.390e-07 (-0.85)	-2.977e-06 (-0.87)	-1.168e-06 (-1.04)	-0.000 (-0.74)
Firm profitability (roe)	1.335e-06 (0.52)	8.661e-07 (0.10)	4.465e-06 (1.49)	5.379e-06 (0.62)	0.000 (1.46)	0.000 (1.34)	6.872e-07 (0.04)	0.000 (1.46)	1.565e-06 (0.17)
Economic Value Added (eva)	3.587e-10 (0.47)	2.726e-10 (0.17)	1.011e-09 (1.43)	4.741e-10 (0.48)	2.624e-10 (0.25)	2.684e-10 (0.39)	-2.531e-10 (-0.18)	7.082e-10 (1.05)	2.881e-10 (0.17)
MDR Coefficient (1- λ)mdr_t1 L1	0.705*** (13.23)	0.735*** (12.12)	0.435*** (6.40)	-0.110 (-1.35)	0.020 (0.09)	-0.027 (-0.26)	0.698*** (5.35)	0.428*** (2.79)	0.719*** (10.91)
Implied speed of adjustment (λ)	29.50%	26.54%	56.50%	-	98.05%	-	30.23%	57.17%	28.11%
Implied half-life	1.98 years	2.25 years	0.83 years	-	0.18 years	-	1.93 years	0.82 years	2.10 years
Obs.	449	449	449	346	262	352	362	453	449
R^2	0.550	-	0.500	0.066	-	-	-	-	-
Wald Chi2	-	172.57	-	1.10	12.46	53.27	70.78	34.55	163.99
Prob > Chi2	-	0.000	-	0.361	0.256	0.000	0.000	0.000	0.000
Durbin-Watson	1.20	1.20	1.20	1.33	1.20	1.20	1.20	1.20	1.20
Sargan (df)					48.74 (5)	31.53 (9)	80.93 (8)	72.00 (8)	

6.3.2 Panel 2 Results for Manufacturing Firms

This section presents and discusses the empirical results for the manufacturing firms. The correlation results are discussed first, followed by the target speed of adjustment results. The descriptive statistics are contained in Table 6.4 below.

Table 6.4: Panel 2 Summary of Statistics for the Manufacturing Firms

The Panel 2 sample consists of 49 manufacturing firms with complete data for two or more consecutive years during the period 2005- 2010. There are a total of 232 observations for the period. Extreme outlier observations in all explanatory variables were identified through ridge regression and removed from the sample. The ridge procedure was not used for the dependent variables, bdr, mdr and change in debt issued. The extended definitions of variables are contained in Section 4.4.3.7.

Cash flow from operations (c_t) (R'm): the cash ex-operations
Capital expenditure (capex) (R'm): the sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries
Asset tangibility (asset): the fixed assets scaled up by the total assets
Firm size (size): the natural logarithm of total assets
Firm growth rate (mtb): the sum of the market equity, total debt and preferred shares, less deferred taxes; this is scaled up by the total assets
Financial distress (fdist): the De la Rey (1981) financial distress ratio
Liquidity (liq): the ratio of total current assets to total current liabilities
Price Earnings Ratio: the firm's year-end share price scaled up by the headlines earnings per share
Ordinary share price (p) (cents): the firm's share price at the end of the financial year
Earnings Retention Rate (rr): the ratio of retained profits to profit attributable to ordinary and preference shareholders
Firm profitability (roe): the profit after taxation scaled up by the total owners' equity
Economic Value Added (EVA) (R'm): the firm's spread multiplied by capital employed
Book-to-debt ratio (bdr): the total debt scaled up by the total assets
Market-to-debt ratio (mdr): the total debt scaled up by the sum of the total debt and firm market capitalisation

Variable	Obs.	Mean	SD	Min.	Max.
Cash flow from operations (c_t) (R'm)	292	1,502,718	4,622,820	-427,723	3.11e+07
Capital expenditure (capex) (R'm)	292	1,042,954	3,370,134	-1,314,627	2.49e+07
Asset tangibility (asset)	292	0.364	0.214	0	0.984
Firm size (size)	292	14.31	1.97	8.56	19.012
Firm growth rate (mtb)	292	1.40	0.970	-0.109	5.49
Financial distress (fdist)	290	0.789	1.91	-12.01	10.37
Liquidity (liq)	292	1.68	1.07	0	9.48
Price earnings (p_e)	283	10.60	29.21	-320	199.18
Ordinary share price (p) (cents)	285	4,276.21	6,349.28	2	4,6788
Retention rate (rr)	292	160.76	1,091.70	-461.03	13,459.15
Firm profitability (roe)	292	22.56	66.87	-302.55	596.2
Economic Value Added (eva) (R'm)	292	-238,321.4	1,905,639	-1.36e+07	4,869,367
Book-to-debt ratio (bdr)	292	0.175	0.185	0	0
Market-to-debt ratio (mdr)	290	0.161	0.199	0	0
# Obs. Market-to-debt ratio =0	37 (12.76%)				
# Obs. Market-to-debt ratio =1	2 (0.69%)				
# Obs. Market-to-debt ratio >1	0 (0.00%)				
# Obs. Book-to-debt ratio = 0	39 (13.36%)				
# Obs. Book-to-debt ratio = 1	0 (0.00%)				
# Obs. Book-to-debt ratio> 1	1 (0.34%)				

6.3.2.1 Model 6, 7, 8 and 9 Correlation Results: Manufacturing Firms

The test results of models 6, 7, 8 and 9 are contained in Tables 6.5 and 6.6 below. The number of observations and the values for R^2, WaldChi2 Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 24.96 and Prob>Chi2 is 0.0003 for BDR and the test statistic's Chi2 is 23.62 and Prob>Ci2 is 0.0003 for MDR. This statistic rejects the null hypothesis that the GLS RE estimator is consistent ($p < 0.05$) and it confirms the fixed effects model as a more consistent estimator in both cases. The results of the GLS RE model were excluded in the determination of the ultimate correlation of each variable. In both BDR and MDR regressions, the Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond and Blundell and Bond models.

Cash flow from operations*:* Except for the TS and A&B estimators, all the estimators predict a negative correlation between the cash flow from operations and the BDR for model 6. The model 7 results show a positive correlation with the BDR. The results of model 8 are mixed, with the TS, A&B and RE Tobit estimators showing positive correlations between the cash flow from operations and the MDR. The model 9 results show a significant positive correlation with the MDR. The majority of the estimators confirm a positive correlation. This confirms hypothesis 9 and the results are similar to those of the full sample described in Section 6.3.1.1 above. The results confirm the validity of both the agency cost and trade-off theories as the best descriptors of cash flow from operations correlations in manufacturing firms.

Liquidity: The results of all the models confirm a negative correlation between liquidity and both the BDR and the MDR. The TS and RE TOBIT estimator coefficients are all significant at 1% for the BDR model. These correlation results are similar to those of the full sample described in Section 6.3.1.1 above.

Price earnings: The results of models 6 and 8 confirm a positive correlation between price earnings and both the BDR and the MDR. Most of the BDR coefficients are significant at 1% and 5%. The results of models 7 and 9 confirm a significant negative correlation between liquidity and both the BDR and the MDR. In the manufacturing firms, price earnings are positively correlated to leverage. Hypothesis 24 is therefore rejected. The price earnings ratio of the manufacturing firms increases with leverage, indicating that the share prices of the firms either remain constant or increase with leverage. There are two possible explanations for this situation. Firstly, the investors may perceive the firms to be underleveraged by market standards. If this is the case, then an increase in leverage would be welcomed by the investors, and this would be signalled by a rise in the share price. Alternatively, the investors may interpret the debt issue as a signal that the firm has good future prospects. According to the signalling theory, management will issue debt to signal good prospects and issue equity if they are not confident about the firm's future prospects (Miglo, 2011:178). Debt commits the firm to fixed interest payments and to a repayment of the principal borrowed. Management will therefore not issue debt if they are not confident about the firm's future prospects (Barclay & Smith, 1999:12). The change in share price seems to be the main driver of the correlation between leverage and price earnings. These results provide evidence for the signalling theory in manufacturing firms.

Ordinary share price: The results of both models 6 and 8 are mixed and inconclusive about the ordinary share price correlations. Models 7 and 9, however, confirm a weak negative correlation between the ordinary share price and both the BDR and the MDR. The results are inconclusive and hypothesis 23 is thus rejected. In the manufacturing firms, the ordinary share price does not exhibit a positive correlation with leverage. The results reject both the market timing and signalling theories in explaining this correlation.

Retention rate: The results of both models 6 and 8 are mixed and inconclusive. Models 7 and 9, however, confirm a weak negative correlation between retention rate and both the BDR and the MDR. Retention rate is negatively correlated to leverage. These correlation results are similar to those of the full sample described in Section 6.3.1.1 above. They confirm the validity of the pecking order theory in the manufacturing firms.

Economic Value Added: The results of model 6 confirm a positive correlation between EVA and the BDR. The model 7 results show a negative correlation with the BDR. All the estimators except the FE estimator show a negative correlation between EVA and the MDR for model 8. The model 9 results are mixed. The results are inconclusive and hypothesis 22 is thus rejected. In the manufacturing firms, EVA does not exhibit a positive correlation with leverage, and this contradicts the pecking order theory.

Liquidity, cash flow from operations, capital expenditure, asset tangibility, ordinary share price, profitability and the price earnings ratio are significant determinants of leverage in the manufacturing firms. The variables have two or more coefficients that are significant at 1%, 5% and 10%. The correlation results concerning both cash flow and retention rate are consistent with the predictions of the pecking order theory. The price earnings results confirm the validity of the signalling theory, whilst the share price correlations are in line with the predictions of both the market timing and signalling theories. As with the results from the full sample, described in Section 6.3.1.1 above, these results indicate that the correlation results largely depend on the dependent variable used, the model fitted and the estimator chosen.

The results of the speed of adjustment estimates for the manufacturing firms are discussed below.

6.3.2.2 Model 6, 7, 8 and 9 Speed of Adjustment Results: Manufacturing Firms

The speed of adjustment estimation results of models 6, 7, 8 and 9 are contained in Tables 6.5 and 6.6 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. As explained in section 6.3.2.1 above, the GLS RE estimator is inconsistent and hence its results were excluded in the determination of the ultimate average and range of speed of target adjustment.

Manufacturing firms: The TS estimator and the A&B estimator fail to estimate the speed of adjustment of the manufacturing firms for models 6, 7, 8 and 9. The average speed of adjustment for models 6 and 7 is 35.25% (2.56 years), and the speed of adjustment ranges between 13.67% (4.71 years) and 70.36% (0.57 years). The average speed of adjustment for models 8 and 9 is 38.68% (1.70 years), and the true speed of adjustment lies between 22.56% (2.71 years) and 60.19% (0.75 years). The manufacturing firms take an average of 2.56 years to fully adjust their leverage when using the BDR, and an average of 1.70 years when using the MDR. The true speed of adjustment for the manufacturing firms is 34.42% for the BDR and 30.56% for the MDR. This is lower than the sample speed described in Section 6.3.1.2 above, and it is lower than the panel 1 estimate in Chapter 5. This demonstrates the impact of the choice of variables on the target adjustment speed. Again, the speed is lower than that of the mining firms, but higher than that of the retail firms.

As with the correlation results discussed in Section 6.3.1.1 above, the speed of adjustment is affected by the dependent variable used (BDR or MDR), the estimator used and the model fitted.

Table 6.5: Panel 2 BDR Regression Output and Speeds of Adjustment: Manufacturing Firms

Regression results for the partial adjustment model 6: $BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1}$ and model 7: $BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T}$, where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. The key financial performance variables determining the firm's long-run target leverage and the speed of adjustment are defined in Section 4.4.3.7 and in Table 5.5 .T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. Model 7 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The Hausman test statistic Chi2 is 24.96 and Prob>Chi2 is 0.0003. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
Variables	GLS Random Effects Model 6	ML Random Effects Model 6	Fixed Effects Model 6	Time Series Model 6	Arellano and Bond (1991) Model 6	Arellano and Bond (1991) Model 7	Blundell and Bond (1998) Model 6	Blundell and Bond (1998) Model 7	Random Effects Tobit Model 6
Cash flow from operations (c_t)	-9.547e-09 (-1.62)	-9.547e-09*** (-2.59)	-5.426e-10 (-0.28)	4.684e-09 (0.57)	3.868e-09 (0.61)	1.223e-08 (1.40)	-9.785e-09 (-1.63)	1.095e-08 (1.23)	-7.819e-09* (-1.83)
Capital expenditure (capex)	1.343e-08 (1.57)	1.343e-08*** (2.59)	1.703e-08*** (4.41)	8.553e-09 (0.55)	-1.849e-09 (-0.46)	-7.520e-10 (-0.07)	5.427e-09 (0.29)	-4.208e-09 (-0.18)	1.468e-08** (2.51)
Asset tangibility (asset)	-0.058 (-1.51)	-0.058* (-1.82)	0.356*** (4.13)	0.235* (1.85)	0.184 (1.02)	0.376* (1.93)	-0.209 (-0.79)	0.597*** (3.19)	-0.027 (-0.45)
Financial distress (fdist)	0.002 (0.41)	0.002 (0.37)	-0.001 (-0.14)	-0.001 (-0.19)	-0.001 (-0.23)	-0.005 (-0.84)	0.010** (1.99)	-0.007 (-1.35)	-0.002 (-0.32)
Liquidity (liq)	-0.008 (-1.25)	-0.008 (-1.03)	-0.032*** (-3.17)	-0.022*** (-3.21)	-0.018 (-1.14)	-0.027* (-1.72)	-0.012 (-0.54)	-0.025 (-0.83)	-0.040*** (-2.78)
Price earnings (p_e)	0.000*** (8.31)	0.000** (2.47)	0.000*** (6.19)	0.000* (1.74)	0.000** (1.97)	-0.000*** (-3.49)	0.000*** (3.73)	-0.000 (-0.86)	0.000** (2.29)
Ordinary share price (p)	8.725e-07 (0.67)	8.725e-07 (0.64)	6.724e-07 (0.81)	-1.998e-07 (-0.16)	-1.740e-06*** (-4.29)	-5.978e-07 (-0.84)	-1.804e-06 * (-1.84)	-3.638e-07 (-0.15)	4.110e-07 (0.24)
Retention rate (rr)	-5.060e-06*** (-2.64)	-5.060e-06 (-0.93)	7.177e-07 (0.58)	9.736e-07 (0.54)	-4.187e-07 (-0.89)	-7.655e-07 (-1.10)	7.128e-07 (1.32)	-1.387e-06 (-1.15)	-0.000 (-0.99)
Firm profitability (roe)	-0.000 (-0.89)	-0.000* (-1.75)	-0.000 (-1.60)	-0.000** (-2.18)	-0.000*** (-4.25)	0.000 (1.59)	-0.001*** (-7.31)	0.000* (1.85)	-0.000* (-1.68)
Economic Value Added (eva)	3.234e-09 (0.45)	3.234e-09 (0.67)	9.205e-09 (1.74)	4.179e-09 (0.48)	5.072e-09 (0.76)	-1.209e-08 (-0.85)	1.566e-08 (1.07)	-8.422e-09 (-0.82)	5.073e-09 (0.79)
MDR Coefficient (1- λ) bdr_t1 L1	0.862*** (16.48)	0.862*** (18.81)	0.296*** (3.33)	-0.140 (-1.45)	-0.012 (-0.04)	-0.192 (-0.69)	0.863*** (8.89)	0.560*** (3.62)	0.656*** (5.97)
Implied speed of adjustment (λ)	13.78%	13.78%	70.36%	-	-	-	13.67%	44.00%	34.42%
Implied half-life	4.68 years	4.68 years	0.57 years	-	-	-	4.71 years	1.20 years	1.64 years
Obs.	235	235	235	180	135	182	188	235	235
R^2	0.713	-	0.222	0.142	-	-	-	-	-
Wald Chi2	2563.87	293.62	24.71	2.53	920.86	106.94	494.01	99.67	163.86
Prob > Chi2	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.70	1.70	1.70	1.34	1.70	1.70	1.70	1.70	1.70
Sargan (df)					21.61 (5)	15.52 (9)	50.05 (13)	50.05 (13)	

Table 6.6: Panel 2 MDR Regression Output and Speeds of Adjustment: Manufacturing Firms

Regression results for the partial adjustment model 6: $BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1}]$ and model 7: $BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T}$, where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. The key financial performance variables determining the firm's long-run target leverage and the speed of adjustment are defined in Section 4.4.3.7 and in Table 5.5 .T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half - life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. Model 7 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The Hausman test statistic Chi2 is 23.62 and Prob>Chi2 is 0.0003. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 8	ML Random Effects Model 8	Fixed Effects Model 8	Time Series Model 8	Arellano and Bond (1991) Model 8	Arellano and Bond (1991) Model 9	Blundell and Bond (1998) Model 8	Blundell and Bond (1998) Model 9	Random Effects Tobit Model 8
Cash flow from operations (c_t)	-3.450e-10 (-0.20)	-6.267e-11 (-0.01)	-2.639e-10 (-0.13)	2.575e-09 (0.65)	4.553e-09 (1.08)	1.397e-08*** (2.64)	-6.164e-09 (-0.83)	8.216e-09 * (1.86)	1.661e-10 (0.03)
Capital expenditure (capex)	-3.210e-09 (-1.34)	-3.419e-09 (-0.50)	-1.030e-09 (-0.27)	-6.739e-10 (-0.16)	1.363e-09 (0.25)	1.474e-08** (2.43)	-1.721e-08 (-1.45)	2.145e-08** (2.04)	-4.673e-09 (-0.62)
Asset tangibility (asset)	-0.076 (-1.49)	-0.086 (-1.35)	0.067 (0.67)	0.134 (0.80)	-0.043 (-0.26)	.35452885* (1.81)	0.249 (0.45)	-0.052 (-0.18)	-0.078 (-1.08)
Financial distress (fdist)	-0.000 (-0.01)	0.000 (0.06)	-0.003 (-0.40)	-0.003 (-0.52)	-0.003 (-0.40)	-.01451075** (-2.24)	0.014 (1.15)	-0.015** (-2.46)	-0.002 (-0.31)
Liquidity (liq)	-0.013 (-1.54)	-0.012 (-0.90)	-0.023 (-1.49)	-0.024* (-1.87)	-0.029* (-1.75)	-.00768458 (-0.59)	-0.036 (-1.18)	-0.027 (-1.08)	-0.036** (-2.08)
Price earnings (p_e)	0.001*** (3.31)	0.001** (2.01)	0.000** (2.55)	0.000 (1.31)	0.001 (1.38)	-.00074365*** (-5.57)	0.001*** (3.13)	-0.001*** (-4.26)	0.001** (2.01)
Ordinary share price (p)	-5.508e-07 (-0.50)	-6.690e-07 (-0.34)	9.402e-07 (0.73)	5.092e-07 (0.36)	4.734e-07 (0.36)	-2.338e-06 (-1.29)	7.960e-08 (0.04)	-2.366e-06 (-1.37)	5.885e-08 (0.03)
Retention rate (rr)	-2.140e-06* (-1.72)	-2.547e-06 (-0.35)	4.140e-07 (0.31)	4.234e-07 (0.26)	-1.112e-06 (-1.30)	-1.869e-06 (-1.30)	-2.017e-07 (-0.12)	-1.796e-06 (-1.44)	-0.000 (-0.80)
Firm profitability (roe)	0.000 (0.08)	0.000 (0.07)	0.000 (0.15)	-0.000 (-0.32)	-0.000** (-2.13)	.0001673** (2.20)	-0.000 (-1.50)	0.000* (1.90)	0.000 (0.49)
Economic Value Added (eva)	-6.527e-09** (-2.24)	-6.974e-09 (-0.94)	5.041e-10 (0.11)	-1.697e-09 (-0.41)	-3.462e-09 (-0.60)	-8.027e-11 (-0.02)	-1.070e-08 (-1.56)	2.431e-09 (0.51)	-6.836e-09 (-0.82)
BDR Coefficient (1- λ)mdr_t1 L1	0.705*** (12.52)	0.732*** (9.11)	0.468*** (6.05)	-0.052 (-0.52)	0.151 (0.52)	-.02814469 (-0.51)	0.774*** (3.11)	0.398* (1.79)	0.694*** (7.60)
Implied speed of adjustment (λ)	29.52%	26.84%	53.25%	-	84.90%	-	22.56%	60.19%	30.56%
Implied half-life	1.98 years	2.22 years	0.91 years	-	0.37 years	-	2.71 years	0.75 years	1.90 years
Obs.	232	232	232	177	132	179	185	232	232
R^2	0.603	-	0.514	0.019	-	-	-	-	-
Wald Chi2	477.79	101.49	6.74	0.64	31.50	55.71	54.84	63.30	107.25
Prob > Chi2	0.000	0.000	0.000	0.792	0.001	0.000	0.000	0.000	0.000
Durbin-Watson	0.99	0.99	0.99	1.38	0.99	0.99	0.99	0.99	0.99
Sargan (df)					34.00 (5)	33.18 (9)	62.02 (8)	(75.43 (13)	

6.3.3 Panel 2 Results for Mining Firms

This section presents and discusses the empirical results for the mining firms. The correlation results are discussed first, followed by the target speed of adjustment results. The descriptive statistics are contained in Table 6.7 below.

Table 6.7: Panel 2 Summary of Statistics for the Mining Firms

The Panel 2 sample consists of 24 mining firms with complete data for two or more consecutive years during the period 2005-2010. There are a total of 110 observations for the period. Extreme outlier observations in all explanatory variables were identified through ridge regression and removed from the sample. The ridge procedure was not used for the dependent variables, bdr, mdr and change in debt issued. The extended definitions of variables are contained in Section 4.4.3.7.

Cash flow from operations (c_t) (R'm): the cash ex-operations
Capital expenditure (capex) (R'm): the sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries
Asset tangibility (asset): the fixed assets scaled up by the total assets
Firm size (size): the natural logarithm of total assets
Firm growth rate (mtb): the sum of the market equity, total debt and preferred shares, less deferred taxes; this is scaled up by the total assets
Financial distress (fdist): the De la Rey (1981) financial distress ratio
Liquidity (liq): the ratio of total current assets to total current liabilities
Price Earnings Ratio: the firm's year-end share price scaled up by the headlines earnings per share
Ordinary share price (p) (cents): the firm's share price at the end of the financial year
Earnings Retention Rate (rr): the ratio of retained profits to profit attributable to ordinary and preference shareholders
Firm profitability (roe): the profit after taxation scaled up by the total owners' equity
Economic Value Added (EVA) (R'm): the firm's spread multiplied by capital employed
Book-to-debt ratio (bdr): the total debt scaled up by the total assets
Market-to-debt ratio (mdr): the total debt scaled up by the sum of the total debt and firm market capitalisation

Variable	Obs.	Mean	SD	Min.	Max.
Cash flow from operations (c_t) (R'm)	178	7,436,741	2.38e+07	-4,782,000	1.52e+08
Capital expenditure (capex) (R'm)	178	5,311,653	1.57e+07	-881,692	1.06e+08
Asset tangibility (asset)	178	0.334	0.296	0	0.925
Firm size (size)	178	14.48	2.85	5.95	20.12
Firm growth rate (mtb)	178	3.73	5.43	0	55.98
Financial distress (fdist)	136	0.491	9.01	-49.16	44.76
Liquidity (liq)	178	2.25	3.02	0.04	25.13
Price earnings (p_e)	173	-6.89	126.48	-1,103.43	468.33
Ordinary share price (p) (cents)	173	11,596.12	19,480.13	2	11,0551
Retention rate (rr)	178	84.45	57.91	-271.43	491.93
Firm profitability (roe)	178	10.43	320.11	-2,550.67	1,546.88
Economic Value Added (eva) (R'm)	141	1,008,563	9,812,838	-5.00e+07	6.47e+07
Book-to-debt ratio (bdr)	178	0.331	0.421	0	2.28
Market-to-debt ratio (mdr)	177	0.145	0.196	0	1
# Obs. Market-to-debt ratio =0	27 (15.25%)				
# Obs. Market-to-debt ratio =1	3 (1.69%)				
# Obs. Market-to-debt ratio >1	0 (0.00%)				
# Obs. Book-to-debt ratio = 0	28 (15.73%)				
# Obs. Book-to-debt ratio = 1	0 (0.00%)				
# Obs. Book-to-debt ratio> 1	14 (7.87%)				

6.3.3.1 Model 6, 7, 8 and 9 Correlation Results: Mining Firms

The test results of models 6, 7, 8 and 9 are contained in Tables 6.8 and 6.9 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 4.41 and Prob>Chi2 is 0.7320 for BDR and the test statistic's Chi2 is 2.83 and Prob>Chi2 is 0.9000 for MDR. The null hypothesis is accepted in both cases ($p > 0.05$). The GLS RE estimator is confirmed a consistent estimator and the the individual effects do not appear to be correlated with the regressors. Thus the fixed effects model is confirmed inconsistent excluded in the determination of the ultimate correlation of each variable. The extra orthogonality conditions imposed by the GLS RE estimator are valid in both cases. The Hausman test only tests for the consistency of the GLS RE and fixed effects models. It is inapplicable to other models used in this study. In both BDR and MDR regressions, the Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond and Blundell and Bond models.

Cash flow from operations*:* The results of both models 6 and 8 are mixed and inconclusive for the BDR and the MDR. The results of model 7 confirm a negative correlation between the cash flow from operations and the BDR, whilst the results of model 9 are mixed. There is a negative correlation between the cash flow generated and the leverage. Hypothesis 9 is thus confirmed, whilst hypothesis 10 is rejected. The results are similar to those of the full sample and of the manufacturing firms described in Sections 6.3.1.1 and 6.3.2.1 above. The pecking order theory is the best descriptor of this variable in the mining firms.

Liquidity: The results of both models 6 and 7 confirm a negative correlation between liquidity and the BDR. The model 8 results are mixed, but the net correlation is positive. The results of model 9 confirm a positive correlation with the MDR. Liquidity is negatively correlated with leverage, and thus hypothesis 26 is accepted. The results are similar to those of the full sample and of the manufacturing firms described in Sections 6.3.1.1 and 6.3.2.1 above.

Price earnings: The results of both models 6 and 8 confirm a negative correlation between price earnings and both the BDR and the MDR, with most of the MDR coefficients being significant at 1%. The results for models 7 and 9 all show a weak correlation with both the BDR and the MDR. Price earnings are negatively correlated to leverage. Hypothesis 24 is thus accepted. The results are similar to those of the full sample described in Section 6.3.1.1 above. They contradict the predictions of the signalling theory.

Ordinary share price: All the estimators except the B&B estimator confirm a negative correlation between the ordinary share price and the BDR for model 6. The results of models 7 and 9 show a negative correlation with both the BDR and the MDR. The model 8 results show a positive correlation between the ordinary share price and the MDR. The correlation is negative for the BDR and positive for the MDR. The net correlation is negative. There is a negative correlation between leverage and ordinary share price in mining firms. The results are similar to those of the full sample described in Section 6.3.1.1 above, and they confirm the validity of the market timing theory in explaining the relationship between the ordinary share price and leverage. The signalling theory is thus rejected.

Retention rate: The results of models 6, 7 and 9 confirm a weak positive correlation between the retention rate and both the BDR and the MDR. The model 8 results show a negative correlation. Thus there is a positive correlation between retention rate and leverage. Hypothesis 25 is thus rejected. In the mining firms, the retention rate increases with increasing leverage. The pecking order theory is not the best descriptor of the variation in retention rate in the mining firms.

Economic Value Added: The results of all the models except the B&B estimator in model 6 confirm a positive correlation between EVA and both the BDR and the MDR. Economic Value Added is positively correlated to leverage in mining firms. These results are similar to those of the full sample described in Section 6.3.1.1 above. Hypothesis 22 is thus rejected. The firm's EVA increases with an increase in leverage as the WACC decreases with an increase in leverage. This contradicts the predictions of the trade-off theory.

The strong determinants of leverage in the mining firms are capital expenditure, financial distress, price earnings ratio and profitability. The results on cash flow are in line with the pecking order theory hypothesis, but the retention rate results reject the pecking order theory. The price earnings results contradict the signalling theory. The market timing and signalling theories' hypotheses are both rejected by the correlation results on the share price. The EVA correlation results reject the trade-off hypothesis. As with the results for the full sample, described in Section 6.3.1.1 above, these results indicate that the correlation results largely depend on the dependent variable used, the model fitted and the estimator chosen.

The results of the speed of adjustment estimates for the mining firms are discussed below.

6.3.3.2 Model 6, 7, 8 and 9 Speed of Adjustment Results: Mining Firms

The speed of adjustment estimation results of models 6, 7, 8 and 9 are contained in Tables 6.8 and 6.9 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. As explained in section 6.3.3.1 above, the FE estimator is inconsistent and hence its results were excluded in the determination of the ultimate average and range of speed of target adjustment.

Mining firms: The TS, A&B and B&B estimators fail to estimate the speed of adjustment of the mining firms under models 6, 7, 8 and 9. The average speed of adjustment for models 6 and 7 is 56.81% (0.90 years) and the average speed of adjustment for models 8 and 9 is 47.75% (1.12 years). The speed of adjustment ranges between 41.92% (1.28 years) and 72.03% (0.54 years) for models 6 and 7, and it ranges between 39.78% (1.37 years) and 65.86 (0.65 years) for models 8 and 9. The mining firms exhibit a true speed of adjustment of 69.59% for the BDR and 45.77% for the MDR. Although this is lower than the estimate provided in Chapter 5, it is still higher than that of the US and European firms described in Section 5.5.1.2 in Chpater 5. The speed of adjustment in these firms is also higher than those of the combined sample and of the manufacturing and retail firms.

As with the correlation results discussed in Section 6.3.1.1 above, the speed of adjustment is affected by the dependent variable used (BDR or MDR), the estimator used and the model fitted.

Table 6.8: Panel 2 BDR Regression Output and Speeds of Adjustment: Mining Firms

Regression results for the partial adjustment model 6: $BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1}$ and model 7: $BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T}$, where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. The key financial performance variables determining the firm's long-run target leverage and the speed of adjustment are defined in Section 4.4.3.7 and in Table 5.5 .T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half-life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. Model 7 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The Hausman test statistic Chi2 is 4.41 and Prob>Chi2 is 0.7320. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 6	ML Random Effects Model 6	Fixed Effects Model 6	Time Series Model 6	Arellano and Bond (1991) Model 6	Arellano and Bond (1991) Model 7	Blundell and Bond (1998) Model 6	Blundell and Bond (1998) Model 7	Random Effects Tobit Model 6
Cash flow from operations (c_t)	2.013e-10 (0.15)	1.545e-10 (0.05)	-1.211e-09 (-0.98)	-2.482e-10 (-0.10)	-5.075e-10 (-0.29)	-3.613e-09 (-1.52)	5.135e-10 (0.37)	-3.539e-09 (-0.98)	-6.765e-10 (-0.25)
Capital expenditure (capex)	2.053e-10 (0.14)	2.296e-10 (0.06)	1.837e-09 (1.08)	1.431e-09 (0.53)	8.609e-10 (0.54)	3.395e-09*** (3.72)	2.942e-10 (0.230	3.883e-09** (2.16)	1.497e-09 (0.49)
Asset tangibility (asset)	-0.122 (-0.67)	-0.125 (-0.93)	-.49079926 (-1.17)	-1.024** (-2.52)	-0.697 (-1.34)	0.611 (0.99)	-1.170* (-1.88)	0.475 (1.17)	-0.131 (-0.79)
Financial distress (fdist)	0.004 (0.57)	0.004 (1.08)	0.002 (0.23)	0.003 (0.32)	0.008 (1.59)	-0.005 (-0.53)	0.011 (0.85)	-0.005 (-0.51)	0.001 (0.17)
Liquidity (liq)	-0.021* (-1.68)	-0.020 (-1.50)	-0.001 (-0.76)	-0.013 (-1.46)	-0.021 (-1.03)	-0.012 (-1.09)	-0.011 (-0.62)	-0.011 (-0.73)	-0.014 (-1.00)
Price earnings (p_e)	-0.001 (-1.38)	-0.001 (-1.39)	-0.000 (-1.12)	-0.001* (-1.99)	-0.001** (-2.43)	0.000 (0.44)	-0.002* (-1.96)	0.000 (0.55)	-0.001 (-0.96)
Ordinary share price (p)	-8.234e-07 (0.56)	-7.881e-07 (-0.49)	5.521e-07 (0.47)	-3.625e-07 (-0.18)	-2.087e-07 (-0.14)	-1.609e-06 (-0.95)	1.637e-06 (0.76)	-9.299e-07 (-0.36)	-3.043e-07 (-0.17)
Retention rate (rr)	0.002 (1.53)	0.002 (1.59)	0.000 (0.38)	0.001 (0.66)	0.001 (1.29)	0.000 (0.83)	0.002 (1.00)	0.000 (0.58)	0.001 (0.47)
Firm profitability (roe)	-0.000* (-1.83)	-0.000** (-2.53)	-0.000 (-1.32)	-0.000** (-2.22)	-0.000* (-1.75)	0.000** (2.08)	-0.000** (-2.25)	0.000** (2.02)	-0.000** (-2.10)
Economic Value Added (eva)	1.493e-09 (0.85)	1.589e-09 (0.42)	2.515e-09 (1.48)	7.567e-10 (0.35)	1.118e-09 (0.67)	1.382e-09 (1.02)	-1.981e-10 (-0.09)	1.218e-09 (0.70)	2.601e-09 (0.75)
BDR Coefficient (1- λ) bdr/bdr_t1 L1	0.581*** (7.82)	0.563*** (5.78)	0.256** (2.34)	-0.219 (-1.04)	-0.373 (-0.63)	0.157 (0.76)	0.318 (1.31)	0.280*** (2.84)	0.304*** (3.10)
Implied speed of adjustment (λ)	41.92%	43.68%	74.35%	-	-	84.27%	68.21%	72.03%	69.59%
Implied half-life	1.28 years	1.21 years	0.51 years	-	-	0.37 years	0.60 years	0.54 years	0.58 years
Obs.	111	111	111	87	68	91	92	115	111
R^2	0.511	-	0.308	0.234	-	-	-	-	-
Wald Chi2	-	78.78	7.33	1.56	154.61	46.72	71.59	39.11	20.68
Prob > Chi2	-	0.000	0.000	0.128	0.000	0.000	0.000	0.000	0.037
Durbin-Watson	1.80	1.80	1.80	1.65	1.80	1.80	1.80	1.80	1.80
Sargan (df)					11.97 (5)	(23.41 (9)	13.55 (8)	24.33 (13)	

Table 6.9: Panel 2 MDR Regression Output and Speeds of Adjustment: Mining Firms

Regression results for the partial adjustment model 6: $BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1}]$ and model 7: $BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T}$, where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. The key financial performance variables determining the firm's long-run target leverage and the speed of adjustment are defined in Section 4.4.3.7 and in Table 5.5 .T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half - life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. Model 7 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The Hausman test statistic Chi2 is 2.83 and Prob>Chi2 is 0.9000. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 8	ML Random Effects Model 8	Fixed Effects Model 8	Time Series Model 8	Arellano and Bond (1991) Model 8	Arellano and Bond (1991) Model 9	Blundell and Bond (1998) Model 8	Blundell and Bond (1998) Model 9	Random Effects Tobit Model 8
Cash flow from operations (c_t)	1.860e-10 (0.33)	1.129e-10 (0.09)	-2.061e-10 (-0.40)	-1.322e-09 (-0.52)	-7.322e-10 (-0.36)	-5.997e-11 (-0.04)	-2.023e-09 (-0.71)	5.122e-11 (0.03)	-1.897e-10 (-0.16)
Capital expenditure (capex)	-3.032e-10 (-0.62)	-5.976e-11 (-0.04)	3.470e-10 (0.88)	1.458e-10 (0.10)	1.103e-10 (0.13)	2.386e-09*** (5.90)	-2.554e-10 (-0.19)	3.057e-09*** (3.90)	-1.120e-10 (-0.08)
Asset tangibility (asset)	0.007 (0.05)	-0.012 (-0.15)	-0.131 (-1.16)	-0.334* (-1.94)	-0.307* (-1.67)	0.182 (1.24)	0.077 (0.33)	0.042 (0.48)	-0.017 (-0.19)
Financial distress (fdist)	-0.003 (-1.58)	-0.004** (2.35)	-0.006*** (-3.14)	-0.005* (-1.98)	-0.005*** (-2.71)	-0.002 (-0.72)	-0.002 (-0.69)	-0.006 (-1.57)	-0.005** (-2.18)
Liquidity (liq)	-0.007 (-1.37)	-0.004 (-0.60)	0.001 (0.22)	0.000 (0.03)	0.006* (1.85)	0.002 (0.80)	0.004 (1.04)	0.001 (0.57)	-0.004 (-0.53)
Price earnings (p_e)	-0.001** (-2.48)	-0.001*** (-4.93)	-0.001** (-2.79)	-0.002*** (-3.19)	-0.002*** (-3.15)	0.000 (0.66)	-0.002*** (-3.32)	0.000 (0.21)	-0.001*** (-4.48)
Ordinary share price (p)	1.469e-07 (0.28)	2.699e-07 (0.34)	4.833e-07 (0.74)	7.890e-07 (0.86)	1.233e-06 (1.29)	-7.909e-07 (-1.12)	8.186e-07 (0.70)	-1.623e-06* (-1.67)	3.959e-07 (0.48)
Retention rate (rr)	-0.001 (-0.95)	-0.001 (-1.30)	-0.001 (-1.18)	-0.000 (-0.53)	-0.001 (-0.58)	0.001 (1.27)	-0.001 (-1.23)	0.001 (0.62)	-0.001 (-1.19)
Firm profitability (roe)	9.484e-06 (0.24)	0.000 (0.56)	0.000 (0.66)	-5.927e-06 (-0.15)	-8.728e-06 (-0.28)	0.000** (2.08)	-0.000 (-0.23)	0.000** (2.38)	5.406e-06 (0.13)
Economic Value Added (eva)	6.923e-10 (0.94)	7.456e-10 (0.48)	8.833e-10 (1.59)	6.519e-10 (0.58)	4.054e-10 (0.43)	1.499e-10 (0.230	6.170e-10 (0.63)	9.229e-10 (1.05)	9.302e-10 (0.59)
BDR Coefficient (1- λ) mdr_t1 L1	0.600*** (5.17)	0.532*** (5.39)	0.414*** (3.58)	0.053 (0.32)	0.143 (0.650	-0.050 (-0.33)	0.602*** (3.36)	0.341** (2.03)	0.542*** (4.94)
Implied speed of adjustment (λ)	40.04%	46.82%	58.56%	94.67%	85.65%	-	39.78%	65.86%	45.77%
Implied half-life	1.36 years	1.10 years	0.79 years	0.24 years	0.36 years	-	1.37 years	0.65 years	1.13 years
Obs.	110	110	110	86	67	89	91	113	110
R^2	0.481	-	0.302	0.496	-	-	-	-	-
Wald Chi2	-	60.96	-	2.78	102.82	53	107.42	69.45	70.02
Prob > Chi2	-	0.000	-	0.004	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.28	1.28	1.28	1.38	1.28	1.28	1.28	1.28	1.28
Sargan (df)					10.69 (5)	17.13 (9)	23.27 (8)	23.93 (13)	

6.3.4 Panel 2 Results for Retail Firms

This section presents and discusses the empirical results for the retail firms. The correlation results are discussed first, followed by the target speed of adjustment results. The descriptive statistics are contained in Table 6.10 below.

Table 6.10: Panel 2 Summary of Statistics for the Retail Firms

The Panel 2 sample consists of 23 retail firms with complete data for two or more consecutive years during the period 2005-2010. There are a total of 107 observations for the period. Extreme outlier observations in all explanatory variables were identified through ridge regression and removed from the sample. The ridge procedure was not used for the dependent variables, bdr, mdr and change in debt issued. The extended definitions of variables are contained in Section 4.4.3.7.

Cash flow from operations (c_t) (R'm): the cash ex-operations
Capital expenditure (capex) (R'm): the sum of the firm's capital expenditures on fixed assets, new investments and net investments in subsidiaries
Asset tangibility (asset): the fixed assets scaled up by the total assets
Firm size (size): the natural logarithm of total assets
Firm growth rate (mtb): the sum of the market equity, total debt and preferred shares, less deferred taxes; this is scaled up by the total assets
Financial distress (fdist): the De la Rey (1981) financial distress ratio
Liquidity (liq): the ratio of total current assets to total current liabilities
Price Earnings Ratio: the firm's year-end share price scaled up by the headlines earnings per share
Ordinary share price (p) (cents): the firm's share price at the end of the financial year
Earnings Retention Rate (rr): the ratio of retained profits to profit attributable to ordinary and preference shareholders
Firm profitability (roe): the profit after taxation scaled up by the total owners' equity
Economic Value Added (EVA) (R'm): the firm's spread multiplied by capital employed
Book-to-debt ratio (bdr): the total debt scaled up by the total assets
Market-to-debt ratio (mdr): the total debt scaled up by the sum of the total debt and firm market capitalisation

Variable	Obs.	Mean	SD	Min.	Max.
Cash flow from operations (c_t) (R'm)	137	731,147.6	927,360.9	-92,106	4,967,000
Capital expenditure (capex) (R'm)	137	463,522.6	1,037,412	-137,523	6,987,762
Asset tangibility (asset)	137	0.183	0.122	0.023	0.563
Firm size (size)	137	14.49	1.54	9.05	17.48
Firm growth rate (mtb)	137	1.75	1.19	0.016	5.59
Financial distress (fdist)	136	1.14	1.36	-1.82	7.53
Liquidity (liq)	137	1.85	1.06	0.61	6.28
Price earnings (p_e)	130	12.10	9.61	-21.69	99.91
Ordinary share price (p) (cents)	130	3,308.74	3,754.04	29	29,657
Retention rate (rr)	137	58.52	33.65	-94.81	166.27
Firm profitability (roe)	137	164.34	1,155.83	-844.8	12,555.81
Economic Value Added (eva) (R'm)	136	229,442	381,380.7	-1,158,593	1,561,375
Book-to-debt ratio (bdr)	137	0.100	0.155	0	0.660
Market-to-debt ratio (mdr)	137	0.100	0.185	0	1
# Obs. Market-to-debt ratio =0	19 (13.87%)				
# Obs. Market-to-debt ratio =1	2 (1.46%)				
# Obs. Market-to-debt ratio >1	0 (0.00%)				
# Obs. Book-to-debt ratio = 0	19 (13.87%)				
# Obs. Book-to-debt ratio = 1	0 (0.00%)				
# Obs. Book-to-debt ratio> 1	0 (0.00%)				

6.3.4.1 Model 6, 7, 8 and 9 Correlation Results: Retail Firms

The test results of models 6, 7, 8 and 9 are contained in Tables 6.11 and 6.12 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. The Hausman test statistic Chi2 is 5.62 and Prob>Chi2 is 0.4676 for BDR and the test statistic's Chi2 is 5.70 and Prob>Chi2 is 0.4573 for MDR. The null hypothesis is accepted in both cases ($p > 0.05$). The GLS RE estimator is confirmed as a consistent estimator and the individual effects do not appear to be correlated with the regressors. Thus the fixed effects model is soundly rejected as a consistent estimator and it is excluded in the determination of the ultimate correlation of each variable. In both BDR and MDR regressions, the Sargan test confirms the validity of the over identifying restrictions implying that all the instrumental variables are valid for the Arellano and Bond and Blundell and Bond models.

Cash flow from operations*:* For model 6, the A&B estimator shows a negative correlation between the cash flow from operations and the BDR, with the remainder of the estimators confirming a positive correlation with the BDR. The results of model 7 and 8 are mixed and inconclusive. Model 9 results confirm a significant positive correlation between the cash flow from operations and the MDR. There is a positive correlation between the cash flow generated and the leverage. This confirms hypothesis 9 and the results are similar to those of the full sample described in Section 6.3.1.1 above. The results confirm the validity of both the agency cost and trade-off theories as the best descriptors of cash flow from operations correlations in retail firms.

Liquidity: The results of model 6 confirm a positive correlation between liquidity and the BDR, with only the B&B and RE Tobit estimators showing a negative correlation. The results of model 8 also confirm a positive correlation with the MDR, with only the B&B estimator predicting a negative correlation. The model 7 and 9 results confirm a negative correlation with both the BDR and the MDR. Liquidity is positively correlated to leverage.

Hypothesis 26 is thus rejected. Surprisingly, the liquidity of the retail firms increases with an increase in leverage. These results contradict the findings of Dawood, Moustafa and El-Hennawi (2011:96) and Mukherjee and Mahakud (2012:53) who documented a negative correlation between liquidity and leverage.

Price earnings: With the exception of the A&B estimator, the results of all the model 6 and 8 estimators confirm a positive correlation between price earnings and both the BDR and the MDR. The results of models 7 and 9 all confirm a negative correlation with the BDR and the MDR. The price earnings are positively correlated to leverage. Hypothesis 24 is thus rejected. The results are similar to those of the manufacturing firms described in Section 6.3.2.2 above. The price earnings ratio of the retail firms increases with increasing leverage. This indicates that the share price of the firms either remains constant or increases with leverage. These results provide evidence for the signalling theory in retail firms.

Ordinary share price: All the estimators except the RE Tobit estimator confirm a negative correlation between the ordinary share price and the BDR for both models 6 and 7. The correlation coefficients are significant at 5% for the A&B and B&B estimators. The results of model 8 are mixed, with the A&B and B&B estimators showing significant negative correlation coefficients. The model 9 results show a negative correlation with the MDR. The ordinary share price is negatively correlated to leverage. The results are similar to those of the full sample described in Section 6.3.1.1 above, and they confirm the validity of the market timing theory in explaining the relationship between the ordinary share price and leverage. The signalling theory is rejected.

Retention rate: The results of all the models confirm a weak positive correlation between the retention rate and both the BDR and the MDR. Hypothesis 25 is therefore rejected. The results are similar to those of the mining firms described in Section 6.3.3.1 above. In the retail firms, the retention rate increases with increasing leverage. This contradicts the pecking order theory.

Economic Value Added: Although the model 7 results are mixed, the results of models 6, 8 and 9 all confirm a negative correlation between the EVA and both the BDR and the MDR. The GLS RE and A&B coefficients are significant at 1%. EVA is negatively correlated to leverage in the retail firms and these results confirm hypothesis 22. The firm's EVA increases with an increase in leverage. According to the trade-off theory, an increase in leverage reduces a firm's overall weighted cost of capital (WACC) up to an optimal leverage point. The optimal leverage point marks the firm's optimal capital structure where the WACC is minimised (Shackelton, 2009:120). An increase in leverage beyond this point will result in an increasing WACC, as the financial distress and bankruptcy costs will outweigh the tax benefits of debt. Thus the WACC decreases with an increase in leverage.

These results are consistent with the hypothesis of the dynamic trade-off theory.

The significant predictors of leverage in the retail firms are asset tangibility, capital expenditure, financial distress, profitability, cash flow from operations, EVA, and the ordinary share price. The cash flow correlation results confirm the validity of both the agency and trade-off theories in explaining the relationship between leverage and the firm's cash flow. Price earnings ratio correlations confirm the validity of the signalling theory. The results on share price reject the signaling theory hypothesis, but are in line with the market timing theory. The retention rate results contradict the pecking order theory hypothesis. Finally, the EVA results confirm the validity of the trade-off theory in explaining the relationship between leverage and EVA in the retail firms. As with the results for the full sample, described in Section 6.3.1.1 above, these results indicate that the correlation results largely depend on the dependent variable used, the model fitted and the estimator chosen.

The results of the speed of adjustment estimates for the retail firms are discussed below

6.3.4.2 Model 6, 7, 8 and 9 Speed of Adjustment Results: Retail Firms

The speed of adjustment estimation results of models 6, 7, 8 and 9 are contained in Tables 6.11 and 6.12 below. The number of observations and the values for R^2, WaldChi2 and Prob> Chi2, together with the Durbin-Watson statistics, are presented at the bottom of each table. These confirm that all the models were well-fitted. As explained in section 6.3.4.1 above, the FE estimator is inconsistent and hence its results were excluded in the determination of the ultimate average and range of speed of target adjustment.

Retail firms: Only the A&B estimator fails to estimate the speed of adjustment of the retail firms for models 6 and 7. The TS, A&B, B&B and RE Tobit estimators all fail in models 8 and 9. The average speed of adjustment for models 6 and 7 is 15.06% (12.89 years) and the speed of adjustment ranges between 1.34 (51.20 years) and 46.50% (1.17 years). The average speed of adjustment for models 8 and 9 is 29.75% (7.90 years) and the true speed of adjustment ranges between 5.77% (11.67 years) and 77.68% (0.46 years). The true speed of adjustment for the retail firms is 9.34% for the BDR. The MDR model fails to estimate the true speed of adjustment, due to the size of the panel; it is too small. This estimate is therefore not a true reflection of the adjustment speed of retail firms.

As with the correlation results discussed in Section 6.3.1.1 above, the speed of adjustment is affected by the dependent variable used (BDR or MDR), the estimator used and the model fitted.

Table 6.11: Panel 2 BDR Regression Output and Speeds of Adjustment: Retail Firms

Regression results for the partial adjustment model 6: $BDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1}$ and model 7: $BDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)BDR_{i,T-1} + \varepsilon_{i,T}$, where λ is the adjustment speed on the lagged book-to-debt ratio (BDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. The key financial performance variables determining the firm's long-run target leverage and the speed of adjustment are defined in Section 4.4.3.7 and in Table 5.5 .T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half - life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. Model 7 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The Hausman test statistic Chi2 is 5.62 and Prob>Chi2 is 0.4676. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
Variables	GLS Random Effects Model 6	ML Random Effects Model 6	Fixed Effects Model 6	Time Series Model 6	Arellano and Bond (1991) Model 6	Arellano and Bond (1991) Model 7	Blundell and Bond (1998) Model 6	Blundell and Bond (1998) Model 7	Random Effects Tobit Model 6
Cash flow from operations (c_t)	9.227e-09 (0.80)	9.227e-09 (0.74)	-2.431e-08 (-0.98)	2.494e-09 (0.15)	-9.176e-09 (-0.16)	1.834e-08 (0.66)	1.537e-09 (0.04)	-1.580e-08 (-0.79)	1.003e-08 (0.74)
Capital expenditure (capex)	1.309e-09 (0.15)	1.309e-09 (0.12)	-4.045e-10 (-0.06)	1.555e-10 (0.01)	4.752e-09 (0.98)	1.613e-08* (1.79)	7.145e-09 (0.77)	2.274e-08** (2.21)	-8.651e-10 (-0.08)
Asset tangibility (asset)	0.051* (1.87)	0.051 (1.09)	0.461*** (4.06)	0.079 (1.39)	0.260 (1.35)	-0.292 (-1.08)	0.705*** (2.74)	-0.067 (-0.22)	0.043 (0.83)
Financial distress (fdist)	0.006*** (2.99)	0.006 (1.48)	0.007* (1.87)	0.006 (1.02)	0.000 (0.06)	-0.028 (-1.42)	0.005 (0.82)	-0.037** (-2.28)	0.005 (1.23)
Liquidity (liq)	0.004 (0.91)	0.004 (0.64)	0.028** (2.39)	0.000 (1.09)	0.014* (1.92)	-0.023 (-0.84)	-0.017 (-0.90)	-0.039 (-1.62)	-0.002 (-0.33)
Price earnings (p_e)	0.000 (0.98)	0.000 (0.90)	-0.000 (-0.13)	0.001 (0.02)	-0.000 (-0.10)	-0.000 (-0.53)	0.000 (0.41)	-0.000 (-0.48)	0.000 (0.77)
Ordinary share price (p)	-8.354e-08 (-0.10)	-8.354e-08 (-0.06)	-2.566e-06** (-2.53)	-2.818e-07 (0.23)	-3.074e-06*** (-4.90)	-1.700e-06 (-1.46)	-3.030e-06*** (-3.16)	-3.696e-06* (-1.87)	1.677e-07 (0.11)
Retention rate (rr)	0.000 (0.17)	0.000 (0.15)	0.000 (1.16)	0.000 (-0.21)	0.000* (1.73)	0.000 (0.61)	0.000 (1.42)	0.000 (0.47)	0.000 (0.24)
Firm profitability (roe)	0.000*** (19.68)	0.000*** (3.33)	0.000*** (14.04)	0.000 (0.23)	0.000*** (3.50)	0.000 (1.43)	0.000** (2.22)	0.000*** (3.90)	0.000*** (2.93)
Economic Value Added (eva)	-3.339e-08*** (-2.65)	-3.339e-08* (-1.77)	-7.887e-09 (-0.37)	-2.793e-08 (1.23)	-3.027e-08 (-0.76)	-4.776e-09 (-0.16)	-3.201e-08 (-0.85)	4.121e-08 (1.19)	-3.917e-08* (-1.90)
BDR Coefficient (1- λ) bdr/bdr_t1 L1	0.881*** (43.03)	0.881*** (21.08)	0.282** (2.76)	0.905*** (10.49)	-0.232 (-0.62)	0.397 (0.77)	0.535** (2.27)	0.987*** (3.55)	0.907*** (19.77)
Implied speed of adjustment (λ)	11.86%	11.86%	71.75%	9.47%	-	60.29%	46.50%	1.34%	9.34%
Implied half-life	5.49 years	5.49 years	0.55 years	6.96 years	-	0.75 years	1.11 years	51.20 years	7.07 years
Obs.	106	106	106	82	62	83	85	107	106
R^2	0.883	-	0.392	0.899	-	-	-	-	-
Wald Chi2	25838.74	227.72	148.06	45.59	3909.91	281.44	186.94	182.32	698.34
Prob > Chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	2.13	2.13	2.13	2.06	2.13	2.13	2.13	2.13	2.13
Sargan (df)					11.76 (9)	15.96 (9)	23.11 (8)	22.73 (13)	

Table 6.12: Panel 2 MDR Regression Output and Speeds of Adjustment: Retail Firms

Regression results for the partial adjustment model 8: $MDR_{i,T+1} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T} + c_{i,T} + \varepsilon_{i,T+1}$ and model 9: $MDR_{i,T} = \alpha + (\lambda\beta)X_{i,T} + (1-\lambda)MDR_{i,T-1} + \varepsilon_{i,T}$, where λ is the adjustment speed on the lagged market-to-debt ratio (MDR), $c_{i,T}$ is the time-invariant unobserved variable (firm fixed effect) and $\varepsilon_{i,T+1}$ is an error term. The key financial performance variables determining the firm's long-run target leverage and the speed of adjustment are defined in Section 4.4.3.7 and in Table 5.5. T-statistics are reported in parentheses. T-statistics are reported in parentheses. The markings ***, ** and * denote coefficients that are statistically significantly different from zero at the levels of 1%, 5%, and 10% respectively. The implied half-life is calculated as: $half - life = \log(0.5)/\log(1-\lambda)$. Model specifications are shown at the bottom of the table. In the ML Random effects model, the Wald Chi 2 statistics are replaced by LR Chi 2, and in both the fixed effects and time series models, they are replaced by F. Model 9 is only estimated using the Arellano & Bond (1991) and the Blundell & Bond (1998) estimators. The Hausman test statistic Chi2 is 5.70 and Prob>Chi2 is 0.4573. The Sargan test statistic is shown for both the Arellano & Bond (1991) and Blundell & Bond (1998) estimators.

Variables	Static Panel Estimators				Dynamic Panel Estimators				Censored Model
	GLS Random Effects Model 8	ML Random Effects Model 8	Fixed Effects Model 8	Time Series Model 8	Arellano and Bond (1991) Model 8	Arellano and Bond (1991) Model 9	Blundell and Bond (1998) Model 8	Blundell and Bond (1998) Model 9	Random Effects Tobit Model 8
Cash flow from operations (c_t)	-6.414e-09 (-0.28)	-6.597e-09 (-0.26)	7.166e-10 (0.02)	-3.418e-08 (-0.51)	3.480e-08 (0.84)	4.238e-08** (2.26)	4.864e-08* (1.84)	5.726e-08*** (4.75)	-7.030e-09 (-0.25)
Capital expenditure (capex)	5.273e-09 (0.32)	5.527e-09 (0.27)	2.867e-09 (0.31)	6.247e-09 (0.28)	1.060e-08* (1.80)	1.323e-08** (2.19)	2.759e-08 (1.06)	2.609e-08 (1.42)	2.076e-09 (0.09)
Asset tangibility (asset)	-0.042 (-0.93)	-0.042 (-0.45)	0.179 (0.96)	-0.030 (-0.11)	0.102 (0.28)	-0.486* (-1.96)	0.336** (2.35)	-0.350 (-1.30)	-0.042 (-0.40)
Financial distress (fdist)	-0.004 (-0.62)	-0.004 (-0.54)	-0.003 (-0.44)	0.004 (0.16)	-0.013 (-0.75)	-0.011 (0.53)	-0.013 (-0.80)	-0.033* (-1.73)	-0.005 (-0.53)
Liquidity (liq)	0.018 (0.94)	0.018 (1.41)	0.014 (1.10)	0.008 (0.34)	0.009 (0.50)	-0.046** (-2.29)	-0.009 (-0.22)	-0.036 (-1.62)	0.007 (0.45)
Price earnings (p_e)	0.001 (0.72)	0.001 (0.99)	0.000 (0.06)	-0.000 (-0.25)	-0.000 (-0.02)	-0.001 (-0.76)	0.001 (0.59)	-0.001 (-1.05)	0.001 (0.82)
Ordinary share price (p)	5.770e-07 (0.63)	6.049e-07 (0.21)	-2.433e-06** (-2.43)	-2.122e-06 (-0.71)	-3.385e-06*** (-7.24)	-1.535e-06 (-1.27)	-3.137e-06*** (-4.07)	-1.108e-06 (-1.04)	9.731e-07 (0.31)
Retention rate (rr)	0.000 (0.98)	0.000 (0.57)	0.000 (1.19)	0.000 (0.49)	0.000** (2.29)	0.000 (0.97)	0.000** (2.35)	0.000 (0.59)	0.000 (0.67)
Firm profitability (roe)	4.305e-06** (2.23)	4.377e-06 (0.57)	3.662e-06* (1.74)	5.835e-06 (0.86)	0.000*** (3.53)	4.105e-06 (1.27)	0.000** (2.33)	6.216e-06 (1.62)	4.925e-06 (0.58)
Economic Value Added (eva)	-2.823e-08 (-0.77)	-2.806e-08 (-0.72)	-3.857e-08 (-0.78)	-6.835e-08 (-0.80)	-9.343e-08*** (-2.79)	-4.657e-08 (-1.03)	-1.073e-07*** (-3.43)	-8.214e-08 (-1.23)	-3.813e-08 (-0.89)
BDR Coefficient (1- λ) mdr_t1 L1	0.942*** (5.25)	0.942*** (7.47)	0.336 (1.19)	-0.299 (1.36)	-0.599 (-1.11)	-0.030 (3.85)	-0.084 (-0.27)	0.223* (1.79)	1.015*** (7.23)
Implied speed of adjustment (λ)	5.81%	5.77%	66.38%	-	-	-	-	77.68%	-1.47%
Implied half-life	11.57 years	11.67 years	0.64 years	-	-	-	-	0.46 yeas	-47.37 years
Obs.	107	107	107	83	63	84	86	108	107
R^2	0.515	-	0.392	0.053	-	-	-	-	-
Wald Chi2	3716.06	77.47	26.51	0.75	242.04	212.59	457.93	94.19	103.61
Prob > Chi2	0.000	0.000	0.000	0.687	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.33	1.33	1.33	1.10	1.33	1.33	1.33	1.33	1.33
Sargan (df)					3.16 (5)	5.97 (9)	7.21 (13)	11.49 (13)	

6.4 A NEW MODEL FOR LEVERAGE DETERMINATION

This study presents a new regression model for leverage determination. The predictors of this model include the firm's key financial performance indicators which the market tracks on a regular basis. These key variables are: ordinary share price, price earnings ratio, liquidity, return on equity and cash flow from operations. The model also incorporates asset tangibility, financial distress, retention rate and capital expenditure. The proposed model is:

$$LEV_{i,T+1} = \beta_0 + (1-\lambda)LEV_{i,T} + \lambda\beta_1 ASSET_{i,T} + \lambda\beta_2 FDIST_{i,T} + \lambda\beta_3 RR_{i,T} + \lambda\beta_4 LIQ_{i,T} + \lambda\beta_5 EVA_{i,T} + \lambda\beta_6 P_{i,T} + \lambda\beta_7 P/E_{i,T} + \lambda\beta_8 ROE_{i,T} + \lambda\beta_9 CAPEX_{i,T} + \lambda\beta_{10} C_{i,T} + \varepsilon_{i,T+1}$$

Where LEV is the firm's leverage measured in either book (BDR) value or in market (MDR) value.

The parameters of this model for the full sample and for each of the three sectors are contained in Tables 6.2, 6.3, 6.5, 6.6, 6.8 and 6.9 above. This model can be used to estimate the firm's optimal operational leverage target. The model does not assume a theoretical optimal capital structure, but rather a dynamic target capital structure. As the parameters are estimated from the same data used to estimate the speed of adjustment and discounted value premium, this model therefore incorporates the firm's target leverage and its financial flexibility slack.

6.5 SUMMARY

This chapter presented and discussed the results of the regression models that incorporate the firm's key financial performance indicators. Panel 2 data were used to fit these models. The results for target adjustment speeds were also discussed. The results can be documented as follows:

Firstly, the most significant firm-specific predictors of leverage are:

- ***Full sample***: liquidity, capital expenditure, ordinary share price and financial distress
- ***Manufacturing firms***: liquidity, cash flow from operations, capital expenditure, asset tangibility, ordinary share price, profitability and price earnings ratio
- ***Mining firms***: capital expenditure, financial distress, price earnings ratio and profitability
- ***Retail firms***: asset tangibility, capital expenditure, financial distress, profitability, cash flow from operations, EVA and ordinary share price.

Secondly, as documented in the preceding chapter, the firms have a positive speed of adjustment which indicates that they have a target capital structure towards which they adjust over time. The target adjustment speeds differ, however, from those estimated using models 1, 2, 3 and 4. This implies that the target speed of adjustment is dependent on the explanatory variables used in the estimation. The speed of adjustment, however, is still highest for the mining firms and lowest for the retail firms. The true speeds of target adjustment are as follows: for the full sample, it is 64.20% (BDR) and 28.11% (MDR); for the manufacturing firms, it is 34.42% (BDR) and 30.56% (MDR); for the mining firms, it is 69.59% (BDR) and 45.77% (MDR); and for the retail firms, it is 9.34 % (BDR). All the estimators failed to estimate the MDR speed of adjustment for the retail firms. This is due to the small sample size.

Thirdly, both the speed of adjustment results and the correlation results are affected by the dependent variable (BDR or MDR), the estimator, the determinants or explanatory variables used, the model fitted and the sector of the firm.

Finally, the study also introduces a new partial adjustment model that incorporates the firm’s key financial performance indicators.

The next chapter presents the results of the discounted value premium tests.

CHAPTER 7
RESULTS ANALYSIS: DISCOUNTED VALUE PREMIUM

7.1 INTRODUCTION

This chapter presents the test results of the discounted value premium. It begins with a brief discussion of the summary statistics and continues with a presentation and discussion of the t-test results.

7.2 THE DISCOUNTED VALUE PREMIUM SAMPLE: SUMMARY STATISTICS

The discounted value premium is estimated for 47 manufacturing, 31 mining and 20 retail firms with complete data for four or more consecutive years during the period 2006-2010. Table 7.1 presents the descriptive statistics of the full sample. The summary statistics of the manufacturing, mining and retail firms are presented in Tables 7.2, 7.3 and 7.4 respectively. The sampled firms were further arranged according to size; that is, large, medium and small firms. The summary statistics of the large, medium and small firms are presented in Tables 7.5, 7.6 and 7.7 respectively.

The sample shows a positive mean discounted value premium of R1, 363,919m (5.00% of the firm value) when no growth in earnings is assumed. However, this rises to R2, 418,455m (8.15% of the firm value) when perpetual growth is assumed. The positive discounted value premium means that the current mean firm value is less than the mean optimal capital structure value. According to the trade-off theory, this implies that the firms are underleveraged. When no growth is assumed, only 7.77% of the observations exhibit a negative discounted value premium. This proportion of observations increases to 10.02% when earnings are assumed to grow perpetually. The negative discounted value premium means that the firm's leverage is more than the theoretical optimal level. Thus, according to the trade-off theory, the firms are overleveraged. The summary statistics indicate that 92.23% of the firms are underleveraged under the no-growth assumption, whilst 89.98% of the firms are underleveraged when perpetual growth is assumed. Only 7.77% of the firms are over-leveraged when no growth is assumed, and 10.02% are over-leveraged when perpetual growth is assumed.

The mining firms have the highest mean discounted value premium of R3, 223,747m when growth is assumed to be zero (R6, 442,168m when growth is assumed to be perpetual). The manufacturing firms have a mean discounted value premium of R643, 196.7m when growth is assumed to be zero (R631, 068.7m when growth is assumed to be perpetual). The retail firms have the lowest mean discounted value premium of R167, 677.7m when growth is assumed to be zero (R364, 184m when growth is assumed to be perpetual). Of the retail observations, only 5.00% (6.00% on perpetual growth) are overleveraged; thus 95.00% (94.00% on perpetual growth) of the observations are underleveraged. Of the manufacturing observations, 94.02% (91.88% on perpetual growth) are underleveraged. Mining firms have the highest proportion of under-leveraged observations, with 87.74% (84.52% on perpetual growth) being under-leveraged.

Lastly, with a mean of 6.11% (8.30% on perpetual growth), medium firms have the lowest proportion of over-leveraged observations. With a mean of 6.67% (10.37% on perpetual growth), small firms have the second lowest proportion of over-leveraged observations. With a mean of 12.00% (12.80% on perpetual growth), large firms have the highest proportion of over-leveraged observations. Although a small proportion (10.02%) of the observations is over-leveraged, a large proportion (89.98%) of the observations is under-leveraged. That is, the current leverage is less than the theoretical optimal leverage, and this gives rise to the discounted value premium. This is the value the firm foregoes by opting for the lower-than-optimal leverage.

The proportion of firms that have a positive discounted value premium contradicts the hypothesis of the static trade-off theory that firms maintain their capital structures at an optimal level. Even the dynamic trade-off theory advocated by Hovakimian *et al.* (2001:24) and Ju *et al.* (2005:279) cannot fully explain this observed under-leveraging by South African firms. The firms may have dynamic targets, but the observed variation is significantly greater than the 0.5% of firm value that the dynamic trade-off theory advocates. According to Graham (2000:1901), under-leveraging by firms is persistent, indicating that corporate financing is not solely driven by the tax benefits of debt as hypothesised by the trade-off theory.

Table 7.1: Discounted Value Premium Summary of Statistics: Full Sample

The discounted value premium sample consists of 47 manufacturing, 31 mining and 20 retail firms with complete data for four or more consecutive years during the period 2006-2010. There are a total of 489 observations for the period. The sector and firm size summary statistics are contained in Tables 7.2, 7.3, 7.4, 7.5, 7.6 and 7.7 below. The summary statistics on sector size are contained in Appendix 21.

Change in debt ratio (∆dr): the debt ratio at the optimal capital structure less the firm's current debt ratio
Change in WACC (wacc): the WACC at the optimal capital structure less the firm's WACC at the current leverage
Change in firm value, no growth (fv_ng)(R'm) : the firm's value at the optimal capital structure less the firm's value at the current leverage assuming no growth in earnings
Change in firm value, perpetual growth (fv_pg))(R'm): the firm's value at the optimal capital structure less the firm's value at the current leverage assuming perpetual growth in earnings
Change in debt ratio (%∆dr) ratio: the change in debt ratio expressed as a percentage
Change in WACC (wacc) ratio: the change in the WACC expressed as a percentage
Change in firm value, no growth (fv_ng) ratio: the change in the firm's value, assuming no growth, expressed as a percentage
Change in firm value, perpetual growth (fv_pg) ratio: the change in the firm's value, assuming perpetual growth, expressed as a percentage

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Change in debt ratio (∆dr)	489	0.103	0.261	-0.786	0.900
Change in WACC (wacc)	489	-0.005	0.009	-0.076	0.011
Change in firm value, no growth (fv_ng) (R'm)	489	1,363,919	5,939,399	-2,481,087	6.94e+07
Change in firm value, perpetual growth (fv_pg) (R'm)	489	2,418,455	1.60e+07	-2.15e+08	1.01e+08
Change in debt ratio (%∆dr)	433	40.55	180.79	-1.00	2,207.86
Change in WACC ratio (change_wacc)	489	-0.041	0.066	-0.482	0.043
Change in firm value, no growth ratio (change_fv_ng)	489	0.050	0.098	-0.041	0.931
Change in firm value, perpetual growth ratio (change_fv_pg)	487	0.081	0.773	-9.726	6.362
# Obs. Change in firm value, ng = negative	38 (7.77%)				
# Obs. Change in firm value, ng = positive	451 (92.23%)				
# Obs. Change in firm value, pg = negative	49 (10.02%)				
# Obs. Change in firm value, pg = positive	440 (89.98%)				

Table 7.2: Discounted Value Premium Summary of Statistics: Manufacturing Firms

The discounted value premium sample consists of 47 manufacturing firms with complete data for four or more consecutive years during the period 2006-2010. There are a total of 234 observations for the period. All the variables are as defined in Table 7.1 above.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Change in debt ratio (∆dr)	234	0.076	0.285	-0.786	0.900
Change in WACC (wacc)	234	-0.006	0.011	-0.076	0.003
Change in firm value, no growth (fv_ng) (R'm)	234	643,196.70	2,309,177	-2,481,087	1.85e+07
Change in firm value, perpetual growth (fv_pg) (R'm)	234	631,068.70	1.65e+07	-2.15e+08	7.02e+07
Change in debt ratio (%∆dr)	207	29.48	129.09	-1.00	932.84
Change in WACC ratio (change_wacc)	234	-0.048	0.077	-0.482	0.026
Change in firm value, no growth ratio (change_fv_ng)	234	0.060	0.117	-0.025	0.931
Change in firm value, perpetual growth ratio (change_fv_pg)	232	0.085	0.974	-9.73	6.36
# Obs. Change in firm value, ng = negative	14 (5.98%)				
# Obs. Change in firm value, ng = positive	220 (94.02%)				
# Obs. Change in firm value, pg = negative	19(8.12%)				
# Obs. Change in firm value, pg = positive	215 (91.88%)				

Table 7.3: Discounted Value Premium Summary of Statistics: Mining Firms

The discounted value premium sample consists of 31 mining firms with complete data for four or more consecutive years during the period 2006-2010. There are a total of 155 observations for the period. All the variables are as defined in Table 7.1 above

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Change in debt ratio (∆dr)	155	0.092	0.273	-0.678	0.899
Change in WACC (wacc)	155	-0.006	0.010	-0.063	.011
Change in firm value, no growth (fv_ng) (R'm)	155	3,223,747	9,923,243	-2,143,069	6.94e+07
Change in firm value, perpetual growth (fv_pg) (R'm)	155	6,442,168	1.94e+07	-1.55e+07	1.01e+08
Change in debt ratio (%∆dr)	134	28.46	143.38	-1.00	1,288.74
Change in WACC ratio (change_wacc)	155	-0.043	0.067	-0.402	0.043
Change in firm value, no growth ratio (change_fv_ng)	155	0.052	0.094	-0.041	0.673
Change in firm value, perpetual growth ratio (change_fv_pg)	155	0.095	0.674	-4.729	5.59
# Obs. Change in firm value, ng = negative	19(12.26%)				
# Obs. Change in firm value, ng = positive	135 (87.74%)				
# Obs. Change in firm value, pg = negative	24 (15.48%)				
# Obs. Change in firm value, pg = positive	131(84.52%)				

Table 7.4: Discounted Value Premium Summary of Statistics: Retail Firms

The discounted value premium sample consists of 20 retail firms with complete data for four or more consecutive years during the period 2006-2010. There are a total of 100 observations for the period. All the variables are as defined in Table 7.1 above.

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Change in debt ratio (∆dr)	100	0.185	0.144	-0.193	0.886
Change in WACC (wacc)	100	-0.003	0.003	-0.015	0.003
Change in firm value, no growth (fv_ng) (R'm)	100	167,677.70	269,779.20	-737,729.30	1,012,138
Change in firm value, perpetual growth (fv_pg) (R'm)	100	364,184.70	894,468.1	-3,668,526	4,358,189
Change in debt ratio (%∆dr)	92	83.08	291.68	-1.00	2,207.86
Change in WACC ratio (change_wacc)	100	-0.023	0.021	-0.101	0.019
Change in firm value, no growth ratio (change_fv_ng)	100	0.024	0.023	-0.018	0.121
Change in firm value, perpetual growth ratio (change_fv_pg)	100	0.052	0.091	-0.092	0.775
# Obs. Change in firm value, ng = negative	5 (5.00%)				
# Obs. Change in firm value, ng = positive	95 (95.00%)				
# Obs. Change in firm value, pg = negative	6 (6.00%)				
# Obs. Change in firm value, pg = positive	94 (94.00%)				

Table 7.5: Discounted Value Premium Summary of Statistics: Large Firms

The discounted value premium sample consists of 24 large firms with complete data for four consecutive years during the period 2006-2010.
There are a total of 125 observations for the period. All the variables are as defined in Table7.1 above.
The firm sizes are defined as follows:

- Large firms (with market capitalisation >R20,000)
- Medium firms (with market capitalisation R1,000m-R20,000)
- Small firms (with market capitalisation <R1,0000m)

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Change in debt ratio (∆dr)	125	0.198	0.223	-0.339	0.899
Change in WACC (wacc)	125	-0.005	0.006	-0.026	0.003
Change in firm value, no growth (fv_ng) (R'm)	125	4,549,910	1.09e+07	-2,481,087	6.94e+07
Change in firm value, perpetual growth (fv_pg) (R'm)	125	9,221,369	2.15e+07	-1.55e+07	1.01e+08
Change in debt ratio (%∆dr)	119	62.09	218.66	-1.00	1,492.29
Change in WACC ratio (change_wacc)	125	-0.033	0.039	-0.192	0.019
Change in firm value, no growth ratio (change_fv_ng)	125	0.036	0.045	-0.018	0.238
Change in firm value, perpetual growth ratio (change_fv_pg)	125	0.037	0.444	-4.73	0.824
# Obs. Change in firm value, ng = negative	15 (12.00%)				
# Obs. Change in firm value, ng = positive	110 (88.00%)				
# Obs. Change in firm value, pg = negative	16 (12.80 %%)				
# Obs. Change in firm value, pg = positive	109 (87.20 %%)				

Table 7.6: Discounted Value Premium Summary of Statistics: Medium Firms

The discounted value premium sample consists of 44 medium firms with complete data for four consecutive years during the period 2006-2010.
There are a total of 229 observations for the period. All the variables are as defined in Table 7.1 above.
The firm sizes are as defined in Table 7.5 above.

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Change in debt ratio (Δdr)	229	0.071	0.237	-0.637	0.900
Change in WACC (wacc)	229	-0.005	0.008	-0.055	0.005
Change in firm value, no growth (fv_ng) (R'm)	229	408,912	1,759,161	-336,810.50	1.85e+07
Change in firm value, perpetual growth (fv_pg) (R'm)	229	1,023,072	7,524,284	-4.70e+07	7.02e+07
Change in debt ratio (%Δdr)	201	38.33	191.59	-1.00	2,207.86
Change in WACC ratio (change_wacc)	229	-0.036	0.056	-0.359	0.043
Change in firm value, no growth ratio (change_fv_ng)	229	0.042	0.075	-0.041	0.561
Change in firm value, perpetual growth ratio (change_fv_pg)	229	0.086	0.380	-2.726	2.917
# Obs. Change in firm value, ng = negative **# Obs. Change in firm value, ng = positive** **# Obs. Change in firm value, pg = negative** **# Obs. Change in firm value, pg = positive**	14 (6.11%) 215 (93.89 %) 19 (8.30%) 210 (91.70%)				

Table 7.7: Discounted Value Premium Summary of Statistics: Small Firms

The discounted value premium sample consists of 30 small firms with complete data for four consecutive years during the period 2006-2010.
There are a total of 155 observations for the period. All the variables are as defined in Table 7.1 above.
The firm sizes are as defined in Table 7.5 above.

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Change in debt ratio (Δdr)	135	0.069	0.310	-0.786	0.90
Change in WACC (wacc)	135	-0.008	0.014	-0.076	0.010
Change in firm value, no growth (fv_ng) (R'm)	135	33,903.61	81,016.74	-7,810.75	5,521,53.10
Change in firm value, perpetual growth (fv_pg) (R'm)	135	-1,513,556	1.85e+07	-2.15e+08	4,500,436
Change in debt ratio (%Δdr)	113	21.82	96.45	-1.00	877.23
Change in WACC ratio (change_wacc)	135	-0.058	0.094	-0.482	0.019
Change in firm value, no growth ratio (change_fv_ng)	135	0.076	0.151	-0.019	0.931
Change in firm value, perpetual growth ratio (change_fv_pg)	135	0.115	1.327	-9.73	6.36
# Obs. Change in firm value, ng = negative **# Obs. Change in firm value, ng = positive** **# Obs. Change in firm value, pg = negative** **# Obs. Change in firm value, pg = positive**	9 (6.67%) 126 (93.33%) 14 (10.37%) 121 (89.63%)				

7.3 EMPIRICAL FINDINGS: THE DISCOUNTED VALUE PREMIUM

The t-test results of the discounted value premium for the discounted value sample are contained in Tables 7.8 and 7.9 below.

Table 7.8: Discounted Value Premium -T-test: ttest fv_ng == 0

This table shows the t-test results of the null hypothesis that assumes zero growth in earnings; firms have a discounted value premium of zero. That is, firms do not deviate from the theoretical optimal leverage. The firm's discounted value premium (DVP) is defined as:

$$DVP = Firm\ value\ at\ optimal\ leverage - value\ at\ current\ leverage$$

The null hypothesis is H_0: mean = 0.
The left hand side alternative hypothesis is Ha: mean < 0.
The right hand side alternative hypothesis is Ha: mean > 0.

If the p-value is less than the pre-specified alpha level of 0.05, then the conclusion is that the change in firm value assuming no growth is statistically significantly greater or less than 0.
If the change in firm value is greater than zero, this implies that firms never gear to the theoretical optimal level.

T-test	Firms/Sector/ Size	Ha: mean < 0 p-values	H_0: mean = 0 p-values	Ha: mean > 0 p-values	t-value	Degrees of freedom	Observations
ttest fv_ng == 0	Full sample	1.00	0.00	0.00	5.08	488	489
	Manufacturing	1.00	0.00	0.00	4.26	233	234
	Mining	1.00	0.00	0.00	4.05	154	155
	Retail	1.00	0.00	0.00	6.22	99	100
ttest fv_ng == 0	Large firms	1.00	0.00	0.00	4.66	124	125
	Medium firms	1.00	0.00	0.00	3.52	228	229
	Small firms	1.00	0.00	0.00	4.86	134	135

T-Test 1: **ttest fv_ng == 0**. In test one, all the p-values of the left hand side alternative hypothesis are greater than the alpha value of 0.05, thus this hypothesis is rejected. The mean firm values are greater than or equal to zero for the full sample and for the manufacturing, mining and retail firms. On the other hand, all the p-values of the right hand side alternative hypothesis are less than the alpha value of 0.05, thus this hypothesis was accepted. The t-values are also significant at 1%, 5% and 10%. The mean firm values when growth is assumed to be zero are all significantly greater than zero for the full sample as well as for all three of the individual sectors. The mean firm values are also significantly greater than zero for all firm sizes. From these results, it can therefore be concluded that when growth is assumed to be zero, all firms exhibit a positive discounted value premium that is significantly greater than zero. These results are similar to the results below, and they are discussed together in full below.

Table 7.9: Discounted Value Premium - T-test: ttest fv_pg == 0

This table shows the t-test results of the null hypothesis that assumes perpetual growth in earnings; firms have a discounted value premium of zero. That is, firms do not deviate from the theoretical optimal leverage. The firm's discounted value premium (DVP) is defined as:

$$DVP = Firm\ value\ at\ optimal\ leverage - value\ at\ current\ leverage$$

The null hypothesis is H_0: mean = 0.
The left hand side alternative hypothesis is Ha: mean < 0.
The right hand side alternative hypothesis is Ha: mean > 0.

If the p-value is less than the pre-specified alpha level of 0.05, then the conclusion is that the change in firm value assuming no growth is statistically significantly greater or less than 0.
If the change in firm value is greater than zero, this implies that firms never gear to the theoretical optimal level.

T-test	Firms/Sector/ Size	Ha: mean < 0 p-values	H_0: mean = 0 p-values	Ha: mean > 0 p-values	t-value	Degrees of freedom	Observations
ttest fv_pg == 0	Full sample	1.00	0.00	0.00	3.35	488	489
	Manufacturing	0.72	0.56	0.28	0.59	233	234
	Mining	1.00	0.00	0.00	4.134	154	155
	Retail	1.00	0.00	0.00	4.07	99	100
ttest fv_pg == 0	Large firms	1.00	0.00	0.00	4.66	124	125
	Medium firms	0.98	0.04	0.02	2.06	228	229
	Small firms	0.17	0.35	0.83	-0.95	134	135

T-Test 2: **ttest fv_pg == 0.** In test 2, all the p-values of the left hand side alternative hypothesis are again greater than the alpha value of 0.05, thus this alternative hypothesis is rejected. The p-values of the manufacturing firms and the small firms are greater than the alpha value of 0.05 in all three hypotheses, thus the t-test fails for these firms. The p-values of the remainder of the firms are all less than 0.05 and the t-values are all significant at 1%, 5% and 10%. The alternative hypothesis is therefore accepted for the full sample and for the mining firms, retail firms, large firms and medium-sized firms. When perpetual growth is assumed, the mining firms, retail firms, large firms and medium-sized firms all have a positive discounted value premium.

Combining the results of the two tests, it can be concluded that manufacturing, mining and retail firms have a positive discounted value premium. The discounted value premium is the value spread between the firm value at the current leverage and the firm value at the theoretical optimal leverage predicted by the trade-off theory. This spread is the price that the firm pays for its underleveraging policy. According to the static trade-off theory, firms have an optimal capital structure where the firm's value is maximised and the WACC minimised. Any leverage below the optimal level implies that the firm is not optimising its value. Barclay and Smith (1999:8) argued that too little debt destroys value. But why would firms opt not to maximise their values? Why would they not gear up to the optimal level so as to maximise their value? The discounted value premium shown by the firms in this study is significant. The answer to these questions seems to lie in the firm's need to achieve and maintain some financial flexibility.

According to Graham (2000:1901) and Marchica and Mura (2010:1339), firms deliberately adopt an under-leveraging policy in order to achieve and maintain financial flexibility. This financing behaviour supports the pecking order hypothesis. According to Shivdasani and Zenner (2005:31), firms place a premium value on creating and maintaining financial flexibility which is viewed as a real option for the firm. The survey of US firms conducted by Graham and Harvey (2001:232) also confirmed that chief financial officers (CFOs) place a premium value on financial flexibility when designing the firm's financial structure. The size of the firm's discounted value premium is therefore a direct measure of its financial flexibility. Firms with large discounted value premiums have safe insolvency barrier margins (Kantor & Holdsworth, 2010:117). They have both equity and debt "external reserve" capacities. That is, if the need arises, they can still raise both equity and debt at reasonable costs. A firm that gears to the optimal level therefore exhausts its "external equity reserves" and this, according to the trade-off theory, increases its cost of additional capital (both debt and equity). This situation can constrain the firm financially and reduce its growth rate, as the firm is unable to finance its future growth options (Bancel & Mittoo, 2011:214 and Campello, Graham & Harvey, 2010:486). Studies by Drobetz, Pensa and Wanzenried (2007:24); Gamba and Triantis (2008:2293); Marchica and Mura (2010:1339); and Pontuch (2011:23) confirmed the positive correlation between a firm's financial flexibility and its increase in new investment. To avoid the costs associated with being financially constrained, firms therefore deliberately choose an under-leveraging policy so as to achieve and maintain financial flexibility. The results for the South African manufacturing, mining and retail firms in this study are consistent with this theory of corporate financing. A large proportion of the firms are under-leveraged. Financial flexibility comes at a price equivalent to the firm's discounted value premium.

Barclay and Smith (2005:8) and Stewart *et al.* (2005:39) argued that the need for financial flexibility depends on the firm's size, growth rate and capital expenditure programme. This means that small, fast-growing firms facing high capital expenditures have greater needs for financial flexibility than mature firms which tend to have few growth options. Accordingly, medium firms, which are the fastest growing firms, will have the highest discounted value premiums. The results of this study confirm this argument. The discounted value premium is also greater for the manufacturing firms and smaller for the retail firms. The capital expenditures of the firms follow the same trend. Mining firms have the largest capital expenditures and the largest discounted value premiums. On the other hand, retail firms have the smallest capital expenditures and the smallest discounted value premiums.

7.4 SUMMARY

Chapter 7 presented and discussed the test results for the discounted value premium. The main findings are as follows:

South African firms have a positive discounted value premium which confirms that, according to the trade-off theory, they are underleveraged. The sample shows a discounted value premium of 5.00% under the no-growth assumption and 8.15% under the perpetual growth assumption. This under-leveraging phenomenon is persistent across all sectors, with 92.23% of the firms showing a discounted value premium under the no-growth assumption (89.98% under the perpetual growth assumption). On assuming perpetual growth, the discounted value premium is smaller for the retail firms than for the mining firms. The manufacturing firms have a discounted value premium of 8.50%, with 91.88% of the total observations having a positive discounted value premium. The mining firms have a discounted value premium of 9.50%, with 84.52% of the observations being under-leveraged. The retail firms have a discounted value premium of 5.20%, with 94.00% of the observations being under-leveraged. The medium-sized firms have the largest discounted value premiums, while the small firms have the smallest discounted value premiums. The small firms are financially constrained; they rely on debt finance and hence have a small discounted value premium.

The next chapter presents a conclusion of the study.

CHAPTER 8
CONCLUSION AND RECOMMENDATIONS

8.1 INTRODUCTION

The main purposes of this research were to: test the validity of both the trade-off and pecking order theories; estimate the speed of adjustment; test for the existence of a discounted value premium; and derive a partial adjustment model that incorporates the firm's key financial performance indicators. The research was based on samples of manufacturing, mining and retail firms listed on the Johannesburg Stock Exchange during the period 2000-2010.

8.2 TRADE-OFF AND PECKING ORDER THEORIES

According to Hennessy *et al.* (2006:1) and Mehrotra *et al.* (2005:18), the trade-off and pecking order theories are the two leading capital structure theories that attempt to explain the financing of firms. The theories are, however, not mutually exclusive; they are complementary (Mukherjee & Mahakud, 2012:51 and Myers, 2008:239). The findings of this study provided further evidence on the complementary nature of these two theories in the context of South African manufacturing, mining and retail firms. The most significant determinants of leverage and changes in debt in the three sectors are as follows: In manufacturing firms, asset tangibility, non-debt tax shields, capital expenditure, firm growth rate, financial distress, profitability and changes in working capital are the most significant predictors of both leverage and changes in debt issued. In mining firms, non-debt tax shields, growth rate, capital expenditure, financial distress and changes in working capital are the most significant predictors of leverage and changes in debt issued. In retail firms, capital expenditure, financial distress, profitability and changes in working capital are the most significant predictors of leverage and changes in debt issued.

There is conclusive evidence in support of the trade-off and pecking order theories in the three sectors. In manufacturing firms, the pecking order theory is confirmed by correlations regarding asset tangibility, capital expenditure, growth rate and long-term debt repaid. The correlations regarding profitability, growth rate and non-debt tax shields are consistent with the trade-off theory. In mining firms, capital expenditure, profitability, growth rate and non-debt tax shield correlations are consistent with the trade-off theory, while correlations regarding asset tangibility, capital expenditure, growth rate, changes in working capital and changes in long-term debt repaid confirm the predictions of the pecking order theory. The retail firms show similar support for these theories. The correlations regarding capital expenditure, asset tangibility and long-term debt repaid are in line with the pecking order hypothesis, while the correlations regarding growth rate and non-debt tax shields validate the trade-off theory.

8.3 TARGET SPEED OF ADJUSTMENT

The manufacturing, mining and retail firms listed on the Johannesburg Stock Exchange have a positive speed of adjustment, which suggests the existence of target leverage. This is further evidence in support of the dynamic trade-off theory. The speeds of adjustment are highest for the mining firms, and lowest for the retail firms. Furthermore, the speeds of adjustment for the South African manufacturing, mining and retails firms are higher than those of the US and European firms. The true speed of target adjustment for the full sample is 57.64% (0.81 years) for the BDR and 42.44% (1.25 years) for the MDR. Manufacturing firms have a target adjustment speed of 45.08% (1.16 years) for the BDR and 44.59% (1.17 years) for the MDR. The true speed of adjustment for mining firms is 72.07% (0.54 years) for the BDR and 56.45% (0.83 years) for the MDR. Retail firms have a target adjustment speed of 28.42% (2.07 years) for the BDR and 42.48% (1.25 years) for the MDR. These speeds are much higher than those of European and US firms. The higher speeds indicate that South African firms adjust their capital structures more frequently than the European and US firms, as they face lower adjustment costs. Finally, the speed of adjustment depends on the dependent variable used (BDR or MDR), the estimator used, the model fitted and the sector of the firm.

8.4 KEY FINANCIAL PERFORMANCE INDICATORS AND CAPITAL STRUCTURE

The study also documented that the most significant key financial performance variables that determine leverage in manufacturing firms are liquidity, cash flow from operations, capital expenditure, asset tangibility, ordinary share price, profitability and price earnings ratio. In mining firms, the key variables are capital expenditure, financial distress, price earnings ratio and profitability. The key leverage determinants in retail firms are asset tangibility, capital expenditure, financial distress, profitability, cash flow from operations, EVA and ordinary share price. The introduction of these additional variables also lowers the firms' speed of target adjustment, implying that the target speed of adjustment is dependent on the explanatory variables used to fit the partial adjustment model. The study introduced a new partial adjustment model that incorporates the firm's key financial performance indicators. This model can be used to estimate the firm's optimal operational leverage.

8.5 DISCOUNTED VALUE PREMIUM

The results of the study confirm that manufacturing, mining and retail firms have a positive mean discounted value premium of 8.15%, with mining firms having the largest discounted value premium of 9.50%. Manufacturing firms have a discounted value premium of 8.50% and retail firms have a discounted value premium of 5.20%. The discounted value premium also varies with firm size. Medium firms have the largest discounted value premiums, followed by large and then small firms. The evidence regarding both the speed of adjustment and the discounted value premium suggests the existence of a target operational leverage which is lower than the traditional optimal leverage. This optimal operational leverage balances the firm's value maximisation objective with its financial flexibility objective. This target is also dynamic. The optimal operational capital structure can be defined as the leverage where the firm maximises its value whilst maintaining adequate financial flexibility to enable it to exercise all its profitable future growth options.

8.6 CORRELATIONS, SPEED OF ADJUSTMENT AND THE DISCOUNTED VALUE PREMIUM: A NEW CAPITAL STRUCTURE THEORY?

The correlation results presented in Chapters 5 and 6 confirm that the pecking order and trade-off theories complement each other in explaining the financing behaviour of South African manufacturing, mining and retail firms. The existence of positive speeds of adjustment for the firms provides further evidence of the trade-off financing behaviour. Although evidence supporting the trade-off theory dominates, the pecking order theory is not totally excluded. This complementary evidence presented in this study is consistent with the findings of Fama and French (2002:30); Mukherjee and Mahakud (2012:53); and Myers (2008:235). Evidence presented in this study confirms that firms do have a leverage target towards which they adjust. But is this target optimal, as hypothesised by the trade-off theory? Evidence from the discounted value premium tests suggests that the target leverage of the firms is not the same as the theoretical optimal leverage. Thus the firms do have a leverage target, but this is lower than the predicted optimal leverage where firm value is maximised. As discussed above, a larger proportion of the firms in this study are underleveraged, at least as defined by the trade-off theory.

The firms appear to follow the principle of “avoiding walking on the edge of the cliff”. They opt for a safer distance, and this equates to a lower target than the theoretically predicted optimum. This behaviour is consistent with the hypothesis of the pecking order theory. The simultaneous existence of target leverage and discounted value premium (financial flexibility slack) seems to explain the complementary nature of the trade-off and pecking order theories.

The target leverage is the preferred leverage that a firm adopts to maintain its preferred financial flexibility slack. Thus the optimal capital structure definition requires some modification. The optimal capital structure occurs at a point where the firm maximises its value whilst maintaining adequate financial flexibility to enable it to exercise all its profitable growth options. Furthermore, it must allow the firm adequate flexibility to deal with unexpected internal and external financial shocks.

These shocks define the firm's financial risk profile and they are a reality for all firms. The risk accounts for the heterogeneity in the capital structures of the firms. There are no two firms that face the same financial risks and hence no two firms have exactly the same leverage profiles over time. The optimal capital structure can therefore not be solely defined in terms of maximising the current firm value. It must enable the firm to maximise its value while minimising its financial and operational risks. The optimal capital structure must support the firm's business plan. Financial flexibility is the key word. It is the important feature of the pecking order theory. The drawback with the pecking order theory is that although it emphasises the maximisation of the financial slack, it does not define the optimal target leverage slack. The upper limit needs to be specified. The complementary evidence of both theories is consistent with the target capital structure and financial flexibility hypotheses. That is, firms have two leverage targets: the target to achieve financial flexibility; and the theoretical optimal target where, theoretically, firm value is maximised. The evidence presented in this research points to the earlier target. The combined results of the pecking order, trade-off and discounted value theories infer a modified definition of optimal capital structure. The operational definition of optimal capital structure should thus be:

"The leverage where the firm maximises its value whilst maintaining adequate financial flexibility to enable it to exercise all its profitable future growth options".

Patrick (1998:77) termed it a balanced capital structure.

In summary, the evidence on both the speed of adjustment and the discounted value premium suggests the existence of a target capital structure that is different from the theoretical optimal capital structure hypothesised by the trade-off theory. This is the operational optimal capital structure. It takes into account the firm's need for financial flexibility and balances this with the need to maximise firm value. This evidence may explain the complementary nature of the pecking order and trade-off theories as target leverage meets financial flexibility.

8.7 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study was limited to a sample of manufacturing, mining and retail firms listed on the Johannesburg Stock Exchange. It excludes listed firms from other sectors as well as unlisted firms from the sectors investigated. The results therefore cannot be generalised to all South African firms. This research can, however, be extended to listed firms in other sectors as well as to unlisted firms. It can also be extended to cover state-owned enterprises such as Eskom, Transnet, South African Airways, Denel and the Public Investment Corporation.

The second limitation of this research is the size and balance of the panels used. A number of cases were removed, as the panels were unbalanced due to missing observations. The quality of the results could be improved if the size and balance of the panels were increased. All observations prior to the year 2000 were removed, as their inclusion would have disturbed the balance of the panels due to missing data. Similar past studies made use of data covering 35 or more years (approximately 132,000 firm years). The quality of the data, and the number of firms listed on the Johannesburg Stock Exchange have been improving steadily, and it is forecast that this trend will continue. It is therefore recommended that this research be repeated after a period of five or ten years from 2010.

The models developed and tested in this research excluded the macro-economic variables as additional predictors of leverage. According to Drobetz and Wanzenried (2006:947), the main drivers of the target adjustment speed are the target deviation spread, business cycles, interest rates and firm-specific factors. Future research on South African firms should include these as additional explanatory variables. It is envisaged that such an inclusion would improve the quality of the models.

Finally, the models developed could be further complemented by direct views from the South African corporate finance practitioners. These views could be obtained by way of a survey or a roundtable discussion with the key practitioners. The main practitioners to be included in the survey or roundtable discussion would be the CFOs of the firms listed on the Johannesburg Stock Exchange, leading corporate finance academics, and merchant bankers. The results of such a survey or roundtable discussion would provide a practitioner's view of capital structure in the South African context. In summary, future research can look at the following:

- Future research can investigate models that incorporate both firm-specific factors and macro-econmic variables as predictors of leverage;
- Extending the research to other sectors such as financial services firms and state-owned firms such as Eskom, Transnet, South African Airways, Denel and the Public Investment Corporation;
- Surveying the chief financial offers or/and financial directors of JSE-listed firms on how the factors that they consider in arriving at the financing decisions.

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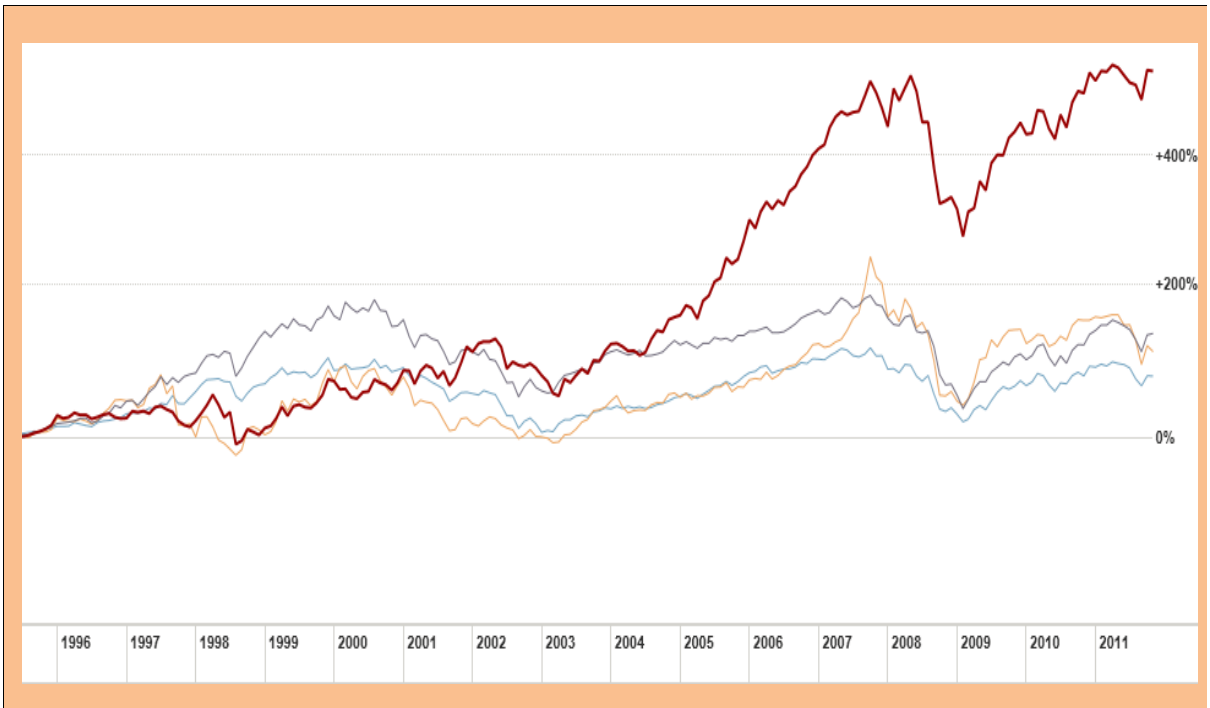
APPENDICES

Appendix 1: JSE/FTSE All Share Index JALSH: JNB

07/01/1995 - 11/12/2011: Monthly data interval

- JSE ALL SHARE INDEX
- FTSE ALL SHARE INDEX
- Hang Seng
- S&P 500 INDEX

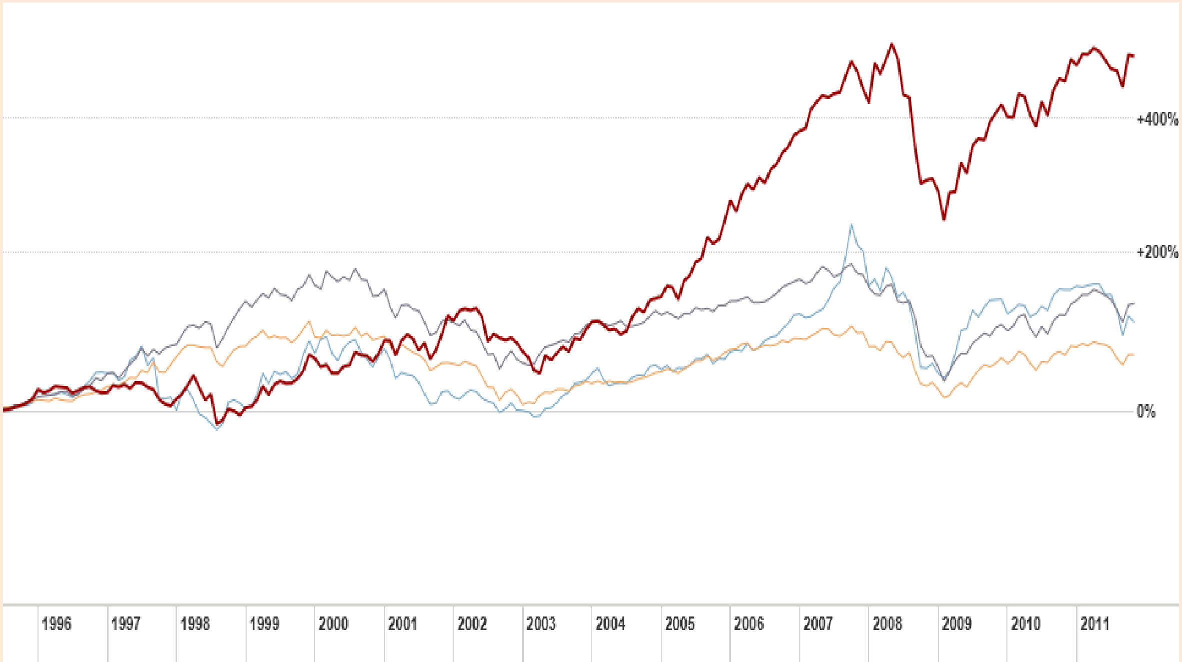


Source: http://markets.ft.com/RESEARCH/Markets/CountryOverview?country=ZA

Appendix 2: JSE FTSE Top 40 JTOPI: JNB

07/01/1995 - 11/12/2011: Monthly data interval

- JSE ALL SHARE INDEX
- Hang Seng
- FTSE 100 Index
- S&P 500 INDEX

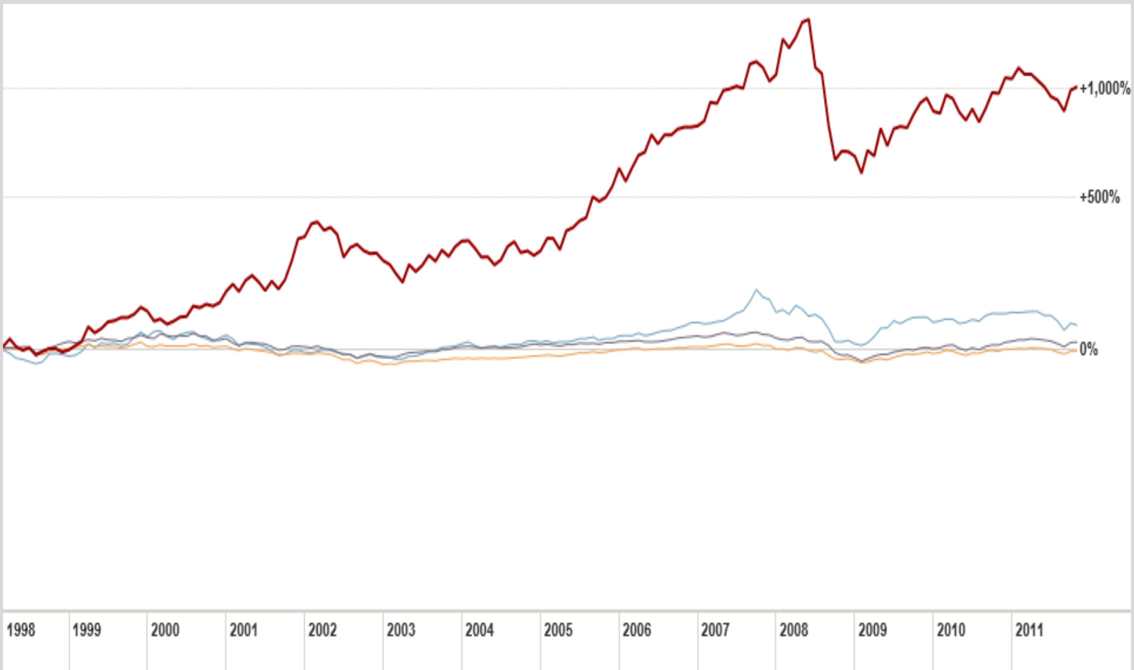


Source: http://markets.ft.com/RESEARCH/Markets/CountryOverview?country=ZA

Appendix 3: JSE FTSE Resource 20 JRESI: JNB

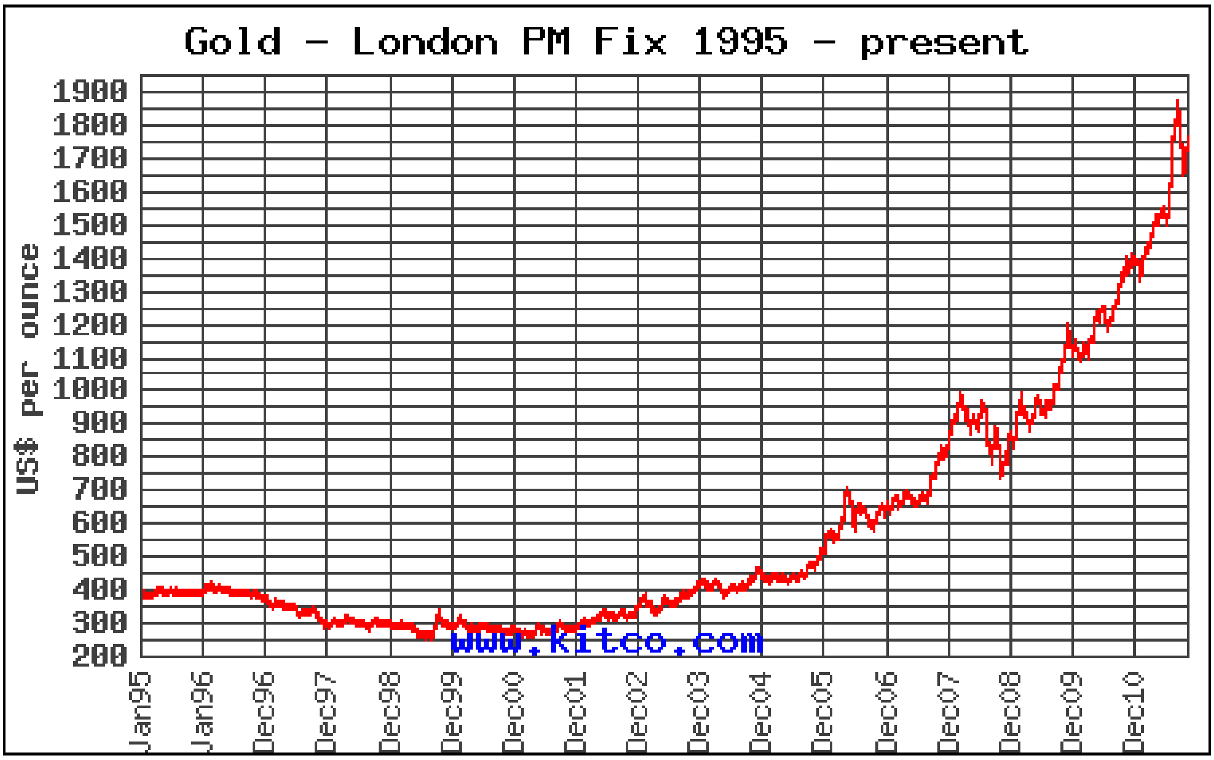
03/01/1998 - 11/12/2011: Monthly data interval

- JSE FTSE Resource 20
- Hang Seng
- FTSE 100 Index
- S&P 500 INDEX



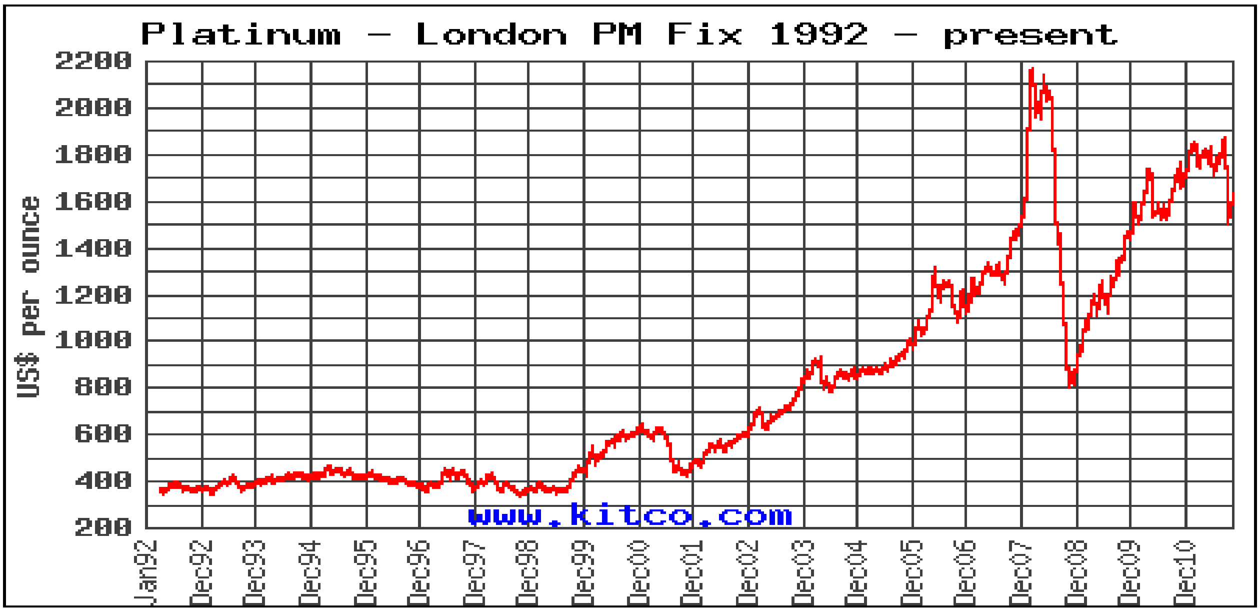
Source: http://markets.ft.com/RESEARCH/Markets/CountryOverview?country=ZA

Appendix 4: History of Gold Prices: 1992-October 2011



Source http://www.kitco.com/scripts/hist_charts/yearly_graphs.plx

Appendix 5: History of Platinum Prices: 1992-October 2011



Source: http://www.kitco.com/scripts/hist_charts/yearly_graphs.plx

Appendix 6: Equity Capital Raised on the JSE (R Million)

	Month Ended Sep 2011	Year to date 2011	Year to date 2011	% Change Year on Year	2010	2009	2008	2007
Acquisition of assets	5,196	36,996	9,345	295.89	10,534	55,846	11,689	61,918
Rights issue	-	9,800	19,002	-48.43	20,183	14,256	21,241	7,382
Share incentive	840	5,837	5,192	12.42	6,833	9,023	9,493	10,040
Via Prospectus	-	-	-	-	-	-	-	-
Waiver of Pre-emptive rights	316	13,404	16,115	-16.82	43.307	27,859	34,267	45,447
Other	-	-	-	-	-	-	-	64
TOTAL	**6,352**	**66,037**	**49,654**	**32.99**	**80,857**	**106,984**	**76,690**	**12,851**

Source: JSE Market Profile, Sept 2011 pp3

Appendix 7: Position in World League - 31 August 2011

	Month Ended Aug 2011	Ranking	Month Ended Aug 2010	Ranking	Ranking at year end			
					2010	2009	2008	2007
Market capitalisation (US$million)	857,844	20	718,096	20	20	19	18	19
Market turnover (US$ million)	49,577	20	33,227	33	21	21	22	22
Year to date liquidity %	70.6	24	52.4	31	25	33	36	33
Monthly liquidity %	60.7	26	50.4	26				

Source: JSE Market Profile, Sept 2011 pp3. Note: The liquidity figure has been adjusted for Off Order Book Principal Trades. The ranking is based on statistics from the World Federation of Exchanges (WFE) (2011).

Appendix 8: Number of JSE Listed Firms & JSE Annualised Liquidity

	Month Ended Sep 2011	Year to date 2011	Year to date 2011	% Change Year on Year	2010	2009	2008	2007
Main board, Venture, Development Capital & Africa Board								
Companies listed	341	341	337	1.19	339	334	348	347
No. of new listings	-	9	8	12.50	13	6	18	25
No. of de-listings	-	7	10	-30.00	14	22	18	40
Altx								
Companies listed	70	70	70	-	68	76	77	75
No. of new listings	-	3	1	200.00	1	4	5	37
No. of de-listings	-	1	2	-	3	3	2	-
Overall JSE								
No. of new listings	-	12	9	33.33	14	10	23	62
No. of de-listings	-	8	12	-33.33	17	25	20	40
Foreign listings	50	50	49	2.04	47	47	46	37
Domestic listings	361	361	358	**0.84**	360	363	379	385
Companies listed	**411**	**411**	**407**	**0.98**	**407**	**410**	**425**	**422**
No. of securities listed	**848**	**848**	**888**	**-4.50**	**839**	**966**	**992**	**1,174**
Market capitalisation (Rbn)	**6,384.6**		**6,318.7**	**1.0**	**6,698.7**	**5,929.1**	**4,541.9**	**5,696.8**
Annualised JSE Liquidity %	**50.1**	**45.4**	**41.3**	**9.93**	**38.3**	**47.9**	**53.3**	**44.9**

Source: JSE Market Profile, Sept 2011 pp3. Note: companies listed for 2007 revised. AltX and Main board include companies that changed boards.

Appendix 9: Optimal Capital Structure Estimation Input Sheet

Inputs

Please enter the name of the company you are analyzing:	Sasol Ltd	
Financial Information		
Earnings before interest, taxes and depreciation (EBITDA)	R 32,691,000.00	
Depreciation and Amortization:	R 5,501,000.00	
Capital Spending:	R 17,403,000.00	
Interest expense on debt:	R 1,478,000.00	
Tax rate on ordinary income:	28.00%	
Current Rating on debt (if available):		
Interest rate based upon rating:	8.53%	
Market Information		
Number of shares outstanding:	664069.0297	
Market price per share:	R 280.86	
Beta of the stock:	1.28	
Book value of debt:	R 8,479,000.00	
Can you estimate the market value of the outstanding debt?	No	
If so, enter the market value of debt:		
Do you want me to try and estimate market value of debt?	No	
If yes, enter the average maturity of outstanding debt?	0.00	
Do you have any operating leases?	No	
General Market Data		
Current long-term (LT) government bond rate:	8.0300%	(in percent)
Risk premium (for use in the CAPM)	6.00%	(in percent)
Country default spread (for cost of debt)	1.60%	
General Data		
Which spread/ratio table would you like to use for your analysis?	1	
Do you want to assume that existing debt is refinanced at the 'new' rate?	Yes	(Yes or No)
Do you want the firm's current rating to be adjusted to the synthetic rating?	Yes	(Yes or No)

Appendix 10: Output from the Estimation Model

Capital Structure		*Financial Market*		*Income Statement*	
Current MV of Equity =	R 186,510,428	Current Beta for Stock =	1.28	Current EBITDA =	R 32,691,000
Market Value of interest-bearin	R 8,479,000	Current Bond Rating =	0	Current Depreciation =	R 5,501,000
# of Shares Outstanding =	664069.0297	Summary of Inputs		Current Tax Rate =	28.00%
Debt Value of Operating leases	R -	Long Term Government Bond Rate =	8.03%	Current Capital Spending=	R 17,403,000.00
Risk Premium =	6.00%	Pre-tax cost of debt =	8.53%	Current Interest Expense =	R 1,478,000.00

RESULTS FROM ANALYSIS	*Current*	*Optimal*	*Change*
D/(D+E) Ratio =	4.35%	40.00%	35.65%
Beta for the Stock =	1.28	1.83	0.55
Cost of Equity =	15.71%	19.04%	3.33%
AT Interest Rate on Debt =	7.29%	7.73%	0.43%
WACC	15.34%	14.51%	-0.83%
Implied Growth Rate =	8.03%		
Firm Value (no growth) =	R 194 989 427.68	R 206 169 806.15	R 11 180 378.47
Firm Value (Perpetual Growth) =	R 194 989 427.68	R 222 030 369.69	R 27 040 942.01
Value/share (No Growth) =	R 280.86	R 297.70	R 16.84
Value/share (Perpetual Growth) =	R 280.86	R 321.58	R 40.72

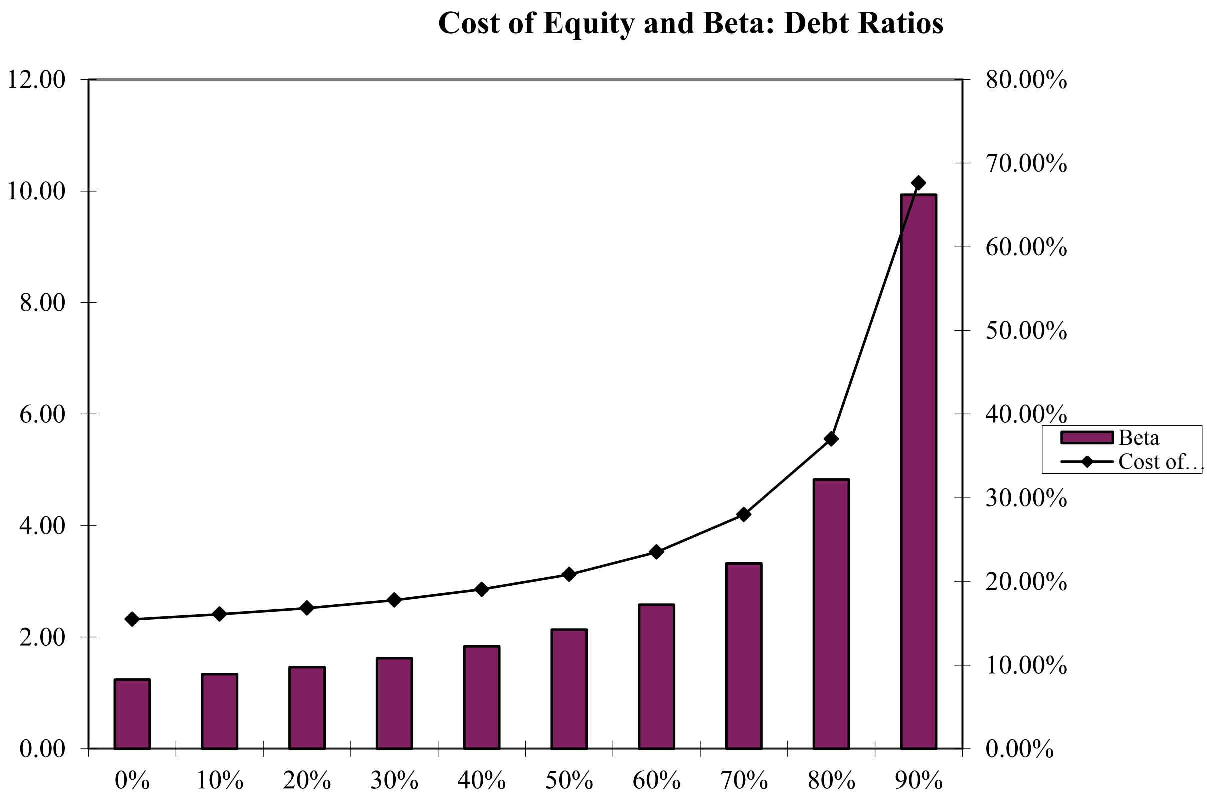
Implied Growth Rate Calculation		
Value of Firm =	R 194 989 428	
Current WACC =	15.34%	
Current FCFF =	R 7 674 800.00	! I am ignoring working capital
Implied Growth Rate =	10.98%	

If this number is >Riskfree rate, I use the riskfree rate as a perpetual growth rate.

Summary Output

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	1.24	15.47%	AAA	10.13%	28.00%	7.29%	15.47%	INR 191 518 187
10%	1.34	16.07%	AAA	10.13%	28.00%	7.29%	15.19%	INR 199 678 615
20%	1.46	16.81%	AA	10.28%	28.00%	7.40%	14.93%	INR 207 806 409
30%	1.62	17.77%	A	10.63%	28.00%	7.65%	14.73%	INR 214 326 881
40%	1.84	19.04%	A-	10.73%	28.00%	7.73%	14.52%	INR 222 028 231
50%	2.13	20.83%	BB	12.98%	28.00%	9.35%	15.09%	INR 202 790 244
60%	2.58	23.51%	B	14.63%	28.00%	10.53%	15.72%	INR 184 731 065
70%	3.32	27.97%	CCC	17.63%	28.00%	12.69%	17.28%	INR 151 055 707
80%	4.83	37.00%	CCC	17.63%	27.68%	12.75%	17.60%	INR 145 453 031
90%	9.94	67.64%	CC	19.63%	22.10%	15.29%	20.53%	INR 107 705 904

Cost of Equity Chart



Appendix 11: The Ridge Procedure: Identified Outlier Observations

BDR 11 years (Panel 2)

Panel 1 models for BDR lagged

Sector=Manufacturing

Obs	firm	bdr_t_1	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
101	Awethu Brewerie	0.3494	0	-3832	0.499	9.8898	0.318	0.7599	-7.0696	4138.2506	-29683.72	725.435	6.23268

Sector=Mining

Obs	firm	bdr_t_1	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
482	Bauba Platinum	0	0	391	0.919	9.5871	0.003	2.6077	-13.954	11820.0697	-47548.1	2.32013	0.55696
604	Petmin Ltd	0	0	-514271	0	10.5315	0	0.491	108.7315	159755.8051	1736.09	1.47164	3.08618

Sector=Retail

Obs	firm	bdr_t_1	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
786	Pick n Pay Stor	0.1394	381600	447500	0.258	15.513	0.056	2.0276	0.0469	468492.4761	12555.81	5.8856	-3.17382
852	Verimark Holdin	0.5745	0	-2375	0.039	7.3499	0.175	0.0212	-101.0353	21801.7583	-4296.92	29.1960	-2.27457

Panel 1 models for MDR lagged

Sector=Manufacturing

Obs	firm	mdr_t_1	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
101	Awethu Brewerie	0.623	0	-3832	0.499	9.8898	0.318	0.7599	-7.0696	4138.2506	-29683.72	24.8118	1.15263

Sector=Mining

Obs	firm	mdr_t_1	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
482	Bauba Platinum	0	0	391	0.919	9.5871	0.003	2.6077	-13.954	11820.0697	-47548.1	3.95108	0.70955
604	Petmin Ltd	0	0	-514271	0	10.5315	0	0.491	108.7315	159755.8051	1736.09	1.68740	3.30380

Sector=Retail

Obs	firm	mdr_t_1	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
852	Verimark Holdin	1	0	-2375	0.039	7.3499	0.175	0.0212	-101.0353	21801.7583	-4296.92	73.4671	-3.60815

Panel 1 models for BDR

Sector=Manufacturing

Obs	firm	bdr	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
111	Awethu Brewerie	0.5367	0	-3832	0.499	9.8898	0.318	0.7599	-7.0696	4138.2506	-29683.72	4.93929	-0.53848

Sector=Mining

Obs	firm	bdr	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
530	Bauba Platinum	0	0	391	0.919	9.5871	0.003	2.6077	-13.954	11820.0697	-47548.1	5.97020	0.89953
664	Petmin Ltd	0	0	-514271	0	10.5315	0	0.491	108.7315	159755.8051	1736.09	1.78439	3.44843

Sector=Retail

Obs	firm	bdr	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
864	Pick n Pay Stor	0.0431	381600	447500	0.258	15.513	0.056	2.0276	0.0469	468492.4761	12555.81	2.611	-2.13924
937	Verimark Holdin	0.0212	0	-2375	0.039	7.3499	0.175	0.0212	-101.0353	21801.7583	-4296.92	100.024	-4.39090

Panel 1 models for MDR

Sector=Manufacturing

Obs	firm	mdr	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
111	Awethu Brewerie	0.706	0	-3832	0.499	9.8898	0.318	0.7599	-7.0696	4138.2506	-29683.72	7.52612	0.66469

Sector=Mining

Obs	firm	mdr	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
664	Petmin Ltd	0	0	-514271	0	10.5315	0	0.491	108.7315	159755.8051	1736.09	0.77920	2.27834

Sector=Retail

Obs	firm	mdr	div_t	capex	asset	size	ndts	mtb	fdist	vol	roe	cookd	res
937	Verimark Holdin	1	0	-2375	0.039	7.3499	0.175	0.0212	-101.0353	21801.7583	-4296.92	70.0574	-3.67475

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Panel 1 models for Changes in Debt Issued

Sector=Manufacturing

Obs	firm	d_change_t	roe	mtb	size	asset	vol	div_t	capex	wc_t	c_t	rr	cookd	res
111	Awethu Brewerie	0	-29683.72	0.7599	9.8898	0.499	4138.2506	0	-3832	2866	-10602	100	0.74757	-0.22142
392	SAB Miller plc	12820000	-92.87	0.5885	17.9715	0.615	9299737.3308	4403670	24390050	-365370	14300710	56.96	2.65310	8.71452
394	SAB Miller plc	10302640	-245.41	2.6875	18.6378	0.591	9299737.3308	6877920	24877280	-1723040	22349680	57.48	0.62997	4.96970
396	SAB Miller plc	0	37.17	2.4975	18.8646	0.419	9299737.3308	8466040	17049230	4397030	27561490	48.01	0.72407	-4.89725
417	Sasol Ltd	749000	19.77	1.5142	18.7128	0.568	9195770.77	7776000	12810000	9889000	27656000	66.2	7.14049	6.68885
418	Sasol Ltd	0	20.15	1.286	18.788	0.588	9195770.77	5678000	17403000	-3873000	24949000	63.67	0.87507	-7.97042

Sector=Mining

Obs	firm	d_change_t	roe	mtb	size	asset	vol	div_t	capex	wc_t	c_t	rr	cookd	res
483	Anglo American	52510470	26.13	1.7768	19.4567	0.545	21156727.0696	3978960	42841260	-7688160	37951860	100	1.8795	13.0431
527	BHP Billiton Pl	35518160	43.32	1.3363	19.85	0.54	65163879.98	44919760	101112400	31043360	146429920	33.1	10.7343	3.4375
528	BHP Billiton Pl	0	47.87	1.0781	20.117	0.602	65163879.98	37153050	84863790	-15369750	152065650	69.53	1.0274	-4.6434

Sector=Retail

Obs	firm	d_change_t	roe	mtb	size	asset	vol	div_t	capex	wc_t	c_t	rr	cookd	res
925	Trueworths Inte	5675	0.05	2.1072	13.9272	0.11	779184.0249	15705	68848	869	193303	-3262.96	1.24595	-0.56841
956	Woolworths Hold	2938200	60.27	1.4833	15.8594	0.267	528193.3752	1396200	413300	67300	1519000	-10.97	1.50607	8.55721

Panel 2:

Panel 2 models for BDR

Manufacturing

Obs	Firm	bdr	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
159	Howden Africa Holdings Ltd	0.0721	0.1503	1.1304	83.6600	0.9300	12.5691	2.2938	43864.0828	948.0000	9.9400	1719.0200	71884.0000	0.61632	-1.70521

Sector=Mining

Obs	Firm	bdr	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
404	Miranda Mineral Holdings	0.0000	0.2305	-57.8011	100.0000	0.2500	6.8967	116.5806	-9330.1496	75.0000	-34.0900	185.1900	-3333.0000	2.23810	-1.53232

Sector=Retail

Obs	Firm	bdr	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
552	Pick n Pay Stores Ltd	0.0431	0.2583	0.0469	17.2300	0.7600	15.5130	2.0276	444228.6840	2326.0000	16.4400	12555.8100	987000.0000	2.71194	-2.34038

Panel 2 models for MDR

Sector=Manufacturing

Obs	Firm	mdr	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
110	Control Instruments Group Ltd	0.3066	0.3646	-0.4486	76.3900	1.5200	13.3538	1.1685	-18081.5491	561.0000	-935.0000	10.2500	52839.0000	2.08845	-2.56333
159	Howden Africa Holdings Ltd	0.0322	0.1503	1.1304	83.6600	0.9300	12.5691	2.2938	43864.0828	948.0000	9.9400	1719.0200	71884.0000	1.09002	-2.26775

Sector=Mining

Obs	Firm	mdr	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
404	Miranda Mineral Holdings	0.0000	0.2305	-57.8011	100.0000	0.2500	6.8967	116.5806	-9330.1496	75.0000	-34.0900	185.1900	-3333.0000	2.38423	1.58155
468	Uranium One Inc	0.1026	0.4080	-1.3897	1244.8100	1.5900	15.7178	5.1940	-1187617.310	3539.0000	-17.3300	-12.9500	505446.0000	0.78024	-0.66975

Panel 2 models for BDR lagged

Sector=Mining

Obs	Firm	bdr_t_1	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
337	Miranda Mineral Holdings	0.0000	0.2305	-57.8011	100.0000	0.2500	6.8967	116.5806	-9330.1496	75.0000	-34.0900	185.1900	-3333.0000	1.07922	-1.02151

Sector=Retail

Obs	Firm	bdr_t_1	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
460	Pick n Pay Stores Ltd	0.1394	0.2583	0.0469	17.2300	0.7600	15.5130	2.0276	444228.6840	2326.0000	16.4400	12555.8100	987000.0000	5.50093	-3.27596

Panel 2 models for MDR lagged

Sector=Manufacturing

Obs	Firm	mdr_t_1	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
133	Howden Africa Holdings Ltd	0.0950	0.1503	1.1304	83.6600	0.9300	12.5691	2.2938	43864.0828	948.0000	9.9400	1719.0200	71884.0000	1.88608	-2.05696

Sector=Retail

Obs	Firm	mdr_t_1	asset	fdist	rr	liq	size	mtb	eva	p	p_e	roe	c_t	cookd	res
434	JD Group Ltd	0.1669	0.0941	0.4339	83.8200	2.6300	15.8993	1.0415	-249686.7287	4436.0000	99.9100	9.6400	343000.0000	0.76285	-1.63129

Appendix 12: Financial Statements Line Items Used in Deriving the Variables

To allow for easy and uniform comparison of line items between firms, this study used the standardised financial statements. **Appendices 13 and 14** contains the sample of the standardised financial statements. To enable fair comparison, the following adjustments were made on the standardised financial statements:

- **Firms with foreign currency denominated financial statements**: these were translated into South African Rand using the guidelines of *International Accounting Standard (IAS) 21: The Effects of Changes in Foreign Exchange Rates*. All historical exchange rates were obtained from the South African Reserve Bank. The income statement and cash flow statements items were translated using the average exchange rate for the year and the translation took into account the year end of each firm. Balance sheet items were translated using the balance sheet date prevailing exchange rate.
- **Annualisation of Income and Cash Flow Items**: all the income and cash flow statement items that are used in this research were annualised so as to allow fair comparison of items between the years.

The following line items that were used in deriving the variables for this research:

1. **Number of shares**: this figure was obtained from *line 102 of the Sundry Items*: Number of ordinary shares in issue at year end. For Gold firms this data was obtained from *line 100 of the Sundry Items*.
2. **Share price (Cents):** this figure was obtained from *line 150 of the Sundry Items: Share Price @ Company Financial Year End)*. For Gold firms this data was obtained from *line 133 of the Sundry Items: Stock Price: Year End. These figures are in South African cents including the data for firms that have foreign currency denominated accounts*.
3. **Share price: R:** this was converted to South African Rand by dividing the Share Price in Cents by 100.
4. **Total long-term debt' (R'000)**: this figure was obtained from *line 221 of the Balance Sheet General Supplementary: Total long-term loans –interest bearing.* This excludes interest free long-term loans.
5. **Short term loan & Current portion of long-term loans (R'000):** This figure was obtained from *line 223: Short-term loans- interest bearing & short-term loans.* Again this excludes interest free short-term loans.
6. **Preference share capital**: this figure was obtained from *line 008 of the Balance Sheet:* Preference Share Capital. For Gold firms this data was obtained from *lines 11 and 12 of the Balance Sheets*: Preference Share Capital redeemable and permanent.
7. **Total Fixed Assets**: this figure was obtained from *line 014 of the Balance Sheet*: Total Fixed Assets. For Gold firms this data was obtained from *line 21 of the Balance Sheet:* Total Fixed Assets.
8. **Total Assets**: this amount was obtained from *line 040 of the Balance Sheet:* Total Assets. And for Gold firms this data was obtained *line 050 of the Balance Sheet*: Total Assets. **Depreciation: Fixed Assets**: this amount was obtained from *line 065 of the Income statement*: Depreciation: other fixed assets. And for Gold firms this data was obtained from **line 067:** Depreciation: other fixed assets.
9. **Depreciation: Land and Buildings**: this amount was obtained from *line 066 of the Income statement*: Depreciation: Land and buildings. And for Gold firms this data was obtained from *line 068 of the Income Statement*: Depreciation: Land & Buildings.
10. Total CAPEX was obtained from the sum of the following:

- **CAPEX: Fixed Assets**: this amount was obtained from *line 719 of the Cash Flow Statement:* Fixed Assets Acquired; the same applies to Gold companies.
- **CAPEX: Increase in Investments:** this amount was obtained from *line 720 of the Cash Flow Statement:* Increase in Investments; the same applies to Gold companies.
- **CAPEX: Net Investments in subsidiaries**: this amount was obtained from *line 721 of the Cash Flow Statement:* Net investments in subsidiaries; the same applies to Gold companies

11. **Financial Distress**: this was obtained from the McGregor BFA database under Financial Models.
12. **Profitability**: This ratio was obtained from the McGregor BFA database under Financial Ratios. McGregor calculates this on actual values based on Standardised Financial statements. The ratio has already been annualised.
13. **Earnings before Tax:** this amount was obtained from *line 075 of the Income Statement:* profit before tax; and for gold firms this was obtained from line *083 of the Income Statement:* profit before tax & state profit sharing.
14. **Debt Issued/Retired**: this was obtained from *line 728 of the Cash Flow Statement*: Increase/decrease in long-term debt; same applies to Gold firms.
15. **Equity Issued/Retired**: this was obtained from *line 730 of the Cash Flow Statement*: Changes in share capital; same applies to Gold firms.
16. **Dividends Paid**: this was obtained from *line 715 and 716 of the Cash Flow Statement*: ordinary dividend and preference dividend respectively; same applies to Gold firms.
17. **Changes in Working Capital**: this was obtained from *line 706 of the Cash Flow Statement*: Decrease/Increase in working capital; same applies to Gold firms.
18. **Cash flow From Operations**: this was obtained from *line 703 of the Cash Flow Statement*: Cash ex Operations; same applies to Gold firms.
19. **Deferred Tax for the year**: this was obtained from *line 129 of the Sundry Items:* Deferred Tax for the year; and for Gold this was obtained from *line 076 of the Income Statement:* Deferred Taxation for the year.
20. **Depreciation and Amortisation**: depreciation was obtained as explained in Theme 1; and amortisation was obtained from *line 323 of the General Supplementary Information to the Income Statement*: Amortisation of Goodwill; the same applies to gold firms.
21. **Earnings before Interest and tax (EBIT)**: this was obtained from *line 073 of the Income Statement*: Profit Before Interest and Tax; and for Gold firms, this was obtained from *line 080 of the Income Statement*: Profit before Interest and Tax.
22. **Interest Expense on Debt**: this was obtained from *line 074 of the Income Statement*: Interest Paid; and for Gold firms, this was obtained from *line 081 of the Income Statement*: Interest Paid: Debentures.
23. **Tax on ordinary income**: the tax rate was obtained from *line 309 of the General Supplementary Information to the Income Statement*: Effective Tax Rate.
24. **Capital expenditure; Book value of debt; Number of shares outstanding and Market price per share**: These were obtained as in Theme 1 above.
25. **Beta of stock; Market risk premium and Current long term government bond rate**: these were obtained from the WACC and CAPM Financial Models of the McGregor BFA database. Tgis study uses the R157 government bond as the risk free security. This rate changes throughout the year and the applicable rate depends on the year end of the firm. The R153 Bond was terminated 5 years ago. Because of the stability of the South African financial system, the market risk premium was assumed to be the same for the 5-year period.
26. **Country default spread**: The South African credit rating was obtained from the Moody's database.

27. **Economic Value Added:** this was obtained from the Financial Models _Value Performance Indicators of the McGregor BFA database.
28. The inputs for the calculation of these ratios were obtained as follows**:**
    - **a. Cash Flow from operating activities**: this figure was obtained from *line 711 of the Cash Flow Statement: Cash Flow Ex Operating Activity.* This was the same for Gold Companies as well.
    - **b. Shareholders' Equity:** This figure was obtained from line *006 of the balance Sheet: Ordinary Shareholders' Interest*. For Gold companies the figure was obtained from *line 10 of the Balance Sheet: Ordinary Shareholders' Interest and Funds.*
    - c. ****Total long-term debt' (R'000**): this figure was obtained fr*om line 221 of the Balance Sheet General Supplementary: Total long-term loans –interest bearing*. This excludes interest free long-term loans.
    - d. **Short term loan & Current portion of long-term loans (R'000):**_This figure was obtained from *line 223: Short-term loans- interest bearing & short-term loans.* Again this excludes interest free short-term loans.
29. **Other Ratios:** These ratios were obtained under Financial Ratios and they were calculated on actual values based on Standardised Financial statements. The ratios have already been annualised.

Appendix 13: Sample of Non Gold Firms Standardised Financial Statements

FINANCIAL STATEMENTS REPORT

SASOL LIMITED (SOL)

Report Date: 07 Jun 2012 08:25:04 PM

Balance Sheet [Year: 2008 - 2010, Financials: Standardised]

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Jun**	**Jun**	**Jun**
Balance Sheet Standardised (000)	**ZAR**	**ZAR**	**ZAR**
001 Ordinary Share Capital	27,229,000	27,025,000	20,176,000
002 Non Distributable Reserves	-17,962,000	-18,072,000	-21,362,000
003 Distributable Reserves	90,088,000	79,237,000	78,893,000
004 Cost Of Control	738,000	805,000	874,000
005 Intangible Assets	9,908,000	9,918,000	7,433,000
006 Ordinary Shareholders Interest	**88,709,000**	**77,467,000**	**69,400,000**
007 Minority Interest	2,512,000	2,382,000	2,521,000
008 Preference Share Capital	6,960,000	6,730,000	2,215,000
009 Total Owners Interest	**98,181,000**	**86,579,000**	**74,136,000**
010 Land And Buildings	28,932,000	22,282,000	19,633,000
011 Total Depreciation: Land and Buildings	3,801,000	3,821,000	3,827,000
012 Cost Other Fixed Assets	111,176,000	107,329,000	104,108,000
013 Total Depreciation: Other Fixed Assets	51,465,000	49,774,000	48,417,000
014 Total Fixed Assets	**84,842,000**	**76,016,000**	**71,497,000**
015 Long Term Loans Advanced	2,032,000	2,860,000	2,645,000
016 Unlisted Investments	4,158,000	2,157,000	5,220,000
017 Shares In Unconsolidated Subsidiaries	0	0	0
018 Listed Investments	0	0	0
019 Total Long Term Investments	**6,190,000**	**5,017,000**	**7,865,000**
020 Total Long Term Assets	**91,032,000**	**81,033,000**	**79,362,000**
021 Secured Long Term Borrowings	4,519,000	4,768,000	8,259,000
022 Debentures	0	0	0
023 Other Long Term Borrowings	14,488,000	12,740,000	14,690,000
024 Total Long Term Loan Capital	**19,007,000**	**17,508,000**	**22,949,000**
025 Net Investment in Long Term Assets	**72,025,000**	**63,525,000**	**56,413,000**
026 Total Inventory	16,472,000	14,589,000	20,088,000
027 Debtors	19,368,000	16,083,000	24,920,000
028 Short Term Loans Advances	2,137,000	2,256,000	1,222,000
029 Cash And Bank	14,870,000	19,425,000	4,435,000
030 Other Current Assets	504,000	545,000	325,000
031 Total Current Assets	**53,351,000**	**52,898,000**	**50,990,000**
032 Short Term Borrowings	2,169,000	5,645,000	3,872,000
033 Creditors	20,031,000	19,815,000	21,199,000
034 Bank Overdraft	119,000	80,000	914,000
035 Provision For Taxation	194,000	675,000	1,522,000
036 Provision For Distribution	4,682,000	3,629,000	5,760,000
037 Total Current Liabilities	**27,195,000**	**29,844,000**	**33,267,000**
038 Net Current Assets	**26,156,000**	**23,054,000**	**17,723,000**
039 Net Assets	**98,181,000**	**86,579,000**	**74,136,000**

042 Surplus Value Over Bookvalue of Investment	**2,728,000**	**3,880,000**	**2,960,000**
040 Total Assets	**144,383,000**	**133,931,000**	**130,352,000**
041 Operating Assets	**136,056,000**	**126,658,000**	**121,265,000**
General Supplementary			
201 Shares In Issue Y/E Ordinary	639,288	665,881	618,234
202 Shares In Issue Y/E 'N'	0	0	0
203 Shares In Issue Y/E 'A'	0	0	0
204 Shares In Issue Y/E 'B'	0	0	0
248 Shares In Issue Y/E 'C'	0	0	0
251 Shares In Issue Y/E 'E'	0	0	9,462
273 Shares In Issue Y/E Deferred	0	0	0
259 Shares Authorised Ordinary	1,175,000	1,175,000	0
260 Par Value Ordinary Shares (cents)	0	0	0
261 Shares Authorised 'N'	0	0	0
262 Par Value 'N' Shares (cents)	0	0	0
263 Shares Authorised 'A'	0	0	0
264 Par Value 'A' Shares (cents)	0	0	0
265 Shares Authorised 'B'	0	0	0
266 Par Value 'B' Shares (cents)	0	0	0
267 Shares Authorised 'C'	0	0	0
268 Par Value 'C' Shares (cents)	0	0	0
269 Shares Authorised 'E'	0	0	0
270 Par Value 'E' Shares (cents)	0	0	0
271 Shares Authorised Deferred	0	0	0
272 Par Value Deferred Shares (cents)	0	0	0
206 Shares In Issue Weighted Average	597,600	596,100	601,000
207 Shares In Issue Fully Diluted	615,500	614,000	609,500
232 Treasury Shares (Number '000)	25,547	25,547	0
233 Treasury Shares (Value R'000)	2,641,000	2,641,000	0
249 Share Trusts and Other (Number '000)	2,839	2,839	49,015
250 Share Trusts and Other (Value R'000)	22,054,000	22,054,000	27,130,000
274 Share Buyback (Number '000)	0	3,217	0
275 Share Buyback (Value R'000)	0	1,114,000	0
238 Preference shares issued by a subsidiary	0	0	0
208 Revaluation Reserve	-117,000	-149,000	222,000
209 Minority Revaluation Reserve	0	0	0
210 Minority Equity Accounted Reserve	0	0	0
228 Foreign Currency Translation Reserve - Cumulative	137,000	939,000	3,006,000
211 Commitments: Land & Buildings	1,749,000	1,675,000	1,590,000
212 Commitments: Other	5,410,000	5,552,000	5,926,000
213 Foreign Borrowings	2,883,000	6,009,000	9,457,000
214 Convertible Preference Shares	0	0	0
215 Convertible Debentures & Loans	0	0	0
216 Share In Issue Latest	0	0	0
217 Mining Assets at Cost	15,100,000	13,034,000	11,478,000
218 Depreciation / Amortisation on Mine Assets	6,385,000	5,595,000	5,009,000
219 Medical Aid Liabilities	2,535,000	2,315,000	2,246,000
220 Pension Fund Liabilities	1,992,000	2,199,000	2,444,000
221 Long Term Loans - Interest Bearing	6,590,000	7,028,000	13,504,000
222 Long Term Loans - Interest Free	12,417,000	10,480,000	9,445,000
223 Short Term Loans - Interest Bearing	1,889,000	5,181,000	3,496,000
224 Short Term Loans - Interest Free	280,000	464,000	376,000
225 Property Revaluation Surplus - I/S	0	0	0
226 Profit /Loss Forex Translations - B/S	0	0	0
227 Profit /Loss Forex Transactions - B/S	0	0	0
229 Foreign Assets	53,076,000	50,915,000	59,148,000
230 Foreign Liabilities	3,263,000	0	0
276 Asset Retirement Obligations - Mining Assets	6,109,000	4,819,000	3,460,000
231 Provisions	9,660,000	9,321,000	7,310,000
236 Provisions - Long term	7,013,000	5,729,000	4,491,000
237 Provisions - Short term	2,647,000	3,592,000	2,819,000
234 Share Trust scheme	0	0	0
235 Capital Distributions (Cash)	0	0	0
239 Non Current Assets held for sale - Land & Buildings	16,000	0	0
240 Non Current Assets held for sale - Investments	0	86,000	3,833,000
241 Non Current Assets held for sale - Other	0	0	0
258 Total Bookvalue Land & Buildings	25,131,000	18,461,000	15,806,000
252 Total Bookvalue Other Fixed Assets	**59,711,000**	**57,555,000**	**55,691,000**
253 Bookvalue Plant & Machinery/Manufacturing Equipment	59,711,000	57,555,000	55,691,000
254 Bookvalue Furniture & Office Equipment	0	0	0

255 Bookvalue Vehicles	0	0	0
256 Bookvalue Computer Hardware & Software	0	0	0
257 Bookvalue Other fixed assets	0	0	0
242 Listed Unconsolidated Subsidiaries	0	0	0
243 Market Value of Listed Unconsolidated Subsidiaries	0	0	0
244 Unlisted Unconsolidated Subsidiaries	0	0	0
245 Directors Valuation of Unlisted Unconsolidated Subsidiaries	0	0	0
246 Minority dividends declared - B/S	0	0	0
247 BEE Share of accumulative profits - B/S	22,054,000	22,054,000	16,161,000

Income Statement

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Jun**	**Jun**	**Jun**
Income Statement Standardised (000)	**ZAR**	**ZAR**	**ZAR**
051 Turnover	122,256,000	137,836,000	129,943,000
052 Change In Turnover %	-11	6	32
053 Cost Of Sales	79,183,000	88,508,000	74,634,000
054 Trading Profit	**34,601,000**	**34,264,000**	**42,563,000**
055 Interest Received	1,301,000	1,763,000	725,000
056 Income Unlisted Investment	84,000	507,000	245,000
057 Income Listed Investment	0	0	0
058 Income Unconsolidated Subsidiaries	0	0	0
059 Total Income Investment	**1,385,000**	**2,270,000**	**970,000**
060 Surplus Sale Investment	-312,000	4,475,000	-934,000
061 Surplus Sale Non Trading Assets	90,000	-536,000	-846,000
062 Extraordinary Profits	-1,895,000	-5,000,000	-116,000
063 Total Profits Extraordinary Nature	**-2,117,000**	**-1,061,000**	**-1,896,000**
064 Auditors Remuneration And Costs	78,000	86,000	83,000
065 Depreciation Other Fixed Assets	5,185,000	4,782,000	3,849,000
066 Depreciation Land And Buildings	316,000	366,000	314,000
067 Rental Fixed Assets	1,015,000	1,111,000	887,000
068 Directors Remuneration: Direct	12,000	11,000	31,000
069 Directors Remuneration: Other	48,000	27,000	66,000
070 Management And Other Services	214,000	610,000	348,000
071 Total Cost Shown	**6,868,000**	**6,993,000**	**5,578,000**
054 Trading Profit	34,601,000	34,264,000	42,563,000
059 Total Income Investment	1,385,000	2,270,000	970,000
063 Total Profits Extraordinary Nature	**-2,117,000**	**-1,061,000**	**-1,896,000**
072 Total Income	**33,869,000**	**35,473,000**	**41,637,000**
071 Total Cost Shown	**6,868,000**	**6,993,000**	**5,578,000**
073 Profit Before Interest And Tax (EBIT)	**27,001,000**	**28,480,000**	**36,059,000**
074 Total Interest Paid	1,478,000	1,917,000	1,148,000
075 Profit Before Taxation	**25,523,000**	**26,563,000**	**34,911,000**
076 Taxation	5,738,000	9,448,000	9,367,000
077 Profit After Taxation	**19,785,000**	**17,115,000**	**25,544,000**
078 Minority Interest In Profit	446,000	67,000	1,111,000
079 Profit to Ordinary And Preference Shareholders	**19,339,000**	**17,048,000**	**24,433,000**
080 Ordinary Dividend	6,389,000	5,148,000	7,929,000
081 Preference Dividend	636,000	614,000	0
082 Retained Profits	**12,314,000**	**11,286,000**	**16,504,000**
083 Earnings Before Interest, Tax, Depreciation And Amortisation (EBITDA)	**32,691,000**	**33,951,000**	**40,417,000**

General Supplementary			
301 Lease Charge: Land Building	390,000	434,000	324,000
302 Lease Charge: Other	625,000	677,000	563,000
303 Research & Development	908,000	922,000	761,000
304 EPS-Equity Accounted	2,668.0	2,290.0	3,730.0
305 EPS-Bottom Line	2,668.0	2,290.0	3,730.0
306 EPS-Headline	2,657.0	2,542.0	3,809.0
307 EPS-Fully Diluted Headline	2,644.0	2,525.0	3,756.0
308 EPS-Fully Diluted Bottomline	2,654.0	2,280.0	3,678.0
374 EPS-Continuing Operations	0.0	0.0	0.0
359 Earnings per Linked Unit	0.0	0.0	0.0
375 Core Headline Earnings - Total Value	0.0	0.0	0.0
376 Core Headline Earnings Per Share	0.0	0.0	0.0
380 Dividend per Share	1,050.0	850.0	1,300.0
381 Interest Distribution per Unit	0.0	0.0	0.0
382 Capital Distribution per Share	0.0	0.0	0.0
309 Effective Tax Rate	30	43	30
310 Deferred Tax: Contingent Liability	0	0	0
311 Deferred Tax: Current	1,743,000	648,000	908,000
312 Deferred Tax: Other	-360,000	419,000	-300,000
318 Accumulated Assessed Tax Loss	0	0	0
319 Accumulated Computed Tax Loss	5,055,000	5,465,000	5,046,000
320 Prior Year Tax Adjustment	-170,000	-205,000	-51,000
333 STC as Published	606,000	831,000	637,000
338 Foreign Tax	1,004,000	756,000	650,000
364 Foreign Tax - Normal	735,000	511,000	459,000
365 Foreign Tax - Previous year	-9,000	4,000	-72,000
366 Foreign Tax - Deferred	278,000	241,000	263,000
313 Interest Capitalised	58,000	34,000	1,586,000
373 Interest Paid - Debentures	0	0	0
314 Invest Allowance Benefit	0	0	0
315 Dilution: Interest Saved	0	0	0
316 Dilution: Dividends Saved	0	0	0
317 Dilution: Equity Income Converted	0	0	0
322 Intangible Assets Written Off	189,000	323,000	195,000
350 Impairments of intangible assets	1,000	137,000	3,000
349 Reversal impairments/Intangible Assets - prev years	15,000	0	0
383 Goodwill Written Off	0	0	0
351 Impairments of goodwill	0	0	0
346 Reversal of impairments of Goodwill - prev years	0	0	0
323 Amortisation of goodwill	0	0	0
384 Impairment of Trade Receivables	138,000	0	0
324 Impairment of Investments	-1,000	-8,000	0
348 Reversal of impairments/Investments - prev years	0	0	381,000
325 Impairment of Loans	0	0	0
368 Reversal of impairments/Loans - prev years	0	0	0
326 Capital Profit /Loss on Financial Assets	7,000	0	-2,462,000
360 Gains/Losses on Mark to Market Value of Financial Assets	-318,000	4,483,000	1,147,000
327 Impairment of Fixed Assets	-108,000	-313,000	-818,000
347 Reversal of impairm/Other Fixed assets - prev years	350,000	0	0
328 Capital Profit /Loss on Fixed Assets	-152,000	-223,000	-28,000
329 Profit /Loss Forex Translations - I/S	0	0	-557,000
330 Profit /Loss Forex Transactions - I/S	-1,007,000	-166,000	300,000
331 Profit /Loss Disposal of Subsidiaries/ Businesses	-5,000	-770,000	349,000
332 Profit /Loss Sundry Extraordinaries	-59,000	-4,064,000	-208,000
352 Extraordinary items - unconsolidated subs	0	0	0
367 Share issue expenses written off	0	0	0
377 Expense in regard to BEE transaction	-824,000	0	0
336 Foreign Turnover	60,242,000	69,275,000	63,107,000
337 Foreign Profit	5,794,000	-1,061,000	6,939,000
339 Ordinary Dividends - Ordinary Shareholders	6,389,000	5,148,000	7,929,000
340 Ordinary Dividends - Minority Shareholders	0	0	0
357 Ordinary dividends declared	6,389,000	5,148,000	7,929,000
358 Ordinary dividends paid	5,360,000	7,193,000	5,766,000
341 Preference Dividends - Ordinary Shareholders	636,000	614,000	0
342 Preference Dividends - Minority Shareholders	0	0	0
353 Minority dividends paid	318,000	583,000	555,000
354 Minority dividends declared - I/S	0	0	0
321 Non Cash Dividends	0	0	0
334 Non-Cash Dividend (Current Year)	0	0	0

335 Non-Cash Dividend (Previous Year)	0	0	0
343 Auditors - Audit Fees - current year	72,000	79,000	75,000
378 Auditors - Audit Fees - previous year	0	0	0
379 Auditors - Audit Expenses	3,000	4,000	4,000
344 Auditors - Other Fees	3,000	3,000	4,000
345 Staff Costs(excluding directors remuneration)	17,546,000	17,532,000	14,443,000
372 Other Staff share based payments - I/S	119,000	32,000	38,000
361 Directors share based payments - I/S	0	0	32,000
362 Directors share based payments - B/S	0	0	0
355 Income from Endowment policies	0	0	0
356 Other Income from Fixed Asset Investments	0	0	0
388 Franchise Fees Received	0	0	0
385 Royalties Received	0	0	0
386 Royalties Paid	0	0	0
387 Legal Fees	0	0	0
363 BEE Share of profits - I/S	824,000	5,893,000	16,161,000

Changes In Equity Statement [Year: 2008 - 2010, Financials: Standardised]

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Jun**	**Jun**	**Jun**
Changes In Equity Statement Standardised (000)	**ZAR**	**ZAR**	**ZAR**
901 Ordinary Shareholders' Equity at Beginning of Year	**83,835,000**	**76,474,000**	**61,617,000**
902 Movements in Issued Capital & Share Premium	**0**	**0**	**0**
903 Balance at begin of year/issued capital & share premium	2,330,000	-6,954,000	-41,000
904 Adj to prior year/issued capital & share premium	0	0	0
905 Ordinary shares issued/issued capital & share premium	204,000	155,000	475,000
906 Share based payments/issued capital & share premium	0	0	0
907 Shares held by subsidiary company/issued capital & share premium	0	0	0
908 Share issue expenses/issued capital & share premium	0	-35,000	-88,000
909 Goodwill written off/issued capital & share premium	0	0	0
910 Capital distributions/issued capital & share premium	0	0	0
911 Treasury shares/issued capital & share premium	0	0	-7,300,000
913 Cancelling of shares/issued capital & share premium	0	8,130,000	0
912 Staff share trust/issued capital & share premium	0	1,034,000	0
951 Share premium raised under share purchase scheme	0	0	0
939 Sundry/issued capital & share premium	0	0	0
940 Balance at end of year/issued capital & share premium	2,534,000	2,330,000	-6,954,000
941 Movements in Non-Distributable Reserve	**0**	**0**	**0**
942 Balance at begin of year/non-distrib reserve	6,623,000	5,768,000	549,000
943 Adj to prior year/non-distrib reserve	0	0	0
944 Ordinary shares issued/non-distrib reserve	0	0	0
945 Profit/(loss) on sale of investments/non-distrib reserve	0	0	0
946 Shares held by subsidiary company/non-distrib reserve	0	0	0
947 Share issue expenses/non-distrib reserve	0	0	0
948 Goodwill written off/non-distrib reserve	0	0	0
949 Capital distributions/non-distrib reserve	0	0	0
950 Section 90 unbundling payment to shareholders	0	0	0
952 Treasury shares/non-distrib reserve	0	0	0
971 Cancelling of shares/non-distrib reserve	0	0	0
953 Staff share trust/non-distrib reserve	0	0	0
954 Profit/(loss) on forex translations/non-distrib reserve	-802,000	-2,067,000	3,449,000
955 Profit/(loss) on forex transactions/non-distrib reserve	0	0	0
956 Tax adjustment/non-distrib reserve	0	0	0

957 Net transfer (to)/from distributable reserve	0	0	0
958 Realised surplus/(loss) - sale of land & build/non-distrib reserve	0	0	0
959 Surplus/(deficit) on revaluation of land & build/non-distrib reserve	0	0	0
960 Derivative valuation adjustment	0	0	0
961 Capital redemption fund	0	0	0
962 Adj arising on changes in composition of group/non-distrib reserve	0	0	0
963 Profit/(loss) on disposal of subs/ businesses/non-distrib reserve	0	0	0
964 Share of associated companies' reserves	0	0	0
965 Profit on share issue of subsidiaries	0	0	0
966 Change in accounting policy/non-distrib reserve	0	0	0
967 Surplus/(deficit) on revaluation of investments/non-distrib reserve	3,000	1,000	-1,000
968 BEE Share of accum profit/non-distrib reserve	0	0	0
969 Share based payments/non-distrib reserve	880,000	3,293,000	1,574,000
970 Net unrealised (losses)/gains on hedging instrum/non-distrib reserve	29,000	-372,000	197,000
999 Sundry/non-distrib reserve	0	0	0
000 Balance at end of year/non-distrib reserve	6,733,000	6,623,000	5,768,000
001 Movements in Distributable Reserve	**0**	**0**	**0**
002 Balance at begin of year/distrib reserve	74,882,000	77,660,000	61,109,000
003 Adj to prior year/distrib reserve	0	0	0
004 Net profit/(loss) for the year	15,941,000	13,648,000	22,417,000
005 Ordinary dividends	-5,360,000	-7,193,000	-5,766,000
006 Preference dividends	0	0	0
007 Treasury shares/distrib reserve	0	0	0
028 Cancelling of shares/distrib reserve	0	-9,244,000	0
008 Net transfer (to)/from non-distributable reserves	0	0	0
009 Profit/(loss) on forex translations/distrib reserve	0	0	0
010 Profit/(loss) on forex transactions/distrib reserve	0	0	0
011 Realised surplus/(loss) - sale of land & build/distrib reserve	0	0	0
012 Surplus/(deficit) on revaluation of land & build/distrib reserve	0	0	0
013 Shares held by subsidiary company/distrib reserve	0	0	0
014 Change in accounting policy/distrib reserve	0	0	0
015 Adj arising on changes in composition of group/distrib reserve	0	0	-100,000
016 Share of associated companies' retained income	0	0	0
017 Share issue expenses/distrib reserve	0	0	0
018 Goodwill written off/distrib reserve	0	0	0
019 Capital distributions/distrib reserve	0	0	0
020 Net unrealised (losses)/gains on hedging instrum/distrib reserve	0	0	0
021 Premium on acquisition of subsidiaries	0	0	0
022 Profit/(loss) on disposal of subs/ businesses/distrib reserve	0	11,000	0
023 Surplus/(deficit) on revaluation of investments/distrib reserve	0	0	0
024 BEE Share of accum profit/distrib reserve	0	0	0
025 Share based payments/distrib reserve	0	0	0
026 Tax adjustment/distrib reserve	0	0	0
027 Profit/(loss) on sale of investments/distrib reserve	0	0	0
059 Sundry/distrib reserve	0	0	0
060 Balance at end of year/distrib reserve	85,463,000	74,882,000	77,660,000
061 Movements in Preference Share Capital & Equity Loans	**0**	**0**	**0**
062 Balance at begin of year/pref share capital & equity loans	0	0	0
063 Adj to prior year/pref share capital & equity loans	0	0	0
064 Shares issued	0	0	0
065 Share issue expenses/pref share capital & equity loans	0	0	0
066 Distribution to shareholders	0	0	0
067 Shares to be issued	0	0	0
068 Debentures issued	0	0	0
089 Sundry/pref share capital & equity loans	0	0	0

090 Balance at end of year/pref share capital & equity loans	0	0	0
091 Ordinary Shareholders' Equity at End Of Year	**94,730,000**	**83,835,000**	**76,474,000**

Cash Flow Statement [Year: 2008 - 2010, Financials: Standardised]

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Jun**	**Jun**	**Jun**
Cash Flow Statement Standardised (000)	**ZAR**	**ZAR**	**ZAR**
701 Operating Profit/loss	21,490,000	23,666,000	32,035,000
702 Depreciation & Non Cash-items	9,272,000	14,146,000	10,109,000
703 Cash Ex Operations	**30,762,000**	**37,812,000**	**42,144,000**
704 Investment Income	84,000	507,000	245,000
705 Other Income	0	0	0
706 Decrease/increase Working Capital	**-3,873,000**	**9,889,000**	**-6,441,000**
707 Decrease/increase Inventory	-2,509,000	4,143,000	-4,261,000
708 Decrease/increase Accounts Receivable	-3,953,000	7,896,000	-6,762,000
709 Increase/decrease Accounts Payable	2,589,000	-2,150,000	4,582,000
710 Increase/decrease Interest-free Loans	0	0	0
711 Cash Ex Operating Activity	**26,973,000**	**48,208,000**	**35,948,000**
712 Net Interest Paid/received	-143,000	411,000	1,693,000
713 Taxation Paid	6,040,000	10,252,000	9,572,000
714 Cash Available	**21,076,000**	**37,545,000**	**24,683,000**
715 Ordinary Dividend	5,678,000	7,776,000	6,321,000
716 Preference Dividend	636,000	0	0
733 Cash From Operating Activities	**14,762,000**	**29,769,000**	**18,362,000**
719 Fixed Assets Acquired	16,108,000	15,672,000	10,855,000
720 Increase In Investments	1,295,000	613,000	76,000
721 Net Investment In Subsidiaries/ Businesses	0	-3,475,000	-250,000
722 Other Expenses/losses	124,000	905,000	88,000
724 Proceeds Disposal Fixed Assets	208,000	697,000	184,000
725 Proceeds Disposal Investment	14,000	7,000	0
726 Other Proceeds	0	0	324,000
734 Cash From Investment Activities	**-17,305,000**	**-13,011,000**	**-10,261,000**
728 Increase/decrease Long-Term Liabilities	-2,122,000	749,000	-1,337,000
730 Change In Share Capital	204,000	75,000	-6,825,000
735 Increase/decrease Short-Term Liabilities	461,000	-1,325,000	-920,000
731 Other (Cash Generated)	0	0	0
736 Cash From Financing Activities	**-1,457,000**	**-501,000**	**-9,082,000**
737 Increase/(decrease) In Cash And Near Cash	**-4,000,000**	**16,257,000**	**-981,000**
General Supplementary			
801 Minority dividends (Ordinary)	318,000	583,000	555,000
802 Net Intangible Assets Movements	-101,000	-10,000	-31,000
803 Preference shares issued by the Company	0	0	0
804 Share Incentive Trust Options Exercised	0	0	0
805 Minority dividends (Preference)	0	0	0

Value Added Statement

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Jun**	**Jun**	**Jun**
Value Added Statement Standardised (000)	**ZAR**	**ZAR**	**ZAR**
760 Turnover	122,256,000	137,836,000	129,943,000
761 Extraordinary Items	0	0	0
762 Other Income/Value Added	1,549,000	2,060,000	989,000

763 Bought Material/Services	74,061,000	89,393,000	76,472,000
764 Value Added	**49,744,000**	**50,503,000**	**54,460,000**
765 Salaries & Wages	17,546,000	17,532,000	14,443,000
766 Interest (Net)	1,799,000	2,191,000	2,427,000
767 Dividends: Ordinary	5,806,000	7,260,000	6,877,000
768 Dividends: Preference	0	0	0
769 Dividends: Minority	0	0	0
770 Taxation	5,602,000	9,413,000	9,521,000
771 Depreciation	6,712,000	6,245,000	5,212,000
772 Retention	12,279,000	7,862,000	15,980,000
773 Minority Interest	0	0	0
774 Other Expenses/Distrib of Value Added	0	0	0
775 Disburse of Value Added	**49,744,000**	**50,503,000**	**54,460,000**
776 Leasing : Property	390,000	434,000	324,000
777 Leasing : Other	625,000	677,000	563,000
778 Dividends Received	84,000	507,000	245,000
779 Interest Received	1,301,000	1,763,000	725,000
780 Deferred Taxation	1,383,000	1,067,000	608,000
781 Number of Employees	33,339	33,544	33,928

Sundry Items

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Jun**	**Jun**	**Jun**
Sundry Items Standardised (000)	**ZAR**	**ZAR**	**ZAR**
101 Ordinary Shares in Issue @ Year End Split Adjusted	639,288	665,881	627,696
102 Nr of Ordinary Shares in Issue @ Year End	639,288	665,881	627,696
103 Par Or No Par Value	2	2	2
110 Debtors As Surety	2	2	2
111 Directors Value in Unlisted Investments	6,886,000	6,037,000	8,180,000
112 Market Value Listed Investments	0	0	0
113 Directors Valuation of Unconsolidated Subsidiaries	0	0	0
114 Arrear Cumulative Dividends	0	0	0
115 Months Covered By Financial Statements	12	12	12
116 Month Of Financial Year End	6	6	6
117 Audit Report Qualified	2	2	2
118 Inflation Adjusted Other Fixed Asset	21,832,394	24,040,463	26,154,233
119 Inflation Adjusted Depreciable Fixed Asset	1,895,814	1,997,420	1,807,611
120 No Of Subsidiaries	25	25	25
121 No Of Foreign Subsidiaries	8	8	8
122 No Of Quoted Subsidiaries	0	0	0
123 Controlled By Another Entity	2	2	2
124 Provision For Increased Replacement Value	2	2	2
125 Preference Share Issued At Par	1	1	1
126 Directors Shareholding Beneficial	186	186	413
127 Directors Shareholding Non-beneficial	0	0	0
128 Deferred Tax Total	9,307,000	7,984,000	6,993,000
129 Deferred Tax For Year	1,383,000	1,067,000	608,000
130 Items Not Representing Cashflow	8,350,000	8,710,000	8,248,000
131 No Persons Employed	33,339	33,544	33,928
175 Foreign Employees	0	0	0
132 Inventory: Raw Material	2,622,000	2,978,000	5,755,000
133 Inventory: Finished Goods	8,242,000	7,116,000	10,802,000
134 Inventory: Merchandise	0	0	0
135 Inventory: Consumable Stores	4,251,000	4,131,000	3,058,000
136 Inventory: Work In Progress	1,357,000	364,000	473,000
137 Inventory: Uncompleted Contracts	0	0	0
138 Proportionate Profit from Associated Companies	164,000	-210,000	19,000
139 Total Reserve Accrued: Associated Companies	208,000	65,000	559,000
140 Capital Commitments	46,224,000	25,125,000	25,048,000
141 Accumulated Depreciation Land & Buildings	3,801,000	3,821,000	3,827,000
142 Long Term Group Loans Advanced	0	0	0
143 Short Term Group Loans Advanced	0	0	0
144 Headline Earnings per Share	2,657.0	2,542.0	3,809.0
145 Long Term Group Loans Received	0	0	0

146 Short Term Group Loans Received	0	0	0
147 Notes To Statements	0	0	0
148 Number Of Analysts	9	2	2
149 Average Price Per Share	28,897	30,170	35,630
150 Share Price @ Company Financial Year End	28,086	28,810	46,788
151 Inventory Valuation Method	3	3	3
152 Mining Assets	8,715,000	7,439,000	6,469,000
153 Exploration, Amortisation Expenses Written Off	1,490,000	1,221,000	1,078,000
154 Undeveloped Property	0	0	0
155 Development Property Less Development Expense	0	0	0
156 Debtors For Property Sold	0	0	0
157 Provision For Future Development	0	0	0
158 Currency Adjustment: R1000 To ?	0.0000	0.0000	0.0000
162 Trade Creditors	9,132,000	5,709,000	8,609,000
163 Loan Portion Of Tax	0	0	0
164 Balance Sheet LIFO Inventory Adjustment	0	0	0
165 Income Statement LIFO Inventory Adjustment	0	0	0
166 Leasehold Commitments	7,159,000	7,227,000	7,516,000
167 Contingent Liabilities	22,003,000	29,545,000	26,661,000
168 Extraordinary Item In Tax	-19,000	35,000	-229,000
169 Extraordinary Item In Minority Interest	0	0	4,000
170 No Of Shares Traded	539,644	580,042	588,557
171 No Of Transactions	769,853	726,744	431,830
172 Value Of Transactions	155,940,498	174,996,317	209,700,854
173 Split Factor (3 Decimals)	1	1	1
174 Month Of Stock Split	0	0	0

Technical (Gold) Statement

Technical (Gold) Statement not disclosed

Appendix 14: Sample of Gold Firms Standardised Financial Statements

FINANCIAL STATEMENTS REPORT

ANGLOGOLD ASHANTI LIMITED (ANG)

Report Date: 07 Jun 2012 08:27:48 PM

Balance Sheet [Year: 2008 - 2010, Financials: Standardised]

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Dec**	**Dec**	**Dec**
Balance Sheet Standardised (000)	**ZAR**	**ZAR**	**ZAR**
001 Ordinary Share Capital	95,000	90,000	88,000
002 Non Distributable Reserves	51,550,000	47,207,000	45,747,000
003 Funds Approved For Mine Assets	0	0	0
004 Reserve Attributable To Associated Costs	0	0	0
005 Distributable Reserves	-25,743,000	-25,993,000	-23,057,000
006 Provision for Future Expenditure	3,873,000	3,351,000	3,562,000
007 Deferred Taxation	5,779,000	5,148,000	5,363,000
008 Cost Of Control	1,164,000	1,178,000	1,208,000
009 Other Intangible Assets	113,000	138,000	195,000
010 Ordinary Shareholders Interest & Funds	**34,277,000**	**28,487,000**	**30,300,000**
011 Preference Shares : Permanent	0	0	0
012 Preference Shares: Redeemable	0	0	0
013 Minority Interest	815,000	966,000	790,000
014 Total Owners Interest	**35,092,000**	**29,453,000**	**31,090,000**
015 Undeveloped Property	0	0	0
016 Land & Buildings At Cost	495,000	1,001,000	472,000
017 Total Depreciated Land & Buildings	61,000	45,000	29,000
018 Other Fixed Assets At Cost	0	0	0
019 Total Depreciation: Other Fixed Assets	0	0	0
020 Mining Assets	40,176,000	42,846,000	40,638,000
021 Total Fixed Assets	**40,610,000**	**43,802,000**	**41,081,000**
022 Listed Shares Bookvalue	896,000	903,000	418,000
023 Unlisted Shares Bookvalue	4,794,000	5,214,000	10,479,000
024 Investment Unconsolidated Subsidiaries	0	0	0
025 Long Term Loans Granted	1,325,000	945,000	656,000
026 Long Term Group Loans Granted	0	0	0
027 Debtors For Property Sale	0	0	0
028 Total Long Term Investments	**7,015,000**	**7,062,000**	**11,553,000**
029 Secured Long Term Loans Obtained	385,000	428,000	287,000
030 Secured Debentures	0	0	0
031 Unsecured Debentures	0	0	0
032 Unsecured Long Term Loans Obtained	19,040,000	7,087,000	10,318,000
033 Long Term Group Loans Obtained	0	0	0
034 Total Long Term Funds	**19,425,000**	**7,515,000**	**10,605,000**
035 Total Inventory	8,116,000	7,610,000	8,373,000
036 Debtors	1,035,000	908,000	419,000
037 Short Term Loans Granted	840,000	8,575,000	9,140,000
038 Short Term Group Loans Granted	0	0	0
039 Cash And Bank	3,036,000	2,535,000	2,141,000
040 Other Current Assets	393,000	384,000	1,009,000
041 Total Current Assets	**13,420,000**	**20,012,000**	**21,082,000**
042 Short Term Loans	886,000	28,263,000	26,472,000
043 Short Term Group Loans	0	0	0
044 Trade Creditors	2,653,000	2,531,000	2,964,000

045 Other Creditors	1,977,000	1,801,000	1,982,000
046 Bank Overdraft	0	0	0
047 Taxation Payable	706,000	1,059,000	425,000
048 Dividends Payable	306,000	254,000	178,000
049 Total Current Liabilities	**6,528,000**	**33,908,000**	**32,021,000**
050 Total Assets	**61,045,000**	**70,876,000**	**73,716,000**
General Supplementary			
201 Shares In Issue Y/E Ordinary	380,769	362,241	353,483
202 Shares In Issue Y/E 'N'	0	0	0
203 Shares In Issue Y/E 'A'	0	0	0
204 Shares In Issue Y/E 'B'	0	0	0
248 Shares In Issue Y/E 'C'	0	0	0
251 Shares In Issue Y/E 'E'	1,120	3,795	3,967
273 Shares In Issue Y/E Deferred	0	0	0
259 Shares Authorised Ordinary	600,000	600,000	400,000
260 Par Value Ordinary Shares (cents)	25	25	25
261 Shares Authorised 'N'	0	0	0
262 Par Value 'N' Shares (cents)	0	0	0
263 Shares Authorised 'A'	0	0	0
264 Par Value 'A' Shares (cents)	0	0	0
265 Shares Authorised 'B'	0	0	0
266 Par Value 'B' Shares (cents)	0	0	0
267 Shares Authorised 'C'	0	0	0
268 Par Value 'C' Shares (cents)	0	0	0
269 Shares Authorised 'E'	4,280	4,280	4,280
270 Par Value 'E' Shares (cents)	25	25	25
271 Shares Authorised Deferred	0	0	0
272 Par Value Deferred Shares (cents)	0	0	0
206 Shares In Issue Weighted Average	371,871	361,228	317,204
207 Shares In Issue Fully Diluted	373,440	361,228	317,204
232 Treasury Shares (Number '000)	2,121	5,174	3,423
233 Treasury Shares (Value R'000)	353,000	517,000	599,000
249 Share Trusts and Other (Number '000)	0	0	0
250 Share Trusts and Other (Value R'000)	0	0	0
274 Share Buyback (Number '000)	0	0	0
275 Share Buyback (Value R'000)	0	0	0
238 Preference shares issued by a subsidiary	0	0	0
208 Revaluation Reserve	144,000	-45,000	-702,000
209 Minority Revaluation Reserve	0	0	0
210 Minority Equity Accounted Reserve	0	0	0
228 Foreign Currency Translation Reserve - Cumulative	4,548,000	6,314,000	9,063,000
211 Commitments: Land & Buildings	179,000	112,000	910,000
212 Commitments: Other	0	0	0
213 Foreign Borrowings	16,803,000	14,097,000	18,015,000
214 Convertible Preference Shares	0	0	0
215 Convertible Debentures & Loans	9,828,000	4,433,000	0
216 Share In Issue Latest	0	0	0
217 Mining Assets at Cost	79,711,000	79,758,000	86,429,000
218 Depreciation / Amortisation on Mine Assets	39,535,000	36,912,000	45,791,000
219 Medical Aid Liabilities	1,241,000	1,111,000	1,099,000
220 Pension Fund Liabilities	17,000	106,000	194,000
221 Long Term Loans - Interest Bearing	18,035,000	6,172,000	8,459,000
222 Long Term Loans - Interest Free	1,390,000	1,343,000	2,146,000
223 Short Term Loans - Interest Bearing	886,000	28,263,000	26,472,000
224 Short Term Loans - Interest Free	0	0	0
225 Property Revaluation Surplus - I/S	0	0	0
226 Profit /Loss Forex Translations - B/S	0	0	0
227 Profit /Loss Forex Transactions - B/S	0	0	0
229 Foreign Assets	46,403,000	53,168,000	58,603,000
230 Foreign Liabilities	0	0	0
276 Asset Retirement Obligations - Mining Assets	3,623,000	3,109,000	0
231 Provisions	1,258,000	1,179,000	1,591,000
236 Provisions - Long term	1,258,000	1,179,000	1,591,000
237 Provisions - Short term	0	0	0
234 Share Trust scheme	0	0	0
235 Capital Distributions (Cash)	0	0	0
239 Non Current Assets held for sale - Land & Buildings	10,000	539,000	0
240 Non Current Assets held for sale - Investments	100,000	111,000	7,479,000
241 Non Current Assets held for sale - Other	0	0	0
258 Total Bookvalue Land & Buildings	434,000	956,000	443,000

252 Total Bookvalue Other Fixed Assets	**0**	**0**	**0**
253 Bookvalue Plant & Machinery/Manufacturing Equipment	0	0	0
254 Bookvalue Furniture & Office Equipment	0	0	0
255 Bookvalue Vehicles	0	0	0
256 Bookvalue Computer Hardware & Software	0	0	0
257 Bookvalue Other fixed assets	0	0	0
242 Listed unconsolidated subsidiaries	0	0	0
243 Market valuation of listed unconsolidated subs	0	0	0
244 Unlisted unconsolidated subsidiaries	0	0	0
245 Directors valuation of unlisted unconsolidated subs	0	0	0
246 Minority dividends declared - B/S	0	0	0
247 BEE Share of accumulative profits - B/S	0	0	0

Income Statement

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Dec**	**Dec**	**Dec**
Income Statement Standardised (000)	**ZAR**	**ZAR**	**ZAR**
093 Turnover	39,824,000	31,517,000	28,686,000
094 % Change in Turnover	26	10	19
051 Trading Profit: Main Business	10,487,000	10,300,000	10,679,000
052 Trading Profit: Other	0	0	-8,000
053 Total Trading Profit	**10,487,000**	**10,300,000**	**10,671,000**
054 Income Listed Shares	0	0	0
055 Income Unlisted Shares	0	0	0
056 Income Unconsolidated Subsidiary Shares	0	0	0
057 Interest Received	311,000	444,000	536,000
058 Total Income from Investments	**311,000**	**444,000**	**536,000**
059 Profit Sale Investments	-45,000	-12,183,000	-6,120,000
060 Profit Sales Non Trading Assets	-825,000	5,535,000	-14,193,000
061 Extraordinary Profits	144,000	796,000	33,000
062 Royalties Received	56,000	0	0
063 Total Profits Extraordinary Nature	**-670,000**	**-5,852,000**	**-20,280,000**
064 Royalties Paid	1,030,000	699,000	634,000
065 Extraordinary Losses	0	0	0
066 Leasing Charges	170,000	280,000	243,000
067 Depreciation Land & Buildings	17,000	16,000	17,000
068 Depreciation Other Fixed Assets	5,005,000	4,599,000	4,603,000
069 Directors Remuneration: Direct	7,000	6,000	5,000
070 Directors Remuneration: Other	38,000	38,000	29,000
071 Auditors Remuneration	71,000	66,000	61,000
072 Technical, Administrative, Secretarial Fees	0	0	0
073 Total Costs Shown	**6,338,000**	**5,704,000**	**5,592,000**
074 Taxation: Ordinary	1,674,000	621,000	651,000
075 Taxation: Other	112,000	89,000	85,000
076 Deferred Taxation	923,000	-166,000	-2,821,000
077 State Share Of Profit	0	0	0
078 Total Taxation	**2,709,000**	**544,000**	**-2,085,000**
053 Total Trading Profit	10,487,000	10,300,000	10,671,000
058 Total Income from Investments	311,000	444,000	536,000
063 Total Profits Extraordinary Nature	-670,000	-5,852,000	-20,280,000
079 Total Income	**10,128,000**	**4,892,000**	**-9,073,000**
073 Total Costs Shown	**6,338,000**	**5,704,000**	**5,592,000**
080 Profit Before Interest And Tax (EBIT)	3,790,000	-812,000	-14,665,000
081 Interest Paid: Debentures	369,000	332,000	558,000
082 Other Interest	834,000	814,000	368,000

083 Profit Before Tax & State Profit Sharing	**2,587,000**	**-1,958,000**	**-15,591,000**
078 Total Taxation	**2,709,000**	**544,000**	**-2,085,000**
084 Profit After Taxation	**-122,000**	**-2,502,000**	**-13,506,000**
085 Capital Expenditure Mining Assets	0	0	0
086 Profit After Capital Expenditure	**-122,000.0**	**-2,502,000.0**	**-13,506,000.0**
087 Minority Interest	381,000.0	417,000.0	324,000.0
088 Profit Ordinary And Preference Shares	**-503,000**	**-2,919,000**	**-13,830,000**
089 Ordinary Dividend	543,000	469,000	353,000
090 Preference Dividend	0	0	0
091 Retained Profits	**-579,000**	**-2,603,000**	**-15,360,000**
092 Profit In Associated Companies	-467,000	-785,000	1,177,000
095 Earnings Before Interest, Tax, Depreciation And Amortisation (EBITDA)	8,830,000	3,803,000	-8,965,000
General Supplementary			
301 Lease Charge: Land Building	170,000	280,000	243,000
302 Lease Charge: Other	0	0	0
303 Research & Development	0	0	0
304 EPS-Equity Accounted	171.0	-765.0	-5,077.0
305 EPS-Bottom Line	171.0	-765.0	-5,077.0
306 EPS-Headline	259.0	-1,880.0	-1,379.0
307 EPS-Fully Diluted Headline	0.0	0.0	0.0
308 EPS-Fully Diluted Bottomline	171.0	-765.0	-5,077.0
374 EPS-Continuing Operations	0.0	-765.0	-5,140.0
359 Earnings per Linked Unit	0.0	0.0	0.0
375 Core Headline Earnings - Total Value	0.0	0.0	0.0
376 Core Headline Earnings Per Share	0.0	0.0	0.0
380 Dividend per Share	145.0	130.0	100.0
381 Interest Distribution per Unit	0.0	0.0	0.0
382 Capital Distribution per Share	0.0	0.0	0.0
309 Effective Tax Rate	66	-100	12
310 Deferred Tax: Contingent Liability	0	0	0
311 Deferred Tax: Current	-1,414,000	1,755,000	-2,813,000
312 Deferred Tax: Other	2,337,000	-1,921,000	-8,000
318 Accumulated Assessed Tax Loss	0	0	0
319 Accumulated Computed Tax Loss	1,548,000	2,964,000	4,945,000
320 Prior Year Tax Adjustment	-645,000	-17,000	1,000
333 STC as Published	0	0	0
338 Foreign Tax	1,597,000	1,969,000	-2,878,000
364 Foreign Tax - Normal	1,628,000	1,113,000	651,000
365 Foreign Tax - Previous year	-17,000	-50,000	-41,000
366 Foreign Tax - Deferred	-14,000	906,000	-3,488,000
313 Interest Capitalised	0	135,000	263,000
373 Interest Paid - Debentures	369,000	332,000	558,000
314 Invest Allowance Benefit	117,000	91,000	129,000
315 Dilution: Interest Saved	0	0	0
316 Dilution: Dividends Saved	0	0	0
317 Dilution: Equity Income Converted	0	0	0
322 Intangible Assets Written Off	18,000	0	0
350 Impairments of intangible assets	0	0	0
349 Reversal impairments/Intangible Assets - prev years	0	0	0
383 Goodwill Written Off	0	0	1,080,000
351 Impairments of goodwill	0	0	1,080,000
346 Reversal of impairments of Goodwill - prev years	0	0	0
323 Amortisation of goodwill	0	0	0
384 Impairment of Trade Receivables	67,000	0	0
324 Impairment of Investments	-16,000	0	-42,000
348 Reversal of impairments/Investments - prev years	0	0	0
325 Impairment of Loans	0	0	0
368 Reversal of impairments/Loans - prev years	0	0	0
326 Capital Profit /Loss on Financial Assets	314,000	0	14,000
360 Gains/Losses on Mark to Market Value of Financial Assets	-343,000	-12,183,000	-6,092,000
327 Impairment of Fixed Assets	-634,000	0	-14,792,000
347 Reversal of impairm/Other Fixed assets - prev years	0	5,115,000	0
328 Capital Profit /Loss on Fixed Assets	-191,000	420,000	599,000
329 Profit /Loss Forex Translations - I/S	0	0	0

330 Profit /Loss Forex Transactions - I/S	18,000	852,000	33,000
331 Profit /Loss Disposal of Subsidiaries/ Businesses	0	0	0
332 Profit /Loss Sundry Extraordinaries	126,000	-56,000	0
352 Extraordinary items - unconsolidated subs	0	0	0
367 Share issue expenses written off	0	0	0
377 Expense in regard to BEE transaction	0	0	0
336 Foreign Turnover	22,777,000	16,631,000	19,274,000
337 Foreign Profit	778,000	-2,674,000	0
339 Ordinary Dividends - Ordinary Shareholders	543,000	469,000	353,000
340 Ordinary Dividends - Minority Shareholders	0	0	0
357 Ordinary dividends declared	543,000	469,000	353,000
358 Ordinary dividends paid	492,000	392,000	324,000
341 Preference Dividends - Ordinary Shareholders	0	0	0
342 Preference Dividends - Minority Shareholders	0	0	0
353 Minority dividends paid	0	0	0
354 Minority dividends declared - I/S	0	0	0
321 Non Cash Dividends	0	0	0
334 Non-Cash Dividend (Current Year)	0	0	0
335 Non-Cash Dividend (Previous Year)	0	0	0
343 Auditors - Audit Fees - current year	61,000	61,000	49,000
378 Auditors - Audit Fees - prior year	-1,000	-3,000	-1,000
379 Auditors - Audit Expenses	0	0	0
344 Auditors - Other Fees	11,000	8,000	13,000
345 Staff Costs(excluding directors remuneration)	9,975,000	9,361,000	8,135,000
372 Other Staff share based payments - I/S	434,000	337,000	329,000
361 Directors share based payments - I/S	0	0	0
362 Directors share based payments - B/S	0	0	0
355 Income from Endowment policies	0	0	0
356 Other Income from Fixed Asset Investments	0	0	0
388 Franchise Fees Received	0	0	0
385 Royalties Received	56,000	0	0
386 Royalties Paid	1,030,000	0	0
387 Legal Fees	0	0	0
363 BEE Share of profits - I/S	0	0	0

Changes In Equity Statement [Year: 2008 - 2010, Financials: Standardised]

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Dec**	**Dec**	**Dec**
Changes In Equity Statement Standardised (000)	**ZAR**	**ZAR**	**ZAR**
901 Ordinary Shareholders' Equity At Beginning Of Year	**21,558,000**	**22,956,000**	**16,204,000**
902 Movements In Issued Capital & Share Premium	**0**	**0**	**0**
903 Balance at begin of year/issued capital & share premium - Gld	**39,834,000**	**37,336,000**	**22,371,000**
904 Adj to prior year/issued capital & share premium - Gld	0	0	0
905 Ordinary shares issued/issued capital & share premium - Gld	5,988,000	2,498,000	14,924,000
906 Share based payments/issued capital & share premium - Gld	0	0	0
907 Shares held by subsidiary company/issued capital & share premium - Gld	0	0	0
908 Share issue expenses/issued capital & share premium - Gld	-144,000	0	0
909 Goodwill written off/issued capital & share premium - Gld	0	0	0
910 Capital distributions/issued capital & share premium - Gld	0	0	0
911 Treasury shares/issued capital & share premium - Gld	0	0	41,000
913 Cancelling of shares/issued capital & share premium - Gld	0	0	0
912 Staff share trust/issued capital & share premium - Gld	0	0	0
951 Share premium raised under share purchase scheme - Gld	0	0	0

939 Sundry/issued capital & share premium - Gld	0	0	0
940 Balance at end of year/issued capital & share premium - Gld	**45,678,000**	**39,834,000**	**37,336,000**
941 Movements In Non-Distributable Reserve	**0**	**0**	**0**
942 Balance at begin of year/non-distrib reserve - Gld	**7,463,000**	**8,385,000**	**-643,000**
943 Adj to prior year/non-distrib reserve - Gld	0	0	0
944 Ordinary shares issued/non-distrib reserve - Gld	0	0	0
945 Profit/(loss) on sale of investments/non-distrib reserve - Gld	0	0	-797,000
946 Shares held by subsidiary company/non-distrib reserve - Gld	0	0	0
947 Share issue expenses/non-distrib reserve - Gld	0	0	0
948 Goodwill written off/non-distrib reserve - Gld	0	0	0
949 Capital distributions/non-distrib reserve - Gld	0	0	0
950 Section 90 unbundling payment to shareholders - Gld	0	0	0
952 Treasury shares/non-distrib reserve - Gld	0	0	0
971 Cancelling of shares/non-distrib reserve - Gld	0	0	0
953 Staff share trust/non-distrib reserve - Gld	0	0	0
954 Profit/(loss) on forex translations/non-distrib reserve - Gld	-1,860,000	-2,678,000	8,493,000
955 Profit/(loss) on forex transactions/non-distrib reserve - Gld	0	0	0
956 Tax adjustment/non-distrib reserve - Gld	0	0	-119,000
957 Net transfer (to)/from distributable reserve - Gld	0	0	12,000
958 Realised surplus/(loss) - sale of land & build/non-distrib reserve - Gld	0	0	0
959 Surplus/(deficit) on revaluation of land & build/non-distrib reserve - Gld	0	0	0
960 Derivative valuation adjustment - Gld	0	0	0
961 Capital redemption fund - Gld	0	0	0
962 Adj arising on changes in composition of group/non-distrib reserve - Gld	0	0	0
963 Profit/(loss) on disposal of subs/businesses/non-distrib reserve - Gld	0	0	0
964 Share of associated companies' reserves - Gld	0	306,000	0
965 Profit on share issue of subsidiaries - Gld	0	0	0
966 Change in accounting policy/non-distrib reserve - Gld	0	0	0
967 Surplus/(deficit) on revaluation of investments/non-distrib reserve - Gld	90,000	432,000	-387,000
968 BEE Share of accum profit/non-distrib reserve - Gld	0	0	0
969 Share based payments/non-distrib reserve - Gld	92,000	122,000	118,000
970 Net unrealised (losses)/gains on hedging instrum/non-distrib reserve - Gld	183,000	834,000	1,822,000
999 Sundry/non-distrib reserve - Gld	-1,000	62,000	0
000 Balance at end of year/non-distrib reserve - Gld	**5,967,000**	**7,463,000**	**8,499,000**
001 Movements In Distributable Reserve	**0**	**0**	**0**
002 Balance at begin of year/distrib reserve - Gld	**-25,739,000**	**-22,765,000**	**-5,524,000**
003 Adj to prior year/distrib reserve - Gld	0	0	0
004 Net profit/(loss) for the year - Gld	637,000	-2,762,000	-16,105,000
005 Ordinary dividends - Gld	-492,000	-392,000	-324,000
006 Preference dividends - Gld	0	0	0
007 Treasury shares/distrib reserve - Gld	0	0	0
028 Cancelling of shares/distrib reserve - Gld	0	0	0
008 Net transfer (to)/from non-distributable reserves - Gld	0	0	-12,000
009 Profit/(loss) on forex translations/distrib reserve - Gld	157,000	0	0
010 Profit/(loss) on forex transactions/distrib reserve - Gld	0	0	0
011 Realised surplus/(loss) - sale of land & build/distrib reserve - Gld	0	0	0
012 Surplus/(deficit) on revaluation of land & build/distrib reserve - Gld	0	0	0
013 Shares held by subsidiary company/distrib reserve - Gld	0	0	0

014 Change in accounting policy/distrib reserve - Gld	0	0	0
015 Adj arising on changes in composition of group/distrib reserve - Gld	0	0	-914,000
016 Share of associated companies' retained income - Gld	0	0	0
017 Share issue expenses/distrib reserve - Gld	0	0	0
018 Goodwill written off/distrib reserve - Gld	0	0	0
019 Capital distributions/distrib reserve - Gld	0	0	0
020 Net unrealised (losses)/gains on hedging instrum/distrib reserve - Gld	0	0	0
021 Premium on acquisition of subsidiaries - Gld	0	0	0
022 Profit/(loss) on disposal of subs/businesses/distrib reserve - Gld	0	0	0
023 Surplus/(deficit) on revaluation of investments/distrib reserve - Gld	0	0	0
024 BEE Share of accum profit/distrib reserve - Gld	0	0	0
025 Share based payments/distrib reserve - Gld	0	0	0
026 Tax adjustment/distrib reserve - Gld	0	0	0
027 Profit/(loss) on sale of investments/distrib reserve - Gld	0	0	0
059 Sundry/distrib reserve - Gld	0	180,000	0
060 Balance at end of year/distrib reserve - Gld	**-25,437,000**	**-25,739,000**	**-22,879,000**
061 Movements In Preference Share Capital & Equity Loans	**0**	**0**	**0**
062 Balance at begin of year/pref share capital & equity loans - Gld	**0**	**0**	**0**
063 Adj to prior year/pref share capital & equity loans - Gld	0	0	0
064 Shares issued - Gld	0	0	0
065 Share issue expenses/pref share capital & equity loans - Gld	0	0	0
066 Distribution to shareholders - Gld	0	0	0
067 Shares to be issued - Gld	0	0	0
068 Debentures issued - Gld	0	0	0
089 Sundry/pref share capital & equity loans - Gld	0	0	0
090 Balance at end of year/pref share capital & equity loans - Gld	**0**	**0**	**0**
091 Ordinary Shareholders' Equity At End Of Year	**26,208,000**	**21,558,000**	**22,956,000**

Cash Flow Statement [Year: 2008 - 2010, Financials: Standardised]

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Dec**	**Dec**	**Dec**
Cash Flow Statement Standardised (000)	**ZAR**	**ZAR**	**ZAR**
701 Operating Profit/loss	-14,911,000	-14,086,000	-17,887,000
702 Depreciation & Non Cash-items	11,150,000	19,299,000	24,785,000
703 Cash Ex Operations	**-3,761,000**	**5,213,000**	**6,898,000**
704 Investment Income	939,000	751,000	739,000
705 Other Income	0	0	0
706 Decrease/increase Working Capital	**-1,537,000**	**-951,000**	**-1,221,000**
707 Decrease/increase Inventory	-667,000	634,000	-3,588,000
708 Decrease/increase Accounts Receivable	-781,000	106,000	-618,000
709 Increase/decrease Accounts Payable	-89,000	-1,691,000	2,985,000
710 Increase/decrease Interest-free Loans	0	0	0
711 Cash Ex Operating Activity	**-4,359,000**	**5,013,000**	**6,416,000**
712 Net Interest Paid/received	589,000	501,000	250,000
713 Taxation Paid	1,371,000	1,232,000	1,029,000
714 Cash Available	**-6,319,000**	**3,280,000**	**5,137,000**
715 Ordinary Dividend	846,000	474,000	455,000
716 Preference Dividend	0	0	0
733 Cash From Operating Activities	**-7,165,000**	**2,806,000**	**4,682,000**
719 Fixed Assets Acquired	7,108,000	8,656,000	9,846,000

720 Increase In Investments	1,151,000	3,396,000	769,000
721 Net Investment In Subsidiaries/ Businesses	0	0	-79,000
722 Other Expenses/losses	328,000	84,000	8,935,000
724 Proceeds Disposal Fixed Assets	500,000	9,029,000	301,000
725 Proceeds Disposal Investment	1,043,000	680,000	1,111,000
726 Other Proceeds	0	0	0
734 Cash From Investment Activities	**-7,044,000**	**-2,427,000**	**-18,059,000**
728 Increase/decrease Long-Term Liabilities	4,280,000	738,000	1,914,000
730 Change In Share Capital	5,656,000	2,384,000	13,592,000
735 Increase/decrease Short-Term Liabilities	182,000	0	0
731 Other (Cash Generated)	0	0	0
736 Cash From Financing Activities	**10,118,000**	**3,122,000**	**15,506,000**
737 Increase/(decrease) In Cash And Near Cash	**-4,091,000**	**3,501,000**	**2,129,000**
General Supplementary			
801 Minority Dividends (Ordinary)	0	0	0
802 Net Intangible Assets Movements	0	0	0
803 Preference shares issued by the Company	0	0	0
804 Share Incentive Trust Options Exercised	0	0	0
805 Minority dividends (Preference)	0	0	0

Value Added Statement

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Dec**	**Dec**	**Dec**
Value Added Statement Standardised (000)	**ZAR**	**ZAR**	**ZAR**
760 Turnover	0	0	0
761 Extraordinary Items	0	0	0
762 Other Income/Value Added - Gld	0	0	0
763 Bought Material/Services	0	0	0
764 Value Added	**0**	**0**	**0**
765 Salaries & Wages	0	0	0
766 Interest (Net)	0	0	0
767 Dividends : Ordinary	0	0	0
768 Dividends: Preference	0	0	0
769 Dividends: Minority	0	0	0
770 Taxation	0	0	0
771 Depreciation	0	0	0
772 Retention	0	0	0
773 Minority Interest	0	0	0
774 Other Expenses/Distrib of Value Added - Gld	0	0	0
775 Disburse of Value Added	**0**	**0**	**0**
776 Leasing : Property	170,000	280,000	243,000
777 Leasing : Other	0	0	0
778 Dividends Received	0	0	0
779 Interest Received	311,000	444,000	536,000
780 Deferred Taxation	923,000	-166,000	-2,821,000
781 Number of Employees	62,046	63,364	62,895

Sundry Items

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Dec**	**Dec**	**Dec**
Sundry Items Standardised (000)	**ZAR**	**ZAR**	**ZAR**
100 Ordinary Shares in Issue @ Year End	381,889	366,036	357,450
101 Ordinary Shares in Issue @Year End after Split Adjustment	381,889	366,036	357,450
102 Ordinary Shares Par Or No Par Val	1	1	1

103 Preference Shares Par Or No Par Val	1	1	1
104 Preference Dividends In Arrears	0	0	0
105 Inflation Adjusted Bookvalue	0	0	0
106 Inflation Adjusted Depreciation	0	0	0
107 Provision For Increase in Replacement Value	0	0	0
108 Listed Share Market Value	907,000	906,000	430,000
109 Unlisted Share Valuation	4,794,000	5,214,000	10,480,000
110 Share In Subsidiary Valuation	0	0	0
111 Total Share @ Valuation	5,701,000	6,120,000	10,910,000
112 Total Share @ Bookvalue	5,690,000	6,117,000	10,897,000
113 Difference between Share Market & Book Value	11,000	3,000	13,000
114 Cost Of Sales	25,833,000	23,220,000	22,558,000
115 Capital Commitments	11,186,000	16,777,000	12,866,000
116 Inventory: Raw Materials	5,039,000	4,367,000	4,862,000
117 Inventory: Finished Goods	787,000	811,000	574,000
118 Inventory: Merchandise	0	0	0
119 Inventory: Work In Progress	612,000	552,000	656,000
120 Inventory: Uncompleted Contracts	0	0	0
121 Inventory: Consumable Stores	1,678,000	1,880,000	2,281,000
122 Months Covered By Report	12	12	12
123 Month of Financial Year End	12	12	12
124 Audit Report Qualified	2	2	2
125 No Of Subsidiaries	16	16	30
126 No Of Foreign Subsidiaries	16	16	18
127 Controlled By Another Company	2	2	2
128 Directors Shareholding %	0	0	0
129 No Skilled Employees	0	0	0
130 No Unskilled Employees	62,046	63,364	62,895
131 Headline Earnings per Share	259	-1,880	-1,379
132 Stock Price:	0	0	0
133 Stock Price: Year End	33,530	31,840	24,642
134 Stock Price: Year Average	31,716	30,715	24,237
135 Number Of Analysts	9	9	2
136 Accumulated Tax Loss	1,548,000	2,964,000	4,945,000
142 Items Not Representing Cashflow	6,746,000	17,340,000	19,783,000
137 Nr Of Shares Traded	271,042	392,823	334,297
138 Nr Of Transactions	599,216	642,819	408,494
139 Value Of Transactions	85,963,486	120,657,087	81,024,434
140 Split Factor (3 Decimals)	1	1	1
141 Month Of Stock Split	0	0	0

Technical (Gold) Statement

Year	**2010**	**2009**	**2008**
Months Covered	**12**	**12**	**12**
Year End Month	**Dec**	**Dec**	**Dec**
Technical (Gold) Standardised (000)	**ZAR**	**ZAR**	**ZAR**
150 Development Costs	0	0	0
151 Mining Stoping	0	0	0
152 Reduction	0	0	0
153 Pumping	0	0	0
154 Ventilation	0	0	0
155 Hoisting	0	0	0
156 Management	0	0	0
157 Sundry Mining Charges	25,833,000	23,220,000	22,558,000
158 Realisation Charges	0	0	0
159 Total Working Costs	**25,833,000**	**23,220,000**	**22,558,000**
160 Working Profit	13,935,000	8,297,000	7,696,000
161 Revenue Main Minerals	38,833,000	30,745,000	29,774,000
162 Work Profit Other Minerals	935,000	772,000	480,000
163 Main Minerals	-2,670,000	2,208,000	-4,721,000
164 Other Minerals	0	0	0
165 Change In Consumable Stores	-202,000	-401,000	621,000
166 Change In Investments	-147,000	-4,491,000	9,564,000
167 Total Capital Expend	**-3,019,000**	**-2,684,000**	**5,464,000**
168 Gold Produced Kg	14,042	147,861	154,958
169 Tonnage Hoisted Tons 000	11,092	0	0
170 Tonnage Milled Tons 000	22,173	11,944	12,335
171 Ore Reserves Tons 000	2,035,720	1,561,310	2,365,700

172 Stoping Width - Ore Reserves Cm	0	0	0
173 Gold Value gr/ton - Ore Reserves	2	3	2
174 Ore Reserves Not Available Tons 000	874,070	830,810	1,010,000
175 Stoping Width - Ore Reserves Not Available Cm	0	0	0
176 Gold Value gr/ton - Ore Reserves Not Available	2	2	2
177 Basic Price P/kg Use For Ore Reserves	0	0	0
178 Uranium Reserves Tons 000	0	0	0
179 Development During Year/Month	0	0	0
180 Development During Year On Reef Meters	0	0	0
181 Waste Hoisted To '000	0	0	0
182 Water Pumped Megalitres	0	0	0
183 Exchange Rate Rand To Foreign Currency	0	0	0
184 Depth Of Mine	0	0	0
185 Ore Sorted Surface Tons 000	0	0	0
186 Area Of Mining Lease Hectares	0	0	0
187 Uranium Ore Value Kg/ton	0	0	0
188 Uranium Ore Slime Treatment Tons '000	0	0	0

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Appendix 15: Variation in Mean Debt Ratios

BDR Variation

	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Prime Rate	0.10	0.12	0.15	0.13	0.11	0.11	0.11	0.15	0.16	-	-
Full sample											
Manufacturing	0.19	0.22	0.19	0.15	0.15	0.15	0.16	0.14	0.10	0.11	0.13
Mining	0.28	0.40	0.31	0.36	0.26	0.32	0.27	0.36	0.20	0.19	0.13
Retail	0.12	0.12	0.13	0.10	0.12	0.13	0.16	0.13	0.11	0.09	0.07
Mean-Sample	0.20	0.25	0.21	0.20	0.18	0.20	0.19	0.21	0.14	0.13	0.12
Large firms											
Manufacturing	0.21	0.28	0.25	0.22	0.15	0.23	0.25	0.30	0.12	0.18	0.21
Mining	0.19	0.32	0.33	0.25	0.22	0.25	0.20	0.17	0.21	0.12	0.08
Retail	0.17	0.16	0.22	0.18	0.23	0.17	0.12	0.14	0.09	0.06	0.03
Mean-Sample	0.19	0.26	0.28	0.22	0.20	0.22	0.19	0.19	0.16	0.12	0.10
Medium firms											
Manufacturing	0.22	0.25	0.23	0.17	0.16	0.15	0.13	0.15	0.12	0.12	0.12
Mining	0.32	0.57	0.38	0.51	0.42	0.37	0.46	0.74	0.29	0.29	0.13
Retail	0.13	0.14	0.12	0.06	0.08	0.10	0.16	0.09	0.08	0.10	0.08
Mean-Sample	0.22	0.30	0.24	0.22	0.20	0.19	0.22	0.28	0.16	0.16	0.12
Small firms											
Manufacturing	0.16	0.15	0.12	0.10	0.14	0.13	0.17	0.08	0.08	0.08	0.12
Mining	0.42	0.37	0.24	0.39	0.17	0.42	0.15	0.20	0.10	0.13	0.18
Retail	0.032	0.046	0.058	0.0375	0.0275	0.11	0.22	0.1825	0.17	0.0975	0.088
Mean-Sample	0.21	0.19	0.14	0.16	0.13	0.20	0.18	0.13	0.11	0.10	0.14

MDR Variation

	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Prime Rate	0.10	0.12	0.15	0.13	0.11	0.11	0.11	0.15	0.16		
Full Sample											
Manufacturing	0.19	0.23	0.21	0.11	0.14	0.12	0.16	0.17	0.16	0.16	0.19
Mining	0.16	0.20	0.12	0.12	0.11	0.12	0.19	0.15	0.11	0.11	0.11
Retail	0.14	0.13	0.14	0.08	0.08	0.14	0.16	0.22	0.16	0.19	0.31
Average	0.17	0.20	0.17	0.11	0.12	0.12	0.16	0.17	0.15	0.15	0.19
Large firms											
Manufacturing	0.08	0.13	0.10	0.08	0.09	0.08	0.12	0.18	0.06	0.09	0.10
Mining	0.09	0.11	0.13	0.09	0.07	0.07	0.09	0.10	0.12	0.13	0.09
Retail	0.11	0.13	0.17	0.10	0.13	0.12	0.11	0.14	0.12	0.09	0.44
Average	0.09	0.12	0.13	0.09	0.09	0.09	0.10	0.13	0.11	0.11	0.17
Medium firms											
Manufacturing	0.20	0.26	0.23	0.13	0.12	0.13	0.15	0.19	0.16	0.18	0.18
Mining	0.22	0.26	0.14	0.17	0.14	0.16	0.23	0.23	0.14	0.13	0.14
Retail	0.05	0.08	0.06	0.03	0.04	0.05	0.09	0.11	0.09	0.08	0.04
Average	0.17	0.22	0.18	0.12	0.11	0.12	0.15	0.18	0.14	0.15	0.15
Small firms											
Manufacturing	0.23	0.22	0.20	0.09	0.20	0.11	0.18	0.13	0.20	0.17	0.24
Mining	0.23	0.29	0.09	0.10	0.14	0.15	0.28	0.14	0.06	0.06	0.10
Retail	0.33	0.22	0.22	0.18	0.11	0.34	0.35	0.51	0.29	0.42	0.42
Average	0.25	0.23	0.19	0.10	0.17	0.16	0.23	0.20	0.18	0.18	0.24

Appendix 16: Leverage Variation According to Sector and Firm Sizes

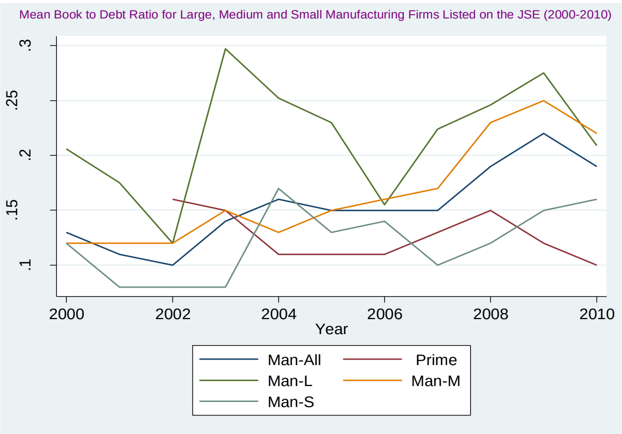


Figure A16.1: L, M and S Manufacturing BDR ratios: 2000-2010

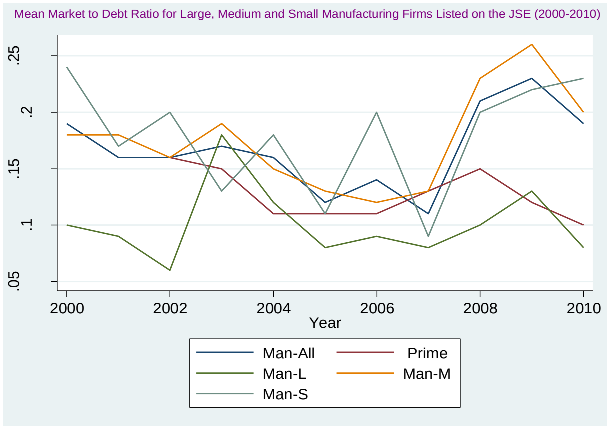


Figure A16.2: L, M and S Manufacturing MDR ratios: 2000-2010

Man-All = all manufacturing firms; Man-L = large manufacturing firms; Man-M = medium manufacturing firms; Man-S = small manufacturing firms.

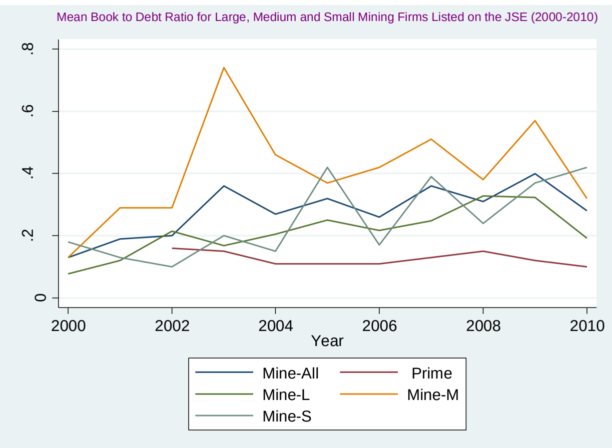


Figure A16.3: L, M and S Mining firms BDR ratios: 2000-2010

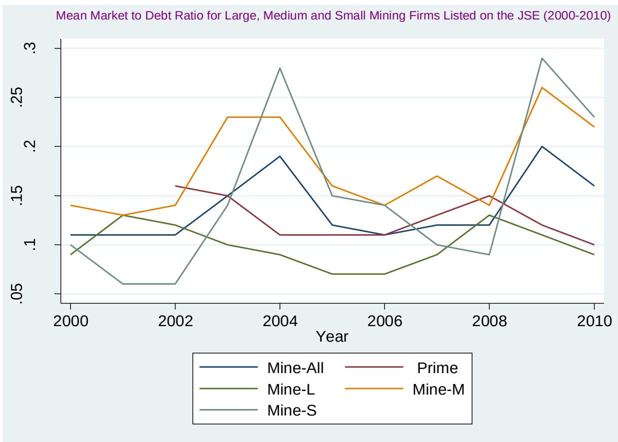


Figure A16.4: L, M and S Mining firms MDR ratios: 2000-2010

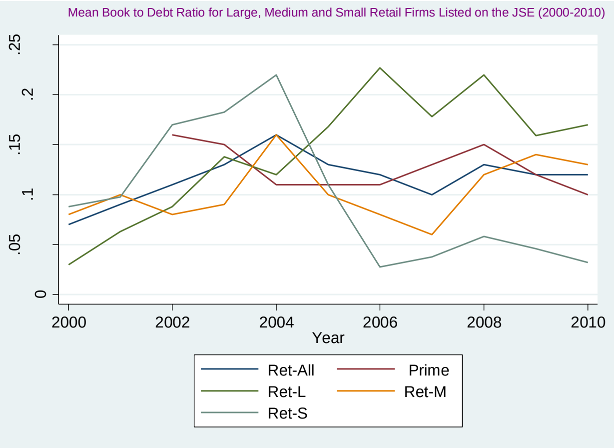


Figure A16.5: L, M and S Retail firms BDR ratios: 2000-2010

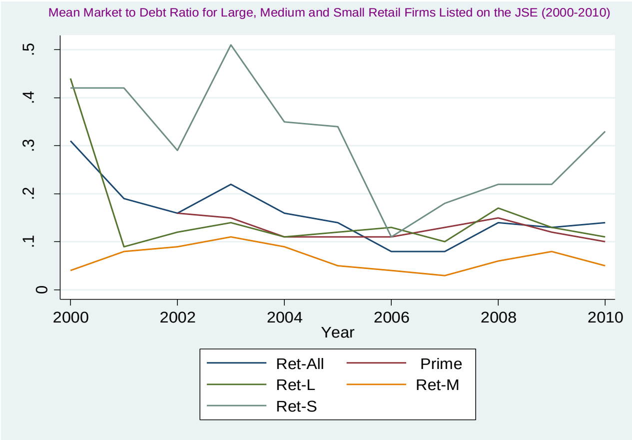


Figure A16.6: L, M and S Retail firms MDR ratios: 2000-2010

Appendix 17: Summary Financing Information

All Sectors

	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Man-Debt	118,217	621,315	700,771	196,543	1,068,598	286,831	208,136	116,499	236,955	540,926	282,394
Mine-Debt	1,600,669	7,038,126	5,496,050	2,086,673	727,936	1,888,275	763,952	1,780,818	2,546,738	545,703	246,792
Retail-Debt	161,668	376,959	344,211	93,443	301,993	396,591	153,524	106,351	14,627	173,208	39,522
Mean-Debt	577,074	2,168,792	1,585,145	867,732	736,864	756,017	353,077	609,663	1,122,755	455,469	210,808
Man-Equity	277,580	213,624	16,546	10,831	37,239	153,378	14,527	19,786	257,944	3,061	25,744
Mine-Equity	1,188,659	533,136	801,689	1,144,741	215,155	169,168	381,920	152,028	211,887	446,914	79,010
Retail-Equity	167,447	11,615	379	13,391	13,448	29,699	96,360	38,573	40,110	37,088	16,090
Mean-Equity	559,320	279,082	328,663	456,662	87,006	140,132	169,150	68,706	197,864	155,883	39,022

Large firms

	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Man-Debt	-	2,906,753	4,172,986	132,284	4,906,700	2,322,317	1,138,666	117,223	2,774,000	3,681,585	1,742,650
Mine-Debt	2,737,031	16,228,972	9,570,433	3,520,169	1,331,264	5,448,270	1,550,105	4,738,312	5,828,320	1,094,845	445,941
Retail-Debt	376,662	913,747	884,510	345,510	563,513	1,026,216	891,522	226,469	41,359	186,970	35,375
Mean-Debt	1,753,544	7,571,305	5,311,722	2,771,153	1,768,393	2,869,890	1,322,188	1,936,583	4,202,960	1,223,343	623,169
Man-Equity	1,870,087	41,467	42,720	56,400	159,855	1,378,620	66,165	30,460	1,444,091	14,773	10,775
Mine-Equity	2,470,414	1,681,928	2,451,410	2,971,635	492,632	287,329	782,042	287,976	417,113	1,097,364	61,942
Retail-Equity	629,600	49,000	-	85,500	32,100	39,834	513,092	31,445	239,655	86,769	24,117
Mean-Equity	2,048,675	863,204	1,843,898	2,391,498	331,763	501,089	569,454	173,743	667,313	523,923	38,470

Medium Firms

Year	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Man-Debt	214,386	418,331	446,450	367,514	442,149	105,850	72,349	228,291	106,618	128,143	104,971
Mine-Debt	188	176,211	889,244	280,026	181,655	191,345	114,601	176,555	103,726	129,270	52,013
Retail-Debt	39,785	66,213	89,783	64,298	59,891	3,586	12,922	32,339	1,733	202,512	69,272
Mean-Debt	127,626	305,288	422,925	269,302	266,853	101,378	71,026	133,584	90,602	144,920	83,423
Man-Equity	201,750	311,783	8,835	9,756	26,521	11,972	5,630	27,094	141,526	1,101	51,604
Mine-Equity	613,993	154,343	107,298	127,632	70,411	178,273	128,265	32,171	125,149	34,391	128,055
Retail-Equity	83,028	4,362	435	5,219	17,213	46,609	21,382	46,598	3,187	8,256	9,509
Mean-Equity	291,894	218,513	40,606	46,750	34,658	64,078	43,748	33,279	99,872	12,898	60,470

Small Firms

	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Man-Debt	8,309	48,590	23,748	13,715	20,840	6,420	5,548	4,466	4,858	2,556	2,636
Mine-Debt	16,144	126,259	418,486	309,583	39,039	25,212	11,849	2,006	55,262	2,665	94,154
Retail-Debt	6,482	221	7,454	3,841	21,055	2,565	1,260	4,835	788	944	2,620
Mean-Debt	9,696	61,392	88,616	81,008	23,690	9,739	5,207	4,193	16,780	2,395	30,792
Man-Equity	9,242	142,145	23,951	8,199	10,189	12,042	4,548	3,674	439	1,867	2,314
Mine-Equity	57,319	17,733	77,822	65,028	38,176	999	10,980	45,303	5,242	60,925	39,220
Retail-Equity	44	175	484	252	2,212	398	461	33,964	4,951	600	15,500
Mean-Equity	19,375	82,401	39,301	23,301	15,409	7,223	5,660	24,222	2,476	17,053	13,873

Appendix 18: Debt and Equity Raised (2000-2010)

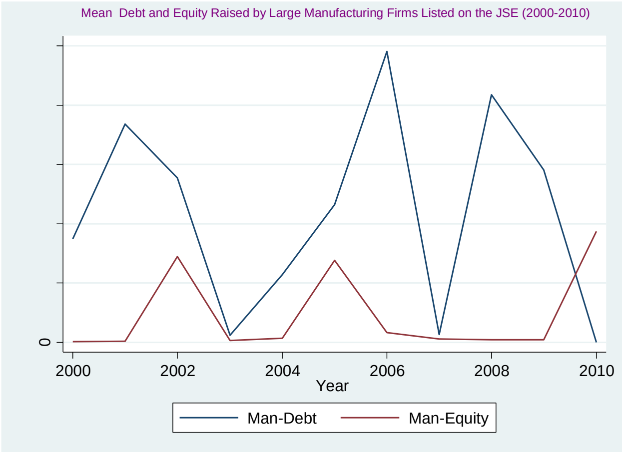


Figure A18.1: Debt & Equity raised by Large Manufacturing: 2000-2010

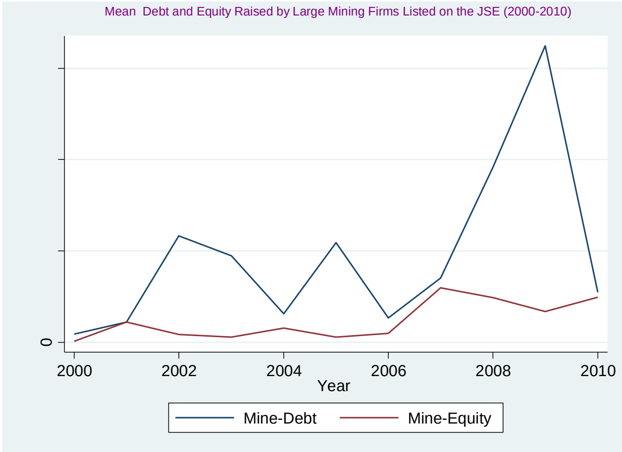


Figure A18.2: Debt & Equity raised by Large Mining: 2000-2010

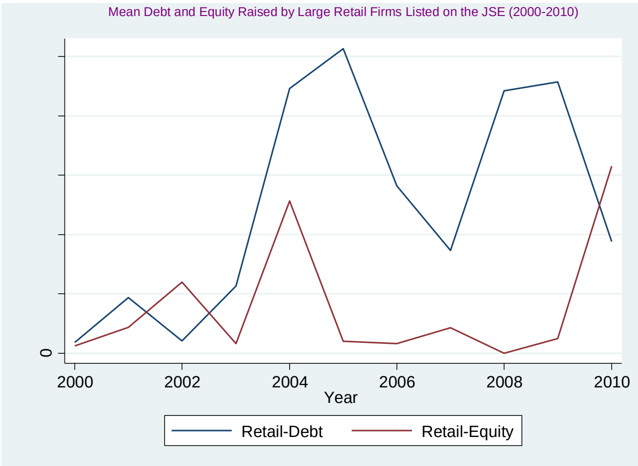
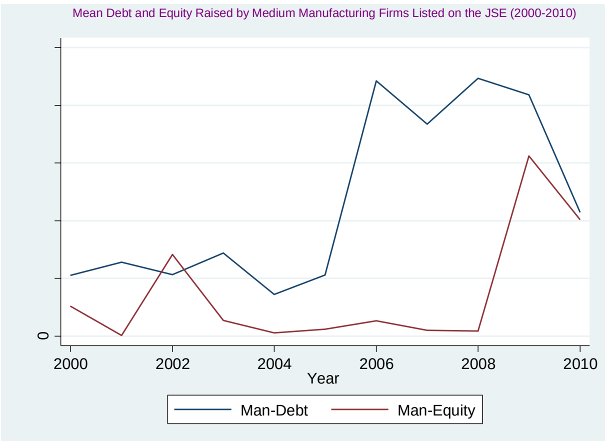


Figure A18.3: Debt & Equity raised by Large Retail: 2000-2010



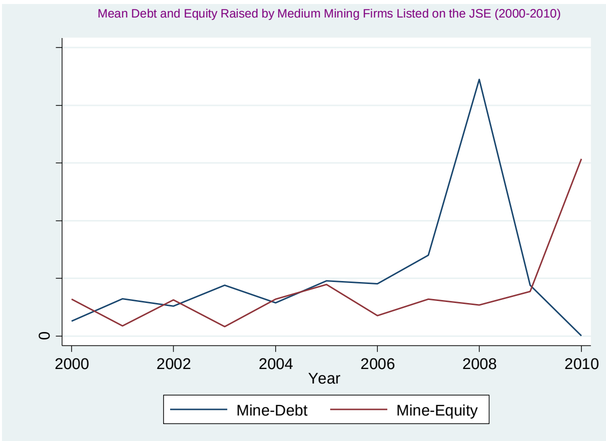


Figure A18.4: Debt & Equity raised by Med. Manufacturing: 2000-2010

Figure A18.5: Debt & Equity raised by Med. Mining: 2000-2010

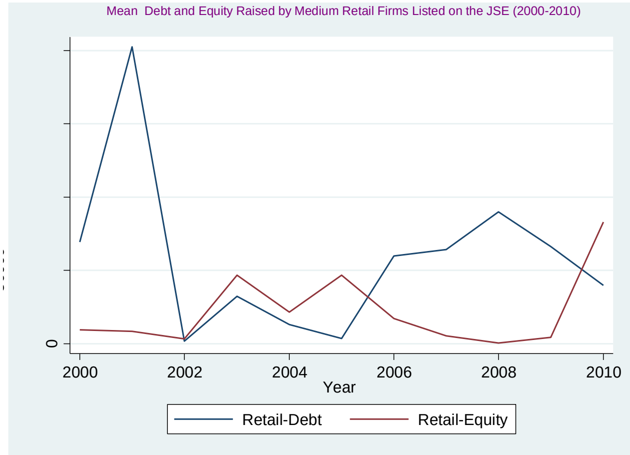


Figure A18.6: Debt & Equity raised by Med. Retail: 2000-2010

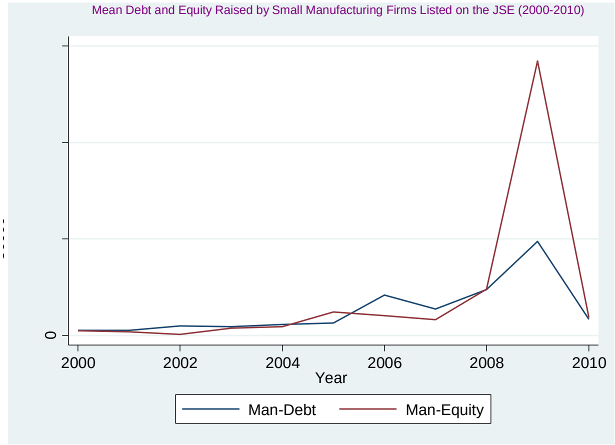


Figure A18.7: Debt & Equity raised by small manufacturing: 2000-2010

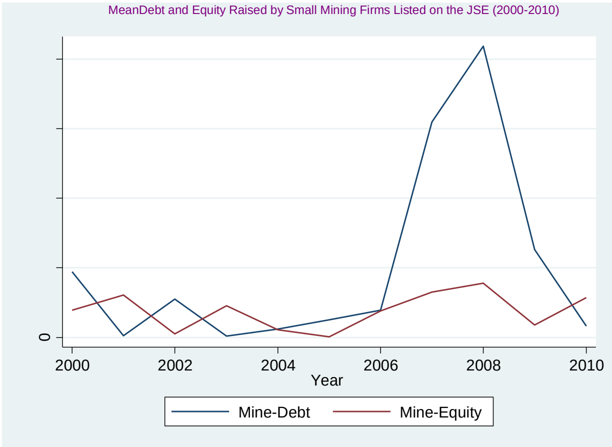


Figure A18.8: Debt & Equity raised by small mining: 2000-2010

Figure A18.9: Debt & Equity raised by small retail: 2000-2010

Appendix 19: Panel 1 Further Descriptive Statistics (mdr)

Firm Sizes or Caps

Table B1.0: Descriptive statistics for large firms

```
. summarize wc_t c_t div_t capex r_t asset size ndts mtb fdist roe vol bdr mdr d_change_t if cap=="Large"
```

Variable	Obs	Mean	Std. Dev.	Min	Max
wc_t	242	-502034.2	3075875	-2.37e+07	3.10e+07
c_t	242	9114223	2.12e+07	-4782000	1.52e+08
div_t	242	2367274	5160278	0	4.49e+07
capex	242	6982827	1.49e+07	-807000	1.06e+08
r_t	242	2998735	8169022	0	7.64e+07
asset	242	.3303269	.2479401	0	.8989
size	242	16.4906	1.413664	13.4983	20.117
ndts	242	.0475793	.038306	0	.2075
mtb	242	2.26791	2.00722	-.0588	13.1388
fdist	242	1.751186	2.364423	-2.1702	11.1724
roe	242	87.26211	833.8041	-1494.58	12555.81
vol	242	6596532	1.36e+07	468492.5	6.52e+07
bdr	242	.1761483	.1966842	0	1
mdr	242	.1032992	.1275894	0	1
d_change_t	242	1655563	5673061	-1783600	5.25e+07

Table B1.1: Descriptive statistics for medium firms

```
. summarize wc_t c_t div_t capex r_t asset size ndts mtb fdist roe vol bdr mdr d_change_t if cap=="Medium"
```

Variable	Obs	Mean	Std. Dev.	Min	Max
wc_t	406	-49825.98	257484.7	-2541182	1224000
c_t	406	540592.9	808113	-530576	6346128
div_t	406	163421.8	306661.4	-118	3173000
capex	406	353870	687041.4	-1314627	7476480
r_t	406	323126.8	824809.5	0	7021950
asset	406	.2974424	.2377281	0	.9837
size	406	14.34366	1.423129	9.0893	17.7937
ndts	406	.0923052	.0770243	0	.4287
mtb	406	1.707603	1.99678	-.0739	28.9155
fdist	406	.9944598	2.985582	-31.3067	11.7928
roe	406	30.85638	259.5948	-748.14	4910.59
vol	406	414529.2	530271.8	30283.98	2555657
bdr	406	.1813638	.2547082	0	2.7408
mdr	406	.1441889	.1728446	0	.7689
d_change_t	406	93971.73	279117.9	-174200	2172973

Table B1.2: Descriptive statistics for small firms

```
. summarize wc_t c_t div_t capex r_t asset size ndts mtb fdist roe vol bdr mdr d_change_t if cap=="Small"
```

Variable	Obs	Mean	Std. Dev.	Min	Max
wc_t	306	-744.5291	37650.72	-165417	230699
c_t	306	35153.45	88237.61	-724185	422587
div_t	306	19657.51	81171.97	0	906905
capex	306	37986.19	195848.8	-1266977	2087351
r_t	305	12804.26	39323.16	0	416310
asset	306	.2868686	.2530429	0	.9963
size	306	12.24166	1.393794	8.1312	15.2237
ndts	306	.091519	.101602	0	.4752
mtb	306	.9910765	1.263322	-.1087	12.5975
fdist	306	.1129507	4.346729	-26.7557	44.7617
roe	306	-115.5612	2736.6	-47548.1	4187.05
vol	306	120748.1	177799.7	2629.656	856774.3
bdr	306	.1318905	.2117232	0	1.0558
mdr	299	.1770562	.259934	0	1
d_change_t	306	17955.55	103350.3	0	1191968

Appendix 20: Panel 2 Further Descriptive Statistics (mdr)

Caps

Table B2.0: Descriptive statistics for large firms

```
. by cap, sort : summarize c_t capex asset size mtb fdist liq p_e p rr roe eva bdr mdr
```

-> cap = Large

Variable	Obs	Mean	Std. Dev.	Min	Max
c_t	143	1.18e+07	2.62e+07	-4782000	1.52e+08
capex	143	8363528	1.73e+07	-468120	1.06e+08
asset	143	.3485387	.2402643	0	.871777
size	143	16.78472	1.315747	13.67357	20.11696
mtb	143	2.610227	2.007181	.588457	13.13878
fdist	124	2.184012	2.832292	-2.1702	19.5247
liq	143	1.547552	.8330795	.39	5.04
p_e	143	5.897552	102.0095	-1103.43	262.45
p	143	17109.22	19726.82	1029	110551
rr	143	76.85559	114.1675	-271.43	1244.81
roe	143	30.0021	209.9292	-1391.71	959.46
eva	125	937401.6	1.07e+07	-5.00e+07	6.47e+07
bdr	143	.2157476	.2252462	0	1.4442
mdr	143	.1003266	.1015356	0	.4963

Table B2.1: Descriptive statistics for medium firms

-> cap = Medium

Variable	Obs	Mean	Std. Dev.	Min	Max
c_t	276	608737.6	733577.2	-427723	6346128
capex	276	397854.2	651744.2	-1314627	5722020
asset	276	.2907642	.2195893	0	.8984401
size	276	14.69548	1.178462	9.089302	17.79367
mtb	276	2.311331	4.205203	.3273563	55.97536
fdist	259	1.297132	2.471038	-19.9726	11.3661
liq	276	1.664855	1.431108	0	17.56
p_e	276	10.47112	43.8632	-342.77	468.33
p	276	3958.406	4956.55	62	37628
rr	276	163.9641	1122.383	-461.03	13459.15
roe	276	39.08127	315.023	-748.14	4910.59
eva	264	-45208.25	1338590	-1.13e+07	2534110
bdr	276	.2136	.3091468	0	2.2786
mdr	276	.1382471	.1792956	0	.7689

Table B2.2: Descriptive statistics for small firms

-> cap = Small

Variable	Obs	Mean	Std. Dev.	Min	Max
c_t	189	28656.9	91018.76	-724185	315835
capex	189	44369.13	241457.6	-1266977	2087351
asset	189	.3231677	.2558193	.0000343	.9836946
size	189	12.16354	1.605189	5.953243	15.22369
mtb	189	1.613535	2.048766	-.1087262	12.59746
fdist	180	-.8750256	7.061576	-49.157	44.7617
liq	189	2.457196	2.709767	.03	25.13
p_e	168	-7.873929	106.2403	-935	199.18
p	170	691.8765	977.4121	2	4877
rr	189	79.63825	59.17644	-386.76	554.63
roe	189	17.58672	264.8735	-2550.67	1546.88
eva	181	-16953.19	72367.83	-606155.7	149931.8
bdr	189	.183255	.2857281	0	1.6416
mdr	186	.1813016	.2579746	0	1

Appendix 21: Discounted Value Premium Further Descriptive Statistics

SECTOR & FIRM SIZES OR CAPS

Large manufacturing firms

```
. by sector cap, sort : summarize dr wacc fv_ng fv_pg change_dr change_wacc change_fv_ng change_fv_pg
-> sector = Manufacturing, cap = Large
```

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	25	.234312	.2048018	-.028	.8844
wacc	25	-.004108	.0048329	-.0214	.0008
fv_ng	25	2726965	4167015	-2481087	1.27e+07
fv_pg	25	5963717	1.10e+07	-1.40e+07	3.64e+07
change_dr	25	9.502412	14.97276	-1	56.6835
change_wacc	25	-.029112	.0320729	-.1431	.0072
change_fv_ng	25	.03116	.036367	-.0072	.1671
change_fv_pg	25	.064836	.0572687	-.0404	.2

Medium manufacturing firms

```
-> sector = Manufacturing, cap = Medium
```

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	129	.0424457	.2636631	-.6373	.9
wacc	129	-.0050147	.0081653	-.0553	.0027
fv_ng	129	621794.5	2315690	-125958.2	1.85e+07
fv_pg	129	1630887	9983250	-4.70e+07	7.02e+07
change_dr	116	33.89626	144.9474	-1	932.8373
change_wacc	129	-.0424372	.0594881	-.3213	.0257
change_fv_ng	129	.0490891	.0779036	-.0251	.4734
change_fv_pg	129	.1249636	.4652131	-2.7256	2.9168

Small manufacturing firms

```
-> sector = Manufacturing, cap = Small
```

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	80	.0807087	.3229337	-.7864	.9
wacc	80	-.0082925	.0150795	-.076	.0019
fv_ng	80	26529.93	58025.75	-7810.746	368119.7
fv_pg	80	-2647591	2.41e+07	-2.15e+08	4500436
change_dr	66	29.27328	123.9816	-1	877.226
change_wacc	80	-.0631537	.1040508	-.4821	.0117
change_fv_ng	80	.0858787	.1705417	-.0116	.9307
change_fv_pg	78	.0265859	1.574816	-9.7259	6.3621

Large mining firms

-> sector = Mining, cap = Large

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	65	.1847	.2628005	-.339	.8988
wacc	65	-.0061969	.0069464	-.0256	.0025
fv_ng	65	7514980	1.43e+07	-2143069	6.94e+07
fv_pg	65	1.50e+07	2.78e+07	-1.55e+07	1.01e+08
change_dr	63	59.18951	205.5905	-1	1288.738
change_wacc	65	-.0420538	.0465115	-.1923	.0148
change_fv_ng	65	.0464985	.054547	-.0146	.2381
change_fv_pg	65	.0227354	.6157696	-4.7294	.8243

Medium mining firms

-> sector = Mining, cap = Medium

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	50	.041404	.23245	-.4984	.8261
wacc	50	-.005308	.0093967	-.041	.0054
fv_ng	50	183069.8	327870.1	-336810.5	1466402
fv_pg	50	322744	898580.1	-2436025	4383890
change_dr	39	1.292385	3.281723	-1	13.7147
change_wacc	50	-.036916	.0699572	-.3593	.043
change_fv_ng	50	.046268	.0971125	-.0413	.5608
change_fv_pg	50	.036294	.3086619	-1.2306	.9225

Small mining firms

-> sector = Mining, cap = Small

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	40	.0029175	.2936931	-.6782	.8693
wacc	40	-.00776	.0135915	-.0632	.0105
fv_ng	40	51339.62	122444.5	-1382.248	552153.1
fv_pg	40	162342.2	465909.5	-48461.61	2563830
change_dr	32	1.059253	5.5041	-1	28.2981
change_wacc	40	-.05394	.0881815	-.4023	.019
change_fv_ng	40	.06907	.1343258	-.0187	.6732
change_fv_pg	40	.2851525	1.00027	-.8515	5.5963

Large retail firms

-> sector = Retail, cap = Large

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	35	.1973829	.1406549	-.1114	.5
wacc	35	-.0025114	.0027889	-.012	.0025
fv_ng	35	345454.3	389389.6	-737729.3	1012138
fv_pg	35	790659.7	1409964	-3668526	4358189
change_dr	31	110.4027	309.509	-.3538	1492.291
change_wacc	35	-.0205	.01972	-.0745	.0188
change_fv_ng	35	.0213257	.0207057	-.0184	.0805
change_fv_pg	35	.0419743	.0465702	-.0916	.1431

Medium retail firms

-> sector = Retail, cap = Medium

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	50	.175682	.1021773	.0331	.5
wacc	50	-.002406	.0020439	-.0104	-.0004
fv_ng	50	85517.23	77836.91	10929.04	290791.1
fv_pg	50	155237.1	182313.1	-133135.5	899736.9
change_dr	46	80.90639	326.1012	.1984	2207.861
change_wacc	50	-.020404	.014367	-.0755	-.0033
change_fv_ng	50	.021056	.0154212	.0033	.0817
change_fv_pg	50	.036284	.0321609	-.0612	.1307

Small retail firms

-> sector = Retail, cap = Small

Variable	Obs	Mean	Std. Dev.	Min	Max
dr	15	.1871267	.249567	-.1932	.8856
wacc	15	-.0047067	.0043604	-.0147	-.0005
fv_ng	15	26733.82	28723.25	1798.638	108363
fv_pg	15	65568.58	84623.36	2379.477	311425.1
change_dr	15	33.28449	40.00217	-1	132.5861
change_wacc	15	-.03906	.0338194	-.1077	-.0069
change_fv_ng	15	.0419	.0384128	.0069	.1206
change_fv_pg	15	.12536	.207749	.0082	.7753

.