THE MODERATING EFFECT OF COST OF CAPITAL ON THE RELATIONSHIP BETWEEN WORKING CAPITAL MANAGEMENT AND FINANCIAL HEALTH IN SELECTED MALAYSIAN PUBLIC LISTED FIRMS

By

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TABLE OF CONTENTS

CHAPTER FOUR: RESULTS AND DISCUSSION

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

Table **LIST OF TABLES** **Page**

LIST OF FIGURES

LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
BLUE	Best Linear Unbiased Estimator
CATA	Ratio of Currents Assets to Total Assets
CLTL	Ratio of Current Liabilities to Total Liabilities
CCC	Cash Conversion Cycle
CAPM	Capital Asset Pricing Model
DIO	Days Inventory Outstanding
DPO	Days Payables Outstanding
DRO	Days Receivables Outstanding
FE	Fixed Effects Model
GLS	Generalized Least Squares Estimation
HMR	Hierarchical Multiple Regression
LSDV	Least Squares Dummy Variable Estimation
MDA	Multivariate Discriminant Analysis
MMR	Moderated Multiple Regression
OLS	Ordinary Least Squares Estimation
RE	Random Effects Model
ROIC	Return on Invested Capital
ROE	Return on Equity
ROA	Return on Assets
SME	Small and Medium Sized Enterprises
WCM	Working Capital Management
VIF	Variance Inflation Factor

ABSTRAK

Polisi pengurusan modal kerja sering dianggap sebagai faktor utama yang mempengaruhi operasi dan kesejahteraan kedudukan kewangan sesebuah firma secara keseluruhannya. Dalam kajian yang melibatkan syarikat-syarikat yang disenaraikan di Bursa Malaysia dalam sektor perdagangan, perkhidmatan dan pengguna ini, polisi pengurusan modal kerja telah dikategorikan mengikut dasar pelaburan aset jangka pendek, dasar pembiayaan aset jangka pendek dan kecekapan dalam menguruskan modal kerja. Dengan menggunakan analisis data panel, model kesan tetap (*fixed effects)* mendedahkan bahawa di antara ketiga-tiga metrik pengurusan modal kerja, kos modal memberi kesan moderator hanya ke atas hubungan antara dasar pembiayaan aset jangka pendek firma dengan keteguhan kewangan. Kajian ini menunjukkan bukti empirikal bahawa apabila kos modal firma meningkat, hubungan negatif di antara polisi pembiayaan aset jangka pendek firma dan keteguhan kewangan akan berkurangan. Walau bagaimanapun, kos modal tidak memainkan peranan sebagai moderator terhadap kesan dasar pengurusan modal kerja yang lain (iaitu polisi jangka pendek pelaburan aset dan kecekapan pengurusan modal) ke atas keteguhan kewangan. Kajian ini juga menunjukkan bukti empirikal bahawa kos modal tidak mempunyai banyak kaitan dengan keteguhan kewangan firma. Kajian ini mempunyai implikasi ke atas perspektif teori dan pengurusan. Dari perspektif teori, oleh kerana komponen modal kerja firma dianggap sebagai sumber penting, terdapat bukti empirikal bahawa polisi pengurusan modal kerja memberi kesan yang signifikan terhadap keteguhan kewangan firma. Dari perspektif pengurusan, analisis moderator membantu pengurus kewangan membuat keputusan mengenai polisi pengurusan modal kerja. Secara lebih khusus lagi, apabila kos modal firma menjadi lebih tinggi, kesan negatif polisi pembiayaan aset jangka pendek yang agresif terhadap keteguhan kewangan akan berkurangan. Dalam keadaan ini, pihak pengurusan firma boleh menyokong satu dasar pembiayaan aset jangka pendek yang agresif kerana kesan negatifnya kini berkurangan.

Kata kunci: kos modal, kesan tetap (*fixed effects)*, pengurusan modal kerja, keteguhan kewangan, analisis data panel.

ABSTRACT

Working capital management policies have been touted as key to influencing a firm's operational and overall financial well-being. In this study involving Malaysian firms in the trading, services and consumer sectors, working capital management policies were categorized by its short-term asset investment policy, its short-term asset financing policy and its efficiency in managing its working capital. Using panel data analysis, the fixed effects model reveals that among the three working capital metrics, only a firm's short-term asset financing policy's relationship with financial health was moderated by its cost of capital. The study provides empirical evidence that when a firm's cost of capital increases, the negative relationship between its short-term asset financing policy and its financial health seems to weaken. However, cost of capital does not play a moderating role on the effects of a firm's other working capital policies (short-term asset investment policy and working capital management efficiency) on financial health. The study also provides empirical evidence that cost of capital has little to do with a firm's financial health. This study has implications on both theoretical and managerial perspectives. From a theoretical perspective, since a firm's working capital components are considered important resources, the findings imply that working capital policies seem to significantly affect financial health. From a managerial perspective, moderator analysis helps finance managers make decisions on working capital policy matters. More specifically, when a firm's cost of capital becomes higher, the negative impact of its aggressive short-term asset financing policy on financial health is now reduced. In other words, its management can advocate an aggressive short-term asset financing policy since its negative impact is now lessened.

Keywords: cost of capital; moderating effects; working capital management; financial health; panel data analysis.

CHAPTER ONE
INTRODUCTION

1.0 Introduction

Major theories in the study of corporate finance over the years have concentrated on long-range financial decisions such as investment appraisal, capital structure, payout decisions and other financial strategy formulations. These areas of finance were deemed to be relatively more productive in terms of time, resources and energy spent. Perhaps, this is because long-term investment and financing decisions provide future cash flows which when discounted determine the market value of the firm. Although these areas of finance are still taking precedence and stealing the limelight, short-term decision studies regarding current assets and liabilities have increasingly begun to get noticed. Fears that a firm's liquidity position is at stake have become common and steps need to be taken so that liquidity and eventual bankruptcy is unthreatened. Over the years, researchers have realized that the 'oil' of working capital is needed for the 'engine' of non-current assets to function. For instance, Fazzari and Petersen[1] (1993) emphasized the advantage of a good working capital management plan to ensure firms smooth fixed capital investment in the face of cash-flow shocks.

In the late 1970's and early 1980's, Pass and Pike[2] (1984) pointed out that liquidity concerns had been increasingly discussed amongst finance practitioners and researchers. Following these concerns, firms were beginning to adopt and adapt strategies within the firm to manage and improve cash flows even during favorable

[1] Fazzari and Petersen (1993) in their paper on the role of working capital on investment smoothing among US firms suggest that finance constraints link inventory movement and cash flow.

[2] Pass and Pike (1984) explained that working capital management involves ensuring firm profitability and maintaining sufficient liquidity levels to meet short-term obligations.

economic periods. In cases where working capital levels are high, it produces low marginal value but nonetheless firms are still willing to indulge in high levels of working capital to offset sudden negative cash flow shocks (Fazzari & Petersen, 1993; Carpenter, Fazzari & Petersen, 1994). Moreover, high levels of working capital are also deemed necessary for firms which do not have much access to long-term capital markets (Kieschnick, Laplante & Moussawi, 2006).

In the US, the 1980's were periods whereby highly leveraged transactions (including buyouts) became popular and many were successful in value creation (Kaplan & Stein, 1993). However, towards the late 1980's and early 1990's, signs of financial distress began to appear more commonly although many such firms had good economic value. Jensen (1991) studied US firms involved in leveraged transactions during late 1980's and found that these firms were facing distress conditions due to regulatory shocks and downturns in the economy. However, during the late 1990's, due to an increasing number of business failures, the research focus had shifted to the management of a firm's working capital (Deloof, 2003).

In recent times, due to the complexity brought about by the dynamics of globalization, issues such as managing short-term assets and liabilities have begun to get noticed. A case in point is the aftermath of the East Asian Financial Crisis in 1997 which exposed firms in developing countries to the vulnerabilities of managing with insufficient working capital (Pomerleano, 1998)[3]. There are many studies on

[3] Pomerleano (1998) studied extensively the role of financing constraints and liquidity in the aftermath of the East Asian Crisis of 1997 which devastated South East Asian Economies. The study found that working capital management played a significant role in firm performance during this period.

long-term investments and their effects on a firm's profitability especially with respect to increasing the value of a firm both in the theoretical domain and in the practitioners' domain. Nonetheless, little attention was being paid to short-term finance issues, especially those concerning working capital management. During major global crises especially those which started occurring since the mid-1990's, many firms around the globe started examining how short-term asset investment and financing policies had to be addressed to avoid them winding up. This turn of events encouraged more studies on liquidity management which became hot and active research topics as many researchers, policymakers and practitioners believed that good working capital management practices may provide solutions to regulate the industry.

1.1 Background of the Study

During the East Asian Financial Crisis of 1997, Claessens, Djankov and Xu (2000) reported that high debt levels contributed to liquidity problems among Malaysian firms. In many instances, much of these predicaments were due to high levels of investments and a drying up of external capital. Firms were therefore forced to resort to short-term financing to ensure their survival. Therefore, this created a perfect scenario for firms to rethink their working capital management policies. In earlier times, there were warnings given by finance experts. For instance, Pass and Pike (1987) in their research called for adequate planning and control of working capital to avoid business failures because much of a firm's resources are usually tied up as working capital. Later studies such as that by Harris (2005) stressed on the important role that an effective working capital policy can play in influencing firm profitability and growth during distress periods.

As far back as the 1930's, Keynes (1936) noted that managing liquidity and financial constraints were some of the key issues facing firms and these issues are still relevant and being addressed today. These factors are important considerations for firms to be successful. The Financial Crisis which hit firms in the US and Western European countries during the 2008-2009 period provoked one of the biggest shocks in the world financial system (Cornett, McNutt, Strahan & Tehranian, 2011; Foster & Magdoff, 2009). Financial constraints, especially the shortage of credit became serious issues and liquidity concerns were taking center stage. As a result, financially constrained enterprises were forced to cut investment spending (Campello, Graham & Harvey, 2010) during the crisis. Not surprisingly, firms which had not much access to external financing had to turn to an often neglected source of funds (working capital). Credit terms extended by suppliers and credit extensions to customers became key to managing prudent business (Yang, 2011). With lesser external financial resources during difficult times, working capital management becomes an important survival tool as it takes on the role of a financial intermediary.

Firms in general may look at time spent managing working capital as less important compared with other major decisions such as capital budgeting or payout decisions. However, since the recent financial crises, liquidity concerns have begun to play a crucial role in business failures and recent empirical evidence (Pass & Pike, 1987; Kolay, 1991; Campello et al, 2010) suggests that managing working capital is critical and is no longer less importunate. It can become troublesomely urgent even in circumstances where a firm is endowed with good assets and handsome profitability but unable to convert its assets readily to pay off its immediate costs. In this respect, Kolay (1991) viewed positive net working capital as a necessity in enabling firms to

carry out their operations by satisfying both their short-term debt obligations, maturing debt obligations and upcoming operational expenses.

One of the principal reasons for financial distress appeared to be due to the obsession of finance managers with firm profitability at the expense of overall financial health. This in some measure may have been caused by improper working capital management and liquidity concerns. In a case study to turn around a firm on the brink of bankruptcy, Altman and La Fleur (1981) observed that the focus and overemphasis on measures such as profitability and efficiency ratios developed from income statements had indirectly contributed to some of the perils in terms of the overall financial health of a business entity. The highly competitive growth fever during the good times gave rise to firms succumbing to overaggressive policies of debt and expansion designed to increase sales and profits (Altman & La Fleur, 1981). It was observed that during bad times, even good companies seemed to struggle managing short-term commitments as witnessed during the East Asian Financial Crisis which hit the region during the latter part of the 1990's (Claessens et al., 2000).

Some researchers claim that it is difficult to value a firm's liquidity and this may be one of the many unresolved problems in finance (Kim, Mauer & Sherman, 1998). However, various components signifying liquidity have been investigated by many researchers in relation to firm performances such as profitability. Claessens et al (2000) in their study comprising 850 public listed firms in Malaysia, Indonesia and Thailand pointed out those firm specific weaknesses such as increased reliance on short-term borrowings were aggravating factors of the East Asian Financial Crisis of

1997. In Malaysia, for instance, the study revealed that long term debt accounted for less than a third of all loans in contrast to countries like Germany (which had 55% long term debt) and the United States (which had 75% long term debt). Thus managing working capital which is a source of funds became critical. The importance (of the impact of working capital management policies) on firm profitability has begun to be recognized in finance literature as it covers many areas of a firm's operations (where liquidity is crucial) and in areas such as capital structure and investment appraisal (Deloof, 2003; Shin & Soenen, 1998).

1.2 Problem Statement

There are a number of issues which must be discussed before embarking on an investigation of the impact of working capital policies on a firm's financial performance. The first is whether a firm's profitability alone is a good measure of wellness. Studies on the influence of working capital management on firm performance have mostly centered on its effect on firm profitability. A firm which has low profitability does not mean it is financially distressed if it has a strong liquidity position (Morris, 1998). This goes to show that profitability alone does not define how well a firm is performing and hence the need to use a composite measure made up of various factors that determine the financial well-being of a firm. An appropriate composite measure which measures financial health must include elements of liquidity, solvency, activity and profitability.

Poor financial health has been touted as affecting the very survival of firms and can lead to business failure. In the Malaysian context, there is a paucity of studies specifically on the determinants of financial health. Most studies done in Malaysia

concentrated efforts on the determinants of profitability rather than distress factors which play an important part on the overall financial health of a firm.

The next issue is the need for a benchmark to determine financial health which includes risk elements. Methods used to measure the financial health of a firm need to be viewed in a substantive manner. Financial health of a firm is usually measured by a number of methods and various methodologies are used to measure it especially bankruptcy predictor models such as the Z-score[4] popularized by Altman (1968), and other statistical methods such as the Logit statistical model. The Z-score and its variants have shown a relatively high degree of precision in predicting corporate financial distress not only in the United States but also in emerging markets (Altman, Hatzell & Peck, 1995). Most of the corporate failure prediction studies (e.g. Agarwal & Taffler, 2008; Smith & Graves, 2005) have used Z-score models developed by Altman (1968). Therefore, it is believed that this model is considered one of the most thoroughly tested and widely accepted distress prediction model available in finance literature.

Although many studies show that profitability variables have a direct positive impact on a firm's financial health, this study will place emphasis on how short term liquidity measures like working capital management can offer added benefits in improving financial health. There is a need to place new emphasis on the short-term performance of an organization especially after the two major crises such as the

[4] The Altman's Z score developed in 1968 by Edward Altman provides an early warning signal for firms to take necessary remedial steps. This score creates a classification distinguishing between financially distressed and healthy firms using a statistical technique called multiple discriminant analysis (MDA).

Asian Financial Crisis and the Global Financial Crisis. One such strategy which needs attention is to look into a firm's working capital policy and its relation to firm financial health. If this is not thoroughly planned, the firm may get into financial distress conditions which eventually may affect its long-term profitability and health.

By managing items which constitute working capital (items which are part of current assets and current liabilities), firms are able to formulate effective working capital strategies (Harris, 2005). This study will concentrate on how these strategies affect the overall financial health of a public listed Malaysian firm in the consumer, trading and services sectors. The reason these particular sectors were chosen is that previous studies on Malaysian firms were mostly on manufacturing firms or were too general taking randomly all firms listed in Bursa Malaysia without specifying the industry they belonged to. Bursa Malaysia lists trading and services as a single sector and it is crudely assumed that the consumer products sector has similar working capital structure as these sectors. Traditional liquidity indicators such as current ratio and other working capital components may vary by industry, thus the need to concentrate efforts on a sector basis. Filbeck and Krueger (2005) showed that significant differences lie in working capital measures between industries across time. Weinrub and Visscher (1998) also found significant differences in working capital management policies among industries by examining these policies in the US between 1984 and 1993.

In the context of managing working capital in Malaysia, there is a lack of studies looking at the various ways in which working capital is managed. Yusuf and Idowu (2012), in studying the effects of working capital management on firm performance

in Nigeria from 2006 till 2010, looked at aggressive working capital management in two ways. The first, being short-term aggressive asset management policies which can be implemented by lowering current assets relative to total assets with the expectation of higher profitability but at the expense of greater liquidity risk. This view conforms to the general trade-off principle inherent in most financial decisions where higher risk is rewarded with higher rewards.

The second view concerning the management of short-term working policy is that short-term aggressive financing policies can be implemented by raising the percentage of current liabilities relative to total liabilities by delaying short-term obligations and taking advantage of credit terms. However, this can give rise to liquidity problems as it may hinder a firm from servicing short-term debts or making creditors unhappy as a result of delayed payments. The worst case scenario for firms which mismanage its working capital is eventual bankruptcy, but prior to the road to bankruptcy, such firms face financial distress problems primarily in terms of non-payment of short-term debts. In the aftermath of the Asian Financial Crisis, Pomerleano (1998) used the ratio of current liabilities to total liabilities to investigate causes of corporate distress.

The discussion on the significance of working capital management policies on a firm's general well-being or financial health will not be complete if we do not reveal the extent of this relationship by examining the moderating effect of the firm's cost of capital. Hence, the research will also investigate the contingent effect (when and if) of the firm's cost of capital on the working capital – financial health relationship. The moderating variable's presence may modify the initial relationship between the

independent and dependent variables and if this occurs, this contingent effect is commonly referred to as interaction (Sekaran & Bougie, 2010).

Empirical research carried out extensively in many countries on the relationship between working capital elements and firm performance (Shin & Soenen, 1998; Lazaridis & Tryfonidis, 2006; Sayaduzzaman, 2006; Afza & Nazir, 2007) assert that most studies concentrated on the direct relationship between working capital elements and firm performance. The missing link was the moderating effect of a company's cost of capital on the above-mentioned relationship. Firms have assets which are usually backed by capital providers such as bondholders and shareholders and the cost of this funding (capital) is a measure of what these stakeholders expect in return for lending their money. Hence, this study will focus on how the costs of stakeholders' funds influence the relationship between working capital management and overall firm performance.

When working capital becomes lower than the costs of running the business, lenders and service providers may impose penalties and interest on monies owed as distress levels mount. Some researchers (e.g. Karadeniz, Kandir, Balcilar & Onal (2009); Ang, Chua & McConell (1982)) observe that access to capital markets and borrowings at lower costs can help firms remain financially healthy and move away from distress situations. Fama and French (2004) suggest that an important component of cost of capital, that is, the cost of equity depends very much on the availability of long term financial resources. In the same vein, White (1989) explains that lowering costs of capital is key to firms surviving financial distress problems and

uses transactions cost theory to explain how firms are able to turn around their fortunes when they are in financially distressed situations.

Many studies such as those conducted by Casey, McGee and Stickney (1986) that use resource dependent theory and White (1989) who uses transactions cost theory found that firms reduce distress costs to avoid harming relationships between them and key stakeholders such as capital providers, suppliers and the government. Here, it can be seen that cost of capital could become a major issue when firms decide on their levels of working capital.

Firms facing working capital management constraints may have difficulty raising external finance (such as debt). Bae and Goyal (2009) noted in their cross-sectional study on 48 countries that tangible assets reduce the cost of financial distress and make it easier for firms to reduce the problem of financial distress. Together with raising equity, the general costs of raising short-term financing assets may have serious implications on the financial health of a firm. Hence, in this study, the direction of the research will initially focus on the effects of working capital components on a firm's financial health and add on a moderating factor, which is, cost of capital to seek a better understanding of the earlier relationship. The moderating variable in this study would be the weighted average cost of capital (WACC).

As working capital management to a large extent involves how firms manage liquidity issues, firms facing liquidity constraints may have difficulties raising

external finance[5]. As such, a firm's cost of capital becomes an important issue. It has to manage its assets without worrying too much about the cost of funding its investments. Otherwise, this in turn may affect the financial health of a firm. The pecking order theory of financing costs (Myers & Majluf, 1984) posits that firms rely first on internal finance and subsequently if there is a liquidity problem, external financing through bond issues and equity issues become necessary. Since firms have access to a host of financial markets to seek capital, corporate uses of capital must be benchmarked and one such benchmark is the cost of capital (Bruner, Eades, Harris & Higgins, 1998)). A firm should earn more than this benchmark if it wishes to create value for its investors. A common way of expressing this cost of capital is the weighted average of the individual sources of capital (debt, equity and others). There is no denying that the trade-off theory which associates risk with return makes finance managers think about whether distress costs associated with too much leverage may play a role in deciding the form of capital needed for the firm.

A firm's long term financial health in terms of survival and growth depends on the availability of funds from capital providers (Ram, 2008). When these funds are taken for the purposes of running businesses, attention must be paid towards servicing its current liabilities in particular. If these funds are expensive due to high individual component costs of capital or difficult to manage due to scarcity (or erratic supply) of such funds, distress levels would begin to appear far more seriously than if costs were lower or funds were readily available. This research will investigate how the

[5] Kim, Mauer and Sherman (1998) developed a model which provides empirical support that working capital such as cash holdings is determined by the tradeoff between the cost of holding them and benefits of minimizing them to fund future investment opportunities which can be expensive notably when external financing is required.

cost of capital as a moderator, causes changes in the direction or magnitude of the relationship between working capital management and financial health. In other words, this dissertation seeks to fill the important gap in the literature by specifically exploring the question of whether cost of capital plays an important role as a moderator in the relationship between working capital practices and firm financial health.

In terms of methodology, most studies concerning the effect of working capital management policies on corporate wellness in Malaysia have been using correlation analysis and multiple regression methods and do not explain much the effects of working capital components relative to other factors such as firm specific determinants like firm size, firm growth levels and capital structure. The data used in most studies is composed of a cross-section of firms taken at a particular period in time. The major drawback with pooled regression is that lumping all firm data together camouflages the heterogeneity that is inherent in firms.

Heterogeneity relates to individuality or uniqueness a firm possesses that can alter the results of regression if it is not taken into account. Panel data also provides a solution for the unobserved heterogeneity which is a general problem in cross-sectional data and panel data can easily handle large number of observations. Thus, it serves as a major motivation to control for possible correlated time-invariant heterogeneity without observing it (Arrelano, 2003). This study plans to perform panel data analysis using regression methods from balanced panel data which not only considers heterogeneity among the various firms but also the ability to allow studying the dynamic relationships over time.

In summary, issues regarding the wider definition of financial health, the questions on the effects of working capital management on financial health, the contingency effect of cost of capital and methodological issues will be addressed. The dissertation will seek compelling evidence on how various working capital policies affect the overall financial well-being of a public listed firm in the consumer, trading and services sector in Malaysia with cost of capital as a moderator.

1.3 Research Questions

Having addressed the main issues on how working capital management policies affect financial health and the contingency effect of cost of capital on these relationships through the problem statement, the next step would be to indicate the specific lines of enquiry through the formulation of the various research questions. From finance literature, the financial health of firms could be influenced by many factors such as size, growth factors and leverage. However, key working capital management policies (short-term asset investment policy, short-term asset financing policy and working capital efficiency) can contribute to firm health. This study investigates the relationships between working capital policies and financial health and examines further the interaction effect of cost of capital on these relationships. Based on this, the following six research questions are formulated.

(i) Does a firm's short-term asset investment policy have a significant relationship with financial health?

(ii) Does a firm’s short-term asset financing policy have a significant relationship with financial health?

(iii) Does the efficient management of a firm’s working capital play an active role in the determination of a firm’s financial health?

(iv) Does a firm's cost of capital play a moderating role on the relationship between its short-term asset investment policy and financial health?

(v) Does a firm's cost of capital play a moderating role on the relationship between its short-term asset financing policy and financial health?

(vi) Does a firm's cost of capital play a moderating role on the relationship between its efficiency in managing its working capital and financial health?

These enquiries are along the lines of providing understanding and seeking possible solutions to help Malaysian public listed firms manage working capital in the consumer, trading and services sector. The research questions are left to be resolved via empirical analysis. The findings from this study are meant to help managers make informed decisions on improving financial health by adjusting the various working capital components and making better working capital management policies in the process.

1.4 Research Objectives

The research objectives will be used to explain how the research questions are going to be answered. In working capital literature, working capital policies can be defined as aggressive, moderate or conservative by looking at a number of working capital ratios and their effects on a firm's financial health. Despite the promise of higher returns due to aggressive working capital policies, firms are still wary of the threat of cash flow and liquidity problems. Relevant working capital ratios will be formulated as representations of working capital management policies.

The policies will be divided into short-term asset investment policy, short-term asset financing policy and the efficiency in managing a firm's working capital . There are four objectives in investigating the relationships between these policies and the financial health of a Malaysian public listed firm in the consumer, trading and services sector.

(i) The first objective of this research is to investigate empirically the relationship between a firm's short-term asset investment policy and its financial health.

(ii) The second objective of this study is to investigate the relationship between a firm's short-term asset financing policy and its financial health.

(iii) The third objective of this study is to determine if the efficiency in managing a firm's working capital is linked to its financial health.

(iv) The fourth objective of this research is to investigate the moderating (interaction) effects of cost of capital on the relationship between each of the above working capital policies and financial health.

In this study, providing empirical evidence is the main concern not only in terms of the impact of working capital policies on financial health but also the moderating effect of cost of capital on these relationships. When or if a firm experiences a high cost of capital, this study will investigate if the primary relationship between a particular working capital policy and financial health is indeed affected by this third variable. In other words, although the relationship between working capital management policies and financial health may hold true, it may nevertheless be contingent upon the cost of capital.

1.5 Scope of the Study.

As in any research, it is imperative to state the boundaries or limits (geographical, time and industry) within which this research needs to be investigated and the main limits are that the dataset contains information only on Malaysian public listed firms which are in the consumer, trading and services sector. This is because the focus of this research is on such firms operating in an emerging economy such as Malaysia. Furthermore, there are too many studies not emphasizing the need to distinguish between the various industries and environments the firms are operating in and failure to distinguish them can give erroneous interpretations. For instance, Fillbeck and Krueger (2005) pointed out that generally firms could lower financing costs (and release more funds for expansion) by reducing funds tied up in current assets. However, they also concede that there are marked differences in these working capital measures between industries across time.

Some sectors such as the financial and securities sectors have financial characteristics such as the use of leverage which are higher than the others. Naturally their risk profiles will be much different compared with other firms. Hawawini, Viallet and Vora (1986) found that working capital policies are industry dependent and explain, for instance, working capital management policies of manufacturing firms are quite different from service sectors. This is presumably because manufacturing firms can carry quite a lot of inventory while service firms may carry very little inventory. They further noted that inventory conversion periods for manufacturing and engineering firms may take several months but are negligible for service firms. It would therefore be wise to restrict our research to only examining the effects of working capital management policies on financial health for firms in a

particular sector. This research will include firms in the consumer, trading and services sector and the sample will exclude financial, plantation and utility firms.

Another limit is that the empirical research to be carried out can render difficult interpretations if the researcher does not take into account the factor of time. As data which is not too recent can give spurious results, the main emphasis of this investigation is the relationship between working capital management and its effects on a firm's financial health in contemporary settings. Although Z-score applications across industries over time have not changed significantly but the financial reporting environment has changed (Hoffman & Patton, 2002). The globalization of accounting standards has changed from rules-based to principles-based[6] (Benston et al, 2006) in a recent paradigm shift. For these reasons, datasets are taken from the year 2006 up till 2012.

The emphasis of this research in terms of measuring firm performance would not be on mere profitability. There are many aspects of measuring how well a firm performs in general terms and the critical areas of concern with respect to such performances include profitability, liquidity, cash flows and solvency. This study tries to combine all these factors into one metric to measure financial well-being and the Altman Z-score best qualifies as a metric to represent financial health since the Z-score is composed of major accounting figures such as earnings figures (current and retained), leverage figures and stock market information.

[6] As of 1st January 2006, the Financial Statements Review Committee (FSRC) of the Malaysian Institute of Accountants (MIA) has requested Malaysian firms to comply with the Financial Reporting Standards (FRSs) in the preparation of financial reports to align itself with global accounting standards ((Lazar, Tan & Othman, 2006).

This study proposes to use panel data analysis. Generally all panel data models are considered dynamic models due to the longitudinal nature of panel data. However all models discussed so far are deemed 'static' as they do not include a lagged dependent variable. Dynamic models become complicated as they have to deal with the problem of endogeneity and need other methods such as IV-techniques (instrumental variable techniques) and LISREL which would not be discussed in this study and left for future research.

All the limits that define the scope of this study are discussed for the purpose of emphasizing an important aspect of scientific research which is the ability to generalize. Hence the need to choose representative samples within a context. And for generalization purposes, firms with zero sales, negative equity and firms which are listed after 2004 are excluded as calculating the relevant statistics from such firms would not be suitable.

1.6 Significance of the Study

This study is motivated by research done by Smith (1980), Nazir and Afza (2009), Weinraub and Visscher (1998) and Pomerleano (1998) whereby working capital policies are said to play an important role in determining not only the financial performance of a firm but also its general financial well-being. The holistic nature of this study hinges upon the premise that firms must look beyond mere profitability and pay attention to business sustainability by managing financial risk via adopting proper working capital management policies. Mention has been made by researchers such as Zariyawati, Annuar, Taufiq and Rahim (2009) that there have been very little empirical studies on working capital management's role on profitability in Malaysian

firms as most studies concentrated on developed markets (e.g. Peel & Wilson, 1996; Shin & Soenen, 1998; Deloof, 2003).

This study is significant in many ways. Firstly, most studies on the impact of working capital management on Malaysian firms concentrated on profitability measures such as its effects on sales, return on assets (ROA) and return on equity (ROE). This study would be somewhat different in the sense that the focus would be more on the effects of working capital management policies on the overall financial wellbeing of the firm rather than the narrow notion of profitability as a benchmark of firm performance. Studying financial well-being includes studying risk and distress factors which are akin to making an effective comprehensive assessment on the present and near future financial state of an organization. Strengthening research in this area is helpful in protecting the rights of investors and creditors against the risk of losing their trust and confidence in the Malaysian financial markets.

Secondly, at the local level (in Malaysia), previous studies do not specify the various industries the firms were operating in. However, the scope of this study would be limited to only firms in the consumer, trading and services sector as we are aware that differences may exist across industries. This is necessary as firms from different sectors or industries may not have the same type of relationship and lumping them together would not be wise as there are differences between sectors (Filbeck & Krueger, 2005). Elton and Gruber (1970) suggest that researchers partition firms into groups having similar characteristics or behaviors so that empirical investigations can be carried out without losing out on the criteria of generalizability of the study.

The debate on the risk return trade-off due to working capital policies to enhance financial performance continues as Van Horne and Wachowicz (2000) found that higher levels of current assets might reduce return on investment (ROI) which is another indicator of profitability. On the other hand, too little current assets can cause shortages and stock-outs to occur. Working capital management policies are important in the sense that their implementation provide success to firms on two fronts; one is maintaining their credit-worthiness in paying their external debts and operating expenses (liquidity) and the other is their function in creating opportunities for the purposes of creating wealth (profitability). Working capital management can therefore be seen as being the core of financing decision. Maintaining high levels of liquidity can reduce financial distress and profitability. In other words, setting incorrect levels of working capital levels can cause liquidity and profitability problems.

This study can contribute to existing literature by looking at the risk-return factor not as two separate and conflicting variables but as a single entity which encompasses the risk-return setting. This entity can be looked upon as the financial health of a firm which encapsulates this (risk-return) idea and measured by the Altman Z-score. The Z-score gives a value that measures financial health by taking into account not just profitability ratios but also risk-invoking ratios such as leverage ratios. The Altman Z-score has five components which generally encompasses both risk and return elements. Due to the paucity of such studies in the Malaysian scenario, it is hoped that this study would contribute further to the understanding of the effects of such working capital policies on the overall financial well-being of Malaysian firms.

Regulatory effects can make the studies on bankruptcy a little complicated. In Malaysia, Haat et al (2005) studied troubled firms in 2002 and noted that listed companies do not generally file for bankruptcy but instead are suspended and given a chance to restructure by Bursa Malaysia (Securities Commission of Malaysia). So there is a need for an appropriate measure to indicate the financial health of a firm and this study advocates the use of the Altman's Z-score as a reliable measure of financial wellness. Investigations will be carried out to see if working capital management policies truly generate value for a firm not just in terms of profitability but also in terms of its overall wellness as reflected in a financial health index which is made up of a composite of financial performance measures. In addition to profitability, the chosen financial health statistic, the Altman Z-Score, incorporates measures of liquidity, solvency, cash flows and market value of its shares.

The other key contribution of this study would be the use of cost of capital as a moderator on the relationship between working capital management and financial health. By definition, moderator variables can be either qualitative or quantitative variables that can affect the strength or direction (or both) of the relationship between predictor variables and the criterion variable (Baron & Kenny, 1986). The interplay between working capital policy decisions and cost of capital concerns and their effects on firm financial health is useful in finding a rational response to firms falling into the unhealthy levels category.

There is a lack of empirical research on the role of cost of capital as a moderating factor in the relationship between working capital management policy and firm financial health. When a firm employs an aggressive working capital policy, the idea

is to improve profitability as fewer funds are left idle and all is well if distress costs are low. However, when the cost of capital is high, this can cause distress costs to resurface and financial health of a firm may be compromised. Each firm manages its own funds in its own manner and some firms have higher cost of funds compared with others. Therefore this study will investigate if cost of capital plays an important role as a moderating influence on the relationship between working capital policies and financial health.

Previous empirical studies on the relationships between working capital management and financial distress have used various methodologies, for example, correlation studies (e.g. Irene & Lee, 2007; Nor Edi & Noriza, 2007) and multiple regression analysis (e.g. Zariyawati et al, 2009 used pooled OLS method) but this study will further enhance empirical investigation by using hierarchical regression and panel data analysis. Balanced panel data analysis allows researchers to capture changes in a dynamic setting as interrelationships are observed over time.

Econometricians such as Baltagi (2008), Gujerati (2003), Wooldridge (2009) and Hsiao (2003) have given credence to panel data methods which have gained prominence over the years as tests become more powerful and estimates become more efficient compared with pooled regression techniques. Panel data analysis also mitigates potential problems which may surface due to multi-collinearity and heterogeneity as there is more variation in panel data sets than just pooling cross-sectional data over different time series. The findings of this study by applying panel data techniques can contribute to academic literature by offering new insights in terms of managing short-term resources. Specifically, they involve examining the

effects of various components of working capital on firm financial health and contingency issues in managing them.

The next part of the dissertation is organized in the following manner. Related literature is reviewed in the next chapter followed by the conceptualization of key variables and description of methodology. Subsequently, models are developed based on the theoretical framework. The models are then tested for robustness and used to provide answers to the research questions and address the research objectives. The results obtained from the analysis are then discussed after which conclusions are made based on the results of the various hypothesis tests. Implications of the impact of working capital management policies on firm financial health will be discussed from both theoretical and managerial perspectives.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

The literature review relates to the different areas of investigation conducted on the relationship between working capital policies employed by listed firms and their financial health. It is interesting to note that the various areas seem to add additional knowledge on the effects of working capital policies on the financial health of firms. For instance, when working capital management was first introduced as a strategy to improve liquidity, its main objective was to make sure there were sufficient funds for paying maturing short-term debt and impending operational expenses (Nor Edi & Noriza, 2010). Not much thought was given to its bigger role on its (working capital policy) effects on profitability or overall financial health.

As some researchers point out (Shin & Soenen, 1998; Afza & Nazir, 2007), finance experts began paying attention to working capital management when analysts, investors and shareholders began scrutinizing working capital policies as essential components of a firm's overall corporate strategy in creating shareholder value. Financial practitioners view working capital management policies as something quite simple, straightforward and liberal which enable firms to fund differences between short-term assets and short- term liabilities (Harris, 2005). In view of the fact that working capital policies are highly reversible ((Fazzari & Petersen, 1993; Carpenter et al., 1994), firms would be able to adjust their working capital components at short notice and this offers variability in the data provided for working capital ratios. It would certainly help us investigate if this variability influences the Altman Z-score which is designed to measure financial health.

The urgency factor associated with the management of working capital items such as components of current assets and current liabilities make working capital management policies among the most important decisions financial managers must make in order to ensure smooth operations of a firm. For instance, current assets are likened to the short-term property of a firm which is needed to pay off short-term obligations usually without delay. In comparison, a firm may decide on a reduction in the investment in fixed assets, for instance, by the use of lease or rental agreements thus delaying the necessity to buy outright fixed assets needed for a firm's operations. Hence, managing current assets and current liabilities are considered urgent compared to managing fixed assets and long-term liabilities which can be delayed by using alternatives. In other words, as Nazir and Afza (2009) explain , managing current assets and current liabilities is a different 'ball game' compared with managing fixed assets and long-term liabilities due to the urgency factor in managing working capital management.

Current assets collectively represent a significant portion of investments for many firms and current liabilities remain a major part of short-term financing. Current assets are likened to cash converters such as cash on hand, short-term investments, inventory and accounts receivable. Accounts receivable must be managed well so that timely collection is maintained. The sooner a firm receives money owed, the sooner it can be used to reinvest to earn good returns. Current liabilities are normally incurred during the operating period to meet budgetary requirements and examples are inventory purchases, wages, taxes, accounts payable and unearned revenue (whereby payments for goods have been done but yet to be delivered). Studies on large American firms have shown that current assets comprise a large percentage of

total assets and therefore pose a risk to a firm's profitability (John, 1993). As for current liabilities, Boisjoly (2009) found that its components such as accounts payable have featured prominently in recent financial management practices as a result of aggressive working capital management by firms trying to shirk off concerns by creditors and future loan providers. For this reason, large amounts are invested in liquid assets even if they are considered costly especially when costs of transaction, taxes and agency problems complicate things (Kim, Mauer & Sherman, 1998).

Arguably for financial practitioners, it's a case of profitability versus liquidity. This is because a lower investment in current assets is akin to putting resources to better use by freeing up cash for investment purposes but incurring the risk of not being able to service short-term obligations (Altman & La Fleur, 1984). Kieschnick et al. (2006) in their empirical study examined the relationship between corporate working capital management and company value. On average, they found that, an additional dollar invested in net operating working capital at the mean level of such investment reduces company value. The tradeoff between liquidity concerns and profitability can be argued as follows. Insufficient liquidity may possibly lead to bankruptcy (Dunn & Cheatham, 1993). On the other hand, too much liquidity can be hindering a firm's profitability (Bhattacharya, 2001).

An approach used by analysts on studying the effects of working capital policy is to introduce the idea of an aggressive and conservative working capital policy (Salawu, 2007). Aggressive working capital policies are commonly associated with higher return and higher risk, while firms which advocate conservative working capital

policies are associated with lower risk and lower returns (Gardner, Mills & Pope, 1986; Weinraub & Visscher, 1998). An aggressive working capital management policy (low net working capital) which is sometimes called a restricted lean – and – mean current asset investment policy is expected to produce the highest return (Brigham & Gapenski, 1997).

In this study, the degree of aggressive working capital policy is measured by three ratios, that is, current assets to total assets ratio (Deakin, 1972; Gilbert, Menon & Schwartz, 1990), current liabilities to total liabilities (Pomerleano, 1998; Nazir & Afza, 2009) and the cash conversion cycle (Deloof, 2003; Shin &Soenen, 1998). If the current assets to total assets ratio is low or the current liabilities to total liabilities ratio is high, this signifies a highly aggressive working capital policy. In addition, when the cash conversion cycle is high, it means that a firm has a more relaxed (conservative) attitude towards converting its sales into cash.

Working capital management is often seen as a simple straightforward way of making sure managers are able to fund the difference between short-term assets and short-term liabilities and it is said to play a key role in ensuring risks are reduced. The net working capital mitigates the risks borne by suppliers of funds to faults of managers, risky markets or even lawsuits (Harris, 2005). This semi liquid sum helps keep a manager's mind on distress signals and helps ease the worries of lenders of capital. The main components of working capital are inventory, accounts payable and accounts receivable and the associated ratios used to measure the effectiveness of managing working capital are the current assets to total assets ratio (CATA), current liabilities to total liabilities ratio (CLTL) and the cash conversion cycle (CCC).

Prior studies in the Malaysian context mainly focused on the relationship between working capital management and a firm's profitability. For instance, Irene and Lee (2007) using correlation analysis explored the working capital management practices of public listed firms in Malaysia and found that profitability and working capital were positively related. Nor Edi and Noriza (2010) conducted a similar study using 172 randomly listed companies in Bursa Malaysia from the Bloomberg database for the period between 2003 and 2007. They reported that the cash conversion cycle, the current assets to current liabilities ratio and the current liabilities to total assets ratio showed significantly negative relationships with the three measurements of a firm's profitability performance which are the Tobin's Q, Return on Assets (ROA) and Return on Invested Capital (ROIC). Zainuddin (2006) commented that in Malaysia, research on the impact of short-term financial management on firm performance has been largely ignored despite the fact that finance managers allocate a significant amount of time managing working capital.

2.1 Resource Based View on Working Capital

Financial crises such as those which affected the East Asian economies, the European debt crisis and mortgage crisis in the US have reopened the argument and brought to the forefront cries for more research on the efficient utilization of a firm's resources. A firm's efficient use of resources is believed to have effects on financial performance despite many researchers noting that there is very little empirical evidence on this matter (Ricci & DiVito, 2000; Hill et al., 2010). In times of financial distress, which can lead to the inability of firms to garner sufficient resources to liquidate (to pay off even short-term debts), some researchers see this as a problem involving inefficient allocation of resources (Aharony, Jones & Swary, 1980). Ricci

and Divito (2000) put it best by acknowledging that practicing good working capital management is one area where a firm controls its financial resources prudently in such a way that a balance is found between profitability and any risks associated with achieving profitability.

From a resource based point of view, business failures have been commonly seen as indications of misallocation of resources that are deemed valuable (Aharony et al, 1980) and working capital management is seen as an area where resources need to be well managed. In China, Guariglia, Liu and Song (2011) studied how liquidity constraints affect firms' assets growth. Using a panel of 79,841 private Chinese firms during the period 2000-2007, they inferred that other than the ability to generate high cash flows, good working capital management policies allowed many of these firms to maintain high growth rates. This is despite having little access to external funds. Hence in China, it is believed that the need for high net working capital is mainly seen as a strategy which mitigates financing constraints. Many finance practitioners have been placing emphasis on the efficient utilization[7] of all resources owned by firms including working capital since they believe that these have effects on a firm's financial performance.

Liquidity concerns of a firm may render its funds being confined to mere liquid assets thus making them unavailable for potential investments to earn better returns thus creating an opportunity cost which affects profitability in the process (Smith, 1980). If there is accumulation of idle funds due to excessive liquidity, profitability

[7] In the US, the collapses of large organizations such as General Motors, Lehman Brothers and Bear Stearns, encouraged research on the importance of managing organizational resources prudently especially the proper management of working capital (Charitou et al, 2010).

suffers. However, if the firm takes a different path by suppressing these funds to a minimum, it may give rise to insufficient liquidity to fulfill its immediate short-term obligations. In such a situation, the firm may suffer loss of goodwill, lower credit standings and in the worst case scenario, financial distress conditions which can lead to liquidation and eventual bankruptcy. A firm which compromises liquidity at the expense of profitability may not be able to maintain its "wellness" which practitioners call financial health.

2.1.1 The Paradox of Maintaining Levels of Current Assets and Current Liabilities

Unlike most studies whereby the direction of influence of the explanatory variable(s) on the dependent variable is easily explained by some logic, theory or previous empirical study, in this study, due to the paradox of liquidity versus profitability, it becomes a little complicated. Keeping too much or too little working capital is tricky business and thus there is a need to understand how firms view this paradox. For instance, when the current ratio or the current assets to total assets ratio (CATA) is low, it may not necessarily mean the firm is in financial distress. It could be that the firm's policy to keep it low (but not too low) is to take advantage of short-term funds for other investment purposes. Likewise, an extremely high current ratio or CATA does not necessarily be good for a firm in terms of opportunity costs related to excessive levels of current assets. A very conservative short-term asset management policy sacrifices profitability for liquidity (Padachi, 2006).

From the aforementioned studies, as a result of this trade-off, the paradox of ensuring profitability at the expense of forsaking liquidity makes managing working capital a

challenge for firms. The important question for this research lies in the premise that an aggressive working capital policy may affect financial health. Many studies indicate that low investments in current assets (aggressive working capital policy) have a positive effect on profitability (Brigham & Gapenski, 1997; Bhattacharya, 2001). However, the exposure to risks associated with financial distress due to low liquidity may affect financial health. Although, optimal working capital levels seek to find the ideal level of working capital to ensure liquidity and maximize profitability (a tradeoff), for the purposes of this research, emphasis will be placed more on overall financial health rather than mere profitability since we are discussing bottom line financial health rather than its nemesis, that is, firm profitability.

The dual targets of working capital management is widely researched and claimed to be conflicting as profitability refers to maximizing shareholder wealth whereas liquidity is more concerned with fulfilling a firm's financial obligations causing loss of opportunity in utilizing funds. Focusing entirely on one rather than the other is said to shake the balance between these two aspects of a firm's financial status (Shin & Soenen, 1998). The importance of managing working capital has become necessary due to working capital management activities being highly reversible due to its short-term nature and this gives a firm flexibility for adjustment (Fazzari & Petersen, 1993; Carpenter et al., 1994). In addition, Fazzari and Petersen (1993) highlighted important aspects of working capital as it can be used to smooth fixed capital investment especially in cases whereby there are cash flow shocks and long-term financing constraints. Finance practitioners maintain that sufficient working capital levels are important to smooth levels of fixed investment and absorb liquidity shocks.

From the literature so far, it can be seen that the focus and the role of proper working capital management has shifted over the years from maintaining liquidity to making sure idle funds are not tied up too long as working capital. Many researchers (Afza & Nazir, 2007; Shin & Soenen, 1998) have argued that the goal of working capital management by itself is to maximize profitability without compromising liquidity issues. In other words it is important for firms to strike a balance between financial stability and profitability as too much working capital impinges upon profitability and too little leads to liquidity problems. This chapter would briefly outline the various empirical works into sections beginning with the dependent variable (financial health), the control variables followed by the specific independent variables (focus variables) under study. Lastly, their linkages when cost of capital is introduced as the moderating variable would be discussed.

2.2 Financial Wellbeing Models

In business sustainability contexts, the financial wellbeing of a firm is often the primary focus. When a firm survives difficulties (due to both internal and external factors), it is more vulnerable especially if its financial health is not looked after. Mere focus on profitability, though a part of financial health, is simply not good enough as liquidity and solvency play an active role in the sustainability of a firm's financial health. Financial health must therefore be a function of profitability, liquidity and solvency concerns.

In the US, during the late 1960's and successive decades later, when business failures became a talking point, development of bankruptcy prediction models began to take shape. The earliest amongst them, most notably the Altman Z score became popular

but practitioners were reluctant to apply these models in practice. However, over time, the passive use of statistically verified predictive models moved seamlessly during the early 1970's from the role of an observer (academic researchers) to the observed (the practitioners or firms) in the late 1970's (Altman & La Fleur, 1981). Since then, the role of bankruptcy and financial distress models began being used actively till today as managers utilized these models in attempts to turn around financially distressed firms.

Many studies on firm performance have used the Altman Z-score to represent business sustainability (Altman & La Fleur, 1981; Allen, Hermanson & Kozlosky, 2006; Pomerleano, 1998). The higher a firm's score, the better its financial health. Increasingly, it is thought that the Altman Z-score is a good indicator of financial well-being due to its holistic approach as the said Z-score also takes into account the risk factor associated with financial health. This is mainly due to its ability to address solvency and liquidity issues.

There are various aspects of working capital management which include inventory purchases on credit, services provided on credit, managing accounts receivables and accounts payable in the short-term. Managing working capital involves managing cash flows of a firm's operations and the generation of income on a short-term basis at the same time making sure that enough capital is raised to balance the needs of short term assets and liabilities. Even if the firm has enough assets to ward off its creditors, if cash flow shortages become frequent, the firm may have to sell off some of its valuable assets to cover its debts. As such, one of the factors touted as a major reason for corporate failure is the inefficient management of working capital as it

involves the ability of a firm to at least pay off its short-term committed payments (Kolay, 1991).

Bankruptcy prediction models were often used to help practitioners address financial distress fears. As active participants, finance managers were encouraged to attempt influencing the models' measurements to help make decisions suggested by the parameters of the bankruptcy prediction models. This active approach helps firms make decisions based on relevant financial variables (and ratios) in the model which can perhaps lead to the recovery and establishment of a firm's financial base. Over the years, analytical tools were developed to help managers decide when action should be taken to help firms recover from bad financial performance. For instance, Altman and La Fleur (1981) showed that despite the Z-score being seen as a portent of doom, it began to be used as an important management tool to turn around distressed firms.

The difference between a firm's financial performance and its financial health is that the former is a subset of the latter as financial health not just looks at profitability but also whether a firm is able to withstand "hard knocks' in times of financial distress. Various measures of financial performances in terms of profitability, liquidity, and solvency have become an integral part that determines a firm's financial health. Early warning signs of a firm in distress are important so that firms have a chance to reexamine its priorities and take necessary steps to ensure its sustainability as a business concern. While the common metric to measure a firm's vitality has been the Tobin's Q and other profitability ratios such as the return on assets (ROA), an

indicator of a firm's corporate financial fragility is best measured by the Altman's Z-score (Pomerleano, 1998).

The flexibility in which the Z-score renders itself and its ease of application have made it a popular choice amongst researchers and it is seen as a proxy for business risk (Allen et al, 2006; Landsman, Nelson & Rountree, 2009; Menon, 2010). The risk element inherent in the Altman's Z score makes it more comprehensive and gives it an advantage over other ratios such as the Tobin's Q which is often used as a market measure of corporate performance. Furthermore, the Altman Z-Score takes into account both accounting measures of corporate performance and market information.

Until the 1980's, discriminant analysis was the most utilized method to predict firm failure but one of the major shortcomings of this method seems to be the assumption of normality among the items in the Z-score which became problematic. Search for better methods gave rise to logistic analysis and later during the 1990's artificial neural works produced promising results in terms of predicting bankruptcy accuracy (Wilson & Sharda, 1995; Serrano-Cinca, 1993; Back, Laitenen & Sere, 1994). Despite these new developments, the Altman Z score stood the test of time due to its flexibility. Its use as an early warning signal and overall measure of firm performance became popular as it contains key areas of a firm's general financial health in terms of profitability, liquidity, solvency and it also includes the market price of the share. Its "all in one" measure of a firm's financial strength makes it useful in determining in a snapshot the state of financial health and economic stability a firm is in.

2.3 The Dependent Variable: Financial Health

As it appears, the prediction of whether a firm will continue to do well, face the prospect of being financially distressed or take a turn for the worse moving towards bankruptcy has led to researchers investigating the use of bankruptcy prediction models. Prior to the use of quantitative measures (such as financial ratios) to detect a firm's operational and financial difficulties, credit rating agencies adopted qualitative means in assessing the credit-worthiness of particular merchants. Only in the 1930's did formal aggregate studies began playing an important role as portents of business failure (Altman, 1968). The propagation of various theories seeking to understand distress conditions became imminent when Fitzpatrick (1932) identified various stages such as, incubation periods when a firm's financials start to show disturbing signs. Some of these signals include embarrassment when management becomes aware of distress signs, financial insolvency when necessary short-term financial obligations are not met and total insolvency when total liabilities exceed physical assets leading to eventual legal proceedings to protect creditors.

From then on, various authors began to discuss causes of business failure and coined several terms for explaining measures used to describe distress conditions. Beaver (1966) used ratio analysis and classification of bankruptcy entities and in doing so unearthed bankruptcy predictors via univariate analysis which is a precursor to multivariate analysis. Beaver (1966), in a way, implied a potential for the development of multiple financial ratios to predict business failure and as a consequence, Deakin (1972) developed a series of multivariate discriminant models using 14 variables that Beaver analyzed.

All these aforementioned studies paved the way for criticisms against the univariate approach as it had many shortcomings. Chief among them were that no interaction is allowed between the ratios and they were examined separately rather than jointly (Altman, 1968). As it is now known, a combination of factors affect distress levels as Morris (1998) illustrated that low profitability does not necessarily mean a firm is financially distressed especially if it has a strong liquidity position. Therefore using a single variable or financial ratio to determine financial distress is not feasible. Thus the need to investigate a number of key variables simultaneously which include profitability, short and long term liquidity and gearing ratios to formulate models that measure financial distress. Models such as multiple discriminant analysis by Altman (1968) and logistic regression (Ohlson, 1980) include interaction between these key variables and they have become popular.

Altman (1968) highlighted the analytical and practical value of using financial ratios as a means of predicting corporate failure by specifying and quantifying them. In his study using multivariate discriminant analysis, it was found that ratios measuring profitability, liquidity and solvency continued to remain significant indicators of corporate distress. Altman et al. (1981) described the following steps in developing a bankruptcy prediction model. Firstly, firms are broken up into failed and non-failed firms to identify the most dissimilar financial characteristics between them before bankruptcy. Then, the original sample of firms were reclassified using those financial characteristics and the model's predictive ability was tested. Thereafter, the model can be used to predict bankruptcies in the future.

2.3.1 The Case for Traditional Ratio Analysis in Measuring Financial Health.

In seeking common reasons of bankruptcy, many studies identified several potential determinants of bankruptcy which included negative net worth, missed payments of creditors and bondholders, overdrawn bank accounts, missed dividend payments and inability to pay debts (Karels & Prakash, 1987). However, Altman (1968) argued that for the sake of clarity and comparativeness, it is better to use published financial ratios to avoid ambiguity and establish a form of consistency across firms. For these reasons, financial ratios fit the bill better in terms of describing the performance of firms.

Many theorists and academicians seem to think that the use of traditional financial ratios measuring liquidity, profitability and solvency were on the wane (Altman, 1990). Following this, during the 1990's, attempts were made by theorists to move away from the traditional financial ratio analysis method of measuring financial distress conditions. The quest for a more rigorous analysis to events such as distress and bankruptcy led to many sophisticated methods being successfully applied as early as the 1960's as these events were deemed behavioral events which were part of a firm's makeup.

Despite new developments in this area, a host of studies seem to prove that ratio analysis derived from financial statements is still very popular and the original ideas of Altman (1968) and Beaver (1966) seem to prevail due to them still being powerful predictors of bankruptcy. For instance, Sandin and Porporato (2007) created a bankruptcy prediction model using traditional ratio analysis in an emerging economy and found that information available in the financial statements from the Buenos

Aires Stock Exchange proved important in developing a classification method (to distinguish between financially distressed and healthy firms) useful to all stakeholders. The contention is that despite the behavioral character of bankruptcy, ratio analysis seemed to detect well operative and financial distress levels of firms.

During financial distress periods, Chiou & Cheng (2006) confirmed the significance of working capital ratios as indicators of financial distress. In another research, Boisjoly (2009) investigated aggressive working policy by using a firm's financial ratios, and his findings reveal that accounts payable and cash flow per share were important determinants of good financial management practices. In these studies, traditional ratio analysis were used to give firms an early warning that all may not be well by observing the trend and behavior of selected financial ratios of distressed firms as compared to healthy ones. The selected ones were most likely to significantly predict bankruptcy before actual bankruptcy occurs. Any expectation of signs of financial deterioration observed from the financial ratios can be easily detected and should be clear enough for remedial timely action so that substantial default or failure risk can be avoided (Bernstein,1993).

Another sound argument for the use of financial ratios is the measurement objectivity from published accounting data as it has evolved from basic to strict and acceptable practices over the years (Koh & Killough, 1990; Chen & Church, 1992). Thus, they can be used as surrogates for measuring financial conditions such as profitability, liquidity and solvency. Many researchers believe that traditional ratio analysis can still be used to predict future bankruptcies given its success throughout the 1990's

although some researchers feel that more qualitative measures such as good corporate governance could do a better job in making the model better.

Finance practitioners have noted that the most important stakeholders in a public listed firm are the shareholders and their investment in a firm's business must be protected. The shareholders look for reasonable assurances that the firm is looked upon as safe. This is inevitable in terms of not just past risk and return criteria but also the capacity to keep up with the expectations of its various stakeholders. The logical way is to look at the various performance measures in terms of the company's profitability, efficiency, liquidity and its ability to register sustainable growth in the future.

While an investor may keep an eye on the firm's performance in terms of the various above-mentioned performance measures, the notion of the financial state of a firm may be preferred to be looked upon in other ways. For instance, the state of a firm's condition in terms of how healthy or sick it is gives us an indication of its sustainability both in the near future and in the long run. Its prospects of sustainability is of concern to its shareholders, debt holders, creditors, employees and other concerned people who would be affected by the condition the firm is in. Sustainability of its operations and sustainability of its ability to keep stakeholders happy are of fundamental importance and its measurement should encompass the various areas of financial performance rather than the narrow notion of mere profitability. For this reason, it can be argued that the Altman's Z-score would be a good measure for such an endeavor.

2.3.2 Financial Health Distress Models and the Altman Z- Score.

(a) Development of Financial Distress Models.

Although there is abundant literature on empirical studies investigating the relationship between financial performance measures and financial wellbeing, there does not seem to be much consensus on their relationship. However, there is agreement that business failure causes heavy losses to all stakeholders especially creditors and shareholders (Deakin, 1972; Opler & Titman, 1994). Most investors rely on accounting disclosures when assessing financial health of firms (Opler & Titman, 1994) and as a result, published accounting data is popularly used in building financial bankruptcy and distress models (Beaver, 1966; Altman, 1968; Altman et al., 1977; Ohlson, 1980; Dopuch et al., 1987).

One of the earliest works on formulating a model to predict bankruptcy was initiated by Beaver (1966) who recognized that financial ratios measuring earnings, liquidity and solvency had significant effects on financial distress levels but not all ratios predicted them equally. In this classic work failure classification, different ratios (30 failure predictors in all) were used one at a time and the conclusion was that cash flow to total debt was the largest contributor to the predictive power of firm bankruptcy.

Although most works were initiated via univariate analysis, they provided some indication on the relative significance of each of the financial ratios on firm bankruptcy and were later used as a basis for future research on multivariate analysis. The present state is that univariate analysis is confined to practitioners (Sandin & Papareto, 2007). Single ratio predictor tests, as we know them now, are misleading

(Rose & Giroux, 1984). Altman (1968) used multiple discriminant analysis to improve bankruptcy prediction. In his work, the wisdom of using univariate analysis was questioned and subsequently many researchers suggested that ratio analysis performed in this manner is susceptible to erroneous interpretations. One of the arguments was that, firms with poor earnings may not necessarily be financially distressed if they had above average liquidity.

The more popular Multivariate Discriminant Analysis (MDA) method classifies firms into groups whereby each group consists of a multivariate equation made up of several independent predictor variables but with different coefficients (Altman et al, 1977). This statistical procedure separates two or more groups of classifications given the measures of several variables of the firms of these groups. Subsequently, it determines to which group a firm with particular characteristics belongs to. It can be seen as an objective procedure to predict whether a firm belongs to a group which is financially healthy, intermediate or distressed. Altman's (1968) work created a score called the Z-score which could be used both as a classificatory and a predictive model. The MDA is still popular despite the development of more accurate bankruptcy models due to its simplicity and the fact that its type I error[8] is acceptable and lower than other methods (Charitou et al, 2004). This is important as it can lead to dire consequences since incorrect categorization of firms can lead to losses to stakeholders such as debt holders, shareholders, banks and other financiers.

[8] Type 1 error occurs when the null hypothesis is rejected when in fact the null hypothesis is true. In this context, Type I error is an error which occurs when an actual bankrupt firm is wrongly classified as a non-bankrupt entity.

(b) Why use the Altman's Z Score as a Proxy for Financial Health?

Researchers have been using the Tobin's Q and the Return on Assets (ROA) as popular means to measure firm performance. While the Tobin's Q is a market measure of profitability and the ROA is an accounting measure of profitability, the Altman Z- score takes into account not just both these elements but also the element of risk. Many researchers have argued that the main reason for the popularity of the Altman Z-score is its simplicity. This is to be expected for reasons such as providing a benchmark for overall financial performance and its ability to be used as an indicator of financial distress. Stickney (1990) viewed the state of a firm's financial health as a continuum from being financially healthy, financially troubled, bankruptcy proceedings initiated and eventual liquidation of company assets to pay off creditors.

Upon reflection of this continuum, the Altman Z-score provides a good measurement for financial distress levels since it provides a continuous score which gives an intuitive feel of distress levels. The score is derived from a combination of five factors which are said to determine a firm's financial health levels namely liquidity, profitability, leverage, solvency and activity. The differing weights used to determine the score are derived from a multivariate -discriminant procedure (MDA) and the higher the Z-score, the lower the probability of bankruptcy meaning better financial health. Z scores usually take values between -4 and +8 and in general, scores below 1.81 indicate that a firm's financial health is questionable, a score between 1.81 and 2.99 lies in a gray area indicating vulnerability which requires monitoring and a score of 3 and above denotes that a firm is financially sound (Altman, 1977). The Z-

score thus provides researchers a standardized measure of how strong a firm is in terms of its overall performance.

Sauer (2002) describes the Altman Z-score as an early alert procedure which is useful in providing a firm's management the initiative to take early steps in terms of managing its operations such as budgeting, marketing and production prior to a financial distress event. It allows firms to re-strategize priorities. The argument for using the Altman Z-score is that although an individual financial ratio can indicate a particular strength or weakness in a particular area of a firm, no individual ratio is adequate to evaluate the overall financial performance of a firm. Altman (1968) developed this score to predict the bankruptcy potential of a firm and although initially used only for manufacturing firms, over the years it has also applied to non-manufacturing firms. Many corporate failure prediction studies (e.g. Taffler, 1983; Agarwal & Taffler, 2003; Smith & Graves, 2005) have used Z-score measures developed by Altman (1968).

2.4 The Independent Variables.

Variables that can affect variations in financial health levels can generally be broken down into three types, that is, the control variables, the main variables under study (focus variables) and the moderating variable. Each category of variables and their reasons to be included as predictors of financial health would be discussed in the following sections. The chosen variables are obtained from various studies.

2.4.1 The Control Variables

Prior to examining the relationship between working capital components and financial health this research will examine a host of factors affecting financial health such as firm size (White, 1989; Deloof,2003)), sales growth (Davidsson & Wiklund, 2000; Deloof, 2003) and leverage (Irene & Lee, 2007). These factors are treated as control variables in this study. Subsequently, emphasis will be placed on the effect of working capital management on financial health as working capital items are added on using a statistical technique called hierarchical regression method. Control variables play an important role in any modeling endeavor as besides the variables under study (working capital items), there are also underlying primary variables (control variables) which affect the dependent variable (financial health).

In finance literature, there are various proxies for firm size such as total revenue, total number of employees, total assets and market capitalization of the firm. There are arguments for and against each type of measure. For example, some studies use total employment as a measure of firm size and this can be problematic as a firm may have different types (categories) of employees or workforce which varies with industry. Intuitively, market capitalization is used in this research as a measure of firm size because its components include not just the number of shares but also its value (Okada, 2006).

Firm size has been routinely used as a control variable in empirical corporate finance for a number of reasons. Shumway (2001) used a simple hazard model for firms in the New York Stock Exchange (NYSE) from 1962 to 1992 to study bankruptcy forecasts and found that bigger firms (as measured by market size) have shown lower

probability levels of default. These firms were less likely to fail and liquidate and even when they were in a financially distressed state, they have a better chance of recovery.

Larger firms usually have the ability to avoid distress costs that can harm relations with key stakeholders such as creditors, suppliers and the Government. The reason is because they have larger assets that can help them survive as suggested by the resource dependence theory (Casey et al, 1986). Larger firms are said to have more access to raising external finance leading to cheaper financing options. Their ability to have access to capital markets and borrow at favorable interest rates also make them less likely to be in financial distress positions.

Since larger firms naturally have larger assets base, Ohlson (1980) reiterated that size was a significant discriminatory factor between distressed and non-distressed firms. Moreover, in theoretical finance, the trade-off theory suggests that larger firms are well diversified and the probability of financial distress amongst them is lower (Ang et al, 1982; Karadeniz et al, 2009). Finally, some studies show that there is a lot less information asymmetry in larger firms between insiders and capital providers since they face more scrutiny from shareholders and this may lead to better financial health amongst larger firms.

It has also been well documented that larger firms are well equipped to handle financial distress situations which can help them turn around during recovery periods when distress levels are high (White, 1989). Big firms are also expected to have better resources such as technology and human resource which can aid them in

handling efficiency issues and subsequent financial health issues. They usually have the ability to avoid distress costs that can harm relations with key stakeholders such as suppliers, creditors and the Government since they have larger assets that can help them survive as suggested by the resource dependence theory (Casey et al, 1986). All these point to the argument that firm size should contribute significantly to financial health.

Besides firm size, there are well documented studies showing that firm growth plays an important role in explaining firm profitability. The case of growth driving financial wellness is related to economies of scale, learning experience and competitive advantages built (Davidsson, Steffens & Fitzsimmons, 2009). Firm growth as measured by sales growth is expected to have a positive effect on financial health. Evidence from a meta-analysis of more than 320 published articles (Capon et al, 1990) reveal that firm growth has been used frequently as one of the determinants of financial performance with most exhibiting consistent positive association between them in both firm level and industry level.

Various studies have used differing methods to measure firm growth. The most common metrics used to represent growth rate are sales growth, asset growth and growth in the number of employees. However, in this study, sales growth is chosen to represent firm growth because of the consensus in finance literature that sales growth is a better measure of growth due to its high generality (Davidsson & Wiklund, 2000; Delmar, Davidsson & Gartner, 2003; Weinzimmer, Nystrom & Freeman, 1998). It is commonly operationalized by calculating the sales growth within a year. Empirical results showing the effect of sales growth on firm

performance has been well documented whereby some show positive association with firm profitability and others showing mixed results. Davidsson et al (2009) uses the resource based view to argue that firms tend to maximize their growth opportunities to create value for the firm. They also observe that it is possible for high growth rates to cause lower profitability due to its increased reliance on external capital which can be expensive.

Empirical observers note that there are too many uncritical growth ideologies maintaining that firm growth always brings benefits in terms of firm profitability. However, Davidsson et al (2009) concede that growth under certain circumstances may be counter-productive. For instance, when growth involves using too much of a firm's valuable resources such as staff and innovative marketing efforts (Reid, 1995), profitability can be compromised. Moreover, many studies affirming the positive effect of growth on firm profitability have created biasness by studying only high growth firms (Henrekson & Johansson, 2009; Delmar et al, 2003; Almus, 2002). From a theoretical perspective, positive association between growth and profitability can be explained by scale economies, cost advantages and other resource based advantages. Many studies show positive and statistically significant correlation between growth and profitability (e.g. Cowling, 2004; Samiloglu & Demirgunes, 2008). There are others which show positive but weak association (Roper, 1999), some which show an absence of any relationship (Markman & Gartner, 2002) while others even show negative association (Reid, 1995).

The next control variable is a firm's capital structure or leverage as some researchers may want to define it. Financial leverage is said to play an important role in

maintaining good financial health levels. Miller and Modigliani's (1963) famous proposition in explaining that there is no magic in financial leverage in terms of increasing firm value comes with the main caveat that financial markets are efficient and that firms operate in a tax-free world. However, firms certainly do not live in a perfect world with those caveats and choices of capital structure become important mainly due to some contingencies. Tax incentives due to using more debt and cost of capital increasing due to risk factors associated with increasing leverage are the main arguments for financial managers when they decide on their capital structure (Myers, 1984). Tax-paying firms are expected to use more debt (due to tax incentives) only until a certain level and when the probability of financial distress (mainly due to liquidity concerns) reaches alarming levels, firms generally will rethink their policies concerning leverage.

Generally, when leverage is at acceptable levels and tax incentives are there for the taking, financial health levels improve. However, beyond these levels, increasing leverage may reduce financial health due to higher distress levels. The higher costs of leverage can offset the benefits of greater leverage leaving firms susceptible to distress situations. Krugman (1999) points out that apart from macroeconomic weaknesses, items in a firm's balance sheet such as debt to equity ratio can trigger corporate failure. This suggests that a firm's financing policy is important in maintaining its financial well-being. Krugman (1999) further argues that low corporate profitability coupled with high cost of funds pose a higher risk of corporate failure.

As for theoretical underpinnings on the use of leverage by firms, the trade-off theory suggests that financial health levels may become better or worse depending on the ability of the firm to address liquidity concerns. The pecking order theory suggests that firms use internal financing first before embarking on seeking outside financing such as debt or other external borrowings. There are also suggestions that highly leveraged firms are softer competitors and due to their lower competitiveness, profitability is curtailed (Myers, 2003).

From the above literature on the relationship between leverage and financial well-being, many studies have shown that leverage is an important factor in explaining a firm's financial health. In the Malaysian context, Nur Adiana et al (2008) found that leverage (as measured by debt ratio) was a key predictor of distressed companies using both Multiple Discriminant Analysis (MDA) and Logit models. The debt to equity ratio indicates how much money borrowed by a firm is being utilized relative to shareholders' equity and an increase in this ratio signifies a larger dependence on debt to finance a firm's assets. Another study by Nor Edi and Noriza (2011) on Malaysian public listed firms reveals mixed results as debt ratio showed positive correlation with Tobin's Q but a negative association with Return on Assets (ROA).

2.4.2 The Focus Variables: Working Capital Management Variables.

One reason for the emphasis of working capital management over the years is the fact that working capital makes up a fair share of a firm's valuable resources. In recent times, it was observed that in the US, working capital constituted a large portion of a firm's investment and that tying up cash in working capital was akin to tying up cash in plant and machinery (Louderback, Holmen & Dominiak, 2000). In

studying small US firms during the 1980-1991 period, Lamberson (1995) contends that optimal levels of working capital management ratios are sought by financial managers as time and effort were needed to bring non-optimal levels of these two ratios back to optimal levels. In the same study, the test results revealed that liquidity increased slightly during economic expansion and no noticeable changes were recorded during economic slowdowns.

Traditionally, working capital usage is measured by the current ratio (CR) which measures working capital policy from a liquidity perspective. A higher value of this measure means better firm financial liquidity (more conservative) although more funds tied up to current assets could prevent a firm's opportunistic endeavors promising high returns. Some studies show that by reducing its current ratio, a firm usually increases its profitability (Christopher & Kamalavalli, 2009; Shin & Soenen, 1998). Despite this assertion, Sayuddzaman (2006) studied firms in Bangladesh and found the reverse to be true, whereby, firms which employed more current assets relative to current liabilities enjoyed better profits.

Many researchers highlighted the importance of working capital management during periods of financial distress. As far back as the 1960's, Smith (1973) suggested that the failure of many businesses were due to financial managers being unable to plan and control current assets and liabilities. In more recent times, Kolay (1991) explains that if there were a working capital crisis, it was due to mismanaging working capital in the past. In other studies, Singh and Pandey (2008) investigated the effect of working capital management in India and concluded that it was an essential element in determining a firm's profitability and liquidity.

In Malaysia, Pomerleano (1998) pointed out that the Asian Financial crisis of 1997 exposed the vulnerabilities of Malaysian public listed firms as investments dried up and firms began facing liquidity issues. In addition, excessively low profitability coupled with unprecedented levels of borrowings and investments were common characteristics of many Malaysian firms during this period. These factors contributed towards financial distress conditions and were among the several reasons blamed for the difficulties faced by the country as a whole [9](Claessens et al., 2000; Pomerleano, 1998). It was argued that weak risk management practices such as improper working capital management policies and insufficient liquidity (shortage of working capital) were factors that affected corporate performance during that period of time.

As far as working capital management is concerned, policies involving the composition of current assets to total assets varies between firms as they deal with issues such as satisfying customer needs (for instance, preventing stock outs) and ensuring creditor needs (for instance, having enough liquidity to pay them) are taken care of. High current assets to total assets ratio (CATA) ensures that liquidity problems are sorted out. However, if large sums are withheld as current assets, there is the issue of opportunity costs which reduces the firm's capacity to maximize profitability as funds tied up there reduces returns on such short-term investments. Customers and creditors may represent a large section of a firm's stakeholders and keeping them happy makes long-term relationships strong (Ng, Smith & Smith, 1999). Nonetheless, this would be at the expense of lower returns on these funds

[9] Claessens et al (2000) studied corporate performance in East Asia prior to the financial crisis of 1997 and compared them with firms in other regions. They found that among other determinants such as external factors (for example a drop in aggregate demand), weak financial structure including inefficient working capital management practices played an important part in many firms facing distress conditions.

which could have been used to finance fixed assets. Fazzari and Petersen (1993) view working capital as the use of funds which is competing with a firm's fixed investment.

Many researchers (e.g. Van Horne and Wachowicz , 2000 : Nazir & Afza, 2009) have placed emphasis on the various working capital management policy strategies as high levels of current assets relative to total assets (CATA) and/or high levels of current liabilities relative to total liabilities (CLTL) may have an impact on firm profitability. It is thought that if there is a high level of current assets as a percentage of total assets, firms may not have liquidity issues but lose out on opportunities to use such valuable funds elsewhere hence affecting overall profitability. In the same vein, if a firm has high levels of current liabilities compared to total liabilities, liquidity issues would be of concern as current liabilities constitute short term obligations which may, for instance, leave creditors worried that they may not be paid on time or paid at all. When this occurs, it would have an impact on the costs of additional funds and this in turn may have effects on the overall financial health of a firm. In static terms, working capital management can be looked upon as a balancing act between managing current assets and current liabilities (Cheatham, 1989). In dynamic terms, Pass and Pike (1984) view working capital as equilibrium between activities on generating income from the purchases of resources.

Researchers have noted the adoption of short term working capital policies in terms of either financing or investment policies. For instance, using panel datasets of Pakistani firms during the 1998-2005 periods, Nazir and Afza (2009) found that managers can create better value for their firms if conservative working capital

investment and financing policies are employed. In addition, the same study reveals that investors have given more value to firms which adopt an aggressive short-term financing policy. Besides these two working capital metrics, the cash conversion cycle is commonly used to investigate how efficiently a firm's working capital is managed by incorporating the element of time. This advantage gives the cash conversion cycle an advantage over other static measures such as the current ratio and acid-test ratio. The popularity of the cash conversion cycle is due to its ability to provide a good assessment of a firm's liquidity (due to its dynamic nature) and a fall in liquidity levels may lead to a higher risk of financial distress or even bankruptcy (Cagle, Campbell & Jones, 2013).

Firms especially public-listed ones use a number of different strategies to optimize the use of working capital since it is regarded as an important resource from which value can be derived. This paper discusses three strategies used by firms and investigates the effects of these three strategies on its financial health. The three strategies can be classified as:

(i) Aggressive Short-Term Asset Investment Policy

(ii) Aggressive Short-Term Asset Financing Policy, and

(iii) Working Capital Efficiency.

(i) Aggressive Short-term Asset Investment Policy.

This policy is said to be employed when minimal levels of current assets are employed in comparison to long-term fixed assets. If the level of current assets increases in proportion to its total assets, working capital management is said to be becoming more conservative as the opportunity cost of utilizing currents assets

becomes lesser. This is referred to as a conservative policy in managing its short-term investment (Nazir & Afza, 2009). Intuitively, in order to measure the degree of aggressiveness of working capital investment policy, the ratio CATA is used whereby, CATA = Current Assets /Total Assets. A lower value of CATA indicates a more aggressive policy.

Some empirical evidence on the effect of CATA on financial performance include a study by Nor Edi and Noriza (2010) which showed that a conservative short-term investment policy had an effect on a firm's financial performance. In their study, a more aggressive short-term asset management policy (such as a low CATA) led to lower financial health levels and a more conservative policy led to better financial health.

(ii) Aggressive Short-term Asset Financing Policy.

Firms which use more long-term debt and less current liabilities are said to practice a more conservative short-term financing policy. On the other hand, firms which generally use an aggressive short-term asset financing policy utilize higher levels of current liabilities with respect to long-term debt and are said to put liquidity at risk. The degree of aggressiveness of a firm's financing policy is best measured by:

> CLTL = Current Liabilities / Total Liabilities, whereby a higher value indicates a more aggressive working capital financing policy (Pomerleano, 1998).

Therefore, a firm can adopt an aggressive policy by increasing the level of current liabilities as a percentage of total liabilities as suggested by Nazir and Afza (2009) and Pomerleano (1998). However, a more aggressive short-term financing policy as measured by a higher CLTL may or may not lead to better financial health. This is

due to the paradox concerning issues such as liquidity and adequate cash flow concerns against profitability.

(iii) Working Capital Efficiency Measurement.

In working capital literature, the cash conversion cycle of a firm measures how efficiently a firm's working capital is managed in terms managing its payables, receivables and inventory. It was first conceived by Gitman (1974) as a dynamic[10] liquidity measure in response to static measures such as cash ratio, current ratio and acid test ratio. Others, such as Jose, Lancaster and Stevens (1996) found that higher profitability could be achieved for corporations which maintained a more aggressive liquidity management policy in terms of reducing the cash conversion cycle. In Taiwan and Japan, Wang (2002) studied the effect of liquidity management on operating performance and using the cash conversion cycle concurred that lower liquidity corresponded with better operating performance.

Shin and Soenen (1998) and Deloof (2003) have presented evidence that profitability and returns (which are risk adjusted) are negatively related to the cash conversion cycle. In a study involving a large sample of US firms during the period 1975-1994, Shin and Soenen (1998) showed that there was a significant negative relationship between the cash conversion cycle and firm profitability. Their study provided empirical evidence that managers can create value for their owners by managing this aspect of working capital policy. Thus, the cash conversion cycle (CCC) is a valuable metric commonly used to measure working capital management (WCM)

[10] Pinches (1992) and Arnold (1998) were among those who clarified the dynamic aspect of CCC as it focuses on the time taken from acquiring raw materials and other inputs till cash inflows are attained as a result of sales of goods and services.

efficiency which conforms to the idea of an integrated working capital management approach as it comprises various components of working capital variables.

A study conducted by Deloof (2003) on a balanced panel set of 5045 firm-year observations comprising large Belgian non-financial and non-utility firms during the period 1992-1996 revealed that managers can increase profitability by managing individual working capital items. It was found that when the number of days accounts receivable, number of days accounts payable and inventories were reduced, corporate profitability was enhanced as less profitable firms take a longer time to pay their bills and receive their payments.

Working capital efficiencies can be captured by the cash conversion cycle (CCC) and its components and generally a shorter CCC implies better overall WCM efficiency as it relates to better (quicker) collectability of accounts receivables. Richards & Laughlin (1980) expressed the view that WCM has a large impact on a firm's liquidity and as such they use the CCC as an alternative to traditional liquidity ratios such as the current ratio and quick ratio. The CCC takes into account the timing of cash flows (both inflows and outflows) thus rendering it superior to traditional liquidity ratios. Schilling (1996) added that working capital management is concerned about a firm's liquidity position and promotes the use of the CCC as the most dynamic tool in managing liquidity.

The logic behind the usage of the cash conversion cycle is that the longer the CCC, the more urgent is the need to address a firm's liquidity position. This is because a higher CCC means it takes a longer time for a firm to collect its receivables, thus

making the CCC metric a more dynamic tool compared with traditional ratios such as the current ratio and quick ratio. The CCC can also give indications on the aggressiveness of working capital management (WCM) policies as a shorter CCC represents more aggressive WCM policies. Uyar (2009) found in a study using public listed Turkish firms that a shorter CCC generally leads to better firm performance in terms of managing its important resource, that is, its working capital. A number of studies have used CCC as an active variable in predicting firm profitability (Jose et al, 1996; Shin & Soenen, 1998; Richards & Laughlin, 1980; Schilling, 1996). Jose et al (1996) in a study examined the relationship between aggressive working capital management policies and profitability of US firms using the CCC whereby a shorter CCC represents a more aggressive WCM policy. Their study found a significant negative relationship between CCC and profitability. In a similar vein, Teruel and Solano (2007) found that shortening the cash conversion cycle improved profitability among a sample panel of 8872 Spanish small and medium sized enterprises (SMEs) during the 1996-2002 period.

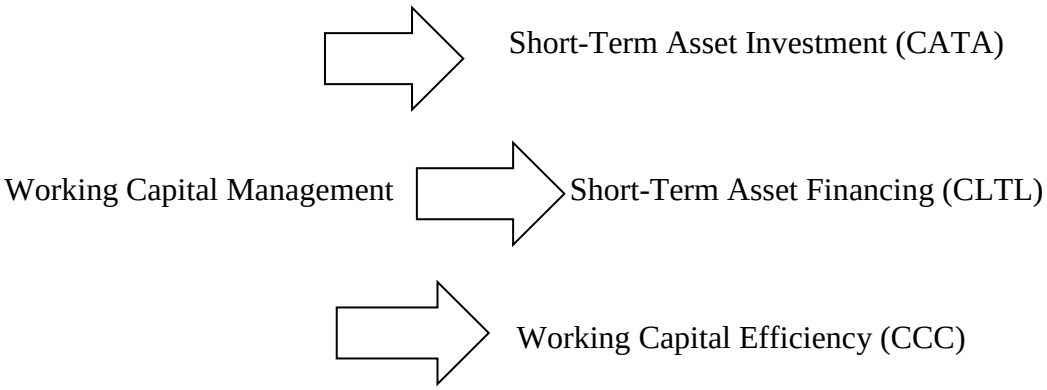
In other studies, Hasan, Halil, Arzu and Salih (2011) used a panel data of companies in the Istanbul Stock Exchange for the period of 2005 – 2009 to shed light on the empirical relationship between efficiency of working capital management and corporate profitability. Their findings revealed that reducing the cash conversion cycle (CCC), a measure of working capital management, positively affected the return on assets (ROA), which is a measure of profitability. Earlier, Uyar (2009) used cross-sectional data on 166 Turkish listed firms and came to the same conclusion whereby the cash conversion cycle had a negative relationship with both ROA

(return on assets) and ROE (return on Equity) of firms listed in the Istanbul stock Exchange.

In the Malaysian context, Zariyawati et al. (2009) used a panel data of 148 firms obtained from six different economic sectors over the period 1996-2006, which led to 1,628 firm year observations. The authors' aim was to understand the relationship between working capital management and firm profitability of firms listed in the Malaysian Stock Exchange. The results of the pooled Ordinary Least Squares (OLS) regression analysis showed a strong negative relationship between CCC and firm profitability.

Traditionally, the current ratio (Current assets/Current liabilities) is intuitively seen as an indicator of liquidity as it is a ratio of short-term assets and short-term liabilities. However, it is better to separate working capital in terms of fulfilling a firm's short-term asset investment and short-term asset financing needs. It is imperative to understand a firm's working capital policy by distinguishing between the short-term investment and short-term financing components (Etiennot, Preve & Allende, 2012). Therefore, the use of the current ratio as a metric for working capital policy metric is relegated. Instead, a short-term asset investment policy variable (CATA) and a short-term asset financing policy variable (CLTL) are used. The additional metric used to measure working capital effectiveness is the popular cash conversion cycle (CCC).

In a snapshot, the three working capital management policy decisions can be summarized as follows:



2.4.3 The Moderator Variable: Cost of Capital

Fund suppliers to the requirements of a firm's financial needs are traditionally classified as either creditors or investors. In the modern context, the most common sources of capital are bonds (debt) and equity. The key difference between groups of debt holders and shareholders are that bondholders and creditors seek principal and interest on sums lent out to firms whereas shareholders seek an expected return from not just the operational activities of the business but also the risk they are bearing on granting their investment towards the firm. Things can get a little complicated as loan providers and shareholders can demand higher rates of return mainly because of two factors, the first being the uncertainty surrounding the firm and secondly the information asymmetry between managers of firms and capital providers.

Despite issues concerning the valuation of funds, finance academics agree that the overall cost of funds is best measured by taking into account all financing costs of its component capital needs. The most common and widely accepted proxy for cost of capital is the weighted average cost of capital (WACC). Many managers feel that it is

appropriate to use the weighted average cost of capital to calculate residual income which is realized when capital used is deducted from operating income (Christensen et al ,2002), and the weighted average cost of capital (WACC) is considered a firm's cost of acquiring investment capital.

In finance theory, the value of any firm is bound to be interpreted as a function of its future forecasted cash flows and in order to generate these cash flows, firms need to raise capital. Capital raised through bondholders, shareholders and other security holders of the firm has costs attached to each group of investors. This is from the stakeholders' point of view. From a firm's point of view, Kitagawa and Gotoh (2011) believe that cost of capital is a cost necessary to anchor a shareholder to the firm. From an investor's point of view, it is a minimum return an investor expects to part with the provided capital and this is consistent with the common belief that the firm's goal is to maximize shareholder wealth. Some firms use cost of capital as a basic tool to affirm if they have met their goals and objectives and Giddy (1981) suggests that for a firm to be successful it needs to have funds available at the lowest cost.

There are bound to be costs attached to these capital needs and as such, raising debt and equity involves decisions based on their component costs and subsequent overall costs as these security holders forego the opportunity to invest their money elsewhere. Holders of a firm's financial claims, whether debt or equity holders, assess the firm based on its market value of its assets (forward looking approach based on what they are expected to produce in the future) and not based on its accounting based book values (based on historical costs). As many finance commentators are aware, calculating the component costs of debt of a firm is quite

straightforward but calculating a firm's equity is far from easy and has created controversies among finance researchers and practitioners.

Nenkov (2012) believes that there is a reason for the measurement of the cost of equity receiving wide attention among academic theoreticians and practitioners of financial management and valuation. This is because no model of estimation has been good enough to come close to its true value in a consistent manner. Kihm (2007) describes cost of equity as a minimum concept which is not necessarily a measure of reasonableness. When capital providers such as stockholders invest in a firm, they expect a minimum rate of return a firm can earn from its existing assets and still meet the expectations of these stakeholders as they incur opportunity costs. The cost of equity is part of a firm's financing cost due to compensation expected by shareholders for providing capital and waiting for this return. In addition to the risk-free return this cost also incorporates a risk premium from holding equity rather than a security without risk (Zorn, 2007).

For a firm to be financially viable and in good health, one of the first things to consider is that, the cash flows generated from a firm's operations must exceed the costs of raising capital. Therefore, there is a need to include cost of capital as one of the variables which affects financial health. In addition, contingency theory posits that firms do not employ a universal system that is optimal all the time. Circumstances or contextual conditions determine which control systems work best for the firm (Waterhouse & Tiessen, 1978). As Horngren (1982) aptly puts it "the choice of a technique or system is inherently dependent on specific circumstances".

In this study, a firm's cost of capital is used as a moderating variable to investigate the relationship between working capital policy variables and financial health. And this interplay between a firm's working capital management decisions, its cost of capital and their effects on its financial health will provide the main theme for this study.

2.5 Methodological and Measurement Issues.

It is worth mentioning here that most work done on this area in Malaysia assumed that all firms were similar to each other in most respects instead of them being from different industries. In addition, when data was collected over time, the element of time, that is, time effects were rarely discussed. This calls for a new direction to be taken in terms of identifying working capital management effects on a firm's financial health and panel data methods may be useful in uncovering relationships which may not be possible if purely pooled data methods are used.

Past research on the effects of working capital management on financial health has also been hampered by the fact that distress measures may differ across industries since firms from different industries are subject to different accounting rules as they use financial information in their construction (Mansi et al, 2009). Firms from different industries may also be exposed to different risk factors. There are a number of studies on working capital management and its relation to profitability which focuses solely on a particular industry[11] to avoid the trap of generalization. For this research, these points are mitigated by the fact that the population concerned is made

[11] For instance, Samiloglu and Demirgunes (2008) studied a sample of manufacturing firms listed in the Istanbul Stock Exchange and found that components of the cash conversion cycle affected firm profitability.

up of listed Malaysian firms involved in trading, services and consumer products. Therefore, firms that constitute this sample would be from a similar industry.

Most studies concerning effects of working capital management on corporate wellness in Malaysia used correlation analysis and multiple regression methods. Furthermore, the data obtained were composed of a cross-section of firms taken at a particular period in time. Even when data was collected and pooled over a period of time, say, for the five-year period (2003 till 2007) that Nor Edi & Noriza (2010) used in their study, the data was still not treated as longitudinal or panel data. In their study, steps were not taken to distinguish the heterogeneity and time factors. However, this study plans to use panel data analysis which not just considers heterogeneity among the various firms but also the ability to study the dynamic relationships as the same firms are followed over time. In other Malaysian studies on working capital management, Zainuddin (2006) used correlation analysis to infer that there was significant positive association between working capital ratios and firm profitability among SMEs in Malaysia which contradicts with the axiom that there is a negative relationship between liquidity and profitability.

As theories in financial management have reached sufficient levels of sophistication, innovation and development over the years, it is felt that there is a need to investigate further intervening factors rather than just the main effects of the independent variables on the main variable under study (Aguinis, 1995). For instance, in this study an interaction or moderating variable would be introduced which proposes that any relationship between the working capital management policy variables and

financial health of a particular firm varies due to a third variable, which in this case, is the cost of capital.

One of the larger issues that can be foreseen in this research is the measurement of the cost of equity as it is an important component of cost of capital. Bekaert (1995) earlier contended that emerging markets were largely segmented although in later studies Bekaert et al (2007) agree that globalization has made markets more integrated. There are arguments that a local Capital Asset Pricing Model (CAPM) should be used in segmented markets and a global CAPM for integrated markets (Stulz, 1996).

In the Malaysian context, Foong and Goh (2010) describe valuation in an emerging market such as Malaysia's very challenging due to lack of a single best practice for such valuation. Hence, it was suggested that both global and local factors should be included into the CAPM model for the estimation of the cost of equity for Malaysian firms. They quoted an example whereby the US sub-prime mortgage crisis in 2008 created concerns leading to the Malaysian economy contracting by more than 6% during the first quarter of 2009. Malaysia is thus considered a partially integrated market. Nevertheless, research shows that most practitioners in the United States (Bruner et al, 1998) and in the UK (Mclaney, Pointon, Thomas & Tucker, 2004) prefer to use the CAPM as a means to calculate the cost of equity and it has become popular in emerging markets (Pereiro, 2006). Nenkov (2012) believes that the preference for using the CAPM as a means to calculate the cost of equity is associated with problems in the successful application of alternative models such as the Arbitrage Pricing Model.

Many finance experts continue to believe in the usefulness of the CAPM (Da, Guo & Jagannathan, 2012; Nenkov, 2012) and explain that although it is far from perfect, it is conceptually sound and is often used reliably to estimate the cost of equity. Furthermore, in a survey conducted by the Association of Financial Professionals in the US, over 80% of finance practitioners surveyed reported using CAPM as their preferred method to estimate the cost of equity on the basis of the associated risk (Jacobs & Shivdasani, 2012).

2.6 Moderator Analysis.

A number of validation models in finance related research place emphasis on the degree of association between predictor variables and a criterion variable. When financial performance is the criterion variable, the common predictor variables are firm size, leverage and firm growth. Over the years, research has shown that other factors most notably working capital management policy variables (the focus variables in this study) have shown a promising role in determining firm performance. However, care must be taken in understanding the phenomenon of the predictive efficacy of these focus variables. More specifically, the association of a predictor variable on the criterion variable may be contingent upon a third variable. Sharma, Durand and Gur-Arie (1981) clarified some confusion about the different types of moderator variables and thus suggested four types of moderator variables. This will be discussed in the next section.

2.6.1 Identifying and Determining the Type of Moderator Variable.

In moderator analysis, emphasis will be placed on simple main effects and interaction contrasts. Firstly, simple main effects are generally conditional effects whereby the emphasis will be on the effect of the independent variables like control

variables (such as leverage and firm size) on a firm's financial health. Then, the focus independent variables (the working capital management policy variables) are added to see if the addition of these variables has a significant impact on the criterion variable. Subsequently, the variable which is thought to moderate the relationship between the focus independent variable and the criterion variable is introduced into the multiple regression specification together with the interaction effects.

Sharma et al (1981) presented a typology of moderator variables (see Table 2.6.1) to identify the presence and type of moderator variable in a multiple regression setting. The typology uses two dimensions to distinguish between the different types of moderators. The first dimension is whether the moderator variable is related to the criterion variable and the next dimension is whether it interacts with the predictor variable. Since this research focuses on the type of moderating role of WACC on the relationship between working capital variables and financial health, the following typology introduced by Sharma et al (1981) will be used.

Table 2.6.1
Moderator Types*

	Related with the dependent variable	Unrelated with the dependent variable
No interaction with Predictor	Predictor Variable	Homologizer
Interaction with Predictor exists	Quasi-Moderator	Pure Moderator

*Above typology adopted from Sharma et al (1981)

Quite simply, what this means is that when a moderator is related to the criterion variable and interacts with a predictor, it is called a quasi-moderator (Jaccard & Turissi, 2003). In a strict sense, a pure moderator is one which has no relationship with the criterion variable but interacts with a predictor. For the purposes of this

study, investigations will be carried out to see whether the cost of capital plays the role of a quasi-moderator, a pure moderator or neither in defining the relationship between the focus variables and financial health. This will help in the specification of the multiple regression models to be used in studying the moderating effect of cost of capital on the relationship between working capital management variables and financial health.

Some researchers (Fry, 1971; Horton, 1979; Peters & Champoux, 1979) classify variables as moderators if they interact with a predictor variable irrespective of whether they (the moderators) themselves are significant predictors. Others (Cohen & Cohen, 1975; Zedeck, 1971) have strict assertions that moderators cannot be significant predictor variables. The third typology of moderators came about as some researchers (e.g. Bennet & Harrell, 1975; Ghiselli, 1972; Hobert & Dunette, 1967) propose using an analytic procedure to examine differences between groups based on some hypothesized moderator value. Nevertheless, the confusion surrounding the concept of a moderator variable seems to be alleviated by the proposal by Sharma et al (1981) that there exist four types of moderator variables as shown in Table 2.6.1. They clarified the understanding of the different types of moderator variables using two dimensions, that is, its relationship with the criterion variable and its interaction with the predictor variable.

This research will place emphasis on whether cost of capital as a moderator is related to the criterion variable and the predictor variable (called quasi-moderator) or acts as a (pure) moderator which purely interacts with only the predictor variable and unrelated to the criterion variable. In other words, of particular interest in this study

is the type of moderating variable which modifies the form of relationship between firm financial health and each of the focal independent variables (namely CCC, CATA and CLTL). Since this study is concerned with the interaction between the focal independent variables (CCC, CATA and CLTL) and the moderator variable (WACC), we can infer if WACC can be classified as a "quasi-moderator" or a "pure moderator" in accordance with the above-mentioned typology of specification variables suggested by Sharma et al (1981).In identifying the presence of a moderator variable, there are two common methods namely subgroup analysis and moderated regression analysis.

(i) Subgroup Analysis

In subgroup analysis, the sample is split into subgroups based on the value of the moderator variable (WACC in this case) whereby the moderator variable is dichotomized or trichotomized. For each subgroup, regression analysis is used to investigate the relationship between the focal independent variables (WCM policy variables) and the criterion variable (financial health). Once this is done, the predictive validity coefficient (R^2) for each subgroup analysis is compared and if there are significant differences, this indicates the presence of a moderator variable. However, it gives no indication of the type of moderator present and hence Sharma et al (1981) conclude that using this method is not appropriate.

(ii) Moderated Regression Analysis.

Unlike subgroup analysis, in this procedure, the loss of information due to the artificial transformation of a continuous variable such as WACC is avoided with complete utilization of data (as suggested by Zedeck, 1971). Moderated regression analysis can be applied in terms of control variables, a single focal independent variable and a moderator variable as suggested by Zedeck (1971) and Jaccard et al (1981). In empirical contingency research, moderated regression analysis is used to

establish the existence of a statistically significant interaction effect and the best method to do so is through hierarchical regression analysis (Arnold & Evans, 1979; Cohen & Cohen, 1983; Sharma et al, 1981).

This study encompasses three main areas namely (i) the impact of control variables on a firm's financial health generally, (ii) the specific effects of working capital management policies on financial health and (iii) the moderating role of cost of capital on the relationship between working capital management policies and financial health. This means studying the simple effects (control variables), studying the effects of the focal independent (WCM policy variables) and the interaction effects (due to WACC). Jaccard and Turissi (2003) suggest that researchers perform hierarchical multiple regression analysis when the researcher is interested in knowing if the addition of one or more predictor variables to an existing simple and main effects model will significantly increase the predictability of the criterion variable. This can be seen in the incremental explained variance (R-squared changes) due to the addition of the predictors.

(iii) Simple Effects, Main Effects and Interaction Effects.

Another way of looking at the relationship between the independent variables and the criterion variable is to classify the independent variables into either control variables, focus independent variables or the moderator variable. Simple effects are the effects of the control variables on the outcome variable conditional upon the moderator variable being equal to a particular value or a set of values. They are often of conceptual interest but usually have little to do with interaction effects. Main effects are the effects of the focus predictor variables on the criterion variable. For an interaction effect to exist in the moderator framework, the effect of the focal

independent variable on the outcome variable must differ depending on the level of the moderator variable.

(iv) Moderated Relationships and Interaction Effects in Multiple Regression.

For this study, a popular school of thought is used that conceptualizes the interaction effects in terms of moderated relationships. In understanding the moderator approach to interaction analysis, we look for a theory that specifies a moderator variable and what is called a focal explanatory variable whose effect on the dependent variable is thought to vary as a function of the moderator variable. For example, in this research, the short-term asset investment policy of a firm (measured by CATA) is said to affect the dependent variable (Financial Health) but is subject to the various levels of cost of capital. In this case, the focal independent variable is CATA and the level of WACC is theorized to play a moderating role in explaining financial health levels. What is of substantive interest here is the characterization of how different WACC levels can moderate the effect of working capital policy variables on a firm's financial health. Three working capital variables which would be used in this study include the current assets to total assets ratio (CATA), the current liabilities to total liabilities ratio (CLTL) and the cash conversion cycle (CCC).

The interaction effects can be difficult to imbue in practical settings and Jaccard & Turrisi (2003) believe that most researchers ultimately fall back on the moderator framework. For instance, the current liabilities to total liabilities ratio (CLTL, one of the working capital management metrics) of a firm may have a larger impact on the financial health of some firms than for others. The reason some firms may display a different relationship from others could be due to a third variable and this has to be investigated. The investigation centers on a moderated causal relationship in which

the nature of the relationship between the CLTL and Financial health of a firm varies, depending on the value of a firm's cost of capital. In the typical moderator framework, financial health is the outcome variable and CLTL is the independent variable and WACC is the moderator variable. WACC is said to moderate the relationship between CLTL and FH.

CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

After having identified the necessary variables from the problem statement and subsequent research questions, the next steps would involve developing the research design and forming the research framework to seek answers to the research questions. This is important as the requisite data gathering process will be put into place to investigate the relationships through the various hypotheses developed and analyzed through statistical analysis. Inferences regarding the population parameters would be drawn from sample statistics.

3.1 The Research Design

Research design involves structuring an enquiry in a logical manner to ensure that the evidence collected enables the research questions to be addressed in a convincing manner. Its central role is to make all efforts to minimize making causal inferences which are incorrect or even spurious from the data and the analysis. For this purpose, samples from which data are obtained must be truly representative of the population to ensure our results are unbiased. The research design developed includes both descriptive and explanatory research elements.

Descriptive, diagnostic and predictive analysis in that sequence will be carried out. The focus would be on the research problem and research questions and what evidence is necessary to address them. In addition, the determination of the correct functional form would be discussed in detail to ascertain that the chosen functional form and subsequent analysis do not lead to erroneous conclusions. Descriptive

measures in this study are meant to give the 'what' elements which provide rich information and added knowledge to the subject of study. In turn, this would be used to provoke the 'why' elements of subsequent explanatory research. Descriptive statistics include the calculation of sample means and standard deviations of the variables. In addition, graphs and charts would be used to describe the individual variables and correlation analysis would be used to describe relationships between bivariate variables. Subsequently, the explanatory part of the research would seek to answer the 'why' questions which involve developing statistical models. From these models, drawing of conclusions via statistical inference methods would be performed such as the various hypothesis tests. Results and findings would be used to answer the research questions.

In specific terms, the results of the hypothesis tests would be used to argue whether working capital policies can affect financial health (direct effect). Further tests would be along the lines of whether working capital policies can provide firms with an avenue for improving financial health provided they keep their costs of capital low (indirect effect). One point to note however is that, as Cook and Campbell (1979) observe, while correlation is observable via correlation statistics, causation is not that simple to prove but can be inferred via inferential statistics.

Nonetheless, the research process must reduce the chances of incorrectly determining that a relationship is causal when in fact it may not be so. This can be done by performing a thorough analysis and eventually combining logical analysis (evidence from previous research) and astute statistical processes to make sure hypothesis tests

are performed on valid statistical models that meet all (or most) criteria of robustness. This is to ensure that the quality of analysis is maintained.

3.1.1. The Research Approach.

A number of studies have contributed to a substantial body of research on the individual components of working capital. For instance, Petersen and Rajan (1997) illustrated that receivables influence capital market access and profitability. Deloof and Jegers (1999) pointed out that payables were related to financing deficits when they studied the demand side of trade deficit. However, over the years, it was found that integrated working capital policies were better suited for changing trading cycle environments as illustrated by studies done by Richards and Laughlin (1980), Sartoris and Hill (1983) and Gentry, Vaidyanathan and Lee (1990).

Since the focus of this research centers on the effect of various working capital management policies on the financial health of firms listed in Bursa Malaysia, the degree of aggressiveness of these policies can be measured through a number of metrics since working capital itself comprises of many items. As such, this study will use an integrated approach to explain how changes in working capital policy strategies can affect firm financial health. The integrated approach to investigate working capital management policies brings us to three commonly used metrics to describe a firm's working capital policy.

The first working capital variable is the ratio of current assets to total assets (CATA) which is used to measure the aggressiveness of a firm's short-term asset management policy (Yusuf & Idowu,2012; Nor Edi & Noriza ,2010). The second variable is a

firm's current liabilities to total liabilities ratio (CLTL**)** as advocated by authors of many studies concerning working capital management in relation to firm performance (e.g. Pomerleano ,1998; Yusuf & Idowu,2012; Nazir & Afza ,2009; Horne & Wachowicz ,2000). In one of these studies, Nazir and Afza (2009) distinguished two measures of working capital management. They are (i) the degree of aggressiveness/conservativeness of working capital investment policy via the ratio of current assets to total assets (CATA) and (ii) the degree of aggressiveness/conservativeness of working capital financing policy via the ratio of current liabilities to total liabilities (CLTL). The third metric popularly used to study working capital management policy is the cash conversion cycle which many see as a composite working capital efficiency variable consisting of a mix of payables, receivables and inventory.

As in most quantitative research, this study will use the hypothetic-deductive approach which would be structured as follows. Based on previous studies as mentioned in the literature review, ideas on the relationship between different working capital variables and financial health are formed with cost of capital as the moderating variable. Subsequently a theoretical framework is developed to show the inter-relationships between the various variables. Hypotheses are then created in relation to the problem statement and research questions.

In short, data collection methods are devised to gather data from the various sources on the dependent variable, the focus variables and the interacting variable. Descriptive measures are obtained through a statistical package program for the purposes of extracting information to provide some general background information.

Using this information, hypothesis tests are carried out to look for compelling evidence with regards to the research questions. Discussions, deductions and implications of the study would be made based on the outcomes of the hypothesis tests.

3.2 Development of the Research Framework

The research framework uses some finance theories to substantiate relationships between the variables. Resource dependent theory suggests that current assets and current liabilities are important resources to the firm in terms of investment and financing and must be managed frugally in order to gain advantages over their competitors. This theory also suggests that firms with better access to the capital markets can lower borrowing costs and this can lead to a firm having competitive advantages over its rivals. Managing a firm's cost of capital can be looked upon as a strategy (valuable resource) which can play an important role in developing better financial wellness for a firm. As such, this can act as a moderating influence in the relationship between working capital management policies and financial health.

The framework used to investigate the relationship between working capital policies and the firm's financial health posits that firms with different costs of capital can play a moderating role in the variation in financial wellness levels. The conceptual model also draws upon the trade-off theory in finance which explains that aggressive working capital policies can affect financial health levels either in a positive or negative manner depending on the ability of firms to keep their costs of capital at an optimal level. In our literature review, mention was made, for instance, that keeping low levels of current assets can yield better profitability (John,1993) but face the

prospect of liquidity constraints that can affect overall financial health. On the other hand, in a similar but somewhat opposite manner, current liabilities if kept to a maximum is profitable for a firm if and only if the firm can manage paying them off in a timely manner without incurring additional costs or other debilitating penalty costs due to delays in payments. The risks inherent in holding too little current assets or too much current liabilities underlie the basic principle of the trade-off theory. Further to this argument is the premise that cost of capital can play a moderating role which can overrule suggestions made by the trade-off theory.

The framework begins by first examining the firm's control variables which (from past studies) affect a firm's financial well-being. The firm specific control variables are: (i) The size of the firm (ii) the firm's growth opportunities and (iii) the firm's leverage. The working capital management variables are: (i) current assets to total assets ratio (CATA) (ii) current liabilities to total liabilities ratio (CLTL) and (iii) the cash conversion cycle (CCC).The research framework is then constructed with the inclusion of cost of capital as the moderating variable which measures contingent effects between working capital variables and financial health as measured by the Altman Z-score.

3.3 The Research Framework

The theoretical framework used to model financial health among firms in the consumer, trading and services sector posits that working capital management policies of a firm play an important role in the variation of the financial health of a firm but the relationship may change due to the moderating effect of the firm's cost of capital. The framework uses two sets of independent variables namely the control

variables and a set of working capital variables where cost of capital is thought to play a moderating role.

The conceptual model draws on the perspectives of the trade-off theory which suggests that aggressive working capital policies may improve profitability at the expense of liquidity concerns and the resource dependent theory which suggests that working capital is an important resource that firms must utilize wisely. The above framework posits that the relationship between the focus variables (working capital variables) and financial health may change due to the moderating effect of a firm's cost of capital.

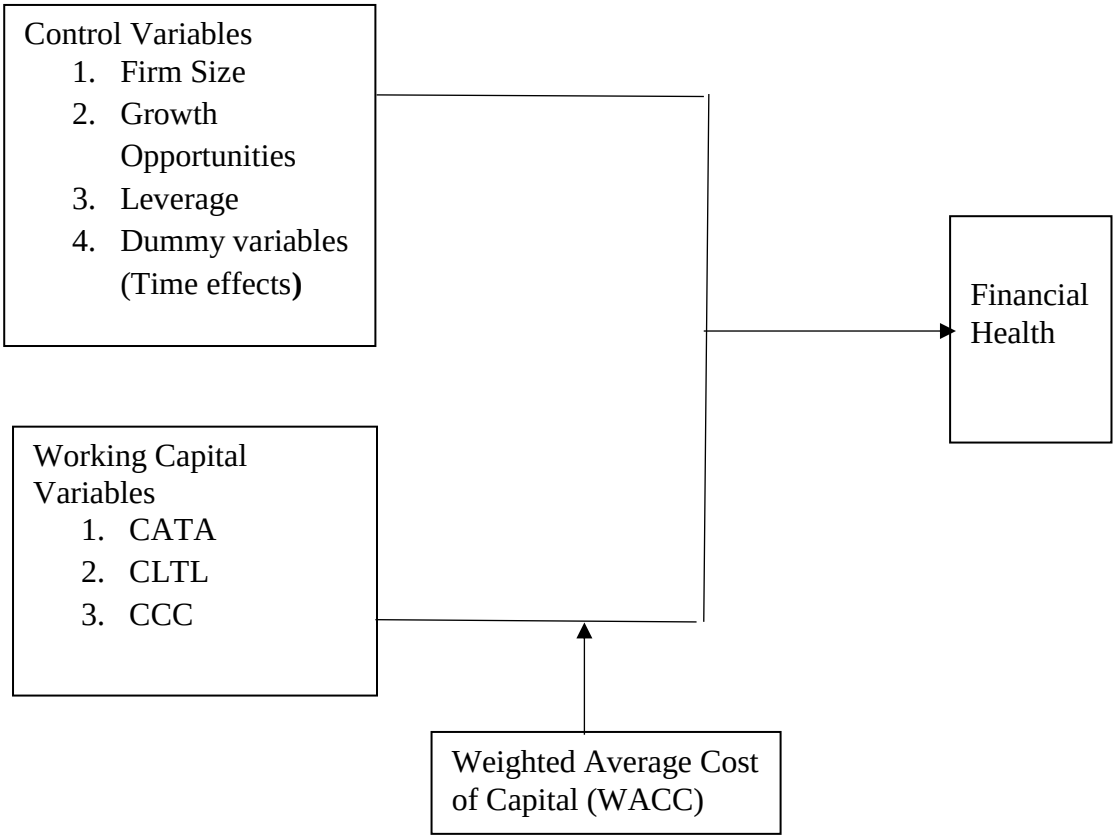


Figure 3.3
The Research Framework

3.4 Specification and Development of Hypotheses.

The table below (Table 3.4) describes several models in hierarchical fashion starting with the control variables, followed by the focus variables and finally incorporating the moderator variable and the interacting variables with financial health (as measured by the Altman Z-score) as the dependent variable.

Table 3.4
***Diagrammatic Representation of Hierarchical Modeling*.**

Dependent Variable	**Financial Health (Measured by Altman Z-Score)**			
Independent Variables	**MODEL 1**	**MODEL 2**	**MODEL 3**	**MODEL 4**
CONTROL VARIABLES				
Firm Size	√	√	√	√
Leverage	√	√	√	√
Leverage Squared	√	√	√	√
Growth	√	√	√	√
Six Time Dummy Variables (7 years)	√	√	√	√
MAIN EFFECTS (Focus variables)				
CATA (Current Assets/Total Assets)		√	√	√
CLTL (Current Liabilities /Total Liabilities)		√	√	√
CCC(Cash Conversion Cycle)		√	√	√
MODERATOR				
WACC(Cost Of Capital, Moderator)			√	√
MODERATING EFFECTS (Interaction variables)				
CATA.WACC				√
CLTL.WACC				√
CCC.WACC				√
GOODNESS OF FIT STATISTICS				
R-Squared	√	√	√	√

3.4.1 Controlled Model Building Specifications

Researchers have at their disposal methods to select variables that predict financial health in a rational manner based on either finance and economic theories or solid empirical basis. However, instead of entering predictor variables one at a time, block entry is preferred on the notion that several variables in combination may predict better than taking one variable at a time in isolation (Meyers, Gamst & Guarino, 2012). The block entries begin with the control variables followed by the focus variables and finally the moderator and interaction variables. Using the framework from Figure 3.3 and the diagram for hierarchical modeling in Table 3.4, this study uses the hierarchical regression method as an aid to investigate the importance of working capital policies on financial health. The study uses balanced panel data which has both cross-sectional and time series features. The time effects are controlled by introducing six dummy variables to indicate the seven time periods from 2006 till 2012 with 2006 as the base year.

The following specification is used to investigate if the first block of three control variables has an impact on financial health.

$$\text{Ln}\ (FH_{it}) = \beta_0 + \beta_1\ \text{Ln}\ (SIZE_{it}) + \beta_2 GROWTH_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LEVERAGE^2_{it} + \varphi_1 D1 + \varphi_2 D2 + \varphi_3 D3 + \varphi_4 D4 + \varphi_5 D5 + \varphi_6 D6 + \varepsilon_{it}. \quad \text{(Equation 1)}$$

Whereby,

FH_{it} = Financial health as measured by Altman's Z-Score of firm i in year t,

$SIZE_{it}$ = Size of firm as measured by Market Capitalization of firm i in year t,

$GROWTH_{it}$ = Sales Growth of firm i in year t,

$LEVERAGE_{it}$ = Debt to Equity ratio of firm i in year t, with D1, D2, D3, D4, D5, D6 to represent time dummies with base year being year 2006.

ε_{it} = error term

Subsequently, the second, third and fourth block of variables are added on to the original specification. The specifications would then be:

$$Ln\ (FH_{it}) = \beta_0 + \beta_1 Ln\ (SIZE_{it}) + \beta_2 GROWTH_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LEVERAGE^2_{it} + \beta_5 CATA_{it} + \beta_6 CLTL_{it} + \beta_7 CCC_{it} + \varphi_1 D1 + \varphi_2 D2 + \varphi_3 D3 + \varphi_4 D4 + \varphi_5 D5 + \varphi_6 D6 + \varepsilon_{it.} \quad \text{(Equation2)}$$

Whereby,
CATA= Ratio of Current Assets to Total Assets,
CLTL = Ratio of Current Liabilities to Total Liabilities,
CCC = Cash Conversion Cycle.

$$Ln\ (FH_{it}) = \beta_0 + \beta_1\ Ln\ (SIZE_{it}) + \beta_2 GROWTH_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LEVERAGE^2_{it} + \beta_5 CATA_{it} + \beta_6 CLTL_{it} + \beta_7 CCC_{it} + \beta_8 WACC + \varphi_1 D1 + \varphi_2 D2 + \varphi_3 D3 + \varphi_4 D4 + \varphi_5 D5 + \varphi_6 D6 + \varepsilon_{it.} \quad \text{(Equation 3)}$$

Whereby,
WACC = Weighted Average Cost of capital of firm i in year t

$$Ln\ (FH_{it}) = \beta_0 + \beta_1\ Ln\ (SIZE_{it}) + \beta_2 GROWTH_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LEVERAGE^2_{it} + \beta_5 CATA + \beta_6 CLTL + \beta_7 CCC + \beta_8 WACC + \beta_9 WACC*CATA + \beta_{10} WACC*CLTL + \beta_{11} WACC*CCC + \varphi_1 D1 + \varphi_2 D2 + \varphi_3 D3 + \varphi_4 D4 + \varphi_5 D5 + \varphi_6 D6 + \varepsilon_{it.} \quad \text{(Equation 4)}$$

Whereby,

WACC*CATA = Interaction variable suggesting WACC's impact on the relationship between CATA and FH

WACC*CLTL = Interaction variable suggesting WACC's impact on the relationship between CLTL and FH

WACC*CCC = Interaction variable suggesting WACC's impact on the relationship between CCC and FH

The fourth specification (Equation 4) contains interacting variables which consists of products of focus variables and the moderating variable. Relations between working capital policy variables and financial health may not be as strong as one would expect and the relationship may be stronger for some firms compared to the others. Firms with a lower cost of capital may find working capital variables having a stronger association with financial health compared with others. Specification 4 is

created to study the effect of the moderating variable on this relationship by adding on the cross-product terms involving the moderator and the working capital variables. Interaction between these variables (working capital variables and cost of capital) generally means their effect on financial health may not simply be additive but multiplicative as well. Using specification 4, the following hypotheses can be created and tested.

To test if the control variables have an impact on financial health, the following hypotheses are created:

Hypothesis 1: Size of the firm has an impact on Financial Health.
Hypothesis 2: Growth of a firm has an impact on Financial Health.
Hypothesis 3: Leverage affects Financial Health.

To test if the focus variables, moderating variable and the interaction variables have effects on financial health, the next set of hypotheses are created and tested.

Hypothesis 4: CATA of a firm affects Financial Health.
Hypothesis 5: CLTL of a firm affects Financial Health.
Hypothesis 6: CCC of a firm affects Financial Health.
Hypothesis 7: WACC has an effect on Financial Health.
Hypothesis 8: WACC has a moderating effect on the relationship between CATA and FH.
Hypothesis 9: WACC has a moderating effect on the relationship between CLTL and FH.
Hypothesis 10: WACC has a moderating effect on the relationship between CCC and FH.

To test for statistical significance of the moderating effects, the coefficients of the interaction variables will be tested against a value of zero by using t-tests and p-

values. Large t-values (> 2) and small p-values (< 0.05) would imply that the effects are significant.

3.4.2 Determination of Correct Functional Form.

When econometric models such as those proposed in this study are used, it is imperative to look for interpretations in terms of sign and size (significance). However, before this is done, it would be prudent to ensure the correct functional form of the relationship between the dependent variable and the explanatory variables is administered. The use of logarithms of non-negative variable values and percentages (relative forms) instead of levels in applied research is common and leads to appealing interpretations. This is because logarithms and percentages normally narrow the range of the variables which make estimates less sensitive to extreme values (Meyers et al, 2012). Furthermore they mitigate cases of heteroskedasticity and skewness.

Logarithmic forms[12] give percentage change interpretations and often satisfy classical linear model assumptions more closely than using levels (Wooldridge, 2009). Another common form used in applied finance is the quadratic form to capture increasing or decreasing marginal effects. Quadratic relationships may conceivably produce better fits to the data. However, this would be investigated by looking at scatter plots involving the criterion variable and its regressors and if necessary incorporate them (quadratic forms) into the model to be tested.

[12] When an estimated model uses logarithmic items, they measure elasticities and are commonly used due to possible highly skewed data and heteroskedasticity. Using a log-log model reduces the importance of high-value outliers and makes errors more homoscedastic (Khandker, 2005).

3.5 Research Methodology

This section begins with the focus on the research process, the tools, and the procedures utilized to seek answers to the research questions. As this research is classified as quantitative in nature, efforts will be taken to describe, compare and to attribute causality (as prescribed by Stainback & Stainback, 1998). In terms of the purpose of enquiry for this research, two approaches would be used. From the research design and the theoretical framework, the first approach begins by embarking on an empirical search for predictors (relating to control variables, working capital policies and cost of capital) which would lead to explaining variation in financial health levels. The next step would be to search for statistical methods to determine specification forms and conduct robustness tests.

For the purposes of this research, a line is drawn between these two approaches as there are fundamental differences. For instance, the first approach which involves the search for predictors are on the grounds of economic significance of the variables, that is, there must be theoretically sound reasons for the choice of variables. The other approach is purely on statistical grounds whereby statistical accuracy in prediction, estimation and the significance of the parameters are deemed important. Tests for robustness of the models used for the purposes of estimation of parameters and prediction of financial health levels are carried out so as to reduce doubts about the results obtained and subsequent inferences drawn from the results obtained.

3.6 Measurement of Variables.

The necessary variables and their measurements in this study come from a variety of sources and they are as follows:

a) **Measuring the Dependent Variable : Financial Health**

Although an individual financial ratio can probably measure a particular strength or weakness in a company, no individual ratio can measure the overall strength or overall weakness of a firm. However, financial health is better measured by calculating the Altman Z-score which is a composite of five financial ratios comprising elements of liquidity, profitability, leverage, activity and solvency. Agarwal & Taffler (2007) maintain that the traditional Z-score invented by Altman (1968) remains a well-respected tool widely used by researchers, academicians and practitioners.

Although initially developed to be used as a proxy for bankruptcy risk, over the years, this score has been increasingly used as a reliable tool in assessing the financial health of public listed firms (Citron & Taffler, 1992; Carcello, Hermanson & Huss, 1995; Taffler, Lu & Kausar, 2004). In this study, the logarithm of the Altman's Z score is used as a proxy for financial health as it is common to approximate percentage change in a firm's financial health due to changes in the independent variables such as working capital management policy variables.

b) **Measuring the Control Variables:**

The Control Variables are chosen based on the literature search on the factors which help explain financial wellness of a firm and are measured as follows:

(i) The first control variable, the natural logarithm of market capitalization serves as a control for firm size for the period concerned. In this study, market capitalization is used to encapsulate the idea of size as it includes not just the number of outstanding shares but also the value of each share (Kajuter, 2006).

(ii) Growth of firm is measured by growth in sales for that particular financial year. It is used as a proxy for opportunities available for a firm as more opportunities mean the firm has a better chance of managing its financial wellness (Davidsson et al, 2009; Capon et al, 1990; Samiloglu & Demirgunes, 2008). It has been documented by Shepherd and Wiklund (2009) that more than 60% of reviewed articles have used sales growth as the proper metric for measuring firm growth.

(iii) Leverage is measured by the debt to equity ratio as empirical studies involving Malaysian firms have indicated that firms which are more leveraged run the risk of facing financial distress conditions (Nur Adiana et al, 2008 : Irene & Lee, 2007). This is due to increased mandatory interest and principal payments. Other studies which have used debt to equity ratio as a proxy for firm leverage is a study done by Tang (2009) in the US on the effect of credit rating changes on firms' credit market access, financing decisions and investment policies.

c) **Measuring the Focus Variables:**

The focus variables (working capital variables) suggesting relationships with financial health are those that are made up of working capital components most notably current assets and current liabilities. These variables are used in formulating working capital strategies. Working capital management policies are measured as described by Yusuf and Idowu (2012) involving short-term asset management policies and short-term financing policies. Using the context developed by Brigham and Gapenski (1997), the following proxies for working capital management

variables are used and for the purposes of clarity regarding working capital terms, the following definitions are used.

(i) CATA = Ratio of Current Assets to Total Assets – measures the proportion of assets that can easily be cash converters or easily sold. A higher CATA produces a larger cushion against unexpected imminent financial obligations. While a higher CATA indicates a conservative working capital policy, a lower CATA value signifies an aggressive working capital policy which can leave a firm in tatters if it cannot meet short term obligations. The CATA can be looked upon as a measure of the firm's ability to pay near-term obligations. A larger value of CATA would indicate liberal use of current assets and a smaller value would indicate more aggressive use of funds. Nor Edi and Noriza (2010) used correlation analysis to show that the CATA of a firm had a positive correlation with its market value.

(ii) CLTL = Ratio of Current Liabilities to Total Liabilities – measures the proportion of short-term (less than a year) obligations to total liabilities. This ratio offers a means of measuring aggressiveness of short-term financing policy and helps to determine the maturity structure of corporate debt (Pomerleano, 1998). A larger value of CLTL would indicate a more aggressive working capital policy because of a heavier use of short-term maturity securities. Pomerleano (1998) studied East Asian firms during the 1997 East Asian Financial crisis and found that the maturity structure of debt via the CLTL can tell us something on how firms were managing their working capital. A large value of CLTL can indicate liquidity problems, for instance, firms in Indonesia during the crisis were trying to lengthen debt maturity levels to avoid serious liquidity issues. Problems regarding

repayment and servicing of loans were made worse if a large portion of these loans were short-term in nature especially when capital markets became difficult and dried up. A higher value can result in liquidity problems in terms of difficulty in servicing short-term debts. The task of repaying a large portion of short-term debt can be daunting to a firm unless it has sufficient cash flows. Thus, a higher CLTL value suggests a more aggressive short-term financing policy.

(iii) While the CATA and CLTL can be considered static measures of working capital management, the cash conversion cycle is seen by finance managers as a popular and comprehensive dynamic measure of working capital management efficiency as it involves a number of working capital components such as accounts payable, accounts receivable and inventory. Intuitively a shorter CCC would be considered ideal as a longer time lag means a larger investment in working capital (Deloof, 2003). However, some researchers like Ashraff (2012) argue that a longer CCC may increase profitability as it can lead to higher sales due to a generous trade policy but at the expense of higher costs of investment in working capital. A lenient trade policy (higher CCC) can lead to better sales but this benefit can be outstripped due to higher costs in maintaining a higher investment in working capital. Lenient trade policy can mean allowing a longer time to collect receivables. The level of inventory held, days receivables outstanding are important components of the cash conversion cycle. A higher level of inventory could also signify a conservative working capital management policy as firms guard against stock outs but again such larger investments can hinder profitability efforts. The Cash Conversion Cycle (CCC) is calculated

by using three important components which detail the average time taken for a firm to sell its inventories, collect its receivables and finally pay its accounts.

The general formula is:

CCC = Days Inventory Outstanding (DIO) + Days Receivables Outstanding (DRO) – Days Payables Outstanding (DPO).
This equation can be expanded as:

CCC = [Average Inventory divided by (Cost of Goods Sold/365)] + [Average Accounts Receivable divided by (Net Sales/365) – [Average Accounts payable divided by (Cost of Goods Sold/365)] in days.

The DIO gives the number of days taken to convert inventory to sales, the DRO calculates the number of days required to collect on sales and the DPO furnishes the number of days the firm is able to defer payments on its payables. Generally a shorter CCC is considered favorable and it indicates that the firm is managing its working capital well. However, it is not entirely surprising to have a negative CCC which means the firm is managing its working capital so well that, on average, it is able to purchase inventory, sell them and collect the receivables from its sales before the corresponding payables from the inventory purchases are due.

d) **Measuring the Moderating Variable.**

The moderating variable is cost of capital which is measured by calculating the weighted average cost of capital of firms for each year ranging from 2006 till 2012. The component costs of capital are costs of debt, k_d (after-tax cost of debt is used) and cost of equity, k_e. The weighted average cost of capital can be seen as a minimum return a firm must achieve to satisfy its stakeholders composed mainly of debt holders and shareholders. Costs of debt are fairly easy to calculate as interest payments due to these types of capital providers are transparent and readily available from financial statements.

The after-tax weighted average cost of debt is calculated using Government bond rates, a debt adjustment factor (a Bloomberg proprietary calculation), the proportion of short-term debt to total debt, long term debt to total debt and the stock's effective tax rate. The debt adjustment factor represents the average yield above government bonds for a given rating class (whereby a lower rating gives rise to a higher adjustment rate). The following formula is used to calculate the after-tax weighted cost of debt:

$$\text{Cost of debt } (k_d) = [[(SD/TD) * CS * AF)] + [(LD/TD) * (CL * AF)]] * (1-TR),$$

Whereby, SD = Short-term debt, TD= Total debt, CS = Pretax rate of short-term debt, AF= Debt adjustment factor, LD= Long-term debt, CL= Pre-tax rate of Long Term debt and TR = effective tax rate.

Although costs of firm debt are fairly straightforward but calculating the cost of equity can be a real challenge as it depends on a number of factors including the riskiness in a firm's ventures. Furthermore, equity does not pay investors directly a fixed return and may be defined as the risk weighted projected return required by investors. Two of the more popular methods to estimate the cost of equity are the Gordon's dividend capitalization model (Dividend Discount Model) and the Capital Asset Pricing Model (CAPM).

Despite the Gordon's model looking intuitively reasonable, since most Malaysian public listed firms in the consumer, trade and services sector pay dividends in a consistent manner, it suffers from some serious deficiencies. The drawbacks include sustainability of dividend payments in the long run, dividend issuances being artificially reduced due to stock repurchases and it is difficult to estimate long run growth rates. In addition, younger growth firms may not pay dividends and may not

have plans to do so in the future and this does not mean that cost of equity does not exist for such firms. Therefore, in a typical ex ante scenario, Gode and Mohanram (2003) have reasoned that the dividend discount rate approach is problematic. This is because one must know the pattern of payout and future growth rates are difficult to estimate. Thus, analysts usually do not make these assumptions public, forcing researchers to make ad-hoc assumptions.

The CAPM model would therefore be the preferred method for estimating the cost of equity obtained from Bloomberg's repository of financial information whereby the cost of equity (k_e) is derived from the CAPM model. The CAPM model is used to estimate the cost of equity, $k_e = r_f + \beta (r_m - r_f)$ whereby r_f would be the risk free rate, $(r_m - r_f)$ would be the excess market return and beta (β) the market risk factor. The default value for the risk-free rate (used by Bloomberg) is the country's long-term 10-year bond rate. The beta used here (obtained from the Bloomberg's Database) is the adjusted beta from the past two years of weekly data but modified by the assumption that a security's beta moves toward the market average over time. The formula used to adjust beta is: Adjusted beta = 0.67*Raw beta + 0.33*1.0. The raw beta is a volatility measure of the percentage price change of the security given a one percent change in a representative market index. Thereafter, the weighted average cost of capital would be equal to $w_d k_d (1-t) + w_e k_e$ where, t=tax rate for that year and w_d and w_e are the market weights of debt and equity respectively. Although not free from flaws either, the CAPM remains the most popular measure for cost of equity (Nenkov, 2012).

Measuring the cost of equity can be quite a difficult exercise as many factors are said to affect its measurement. There are claims that emerging markets pose high risk and subsequently influence the cost of equity (Lessard, 1996). Nevertheless, finance researchers maintain that there are two main approaches with regards to measuring cost of equity. The first being the ex post approach using realized returns such as the CAPM and the Fama and French's three factor model and the ex-ante approach whereby the cost of equity is estimated via expectations by market participants. Despite many competing models to measure cost of equity, Estrada (2000) argues that the CAPM is still the preferred method to estimate the cost of equity in developed markets. As markets in Asia become more developed, the CAPM model is becoming more popular in its usage. Furthermore, it is intuitively more appealing to use the CAPM as it takes into account the risk return tradeoff apparent in investors expecting better returns as a reward for taking higher risks. Table 3.6 below provides a summary of the various types of variables, their description, measurement and their sources from literature.

Table 3.6
Summary of variable types, description, measurement and their sources.

Variable type/ Initials	Description	Measurement	Source-used in past Studies
Dependent Variable : Financial Health /FH	Financial Health of firm as in overall financial well-being which includes liquidity, profitability, solvency, leverage and activity variables and encompasses elements of risk and return	**The Altman Z-Score,** $Z = 1.2T_1 + 1.4T_2 + 3.3T_3 + 0.6T_4 + .999T_5$ Where, T_1 = Working Capital / Total Assets T_2 = Retained Earnings / Total Assets T_3 = Earnings Before Interest and Taxes / Total Assets T_4 = Market Value of Equity / Total Liabilities T_5 = Net Sales/ Total Assets	Altman(1968) ; Altman & La Fleur (1981); Agarwal & Taffler (2007) : Cho et al (2012) ;

Table 3.6
(Continued)

Independent Variables : Control variables are	Description	Measurement	Source used in past studies
1. Growth	i. Growth indicates opportunities for better managing financial well-being.	Measured via annual growth in sales used as a proxy for measuring firm growth.	Davidsson et al, (2009); Capon et al,(1990) ; Shepherd & Wiklund (2009)
2. Leverage	ii. Studies have shown that leverage is a key predictor of financial distress.	Measured by the debt to equity ratio.	Nur Adiana et al, (2008) ; Irene & Lee, (2007)
3. Size	iii. Size of firm usually translates to firms having the means and resources to produce better financial performance which leads to better financial health.	Measured by market capitalization of firm.	White(1989); Kajuter (2006)
Focus variables are :			
1. CCC	Cash Conversion Cycle details the average time taken for a firm to sell its inventories, collect its receivables and finally pay its accounts.	CCC= Days Inventory Outstanding (DIO) + Days Receivables Outstanding (DRO) – Days Payables Outstanding (DPO)	Jose et al (1996); Schilling (1996); Richards & Laughlin(1980); Uyar(2009); Cagle et al(2013)
2. CATA	Short-term asset management policy. – measures the proportion of assets that can easily be cash converters or easily sold. A higher CATA produces a larger cushion against unexpected financial obligations.	Ratio of Current Assets to Total Assets. Higher CATA means a more conservative short=term asset management policy which can reduce financial distress.	Nazir & Afza, 2009; Van Horne & Wachowicz (2000) ; Yusuf & Idowu (2012)
3. CLTL	Short-term asset financing policy. This ratio offers a means of measuring aggressiveness of short-term financing policy. A higher value means a more aggressive short-term financing policy.	Ratio of Current Liabilities to Total Liabilities – measures the proportion of short-term(less than a year) obligations to total liabilities.	Nazir & Afza (2009); Pomerleano (1998).

Table 3.6 (Continued)

Moderator Variable :	Description	Measurement	Source used in past studies
Weighted Average Cost Of Capital, WACC	Cost of funds the firm has at its disposal is said to have an impact on financial distress but these are expectations of a firm's capital providers and need not necessarily affect financial health directly. When or if costs of funds vary, it may affect the relationship between working capital variables and firm financial health.	Weighted Average cost of capital = After tax weighted cost of debt + Weighted cost of equity	Nenkov (2012) ; Estrada (2010).

3.7 The Unit of Analysis.

The unit of analysis is a public listed firm in Malaysia which belongs to the consumer, trading and services category. In the problem statement, mention was made in studying the relationship between working capital policies of a firm and their effects on the firm's financial health. Each firm will have its individual working capital policy and the research problem centers on how these policies affect its financial health and if there is a contingent factor (cost of capital) inherent in a firm that may explain further the relationship between these two variables.

3.8 The Nature of Data

Data on the financial health of firms and the respective explanatory variables are taken for the same group of listed firms taken at random from Bursa Malaysia from the years 2006 till 2012. Since the research involves studying firm behavior at more than one point in time, a balanced panel data is used where observations of the variables of the same firm over seven years are taken. This is done to reduce noise due to firm heterogeneity. The balanced panel data comprises of two components,

that is, the individual firm component and the time component. Thus the data collected would be a combination of time series and cross-sectional data with observations taken on 193 firms over a period of 7 years from 2006 till 2012.

Financial health, working capital variables, control variables and cost of capital data were collected for a set of 193 firms over a 7 year period which is a case of a large number of firms observed over a few periods of time (micro-panel data). There are a number of benefits using a balanced panel data namely:

(i) A time fixed effects test can be carried out by creating dummy variables specific to the period of study. Dummy variables offer rich information without 'killing' the data.

(ii) Larger sample size due to the pooling of individual and time dimensions creates more variability in data and reduced multi-collinearity. Pooling of datasets provides more efficient estimation, inference and possibly better prediction ability. However, pooling of data assumes that the population has the same distribution of data over different years and this will be tested before pooling of data is admissible.

(iii) Same firms over different periods of time exploit information on dynamic reactions of each firm over time.

3.9 Data Collection, Data Organization and Sources of Data

This study uses data on firms listed on Bursa Malaysia (The Malaysian Stock Exchange) for the period 2006 till 2012. The secondary data used in this empirical analysis was collected mainly from selected published statistics on corporate information available from Bloomberg's Database.

As Gujerati (1995) observed, the results of a research are as good as the quality of the data. The data obtained from Bloomberg's vast database include data on stock values, market risk values (stock betas) and information on costs of debt and equity. These component costs can be retrieved on a yearly basis in order to estimate a firm's weighted average cost of capital. In addition to that, the Bloomberg database also provides key statistics on firm performance, the Altman Z-score, control variables and working capital management ratios.

3.10 Population Frame, Sampling Frame and Sampling Technique

One of the challenges of data handling and data representation is whether the data retrieved is representative of the population in question. All efforts have been made to ensure that the sample obtained is unbiased meaning they represent the behavior of all the firms in the trading, services and consumer sectors. There are over 900 companies listed in the Main Market of Bursa Malaysia (Malaysian Stock Exchange) out of which there are 331 firms listed in the trading, services and consumer sectors. The initial sample of 331 firms consists of all firms in the consumer, trading and services sector covered by the Bloomberg database over the period 2006 – 2012. From the population frame of 331 firms, a sample of 193 firms were identified and used to represent the population of firms under the consumer, trading and services sector. The other firms were kept out of the sample due to various reasons chief among them being missing financial data and the unavailability of necessary complete data.

In addition, only firms established prior to 2004 were chosen to ensure some form of regularity and normalcy in the variable sets. For a firm to be included in our sample,

it should have consistent data for the years 2006 till 2012 for the estimation of parameters for the regressions in this study. Based on the above criteria, the initial number of firms in the trading, services and consumer sector dropped from 331 firms to 193 firms. For each of the 193 firms (60% of firms in these sectors) whose shares are publicly traded, the required data was collected and computed (where necessary) to obtain the variable values for this study for each of the years 2006 till 2012.

3.11 Data Analysis Techniques.

The main tools for analyzing and investigating the various relationships between the variables of interest would be correlation analysis and hierarchical moderated multiple regression. Panel data methods would be useful to look into the problem of heterogeneity in firms. However, before doing this, it would be interesting to look at some summary statistics such as the mean and variance of variables especially those which involve the different types of working capital policies. For instance, the means and standard deviations of working capital policy variables such as the ratio of current assets to total assets (CATA), the ratio of current liabilities to total liabilities (CLTL) and the cash conversion cycle (CCC) would help describe aggressive and conservative working capital policies inherent in Malaysian firms.

Correlation analysis is used by researchers to examine the strength of relationships between the variables of interest. In addition, it also gives an idea if the signs on the correlation coefficients are at odds with expectations. There are two ways in which correlation analysis would be of benefit to us. One is to examine the correlation of the independent variables with the dependent variable. Before looking for any influences, for instance, of the control variables on financial health or the working

capital policy variables on financial health, it is good to at least examine the correlations between these variables. The correlation could be probably and preferably explained by some logic, theory or built on some knowledge obtained from prior studies. The second use of correlation analysis is to detect the presence of multi-collinearity, that is, inter-correlations among the independent variables. The Pearson's coefficient of correlation and associated tests of significance available in STATA 12 would be used in this study.

To seek guidelines on the methods used to answer the research questions, a proper flow of methods used is imperative. Since panel data is used, it is commonly suggested by econometricians that the first step in investigating which model is the more appropriate one is to begin with the pooled OLS method (Cameron and Trivedi, 2009). Although it may seem convenient to do so, this approach tantamounts to oversimplifying the model, avoiding complexities and missing out on key issues such as firm heterogeneity and omitted variable bias. In respect of this, Wooldridge (2009) concurring with other studies (e.g. Hsiao,2003 and Baltagi, 2008) pointed out that it would be wise to focus on the choice of model by first testing between a Pooled Model and a Random Effects model by using the Breusch- Pagan test. Therefore, in this respect, tests will be performed on the suitability of the different models by posing questions such as:

(i) To pool or not to pool? This is done by the Breusch-Pagan Lagrange Multiplier Test. The test ascertains whether Pooled or Random Effects is the better model.

(ii) If pooling of data is not suitable, there is a need to decide on either the Random or Fixed Effects model. This second test of model appropriateness is

carried out by performing the Hausman test. Once this test is carried out, some idea on the suitability of the prescribed model would be known.

(iii) After having decided on the best model, tests for robustness of the chosen model are carried out. This involves performing diagnostic checks by testing for heteroskedasticity, serial correlation and multicollinearity as these assumptions are important for the models to be valid. If any of these assumptions are violated, appropriate robust models are suggested after appropriate remedial procedures are performed.

The primary aim of this econometric activity would be to quantify structural or causal relationships which are required for testing economic and finance theories. Although by construction, in a standard regression model, regressors and unobservables are uncorrelated; in reality explanatory variables may be correlated with the unobservables and thus render popular methods such as pooled OLS not feasible. This study will investigate if pooling of data is permissible and if this is not suitable, efforts will be made to develop models that reflect the structure of panel data by investigating whether fixed or random effects is the more appropriate model.

3.11.1 The Advantages of Panel Data Analysis over Cross Sectional Studies

The results of studies using only cross-sectional data can be highly disputed as they may be attributable to the problem of unobserved heterogeneity. In addition, pure time-series data again ignores the heterogeneity effect. These are compelling reasons for using panel data methods as opposed to cross-sectional or time series methods. Cross-sectional methods assist us in understanding the impact of particular variables at any point in time. Cross-sectional Ordinary Least Squares (OLS) estimators rely

totally on between firm comparisons and this can be misleading due to firms being self-selected. This makes such analysis less robust as firm-level panel data takes into account firm heterogeneity (Khandtner, 2012).

Using panel data, it is possible to identify the true effects even in the presence of self-selection. However, when pooled OLS is used, in the presence of firm heterogeneity, the estimators are biased due to unobserved heterogeneity. Failure to use the correct methods can lead to erroneous results.[13] Nevertheless, using panel data alone does not solve the problem of unobserved heterogeneity. Hence the need to apply special regression methods such as error components model whereby the error term ε_{it} (from Equation 4) is decomposed into two terms, a firm specific error term $\boldsymbol{\lambda_i}$, and an idiosyncratic term, u_{it} whereby $\varepsilon_{it,} = \lambda_i + u_{it}$.

3.11.2 The Pooled Model

The following is a multiple regression model relating financial health with the explanatory variables using a pooled model approach as described in section 3.4.1.

$$Ln\ (FH_{it}) = \beta_0 + \beta_1\ Ln\ (SIZE_{it}) + \beta_2 GROWTH_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LEVERAGE^2_{it} + \beta_5 CATA + \beta_6 CLTL + \beta_7 CCC + \beta_8 WACC + \beta_9 WACC*CATA + \beta_{10} WACC*CLTL + \beta_{11} WACC*CCC + \varphi_1 D1 + \varphi_2 D2 + \varphi_3 D3 + \varphi_4 D4 + \varphi_5 D5 + \varphi_6 D6 + \varepsilon_{it}. \quad \text{(Equation 4)}$$

The pooled model postulates that both intercepts and slopes are the same across firms and across time. This over simplistic model assumes that the intercepts do not change with firm or time and the slope coefficients do not change with firms. These

[13] A case in point is the study conducted by Deloof (2003) on the impact of the cash conversion cycle on Belgian firms' profitability. While a pooled method showed significant results, the fixed effects method showed no significant impact. It is interesting to note that the study did not include the Breush & Pagan's LM test to determine if data should be pooled.

assumptions are too restrictive since they would give rise to heterogeneity bias. In other words, if the assumptions that the intercepts and slopes are equal across firms and time are made, this leads to heterogeneity bias because there are often reasons why the intercepts or slopes may be different. As such, pooling the datasets may not be a good idea as it would produce a constant intercept and a constant slope. Baum (2006) pointed out that assuming a pooled model makes the error process more complicated especially if there is evidence of heteroscedasticity across panel units (across firms) and serial correlation within panel units (within firms). As such, pooled OLS solutions are not considered practical in panel studies.

Panel data methods suggest that firms are heterogeneous in nature and their intercepts differ from one firm to the other. This aspect of panel data analysis is important as a panel of firms may capture unobservable factors in each firm such as managerial quality, human capital and initial endowment of firms. Models with constant slopes and variable intercepts are the most popular in panel-data studies. They are the most widely used due to their simplicity and they fulfill general assumptions that parameters take common values over the time period in question (Hsiao, 2003).

3.11.3 The Treatment of Individual Effects (λ_i)

There are two proposed ways of treating the individual effects, λ_i, one being the assumption that λ_i's are treated as constants, whereby, each firm is said to possess an individual fixed effect. The second assumption is that $\boldsymbol{\lambda_i}$'s are drawn independently from some probability distribution which we call random effects (non-fixed effects).

a) The Fixed Effects and Random Effects Model

As discussed earlier, the composite error term is decomposed into: $\varepsilon_{it} = \lambda_i + u_{it}$.

$$\text{Ln}\,(FH_{it}) = (\beta_0 + \lambda_i) + \beta_1\,\text{Ln}\,(SIZE_{it}) + \beta_2 GROWTH_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LEVERAGE^2_{it} + \beta_5 WACC + \beta_6 CATA + \beta_7 CLTL + \beta_8 CCC + \beta_9 WACC*CATA + \beta_{10} WACC*CLTL + \beta_{11} WACC*CCC + \varphi_1 D1 + \varphi_2 D2 + \varphi_3 D3 + \varphi_4 D4 + \varphi_5 D5 + \varphi_6 D6 + u_{it}. \quad \text{(Equation 5)}$$

λ_i is now part of the constant but varies with each firm having its own intercept and u_{it} being the idiosyncratic error term.

In both cases, it is assumed that the slopes are constant with only varying intercepts. However, how these intercepts vary, is a subject in which two cases (fixed versus random effects) are made out and discussed in detail as follows. Heterogeneity is thus taken into account.

Every firm would now have a fixed value on this variable (fixed effects) and λ_i represents a firm's specific time constant unobserved heterogeneity. If the fixed effects model is assumed to be the correct model, the firm specific effects can be interpreted as initial technological and other resource endowments which differ across firms and these are expected to be correlated with the other independent variables such as firm size. As such, their relationship can be written as:

$$\text{Covariance}\,(\lambda_{i,}\, X_{it}) \neq 0.$$

b) The Fixed Effects Estimators.

To find the FE (Fixed Effects) estimator, the unobserved effect $\boldsymbol{\lambda_i}$ has to be removed by either: a) running OLS (within groups fixed effect) or b) by using Least Squared Dummy Variables (LSDV) estimation. The second method has the disadvantage of (i) not being practical since there are 193 firms and 192 dummy variables need to be

introduced and (ii) it tends to lose too many degrees of freedom. In addition, the fixed effects and LSDV (Least Squares Dummy Variables) estimators provide exactly identical estimates. The Fixed Effects method discards all variation between firms. Fixed Effects uses only variation over time within a firm and is sometimes simply called the 'within' estimator. In this way, the fixed effects model is itself a valuable tool for the elimination of omitted variables, thus mitigating omitted variable bias.

c) The Within-Groups Fixed Effect Model

By using the first method, that is, the within groups fixed effect, the variables are de-meaned by subtracting the firm-specific mean from each observation.

For instance,

The error –components model begins by:

$Y_{it} = \beta_0 + \beta_1 X_{it} + \lambda_i + e_{it}$ (1),

Average each equation over time for each firm (between transformations),

$\overline{Y}_i = \beta_0 + \beta_1 \overline{X}_i + \lambda_i + \overline{ei}$ (2)

By subtracting Equation (2) from Equation (1),

$(Y_{it} - \overline{Y}_i) = \beta_1 (X_{it} - \overline{X}_i) + e_{it} - \overline{ei}$ (3),

Equation (3) can then be estimated by the Ordinary Least Squares Method.

Here, it can be seen that the time constant heterogeneity λ_i, is no longer a problem as it has been "differenced away". Once the data is 'time demeaned', only the within variation is left. Demeaning each observation by the individual-specific mean eliminates the need to create *(n – 1)* dummy variables and this makes the fixed effects method computationally much simpler and more appealing. The intuition surrounding the fixed effects estimates is that after 'time demeaning' is done, between firms comparisons are no longer relevant. The Fixed Effects (FE) method

can therefore be used to explore the relationship between predictors and outcome variables within an entity (in this case within firms).

In assuming time constant unobserved heterogeneity, the fixed effects model removes the effect of those time-invariant characteristics from the predictor variables so that the predictors' net effect on the outcome variable can be assessed. The key observation is that, if the unobserved heterogeneity (fixed firm specific characteristic) does not vary over time, and are removed via demeaning, then any variation in financial health must be due to the influences besides those fixed characteristics (Stock and Watson, 2005). Unobserved heterogeneity (assuming constant over time) between firms no longer biases the estimators. As the number of periods (T=7) is not too long, it is assumed that the omitted variables are time constant.

In this study, the effects of the omitted variables that are time invariant are not our concern as the emphasis of the study is on the focal variables (working capital management variables). Although omitted variables can have serious effects on the analysis of the model, they would have been 'partialed out' when fixed effects analysis is carried out. In other words, if it is believed that there are omitted variables and these variables are correlated with the other explanatory variables, then the fixed effects model would provide a means for controlling omitted variable bias.

d) The Random Effects Estimators.

In contrast, if the omitted variables are assumed to be uncorrelated with the other observed explanatory variables, a random effects model would be the more appropriate specification. The Random Effects model allows us to estimate the

effects of the time invariant variables via the Generalized Least Squares method. Nevertheless, tests will be conducted to determine which model best fits the datasets (Pooled OLS, Fixed - Effects or Random- Effects Model). Time effects can also be included to the firm effects model. Control for time effects is necessary if there is an unexpected variation or surprise events that affect the criterion variable. This ensures that heterogeneity across firms and heterogeneity across periods are taken into account.

3.11.4 The Treatment of Outliers.

Outliers are observations which dwell far from the sample regression function. They cause large residuals which subsequently reduce the measurement of goodness of fit such as the R-Squared (the ratio of explained to unexplained variation) values. Since these values (the outliers) are not the norm, they are often removed as the purpose of the analysis is generally to describe average behavior of firms. Usually, the removal of outliers provides normality of residuals, a necessary condition to carry out appropriate parametric tests such as t-tests and F-tests whereby normality of residuals is a pre-requisite. As Hsiao (2003) advocates, when panel data is available and used and if sample sizes are large, the Central Limit Theorem is invoked whereby the estimators are assumed to remain asymptotically normal.

3.11.5 Diagnostic Tests

Diagnostic tools are commonly found in almost all statistical packages to help ensure that the chosen model more or less satisfies the conditions upon which the model is built. These conditions or assumptions are tested as they can have serious implications on the estimation of the model coefficients if violated. Diagnostic tests

for robustness which include tests for multi-collinearity, heteroscedasticity and serial correlation would be conducted and if necessary, remedial measures would be taken to mitigate these conditions. If specification tests (e.g. pooled versus random effects and random effects versus fixed effects) using the Breusch-Pagan test and the Hausman test respectively reveal the most appropriate model, the next step is to test for the robustness or strength of the chosen model.

Another important assumption when using multiple regression is that predictor variables should be independent (uncorrelated) of each other. Some studies such as Titman and Wessels (1988) describe a link between leverage and firm size and this could be a cause for multicollinearity. Multi-collinearity leads to biased and exaggerated parameter estimates (Gujerati, 2003) and this phenomenon is particularly prone to models with interaction terms (Mahajan, Jain, & Bergier, 1977). To test for multi-collinearity, simple correlation tests among the independent variables are performed and to judge if multi-collinearity is a problem, variance-inflating factors are used. A variance inflating factor (VIF) value greater than 10 indicates the existence of such a problem (Montgomery, 2001).

Other than the assumption of multicollinearity, a standard panel data model also assumes that the residuals obtained from the use of such models are homoscedastic and not serially correlated. However, assuming homoscedastic errors when they are not, results in inefficient estimates of regression coefficients although they are consistent estimates (Baltagi, 2008). In the same way, tests for serial correlation would be conducted as ignoring correlation in the error terms when it is present leads to consistent but inefficient estimates of the regression coefficients (Baltagi, 2005).

3.11.6 Schematic Diagram for the Choice of Best Model

Figure 3.11.6 below shows a schematic diagram on how the best model is chosen. When the appropriate model is chosen, diagnostic checks are performed by testing for multi-collinearity, heteroskedasticity, and serial correlation. The Modified Wald test for hetersocedasticity and the Wooldridge test for autocorrelation is performed and corrected with appropriate panel corrected methods in the presence of violations to these assumptions.

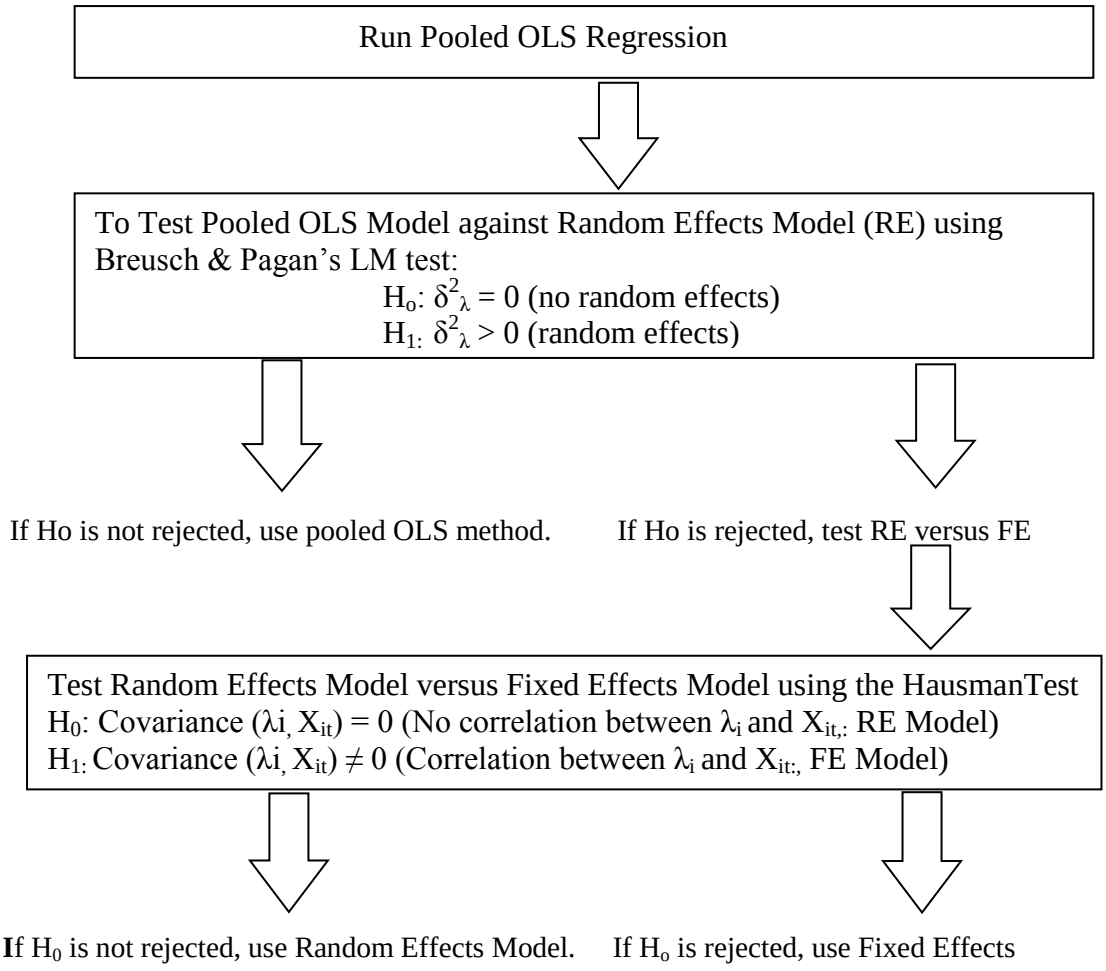


Figure 3.11.6
Schematic diagram for the choice of best model

3.12 Summary of Methodology.

In any econometric activity, the focus is either on empirical description and forecasting or quantifying structural or causal relationships or both. Emphasis on this study is placed on structural relationships which play an important part in policy evaluation and testing theories empirically using panel data analysis. Growth in panel data studies over the years has been phenomenal mainly due to its greater capacity to tackle model complexity and challenging methodology such as controlling for the impact of omitted variables (Hsiao, 2007). Hsiao (2007) further explained that the fixed effects model is suitable to control for the effects of omitted variables. Panel data analysis contains details on both the inter-temporal dynamics and the individuality of the firms which allows the researcher to control the effects of missing or firm-specific unobserved variables.

The use of panel data analysis to study the effects of working capital variables on firm financial performance has been well documented. However, most studies in Malaysia have relied on correlation analysis, logistic regression and basic multiple regression methodology. There were some studies whereby data was collected across firms over a period of time, say, for the five-year period (2003 till 2007) that Nor Edi and Noriza (2010) used in their study but the data were just pooled without mention of firm specific effects or time effects. Another study was done by Zariyawati et al (2009) on the relationship between working capital management and corporate performance in Malaysia by using pooled OLS regression analysis based on a panel set of 1628 firm-year observations. These studies ignore the heterogeneity factor in firms.

In cases whereby panel data is available, micro panel data analysis is the preferred method as Bond (2002) warns that aggregated time series data can cause aggregation biases and the possibility that underlying microeconomic dynamics are obscured. Though panel data methods[14] are widely used in many studies in other countries, the paucity of such studies on working capital management and its effects on firm performance in Malaysia using panel data analysis is lacking. For instance, Nor Edi and Noriza (2010) studied the effect of working capital management and its effect on the financial performance of Malaysian listed firms using correlation analysis and multiple regression analysis. Basic multiple regression does not emphasize the need to check for control variables and correlation analysis is only a preliminary step towards identifying relationships between variables.

Concepts of hierarchical multiple regression (HMR), moderated multiple regression (MMR) and panel data techniques can be considered the keys to understanding the effects of working capital management on a firm's financial health because it allows the accommodation of control variables and interaction variables into the multiple regression models. As discussed in section 3.4, control variables would be investigated first and working capital management variables would be added later to look for any variation in the dependent variable (financial health). Finally, the moderating variable will be added with its corresponding cross-products and the working capital variables to look for any moderated relationship.

[14] Studies done by Deloof (2003) in Belgium, Padachi (2006) in Mauritius and Raheman et al (2010) in Pakistan are examples on how panel data analysis were used in the investigation of working capital management on firm performance in their respective countries.

CHAPTER 4
RESULTS AND DISCUSSION

4.0 Introduction

Descriptive analytics, followed by diagnostic analytics are used to gain insights into characteristics of financial health and discovering patterns and correlations between financial health and its covariates. Predictive analytics is used to build models and prescriptive analytics help in relating how certain actions (strategies) such as working capital policies affect outcomes (financial health). Finally, the contingency theory paradigm in working capital management studies would be used to provide impetus in looking for compelling evidence on whether the relationship between working capital policies and financial health is contingent upon a firm's cost of capital.

4.1 Descriptive Statistics.

The process of inquiry begins with descriptive analytics which gives an idea of the distribution of the variables used in this study. As panel data is used, it is noteworthy to capture distributions of data over time and the common statistics are the mean as a measure of location and standard deviation as a measure of spread. This is followed by examining inter-relationships between variables via correlation analysis. In explaining the relationships between variables, efforts will be made to identify linkages between the different types of variables (e.g. control variables, focus variables, moderator and interaction variables).Table 4.1 provides results of descriptive statistics for all variables in terms of their means, standard deviations and measures of skewness. Subsequently time series charts are drawn to describe how their annual mean values are distributed over time.

Table 4.1

Table showing descriptive measures of location, dispersion and skewness of criterion, control, focus and moderator variables.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness
FH	1351	.00	61.18	3.5970	3.53348	5.175
MKTCAP	1351	5.00	41514.04	1203.0771	4091.18282	5.861
LEVERAGE	1351	.00	455.88	49.1004	62.89511	2.588
GROWTH	1351	-78.11	624.56	10.4455	37.90489	6.021
CATA	1351	.04	1.00	.5169	.18629	-.028
CLTL	1351	.05	1.20	.7405	.20710	-.787
CCC	1351	-1340.52	5099.85	139.4001	253.70921	9.713
WACC	1351	-9.87	148.38	9.2673	8.75454	11.835

Figure 4.1.1 shows a trend line for the annual average financial health of the 193 firms in the trading, consumer and services sector for the period 2006-2012. The average Z-score over the 7 year period is 3.60 (as shown in Table 4.1). However, it can be seen that there is a fall in financial health levels from 2006 till 2008 and then a quiet general rise in health levels from then onwards. It is believed that the Global Financial Crisis which occurred during the 2008-2009 period in the US, Japan and Western Europe had caused such effects.

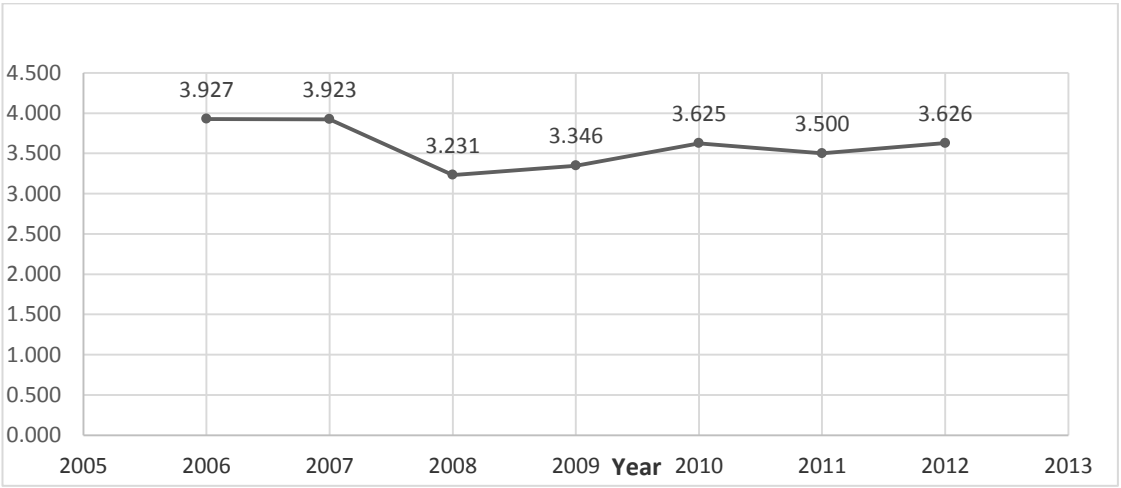


Figure 4.1.1

Financial Health (As measured by the Altman Z-Score)

Although scores above 3 indicate that a firm is generally financially healthy, there seems to be a high variability in the financial health score measures. From Table 4.1, a high standard deviation 3.533 units (compared with a mean of 3.60 units) indicates a high dispersion of scores across the firms. Some large (extreme) values seem to have caused the distribution of financial health levels to be positively skewed (to the right) as shown in Table 4.1.

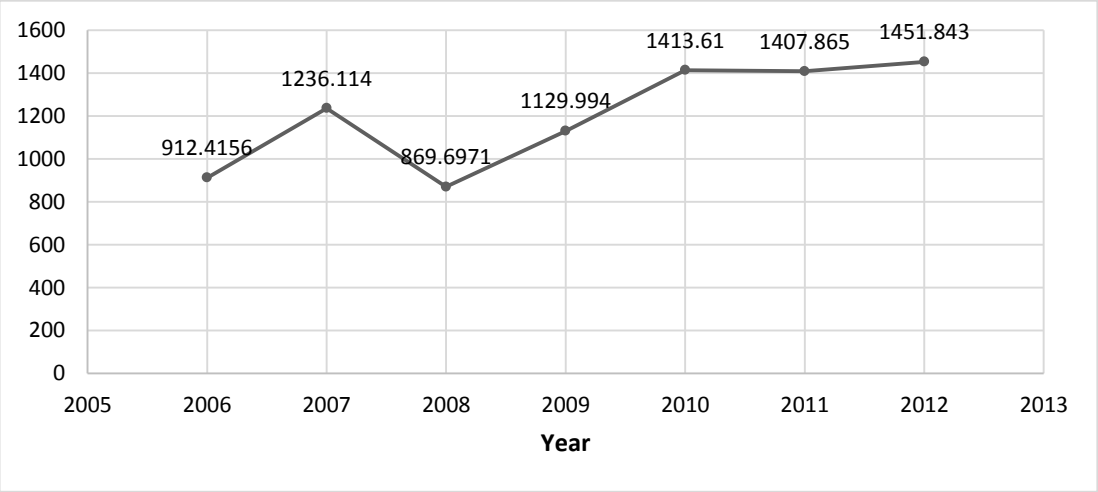


Figure 4.1.2
Firm Size (As measured by market capitalization in RM millions)

The average market capitalization of firms in these sectors over the seven years was worth about RM 1203.08 million (as shown in Table 4.1). The datasets exhibit high dispersion levels with a standard deviation which is more than three times the mean value (standard deviation is 4091.18 million ringgit). Large outliers have made the distribution of values skewed to the right.

Although Figure 4.1.2 shows a general rise in the average annual market capitalization of firms across the period 2006 - 2012, years 2008 and 2009 show a dip in mean values. This can be attributed to weaknesses in the US financial sector which eventually escalated into a severe financial crisis. During this period, global

trade was affected which gave rise to a global recession by late 2008. This external shock affected Malaysian firms because of the country's open and export-driven economy and the demand for exports were mainly from the US, Japan and Europe. After the Asian Financial crisis in 1997, the Malaysian economy became more export dependent (Athukorala, 2002) but it exposed itself to external turbulence.

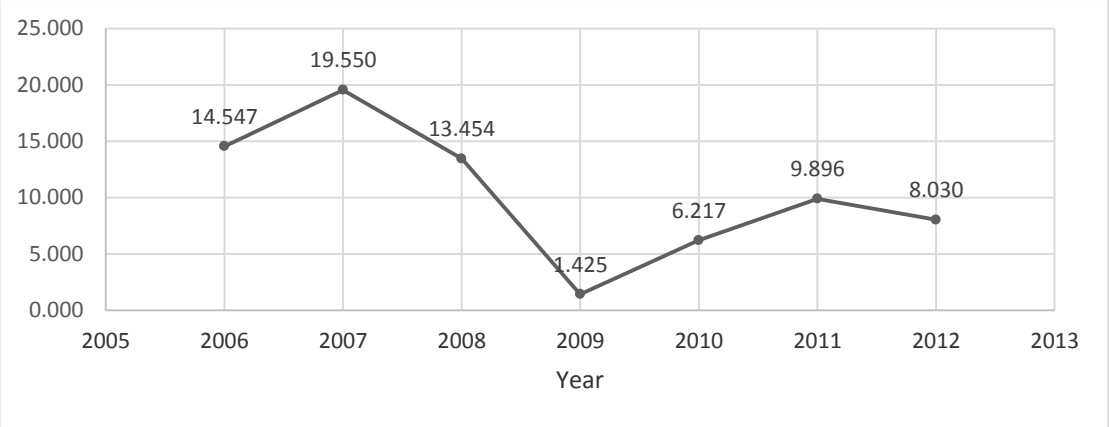


Figure 4.1.3
Firm Growth (As measured by year on year sales growth in %)

On average, the annual growth level is 10.45 % (Table 4.1) during this period. Figure 4.1.3 shows that growth levels increased from 2006 till 2007. However this trend started taking a dip from 2007 onwards mainly due to the global crisis which occurred during the 2008-2009 period. The year 2009 showed a very low sales growth of only 1.425%. However, recovery from the crisis seems to have allowed growth levels to steadily increase thereafter. Measures of dispersion and skewness from table 4.1 suggest that annual growth levels were highly dispersed (standard deviation of 38%) and positively skewed during this period due to some extremely large growth levels in some firms.

Figure 4.1.4 shows a general decline in debt to equity levels from 2006 till 2009. However, there was a jump in debt levels after 2009 but it was short-lived and then

continued to decline after 2010. The mean leverage level was 49.1% (Table 4.1) with a standard deviation of 62.90 %. The decline in leverage levels shows that firms started using more equity financing in place of debt over the 7-year period. Overall, it can be seen that firms have started to use less debt financing although tax benefits favor this form of financing. The fear of being unable to service debt commitments could lead to financial distress and this could be one of the reasons for such behavior.

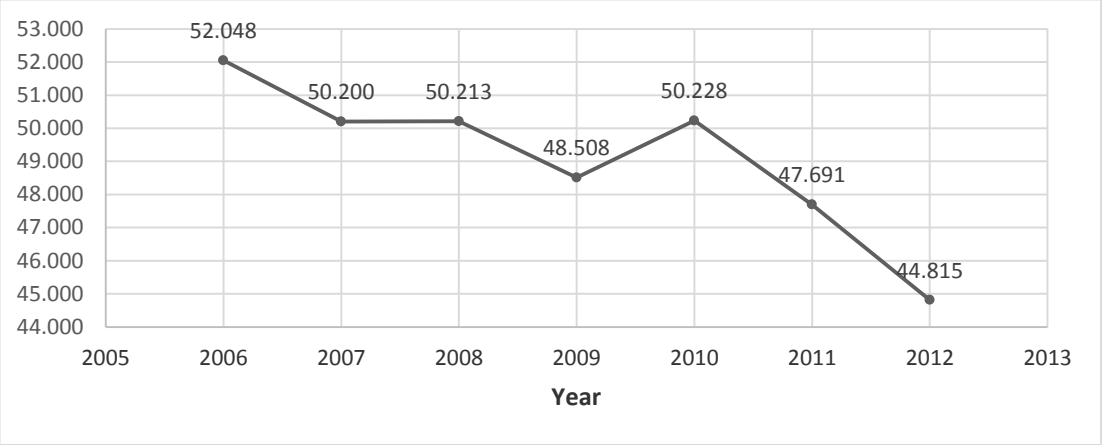


Figure 4.1.4
Leverage (Debt to Equity Ratio in %).

Current Assets to Total Assets Ratio (CATA).

From table 4.1, it can be seen that the average CATA levels are about 51.69% with not much variability over the 7-year period (standard deviation of only 18.6%). This shows that on average, slightly more than 50% of a firm's total assets over this period of time are tied up as current assets. The low dispersion in these values suggests that firms in this sector have CATA levels which have been quite stable over the 2006-2012 periods. The time series plot also shows that the composition of current assets to total assets has been steadily declining (Figure 4.1.5) from 2007

till 2010 but started to rise slightly after this period. Overall, there is not much change in the behaviour pattern of utilising this short-term asset investment.

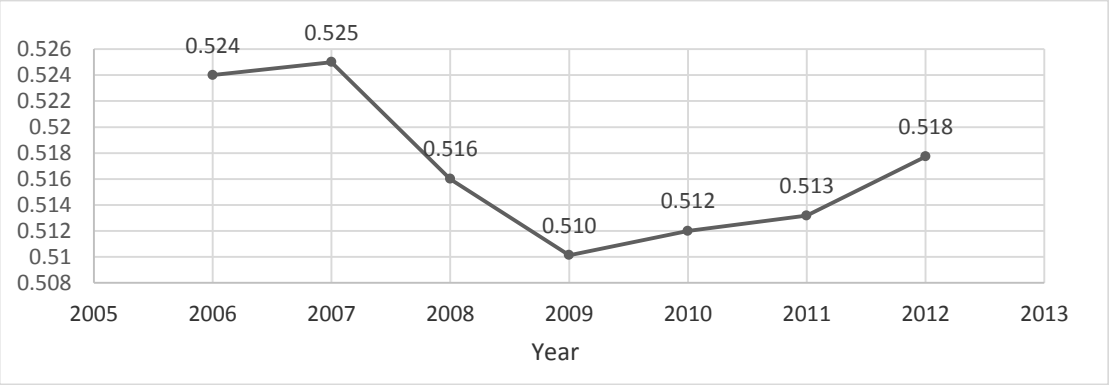


Figure 4.1.5
Current assets to total assets ratio (CATA).

Current Liabilitities to Total Liabilities Ratio (CLTL)

On average, about 74% of a firm's total liabilities comprise of current liabilities which tells us that managing this short-term resource is important. It puts added pressure on firms as these are short-term commitments that have to be managed quickly and efficiently. The dispersion measure (standard deviation of only 20.7%) indicates that there is not much variation in these values over the 7-year period. Although CLTL levels have been stable over the years (low standard deviation), nevertheless the CLTL levels are high and as such , firms in these sectors must be on guard as it can lead to high financial distress levels (as observed by Pomerleano,1998 during the 1997 East Asian Financial Crisis). Figure 4.1.6 shows a steady annual increase in CLTL levels from 2006 but took a slight dip in 2009 possibly to address liquidity concerns during the 2008-2009 Global Financial Crisis.

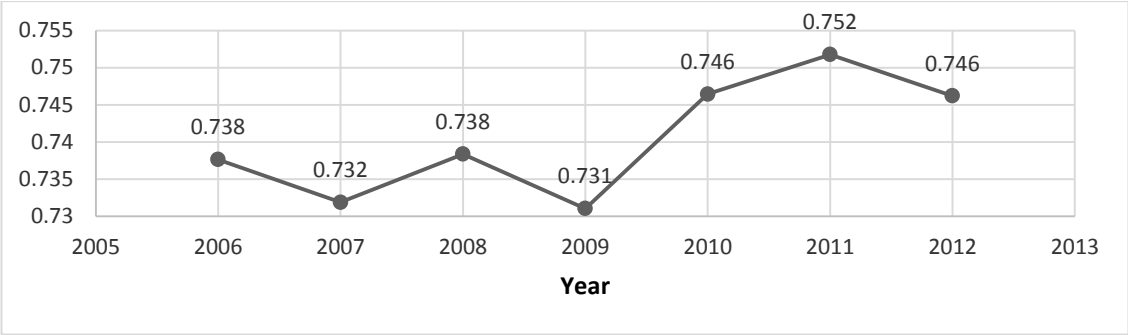


Figure 4.1.6
Current liabilities to total liabilities ratio(CLTL).

Cash Conversion Cycle (CCC)

The average time a firm takes to sell its inventories, collect its receivables and pay its accounts is 139.4 days with a standard deviation of 254 days. Based on Figure 4.1.7, it can be seen that the cash conversion cycle has been steadily decreasing over the years. Although firms in these sectors have taken steps to improve managing their working capital efficiently, a high level of dispersion in CCC levels (254 days) indicate a large spread (relative to the sample means) in cash conversion cycle levels. This shows that firms have varying cash conversion cycles due to the nature of their businesses and relationships with their clients.

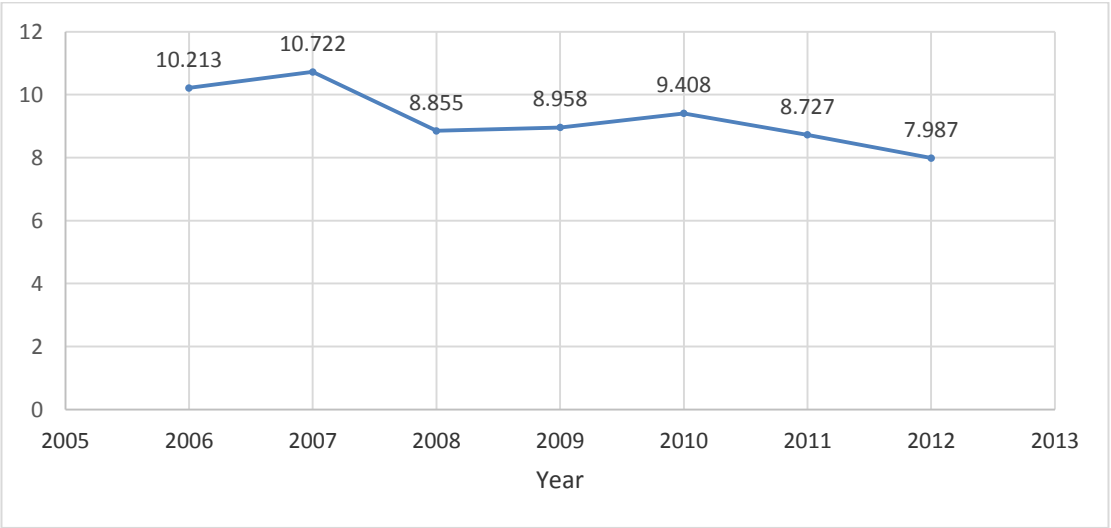


Figure 4.1.7
Cash conversion cycle (CCC in days)

Weighted Average Cost of Capital (WACC).

The average annual costs of capital of firms in these sectors have generally become lower over the seven year period hitting a low of 7.99% in 2012. On average, the cost of capital for the 7 years was 9.27 % (with a standard deviation of 8.75%). The cost of funds as measured by the average annual returns expected by stakeholders of firms in these sectors has generally come down over the seven year period. A point to note is that there is a minimum observation (of WACC values) which has a negative value from Table 4.1. Upon further investigation, it was found that out of 1351 firm-year data only three negative values were found. As such, these values can be treated as outliers. However, all annual mean values were found to be positive.

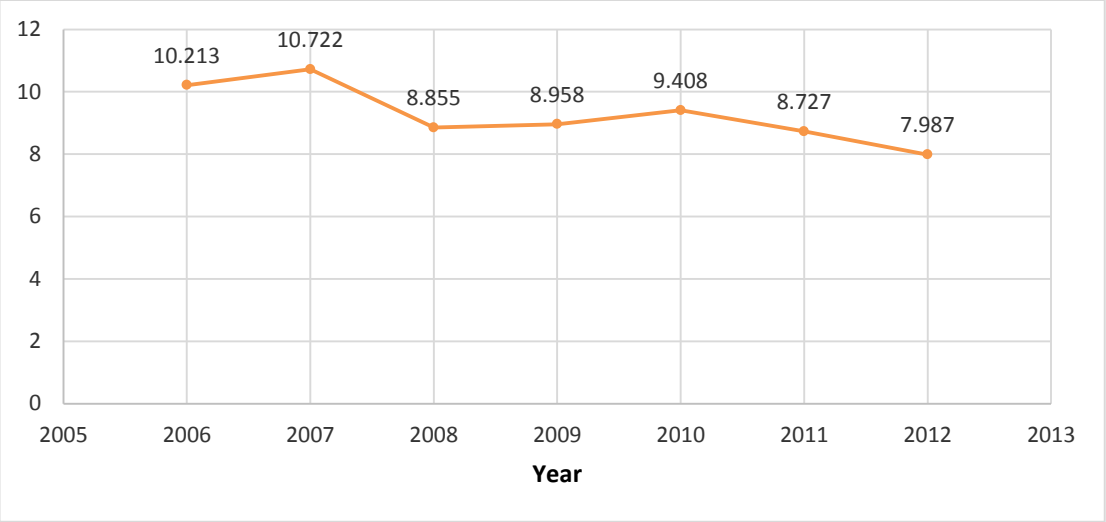


Figure 4.1.8
Weighted average cost of capital (WACC in %)

4.2 Scatter plots.

Scatter plots are used to address three questions namely, to check for relationships between financial health and its predictors, to determine the direction of these relationships and to check for linearity. This is because multiple regression models call for linear relationships between the criterion variable and its predictors.

The scatter matrix (Figure 4.2.1) gives a rough idea visually on the association between the dependent variable and each type of regressors (the control variables, the focus variables and the moderator). Besides this, it can also help detect multi-collinearity among regressors. Graphing will also help visually in the determination of the appropriate functional form (linear or non-linear) between the variables.

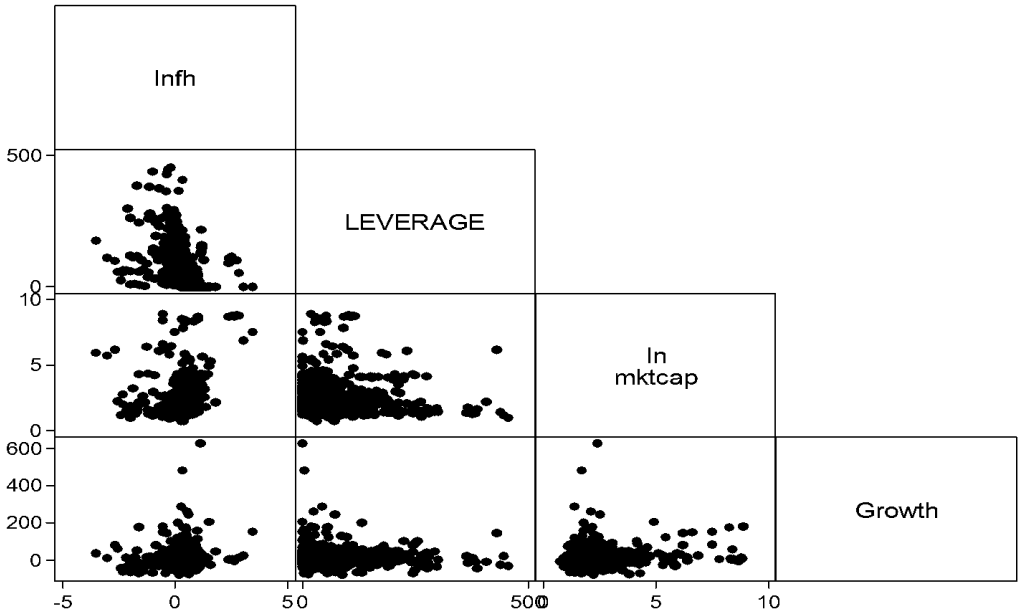


Figure 4.2.1
Scatter plot matrix of financial health against control variables

The above scatter plot reveals a curvilinear inverse relationship between LnFH (Log financial health) and leverage. Specifically, it suggests a U-shaped curve (quadratic relationship) and this calls for the addition of a square version of the leverage variable.in a multiple regression model The plot also suggests positive linear relationships between financial health and the two control variables (size and growth).The second scatter plot (Figure 4.2.2) reveals a weak relationship between financial health and the first two working capital variables (CATA and CLTL) meaning that when these two ratios increase, it is not obvious that financial health

seems to be better. There is also a weak negative linear relationship between financial health and a firm's cash conversion cycle.

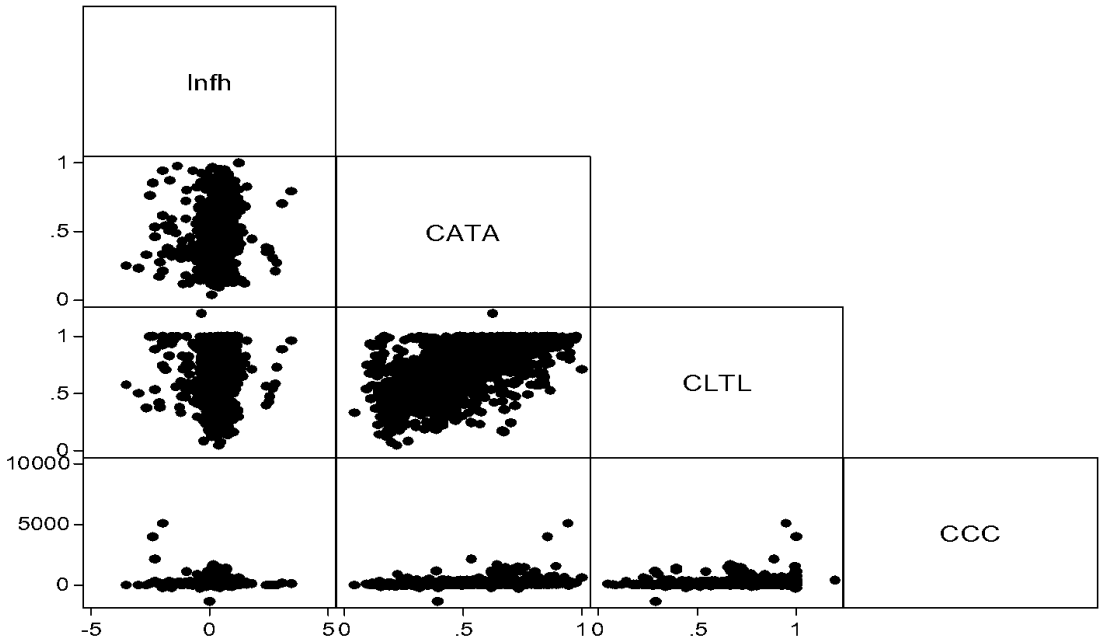


Figure 4.2.2
Scatter plot matrix of financial health against focus variables.

The third scatterplot (Figure 4.2.3) generally shows no relationship between financial health levels with a firm's cost of capital. The relatively flat curve suggests that a firm's cost of capital may not play a significant role in explaining its financial health.

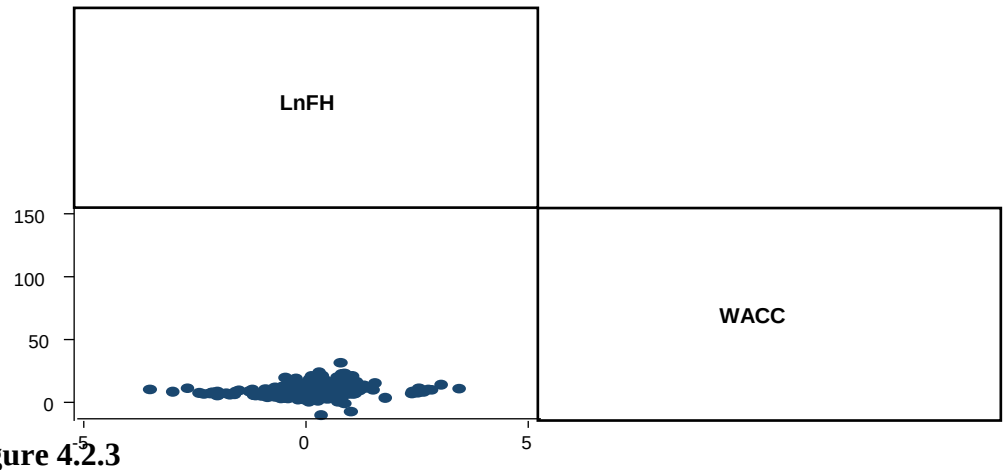


Figure 4.2.3
Scatterplot matrix of Financial Health against WACC.

4.3 Correlation Analysis

The display of correlation coefficients between Financial Health and its regressors is to note numerically the relatedness between these variables. The correlation coefficient gives a handle on the strength of linear association between any two variables. Two types of relatedness will be discussed, one involving the dependent variable and its regressors and the other involves the inter-correlation amongst the independent variables. The Pearson measure of correlation tells us the strength and general direction of association between any two sets of variables and the t-test gives us an indication of significance (of association) in this bivariate relationship.

For the purposes of this study, correlational analysis is best performed first by looking at associations between financial health and its predictors. Secondly, inter-correlations among the regressors are recorded to test if multi-collinearity is present. Multi-collinearity can distort hypothesis tests and render unreliable results (Keller, 2005). The correlation matrix (Table 4.3.1) involving all the variables used in this study gives strength of association amongst the variables.

Table 4.3.1 shows that the financial health (LnFH) of a firm is positively correlated to the size of the firm (LnMKTCAP), growth (GROWTH) and current assets to total assets ratio (CATA). In addition, all these correlations are significant at the 0.01 level of significance. The results show that these independent variables have significant positive correlations with financial health. They imply that when the values of these variables increase, the financial health of the firm increases in tandem.

The results also show that financial health is significantly negatively correlated to leverage and the cash conversion cycle. This means that when a firm uses more debt in its capital structure, financial health seems to deteriorate. Higher leverage may restrict a firm's use of internal finance which is cheaper and this together with risks inherent in borrowing may contribute to deteriorating financial health. Information from the datasets also reveal that when a firm's cash conversion cycle increases, financial health decreases. This is understandable as the longer the cycle is, the larger the investment in working capital (Deloof, 2003) which is said to affect firm profitability due to the liquidity-profitability trade-off.

Table 4.3.1
Correlations (Pearson correlation coefficient)

	LnFH	LnMKTCAP	LEVERAGE	GROWTH	CATA	CLTL	CCC	WACC
LnFH	1	.27**	-.45**	.09**	.13**	.068*	-0.2**	.0071
LnMKTCAP		1	.004	.11**	-.21**	-0.32**	-.063*	.026
LEVERAGE			1	-.009	-.12**	-.202**	-.014	-.15**
GROWTH				1	-.007	-.004	-.11**	-.015
CATA					**1**	.530**	.265**	.065*
CLTL						1	.056*	0.027
CCC							1	.091**
WACC								1

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Inter-Correlations between the Independent Variables

From table 4.3.1, CATA and CLTL show quite a high degree of positive correlation (.530**) meaning when CATA levels are high, CLTL levels are high too. This means that when a firm's short term asset management policy is conservative, it is accompanied by an aggressive short-term asset financing policy and vice-versa. Weinraub and Visscher (1998) have noted that studies in the US have found a high correlation between short-term industry asset and liability policies. This is to say that

when conservative working capital asset policies are used, they are usually balanced by relatively aggressive working capital financing policies to mitigate against liquidity concerns. Van Horne and Wachowicz (2000) in their study showed evidence whereby Malaysian firms routinely use conservative asset management policies and aggressive financing policies to improve financial performance.

4.4 Determination of Correct Specification: Pooled, Random or Fixed Effects Model.

From Figure 3.4 and Section 3.4.1 a number of models were developed to shed some light on the relationship between working capital variables and financial health. The first suggested model is:

$$Ln\ (FH_{it}) = \beta_0 + \beta_1 Ln\ (SIZE_{it}) + \beta_2 GROWTH_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LEVERAGE^2_{it} + \varphi_1 D1 + \varphi_2 D2 + \varphi_3 D3 + \varphi_4 D4 + \varphi_5 D5 + \varphi_6 D6 + \varepsilon_{it} \quad \text{(Equation 1)}$$

The issue of whether to pool or not to pool the datasets was discussed in section 3.10. For a thorough analysis on the most appropriate model, the proposed schematic procedure in section 3.10.6 was used. For each regression beginning with MODEL 1, the suitability of the specification is tested to see if the datasets should be pooled. If pooling is not justified, then a second test is performed to determine the more appropriate specification: random or fixed effects model.

4.4.1 Pooled versus Random Effects Model. (The Breusch-Pagan Test).

The Breusch and Pagan test is performed as an initiative to determine an appropriate model which explains the relationship between financial health and its covariates. Used extensively in panel data analysis, the two competing models in this endeavor are the pooled model and the random-effects model. This procedure is performed essentially to test whether the Generalized Least Squares (GLS) method or simple

Ordinary Least Squares (OLS) method is the preferred method to explain the variation in financial health levels. The outcome of this test helps determine if pooling the datasets is permissible.The hypotheses using the Breusch-Pagan (1980) test are:

H_o: Var (λ_i) = 0 (there are no random effects)
H_1: Var (λ_i) > 0

The presence of the firm-specific component (λ_i) distinguishes the random-effects model from the pooled model. If the null hypothesis is not rejected, then the ordinary least squares method (OLS) would render estimates which are best, linear and unbiased (BLUE). Using STATA 12, the results of this test indicates that the p-value = 0 < 0.05, (Prob > chi2 = 0.00). Thus the null hypothesis is rejected. Consequently, the test reveals that pooling of data is inadmissible. It can therefore be concluded that there are firm-specific effects in the data. Subsequently, the next question will be how to treat these firm-specific effects (random or fixed effects).

4.4.2 Random Effects versus Fixed Effects (The Hausman Test)

Since it is confirmed that there are firm specific effects, the next step is to determine the manner in which these firm specific effects are treated**.** The Hausman (1978) specification test is carried out to determine if these firm specific effects are random effects or fixed effects. The relevant hypotheses are:

H_o: Cov (λ_i, X_{it}) = 0 (No Correlation between λ_i and X_{it})
H_1: Cov (λ_i, X_{it}) $\neq$ 0

Using STATA 12, the p-value for this test is < 0.05 (Prob>chi2 = 0.00). Thus the null hypothesis is rejected. Hence, the outcome of the Hausman Test indicates that the random effects model is unsuitable and the fixed effects specification is the more appropriate model.

4.5 The Fixed Effects Model.

The outcome of the Hausman specification test supports the decision to use the fixed effects approach for these datasets. Using the fixed-effects approach, the next step will be to give details on how the predictors (control variables, focus variables and interaction variables) produce (if any) impacts on the financial health of firms.

4.5.1 Fixed Effects Model 1

Table 4.5.1
Results using Model 1 with only control variables as predictors

Fixed-effects (within) regression Number of Obs = 1351 Number of groups = 193				
R-sq: within = 0.3410 between = 0.2379 overall = 0.2163 F(10,1148) = 59.41				
Corr(u_i, Xb) = -0.7741, Prob > F = 0.0000				
Ln FH	Coef.	Std. Err.	t-value	P>t
Ln Mktcap	.5615508	.0383021	14.66	0.000 **
Leverage	-.0085584	.0006003	-14.26	0.000 **
Levsqd	.0000133	1.51e-06	8.86	0.000 **
Growth	.000545	.0002308	2.36	0.018 *
Year				
2007	-.0326473	.0297937	-1.10	0.273
2008	.0108361	.0299027	0.36	0.717
2009	-.0361371	.029827	-1.21	0.226
2010	-.091582	.0300361	-3.05	0.002**
2011	-.1134657	.0299311	-3.79	0.000 **
2012	-.1126863	.0301917	-3.73	0.000 **
_cons	-.5580689	.0971506	-5.74	0.000 **
sigma_u = .6069566 sigma_e = .29066444 rho = .81344855 (fraction of variance due to u_i)				
F test that all u_i=0: F(192, 1148) = 10.19 Prob > F = 0.00				

* means significant at 5 %, ** means significant at 1 %

The outcome using Model 1 reveals the following: F (10, 1148) = 59.41 and Prob > F = 0.0000 (< 0.05). This indicates that the overall model is good with the coefficients in the model significantly different from zero. The statistic, Corr ($u_{i,}$ **Xb**) = -0.7741 shows a high degree of correlation between the firm specific errors and the regressors in the fixed effects model. The appropriate goodness of fit

measure is the within firm R-squared value, which gives a value of R-sq within = 0.3410. This shows that 34.10 % of the within firm variation in LnFH values is explained by the regression equation and a reasonably good fit is obtained.

The signs on the coefficients in this model are as expected. A priori, size (as measured by LnMktcap) is expected to have a positive impact on financial health as larger firms have better resources to manage financial health and the results show that the effect of size on firm financial health is indeed positive. In the case of leverage, firms which use more debt face a higher risk of financial distress and thus we would expect its impact on financial health to be negative and indeed the results confirm it. However, further increases in leverage in its capital structure lead to only small amounts of further decreases in financial health levels. In other words, additional leverage seems to lower this impact. Next, the results using Model 1 shows that firm growth has a positive impact on financial health.

In terms of significance, the results from this model reveal that all the regression coefficients of the control variables are significant at the 1 % level of significance except for the growth variable which is significant at the 5 % level of significance. This implies that the control variables have an impact on the financial health of firms. Large t-values (> 3) and the small p-values (< 0.05) suggest that these factors play an important role in determining the financial health of firms. Leverage also plays an important part in explaining financial health. In addition, running a test of the null hypothesis on the coefficient of the squared term on leverage being zero is a test to see whether leverage has a non-linear impact on financial health. The

outcome of this hypothesis test affirms that the squared term on leverage seems appropriate (since the p-value for Levsqd < 0.01, from Table 4.5.1).

As in any parametric test which assumes normality, the t-values are used to test the hypothesis that each coefficient differs from zero. To reject this, the t-values must be large (at least more than 2) and the p-values must be at least lower than 5%. From the output, shown on Table 4.5.1, it can be seen that all the control variables seem to have a significant impact on the dependent variable. In addition, the test for all firm specific errors equal to zero is rejected (F-test that all u_i=0: F (192, 1148) = 10.19, Prob > F = 0.00 which is less than 0.01). This means that there is at least one firm specific error which is non-zero. Generally these are firm specific effects which need to be controlled for. Lastly, the year coefficients reveal that from 2010 onwards, financial health levels have been significantly lower compared to 2006.

4.5.2 Fixed Effects Model 2

The next step in the analysis is to include the focus variables into the model to see if the addition of these variables (in bold below) can contribute significantly towards explaining the variation in Lnfh levels. The fixed effects model was chosen based on the relevant Breusch-Pagan test (Pooling versus Random effects) and the Hausman test (Fixed versus Random effects) as described in Figure 3.11.6. The results of these tests confirm that the fixed effects model is the appropriate one. The output using Model 2 by fixed effects method is shown in Table 4.5.2.

$$\text{Ln}\,(FH_{it}) = \beta_0 + \beta_1 \text{Ln}\,(SIZE_{it}) + \beta_2 GROWTH_{it} + \beta_3 LEVERAGE_{it} + \beta_4 LEVERAGE^2_{it} + \mathbf{\beta_5 CATA_{it}} + \mathbf{\beta_6 CLTL_{it}} + \mathbf{\beta_7 CCC_{it}} + \varphi_1 D1 + \varphi_2 D2 + \varphi_3 D3 + \varphi_4 D4 + \varphi_5 D5 + \varphi_6 D6 + \varepsilon_{it} \quad \text{(Equation 2)}$$

The results show similar characteristics to Model 1 in terms of the overall goodness of the model (large F-statistic), firm specific errors being correlated with the regressors, and control variables such as leverage and size having significant impact of firm financial health but the impact of growth on financial health is no longer significant.

Table 4.5.2

Results using Model 2 with the inclusion of focus variables.

Fixed-effects (within) regression Number of Obs = 1351 Number of groups = 193				
R-sq: within = 0.4078 between = 0.2810 overall =0.2677 F(13,1145) = 60.66				
Corr(u_i, Xb) = -0.7349, Prob > F = 0.0000				
Ln FH	Coef.	Std. Err.	t-value	P>t
Ln Mktcap	.5265377	.0366501	14.37	0.000 **
Leverage	-.0080666	.0005976	13.50	0.000 **
Levsqd	.0000124	1.49e-06	8.37	0.000 **
Growth	.0002509	.0002215	1.13	0.258
CATA	.8438551	.1036306	8.14	0.000 **
CLTL	-.1575282	.076538	-2.06	0.040 *
CCC	-.00041	.0000449	-9.12	0.000 **
Year				
2007	-.0218863	.0283038	-0.77	0.440
2008	.0158452	.0283928	0.56	0.577
2009	-.0335127	.0283703	-1.18	0.238
2010	-.0732661	.028576	-2.56	0.010 **
2011	-.0978222	.0284719	-3.44	0.001 **
2012	-.1092014	.0286993	-3.81	0.000 **
cons	-.7603012	.1179977	-6.44	0.000 **
sigma_u = 55277341 sigma_e = .2759014 rho = .80056179 (fraction of variance due to u_i)				
F test that all u_i=0: F(192, 1145) = 10.23 Prob > F = 0.0000				

* means significant at 5 %, ** means significant at 1 %

The addition of the three focus variables has resulted in the R-squared within value to increase significantly to 40.78 % (an almost 7% increase in explained variation). This shows that the three working capital variables have jointly contributed to a significant increase in the variation of the dependent variable. All the control variables except growth remain significant but most importantly the variation in the

three focus variables have contributed significantly to the variation in the dependent variable. The year coefficients yield similar results to the first model with substantial falls in the dependent variable values from year 2010 onwards compared to year 2006.

4.5.3 Fixed Effects Model 3

Table 4.5.3 below reveals that the inclusion of the weighted average cost of capital as an independent variable has not changed much the overall significance of the model. The R-squared within value has only increased marginally from 40.78% to 40.88%.

Table 4.5.3

Results using Model 3 with the addition of the moderator variable, WACC.

Fixed-effects (within) regression Number of Obs = 1351 Number of groups = 193				
R-sq: within =0.4088 between = 0.2788 overall = 0.2652 F(14,1144) = 66.50				
Corr(u_i, Xb) = -0.7425, Prob > F = 0.0000				
Ln FH	Coef.	Std. Err.	t-value	P>t
Ln Mktcap	.536563	.0373527	14.36	0.000 **
Leverage	-.008215	.000607	-13.53	0.000 **
Levsqd	.0000127	1.50e-06	8.49	0.000 **
Growth	.0002458	.0002215	1.11	0.267
CATA	.8467032	.1036108	8.17	0.000 **
CLTL	-.1581439	.0765095	-2.07	0.039 *
CCC	-.0004135	.000045	-9.19	0.000 **
WACC	-.004432	.0032197	-1.38	0.169
Year				
2007	-.0206142	.0283079	-0.73	0.467
2008	.0107023	.0286266	0.37	0.709
2009	-.0398212	.0287271	-1.39	0.166
2010	-.0783769	.0288051	-2.72	0.007 **
2011	-.1059561	.0290677	-3.65	0.000 **
2012	-.1213082	.030006	-4.04	0.000 **
_cons	-.7329983	.1196077	-6.13	0.000 **
sigma_u =.56123117 sigma_e = .27579365, rho =. .80548886 (fraction of variance due to u i)				
F test that all u_i=0: F(192, 1144) = 10.25 Prob > F = 0.0000				

* means significant at 5 %, ** means significant at 1 %

The results using Model 3 further corroborates evidence that size, leverage and the three working capital variables have an impact on a firm's financial health but growth is no longer a significant predictor of health. The addition of cost of capital as an independent variable does not seem to have an impact on financial health as shown by its large p-value ($p=0.169 > 0.05$). Although the sign on its coefficient makes sense (negative sign means firms with larger costs of capital have reduced financial health), there is no sufficient statistical evidence that this impact is significant.

4.5.4 Fixed Effects Model 4

The fourth model incorporates all the different types of regressors discussed in the frame-work namely the control variables, the focus variables, the moderator variable and the interaction terms. The results (from Table 4.5.4) indicate that the effects of the control variables and focus variables have been consistent and significant except for the growth variable not being significant despite having the expected positive sign. The impact of the moderator variable (WACC) on financial health is now significant. Model 4 also reveals now that cost of capital has a negative effect on firm financial health. Looking at the p-values of the interaction terms, there seems to be significant interaction only between cost of capital and one of the three working capital management variables, namely CLTL (a measure of short-term asset financing policy variable with a p-value < 0.05).

Using Model 4, (results from Table 4.5.4), there is evidence to suggest that the cost of capital can play a moderating role in defining the relationship between a firm's short-term asset financing policy and financial health. However, this can only be

confirmed once more tests are conducted to determine if the assumptions of the panel data models are fulfilled.

Table 4.5.4
Table showing results using fixed effects model 4

Fixed-effects (within) regression Number of obs = 1351 Number of groups = 193				
R-sq: within = 0.4150 between = 0.2758 overall = 0.2643				
F(17,1141) = 47.62 corr(u_i, Xb) = -0.7434, Prob > F = 0.0000				
Ln FH	Coef.	Std. Err.	t-value	P>t
Ln Mktcap	.5383912	.0372545	14.45	0.000 ***
Leverage	-.0080705	.0006107	-13.21	0.000***
Levsqd	.0000123	1.50e-06	8.18	0.000***
Growth	.0002374	.0002217	1.07	0.284
CATA	.9460554	.1941499	4.87	0.000**
CLTL	-.6700321	.1759053	-3.81	0.000**
CCC	-.0005169	.0000743	-6.95	0.000**
WACC	-.0426095	.0125258	-3.40	0.001**
WACC*CATA	-.0110343	.0170538	-0.65	0.518
WACC*CLTL	.0564902	.0173905	3.25	0.001**
WACC*CCC	.0000135	7.72e-06	1.75	0.080
Year				
2007	-.0137656	.0283027	-0.49	0.627
2008	.0160846	.0285781	0.56	0.574
2009	-.0346651	.0286635	-1.21	0.227
2010	-.0711531	.0288056	-2.47	0.014*
2011	-.1039671	.0290209	-3.58	0.000**
2012	-.1195972	.0299618	-3.99	0.000**
_cons	-.4064695	.1611513	-2.52	0.012*
sigma_u = .56393275 , sigma_e = .27469515 , rho = .80822941 (fraction of variance due to u_i)				
F test that all u_i=0: F(192, 1141) = 10.28 , Prob > F = 0.0000				

* means significant at 5 %, ** means significant at 1 %

Test for time-fixed effects.

Earlier, as models were formulated to study the effects of working capital management policies on a firm's financial health, a two way effects model was suggested. The first effect being due to the heterogeneity of firms (firm specific fixed effects) factor and the second is the time-fixed effects factor. The Hausman test had suggested that a fixed effects model is the more appropriate specification. In

microeconomic literature, it is commonly asserted that there are some factors that are time specific and are able to influence the behavior of firms (Baum, 2006). As such, a time fixed effects test was performed to see if time effects play a role in financial health levels.

The following is a test to see if time fixed effects are needed when running a fixed-effects model. STATA 12 provides a means to test for such effects and the results are as follows.

(1) 2007.year = 0, (2) 2008.year = 0, (3) 2009.year=0, (4) 2010.year = 0
(5) 2011.year = 0, (6) 2012.year = 0, F (6, 1141) =5.77, Prob > F=0.0000

The above test is a joint test to see if the dummy variables for all the years are equal to zero. As can be seen from the above results, the null hypothesis that all the year coefficients are zero is rejected since the p-value < 0.05. Since the time-effects are jointly significant, they should be included in a properly specified model.

4.6 Post-Estimation: Diagnostic Tests for Robustness and Remedial Measures.

Overall, the use of the fixed-effects model has shown promising results as it allows one to take into account issues of selectivity and heterogeneity biases. According to Hsiao (2003), if these biases are addressed in a proper manner, we can have confidence in the results of panel data analysis. Panel data methods have become prominent in recent years due to its ability to capture complexities in firm behavior. Since issues of selectivity and heterogeneity have been addressed in the earlier section, panel data methods are not without other issues such as heteroscedasticity, multicollinearity and serial correlation. These issues must be addressed to avoid biasness in drawing inferences from the datasets about the population. More specifically, to ensure valid statistical inference in the presence of violations of

model assumptions, it is common for researchers to turn to robust standard errors (Hoechle, 2007).

4.6.1 Multicollinearity Tests.

An important assumption when using regression models is that independent variables are not perfectly correlated with each other (no multicollinearity problems). It means a predictor is not a linear function of the other. Multicollinearity causes inflation of variances amongst variables in a model and these can be problematic due to some variables being adjudged to be non-significant due to this condition (Belsey, Kuh & Welsch, 1980). Although there are no standard tests for multicollinearity , many researchers have used the variance inflation factors (VIFs) of the independent variables to decide if multicollinearity is evident

There are no formal tests to determine if multicollinearity causes problems (Schroeder, Sjoquist & Stephan, 1986). However there are ways to detect multicollinearity and the most popular method is to look at the variance inflation factors when variables are uncentered (Freund, Littell & Creighton, 2003). This statistic tells us the degree of degradation of precision of estimates and is measured by $1/ (1-R^2)$ where R^2 is the coefficient of determination of each of the independent variables on the other regressors. If an independent variable is highly correlated with the remaining regressors, the VIF will be large and if VIF is larger than 10, multicollinearity can cause problems (Belsey, Kuh and Welsch, 1980). Using STATA 12, the variance inflation factors (VIFs) are shown in Table 4.6.1.

Table 4.6.1
Table showing variance inflation factors (VIF)

Variable	VIF	1/VIF
Leverage	5.47	0.182836
Levsqd	5.24	0.190904
CLTL	1.59	0.629639
CATA	1.52	0.65906
Lnmktcap	1.14	0.879571
CCC	1.11	0.902083
WACC	1.04	0.959046
GROWTH	1.03	0.975234
Mean VIF	2.27	

From the above table, since the VIFs are lesser than 10, no multicolinearity problem is anticipated. However, there have been concerns regarding interaction analysis with product terms since the product term is usually highly correlated with its component parts. For instance, if WACC*CCC is highly correlated with either WACC or CCC or both, the evaluation of the interaction is undermined due to multicollinearity. However, Jaccard and Turissi (2003) dismiss these concerns as unfounded and state that only high collinearity between the components (example, WACC and CCC) can lead to serious complications.

4.6.2 Heteroscedasticity and Serial Correlation

Generally, panel data analysis assumes that regression disturbances are both homoscedastic and without autocorrelation across the panel (Baltagi, Jung and Song, 2008). However, heteroscedasticity and serial correlation among the error terms are some of the common violations of a standard panel data model and ignoring their existence renders estimated coefficients still consistent but their standard errors

would be biased resulting in the coefficients being inefficient estimates (Baltagi, 2008). In other words, if the standard errors were not corrected, t-tests and confidence intervals are not admissible.

Although there are remedial measures to take into account heteroscedasticity and serial correlation separately, one major problem in panel data studies is the lack of studies that have looked into the joint occurrence of heteroscedasticity and serial correlation. A notable study that considers the existence of both these violations is the one done by Baltagi, Jung and Song (2008) where the authors used robust estimates to correct for violations of the assumptions. Petersen (2009) laments that failing to adjust the standard errors for heteroskedasticity and serial correlation is fairly common even in published articles in finance journals as it can lead to erroneous inferences regarding the population parameters.

In this study, the econometrics package STATA 12 is used as it is equipped with commands that handle options to estimate standard errors that are robust to violations of the underlying econometric model such as serial correlation and heteroscedasticity. The statistical package performs fixed-effects (within) regression using Driscoll and Kraay standard errors. In practice, the idiosyncratic errors are often likely to be serially correlated. Bertrand, Duo and Mullainathan (2004) show that the usual standard errors using the fixed effects estimator are drastically understated in the presence of serial correlation. It is therefore advisable (if serial correlation is evident) to always use cluster-robust standard errors for the fixed effects estimator.

According to Hoechle (2007)[15], if the residuals are only heteroscedastic, the VCE (robust) option is used to estimate the standard errors. STATA 12 reports cluster-robust Huber/White standard errors with the VCE (robust) option. In the presence of both heteroscedasticity and serial correlation, there is a need to correct the standard errors which are both heteroscedasticity and serial correlation consistent. In such cases, Hoechle (2007) advocates the use of the fixed effects cluster standard errors method which provides the necessary robust standard errors. In any case, if the assumptions of homoscedasticity and no autocorrelation are violated, the parameter estimates are still linear and unbiased. However, the standard errors would be biased which would make t-values unreliable and hypothesis tests can give misguided results. The diagnostic tests below will seek to uncover if error disturbances are well-behaved (conform to the assumptions of serial correlation and heteroscedasticity) or otherwise.

(i) Heteroscedasticity Test.

A test for heteroscedasticity on Model 4 is conducted to check if error terms conform to the assumption of homoscedasticity that is a requirement to produce robust results. The results of the test are as follows.

The Modified Wald test for group-wise heteroskedasticity in fixed effect regression model uses the following null hypothesis:

H_0: $\sigma_i^2 = \sigma^2$ all i (errors are homoscedastic)

Chi-Squared (192) = 7.7e+05 Prob > Chi-squared = 0.0000.

Since the p-value is low (< 0.05), with a large chi-squared value, there is evidence of the presence of heteroskedasticity. There is therefore a need for remedial action and this is done by using the 'robust' option to correct for heteroskedasticity.

[15] Hoechle (2007) gives an excellent overview on the necessary commands and options in STATA which produces robust estimates of standard errors for panel data models.

(ii) Serial Correlation Test. (Wooldridge test for autocorrelation in panel data)

A test for serial correlation using Model 4 is conducted to determine if there is evidence of serial correlation in the error terms. Since serial correlation in linear panel data models causes biased standard errors, there is a need to identify serial correlation in the idiosyncratic error term in panel data models. The Wooldridge test is commonly used due to its application under general conditions (few assumptions) and easy implementation (Drukker, 2003). Wooldridge (2002) devised a test to determine if a model suffers from serial correlation in panel data and the results of the test are discussed below.

The Null Hypothesis, Ho: No first order autocorrelation.

F (1,192) = 4.337, Prob > F = 0.0386. Since the p-value < 0.05, Ho is rejected. There is evidence to suggest that serial correlation is present. The results of both diagnostic tests for homoscedasticity and no serial correlation suggest that model 4 needs to be corrected by obtaining robust estimates of the standard errors. If heteroscedasticity and serial correlation are ignored, wrong conclusions may be drawn as the standard errors would have been compromised, giving rise to invalid t-tests and p-values.

4.6.3 The Corrected Model

As discussed in section 4.6.2, Hoechle (2007) notes that the actual information contained in microeconomic panels is commonly misstated due mainly to cross-sectional (heteroscedastic) and temporal (serial correlation) dependencies. Since, Model 4 suffers from such dependencies, the best option is to use the fixed effects cluster robust estimators as advocated by Stock and Watson (2008) in the presence of

heteroscedasticity and serial correlation. Table 4.6.3 gives the corrected estimates for the standard errors of the coefficients which affect the significance of the parameters in hypothesis tests.

Table 4.6.3
The Corrected Model: Panel data model corrected for heteroskedasticity and serial correlation giving robust estimates

Fixed-effects (within) regression Number of obs = 1351 Number of groups = 193				
R-sq: within = 0.4150 between = 0.2758 overall = 0.2643				
F(17,192) = 15.46 corr(u i, Xb) = -0.7434 Prob > F = 0.0000				
(Std. Err. adjusted for 193 clusters in firmno) Robust Estimates				
Ln FH	Coef.	Std. Err.	t-value	P>t
Ln Mktcap	.5383912	.1110974	4.85	0.000 **
Leverage	-.0080705	.0022969	-3.51	0.001**
Levsqd	.0000123	4.84e-06	2.54	0.012*
Growth	.0002374	.0002409	0.99	0.326
CATA	.9460554	.3253494	2.91	0.004**
CLTL	-.6700321	.2706994	-2.48	0.014*
CCC	-.0005169	.0000622	-8.31	0.000**
WACC	-.0426095	.0224882	-1.89	0.060
WACC*CATA	-.0110343	.0217372	-0.51	0.612
WACC*CLTL	.0564902	.0250435	2.26	0.025*
WACC*CCC	.0000135	9.51e-06	1.42	0.157
Year				
2007	-.0137656	.0184238	-0.75	0.456
2008	.0160846	.0239457	0.67	0.503
2009	-.0346651	.0332761	-1.04	0.299
2010	-.0711531	.0471557	-1.51	0.133
2011	-.1039671	.0529993	-1.96	0.044*
2012	-.1195972	.0623906	-1.92	0.046*
_cons	-.4064695	.2880605	1.41	0.160
sigma_u = .56393275 , sigma_e = .27469515 , rho = .80822941 (fraction of variance due to u_i)				

* means significant at 5 %, ** means significant at 1 %

4.7 The results of hypothesis tests.

After having taken into account heterogeneity (firm-specific effects) by using the fixed effects model and having corrected the model for serial correlation and heteroscedasticity which were evident via tests for serial correlation and

heteroscedasticity, the results of the corrected model reveals the following. From the research questions and subsequent formulation of hypothesis tests, the outcomes of the hypothesis tests are reported using the corrected model from Table 4.6.3.

Hypothesis 1: Size of the firm has an impact on Financial Health.

From Table 4.6.3, the size of a firm in these sectors does have a significant positive impact on its financial health. A large t-value (>2) and a p-value = 0(< 0.05) suggest that larger firms have better resources to deal with financial distress thus enabling them to achieve better financial health.

Hypothesis 2: Growth of a firm has an impact on Financial Health.

The results of the regression above show that the growth variable coefficient displays the correct positive sign. However, this effect is not significant enough (t-value of 0.99 and a p-value of more than 0.10) to conclude that growth plays an important part in affecting a firm's financial health. Firms in the trading, services and consumer sector may experience growth opportunities (as measured by the growth in sales) but this does not necessarily translate into significant improvements in financial health. Growth may bring about an increase in the usage of a firm's resources and this could have cancelled out the benefits the firm may have gained from these opportunities. Thus, a positive albeit insignificant effect of firm growth on the firm's overall financial health is perfectly understandable and not surprising.

Hypothesis 3: Leverage affects Financial Health

A firm's use of more debt can be considered risky as obligations arising from debt commitments are mandatory despite the tax benefits of using debt in a firm's capital

structure. Some studies in Malaysia (e.g. Nur Adiana et al (2008) and Irene & Lee (2007)) report evidence that greater leverage negatively affects firm financial performance**.** The results of this study confirm the assertion that leverage has a significant negative impact on firm health (t-value = -3.51 and a p-value < 0.05). This result is not surprising as the Pecking Order Theory suggests that financially healthy firms are less likely to borrow and rely more on internal funds for investment purposes.

It is also noted that the quadratic term on leverage is admissible (t-value = 2.54 and p-value <0.05). This shows that although higher leverage causes a dip in financial health levels, the slope (rate of change of financial health) seems to become less steep (positive coefficient of Levsqd) as a firm uses additional debt in its capital structure. In other words, further leverage (to a certain extent) leads to only small levels of reduction in financial health levels.

Hypothesis 4: CATA of a firm affects Financial Health.

The current assets to total assets ratio (CATA) measures a firm's short-term asset investment policy whereby a larger value indicates a more conservative policy. In other words, if a significant part of firm's assets are tied down as current assets, the short-term asset investment policy is considered conservative designed to ensure liquidity and servicing short-term obligations. An aggressive investment policy generally translates into high levels of fixed assets and low investment in current assets and this strategy is designed to increase firm profitability. A more aggressive short-term asset investment policy (where smaller CATA ratios are used) is said to enhance firm profitability as less funds are tied down as current assets. However, the

results of the regression above confirm that a more conservative policy seems to give rise to better financial health (a positive coefficient, t-value =2.91 and a p-value < 0.05). This means that firms in these sectors are able to improve their financial health by adopting a more conservative short-term asset investment policy.

Hypothesis 5: CLTL of a firm affects financial health.

The current liabilities to total liabilities ratio (CLTL) is intended to measure a firm's short-term asset financing policy whereby a larger value indicates a more aggressive short-term financing policy. An aggressive working capital management policy in this respect implies that a greater portion of current liabilities are maintained compared to long-term debts. This means that if levels of current liabilities make up a significant portion of total liabilities, firms practise a more aggressive financing policy. Since current liabilities are a form of short-term financing which bear lesser rates of interest, they are deemed to enhance profitability due to interest savings. Conservative working capital financing policies use greater long-term debts compared to current liabilities.

Although, it is thought that a more aggressive short-term financing policy improves profitability, the results of the robust regression prove otherwise. Nevertheless, CLTL is an important predictor of firm financial health (negative coefficient, high t-value and a very low p-value). The results indicate that a more aggressive short-term financing policy has a negative impact on financial health. As the degree of aggressiveness of short-term asset financing policy increases, financial health deteriorates. Firms in these sectors must be cautious in pursuing a more aggressive short-term asset financing policy as the results show that short-term financing plays

an important role in maintaining a firm's financial health. The implications are that firms in these sectors should keep current liabilities lower relative to total liabilities in order to achieve better financial health.

Hypothesis 6: The cash conversion cycle of a firm affects financial health.

A firm's cash conversion cycle is regarded as an important measure of how firms comprehensively manage their working capital by taking into account the element of time. Longer cash conversion values indicate a firm is not managing its inventory, receivables and payables in a timely manner. The results of the regression above indicate that the cash conversion cycle is an important predictor of firm financial health (a very large negative t-value of -8.31 and a p-value < 0.01). Larger cash conversion cycles mean a longer time taken to receive payments due and this affects firm financial health as it can give rise to liquidity and cash flow issues. The results also mean that when firms manage their inventories, receivables and payables in an efficient manner (lower CCC), this helps to improve their financial health.

Hypothesis 7: WACC has an effect on financial health.

Cost of capital means the costs associated in raising capital for carrying out a firm's various activities in order to provide a reasonable return for its stakeholders. Higher long-term financing costs can eat into a firm's profitability. In this study, the impact of cost of capital on a firm's financial health has the expected negative sign. A Priori, as cost of capital of firms in this category increases, financial health suffers. However after correcting for serial correlation and heteroscedasticity, it was found that this factor is not significant (t-value of -1.89 and a p-value > 0.05). This means that there is insufficient evidence from the sample data that cost of capital plays an

important role in predicting a firm's financial health. Nevertheless, the effect of cost of capital as a moderator will be examined shortly in the next section.

Since it has been verified that the cost of firm's capital does not significantly affect its financial health, its role as a predictor of financial health is dismissed. The next question is whether it plays an important part as a moderating factor in defining the relationship between the working capital variables and financial health.

Hypothesis 8: WACC has a moderating effect on the relationship between CATA and FH.

The outcome of Hypothesis test 4 gives empirical evidence that current assets to total assets ratio affects financial health (higher CATA leads to better financial health). However, the results of Hypothesis 7 reveal that WACC is not a predictor of financial health. As for determining if WACC plays the role of a moderator between CATA and financial health, the outcome of the test reveals that the coefficient of the interaction variable (WACC*CATA) is not significant (t=-0.51 and p-value = 0.612). This means that a firm's cost of capital does not moderate the relationship between CATA and financial health. The results provide empirical evidence that the relationship between a firm's short-term asset investment policy (CATA) and financial health (FH) is not contingent upon its cost of capital.

Hypothesis 9: WACC has a moderating effect on the relationship between CLTL and FH.

Although the coefficient of CLTL is negative (indicating that high CLTL levels cause deterioration of financial health levels), the coefficient of the interaction term (cross-product) WACC*CLTL is positive and significant (t= 2.26 and p= 0.025 < 0.05). This means that there is empirical evidence to suggest the moderating

influence of cost of capital on the relationship between short-term asset financing policy and financial health. Hence, the relationship between CLTL and FH is contingent upon the cost of capital. The positive sign on the cross product means that when WACC levels are higher, the effect of CLTL on financial health becomes weaker (slope of FH on CLTL becomes less negative). In other words, at low WACC levels, the relationship between CLTL and financial health is negative and significant but at higher WACC levels, this relationship seems to weakening. In accordance with the typology of moderator variables suggested by Sharma et al (1981), the cost of capital can now be classified as a pure moderator in defining the relationship between a firm's short-term asset financing policy and its financial health.

Hypothesis 10: WACC has a moderating effect on the relationship between CCC and FH.

Earlier, there was sample evidence that the cash conversion cycle as a measurement of working capital management efficiency plays an important role as a predictor of financial health (from results of Hypothesis 6). Firms' with a lower CCC (more efficient management of payables, inventory and receivables) tend to achieve better financial health levels. Results from Table 4.6.3 show that the coefficient of the interaction term WACC*CCC is not significant (t = 1.42 and p= 0.157). Therefore, there seems to be no statistical evidence to suggest that WACC acts as a moderator in the relationship between CCC and FH. Hence, it can be said that the relationship between a firm's cash conversion cycle and its financial health is not contingent upon its cost of capital. It shows that irrespective of a firm's levels of WACC, the cash conversion cycle's effect on financial health remains significantly negative.

4.8 Summary of Analysis and Findings.

In this section, the discussion will center on the full fixed effects model and the corrected model for serial correlation and heteroscedasticity. Hoechle (2007) noted that often information in microeconomic panel datasets is often overstated in the presence of heteroscedasticity and serial correlation and calls for models to be corrected for cross-sectional and temporal tendencies. If a fixed-effects model is favored, Stock and Watson (2008) propose the use of cluster-robust estimators in the presence of heteroscedasticity and serial correlation.

Table 4.8.1 provides coefficient estimates and comparisons between uncorrected and corrected standard errors. It is noted that in the presence of serial correlation and heteroscedasticity, the parameter estimates remain the same but the standard errors do not, thus affecting t-values and p-values. The corrected model using clustered standard errors retains the values of the estimated coefficients and their respective signs but their t-values (indicating significance) have changed due to the larger robust (corrected) standard errors.

Upon correcting for serial correlation and heteroscedasticity, the standard errors for all variables have become much larger. The results indicate that if serial correlation and heteroscedasticity were ignored, the standard errors would have been underestimated and this in turn would have produced erroneous t-values (larger t-values). Subsequently, tests of hypothesis would have become invalid. Warnings by noted finance researchers such as Petersen (2009) and Baltagi et al (2008) to correct for violations of models must be heeded so that erroneous inferences from biased models can be reduced or avoided.

Table 4.8.1
Comparisons between unadjusted and corrected models

Fixed-effects (within) Regression – Unadjusted Estimates				Corrected model with standard errors adjusted for 193 clusters- Robust Estimates			
Ln FH	Std. Err	t-value	P>t	Coef	Std. Err	t-value	P>t
Ln Mktcap	.03725	14.45	0.000**	.5383912	.1110974	4.85	0.000**
Leverage	.00061	-13.21	0.000**	.0080705	.0022969	-3.51	0.001**
Levsqd	1.50e-06	8.18	0.000**	.000012	4.84e-06	2.54	0.012*
Growth	.000222	1.07	0.284	.0002374	.0002409	0.99	0.326
CATA	.194150	4.87	0.000**	.9460554	.3253494	2.91	0.004**
CLTL	.175905	-3.81	0.000**	-.6700321	.2706994	-2.48	0.014*
CCC	.000074	-6.95	0.000**	-.0005169	.0000622	-8.31	0.000**
WACC	.012526	-3.40	0.001**	-.0426095	.0224882	-1.89	0.060
WACC* CATA	.017054	-0.65	0.518	-.0110343	.0217372	-0.51	0.612
WACC* CLTL	.017391	3.25	0.001**	.0564902	.0250435	2.26	0.025*
WACC* CCC	7.72e-06	1.75	0.080	.0000135	9.51e-06	1.42	0.157

** Significant at 1 % level of significance.
* Significant at 5% level of significance.

As far as control variables are concerned, both models confirm that the variation in firm size and leverage play an important role in explaining changes in financial health levels. Larger firms and less leveraged firms significantly contribute to better financial health of firms in the trading, services and consumer goods sectors. However, the results from using both models show that there is insufficient evidence to suggest that higher growth translates to better financial health.

In terms of the impact of the focus variables on firm financial health, all three working capital management variables play an important part in influencing financial health levels. A priori, signs and sizes of the coefficients are as expected. Both models provide compelling empirical evidence that: (i) a more conservative short-

term asset investment policy (higher CATA) improves financial health (ii) a more aggressive short-term asset financing policy (higher CLTL) reduces a firm's financial health levels and (iii) a longer cash conversion cycle (higher CCC) is detrimental to a firm's financial health.

Although the uncorrected model shows that the cost of capital plays a significant role as a predictor of firm financial health, the corrected model seems to suggest otherwise. The implications of not using the corrected model can lead to erroneous inferences drawn from the sample datasets such as rejecting the null hypothesis when it is true (Type 1 error). In this case, if the model was not corrected, the standard errors (of WACC) would have been smaller. This would have led to larger t-values and wrongly concluding (Type 1 error) that WACC is a predictor of financial health. When corrected, Table 4.8.1 shows that WACC is no longer a predictor of financial health.

From the corrected model (see Table 4.8.1), there are suggestions that the short-term asset financing policy of a firm can affect a firm's financial health. The negative sign on the coefficient of CLTL means that when CLTL increases, financial health deteriorates. Furthermore, a p-value of less than 0.05 provides empirical support that a more aggressive short-term asset financing policy achieved by increasing its level of current liabilities relative to its total liabilities can be detrimental to a firm's financial health. This can be attributable to increased liquidity risk.

The second part of the analysis focuses on the moderating role of cost of capital in this relationship. Despite the cost of capital not playing an active role as a predictor

of financial health, nevertheless, it plays an important role as a moderator in defining the relationship between a firm's short-term asset financing policy and its financial health. The corrected model suggests that when the cost of capital is low, the impact of a firm's conservative financing policy (CLTL) on its financial health is significant. However, with increasing cost of capital, the impact seems to be reducing. Given the statistically significant value of the interaction term (WACC*CLTL), it can be inferred that a firm's cost of capital serves as a pure moderator as defined by Sharma et al (1981).

It is noteworthy that the same (cost of capital's role as a moderator) cannot be said about a firm's short-term asset investment policy (proxied by CATA) and its efficiency in managing its inventory, payables and receivables (proxied by CCC). Statistical evidence from the above model reveals that the p-values of the interaction terms (WACC*CCC and WACC*CATA) are more that 5%. Therefore, it can be concluded that cost of capital does not have a moderating influence on the relationship between these variables (CATA and CCC) and financial health. This means that although a firm's short-term asset investment policy and its efficiency in managing its working capital are important in achieving better financial health levels, it is not dependent on its cost of capital.

Chapter 5
Conclusion and Recommendations

5.1 Recapitulation of the Study.

Although a number of studies have concentrated on the determinants of a firm's performance in terms of profitability, very few have actually touched on the subject of finding empirical evidence for the determinants of a firm's financial health which contain elements of working capital management policies. The basic aim of a firm's working capital management policy is to ensure that profitability is maintained and not compromised by putting a firm's financial health position in jeopardy. Liquidity needs at the expense of profitability concerns must be looked at as finance theory suggests that the risk-return trade-off offers some insight into understanding the basis of working capital strategies. This study offers aspects on how the various working capital management strategies can help improve a firm's financial health and whether a firm's cost of capital plays a contingent role in the impact of working capital management policies on a firm's financial health. The final chapter presents a summary of inferences drawn from this sample of 193 Malaysian public listed firms addressing the research objectives and the research questions.

From the analysis, having controlled for the variation in the control variables, the variation in the focus variables seem to do a good job in explaining the variation in the criterion variable. The focus variables in question are short-term asset investment policy, short-term asset financing policy and the cash conversion cycle. Empirical evidence from this study via t-tests have shown firm size and leverage to be significant predictors of firm financial health although firm growth (despite having the correct sign) stops short of being a significant predictor of firm health.

The objectives of this study include determining if a firm's short-term asset investment policy, its short-term asset financing policy and its working capital efficiency have a bearing on its financial health. In particular, the study focuses on areas where cost of capital can play a moderating role in defining the relationship between each of these working capital policy variables and financial health. In this context, the objectives were to provide empirical support using data from Malaysian public listed firms in the trading, services and consumer products sector.

Subsequently six research questions were posed in line with the research objectives. The first three research questions include whether a firm's short-term asset investment policy, its short-term asset financing policy and its working capital management efficiency ratio affect its financial health. The next three questions center on whether cost of capital plays the role of a moderator in the relationship between these working capital policy variables and financial health.

The results using Table 4.8.1 show that the three working capital strategies have shown promise in predicting firm health after controlling for cost of capital and other control variables. One of the main objectives of this study is to determine the role of cost of capital as a moderator. Hence research questions are posed to determine if there are statistically significant interactions between working capital variables and cost of capital in predicting financial health. A number of model specifications were formulated and tests of hypotheses were created to address these research questions using moderated regression analysis and appropriate models based on proper methodological procedures were performed. Since panel data is used, checks were conducted if pooled, random-effects or the fixed effects model would be the most

suitable. The procedure (using schematic diagram 3.11.6) revealed that the fixed effects model was the preferred approach and from there onwards, tests of hypotheses to answer the research questions were carried out.

The results of this study show that the addition of working capital variables further contributes to the significance of the model with R-squared (within) value showing a significant increase. Moving from Table 4.5.1 to Table 4.5.2, the explained variance (measured via the R-Squared within value) has increased by 7 %. This provides evidence that the variation in working capital management policy variables help explain the variation in financial health levels. The results show that finance decision makers can use these policy variables as tools to help improve financial health levels.

To test if interaction plays an important role in explaining the behavior of the working capital variables and its effect on financial health, Model 4 (from section 4.5.4) which includes interaction terms) was formulated and later corrected (Table 4.6.3) as there was evidence of violations to the assumptions of the regression model. The outcomes of the regressions using these models are compared using Table 4.8.1. The corrected model was then used to answer the research questions. The following table (Table 5.1) summarizes the outcomes of hypothesis tests carried out to answer the research questions.

Table 5.1
Summary of hypothesis tests and results

Financial health as dependent variable.

Control Variables	Hypothesis Tests	Results
1.Firm Size	Ho: Firm Size has no impact on financial health.	Reject Ho. since p-value < 0.05 Therefore firm size has an impact on financial health
2.Leverage	Ho: Leverage has no effect on financial health.	p-value < 0.05, Reject Ho, leverage has an impact on financial health
3.Growth	Ho: Growth has no effect on financial health.	p-value > 0.05, Do not reject Ho. Growth is not a significant predictor of financial health
Focus Variables		
4. Current Assets To Total Assets Ratio (CATA).	Ho: Short-Term Asset Investment Policy has no effect on Financial Health.	Reject Ho since p–value is < 0. Evidence of a more conservative short-term investment policy helps improve financial health.
5. Current Liabilities to Total Liabilities Ratio (CLTL).	Ho: Short-term Asset Financing Policy has no effect on Financial Health	Reject Ho since p-value <0.05. Results show evidence that a more aggressive short-term asset financing policy causes fall in financial health levels.
6. Cash Conversion cycle (CCC).	Ho: Working capital efficiency has no effect on financial health.	Reject Ho since p-value < 0.05. This provides empirical evidence that efficiently managing payables, receivables and inventory helps improve financial health significantly
Moderator		
7. Cost of Capital (WACC)	Ho: Cost of capital has an impact on financial health.	Do not reject Ho since p-value > 0.05. Cost of capital is not a significant predictor of firm financial health.
Interaction variables		
8. WACC*CATA	Ho: Cost of capital does not moderate the relationship between short-term asset investment policy and financial health.	Do not reject Ho. Cost of capital does not act as a moderator in the relationship between short-term asset investment policy and financial health.
9. WACC*CLTL	Ho: Cost of capital does not moderate the relationship between short-term asset financing policy and financial health.	Reject Ho. Cost of capital acts as a pure moderator. This means that the relationship between short-term asset financing policy and financial health is affected to a certain extent by a firm's cost of capital.
10. WACC*CCC	Ho: Cost of capital does not moderate the relationship between working capital efficiency and financial health.	Do not reject Ho. The relationship between a firm's working capital efficiency and financial health is not contingent upon its cost of capital.

5.2 Discussion of Analysis, Results and Findings.

To ensure the study provides useful leads, knowledge and information on how working capital management variables affect a firm's financial health, a thorough analysis was conducted by relying on current working capital literature. Using panel data methods, the fixed effects model was found to be superior to both the pooling method and the random effects model. Subsequently, great care was taken to ensure that the appropriate model used provided robust estimates of the population parameters (coefficients and standard errors) by checking for violations of model assumptions and correcting for them.

In the subsequent section, a summary is produced on the effects of the four types of independent variables (control variables, focus variables, moderator and interaction variables) on the financial health of Malaysian firms in the trading, services and consumer sectors. The results are based on the robust model (Model 4.6.3) obtained from chapter 4 and are divided into two sub-sections, the first on control variables and the second on the focus variables and interaction variables.

(i) Control Variables and Financial Health.

Table 5.1 shows that from the block of control variables, it can be inferred that firm size and leverage are significant determinants of financial health. However, the results from the output show that the growth of a firm has no significant impact on financial health. In examining the effects of firm size on financial health, the results concur with findings by Shumway (2001) that larger firms face lower chances of default and studies by Ohlson (1980), who found empirical evidence to suggest that size of a firm is a significant discriminatory factor in distinguishing between distressed and non-distressed firms. Casey et al (1998) reason that this is because

larger firms have better resources such as larger asset bases and lesser information asymmetry which make it easier for them to achieve better financial health.

In testing if leverage plays an important role in explaining financial health, the results provide empirical evidence to support this argument. The results of this study concur with studies in the US by Myers (2003) which provided empirical support for the rationale that highly levered firms can result in lower profitability. Similar results were reported in Malaysia through research conducted by Nur Adiana et al (2008) who predicted that highly leveraged firms face more financial distress although in a study by Nor Edi and Noriza (2011) , the results were mixed with higher leverage giving rise to a higher Tobin's Q but lower ROA (return on assets).

In this study, the third control variable, that is, the growth of a firm, seems to have no impact on financial health although growth intuitively suggests potential opportunities available for a firm to improve various aspects of its financial performance. Despite having the correct sign (positive), the result of this study (p-value > 0.05) indicates that growth does not significantly affect financial health. Although some research studies have shown significant positive association between firm growth and financial performance (e.g. Cowling, 2004: Samiloglu & Demirgunes, 2008), there are others which show no relationship between growth and firm performance. Therefore, this result is not entirely surprising as some studies (such as Davidsson et al (2001)) have shown that growth has little effect on financial performance. Davidsson et al (2001) argue that higher growth can cause extensive use of resources which may not necessarily enhance financial performance. For instance, high growth may trigger the use of more external funds which can be costly.

(ii) Working Capital Management Policy Variables and Financial Health.

The outcomes of the various hypothesis tests as regards to working capital variables have lent credence to the belief that all three aspects of working capital management have effects on financial health levels. Therefore, as far as the working capital variables are concerned, these are clear indications that finance managers should use all three measures of working capital management in managing a firm's financial health. This is because the results show empirical support that a more conservative short-term asset investment policy and a more conservative asset financing policy help improve financial health. In addition, there is sufficient evidence to suggest that when firms manage their working capital well in terms of a dynamic working capital measure (managing components such as payables, receivables and inventory), financial health improves. In the latter case, evidence from the results suggests that a shorter cash conversion cycle results in better financial health levels. The results are consistent with similar studies conducted by researchers in many countries (e.g. Teruel & Solano (2007) in Spain: Uyar (2009) in Turkey: Zariyawati et al (2009) in Malaysia).

(iii) Role of Cost of Capital as Moderator.

The results (from Table 4.8.1) extracted from the corrected model reveal that cost of capital by itself is not a significant determinant of financial health. In addition, the findings show that among the three working capital policy variables (CATA, CLTL and CCC), only its short-term asset financing policy's (CLTL) effect on financial health is contingent upon (moderated by) the firm's cost of capital. Earlier, the results have indicated that keeping cost of capital constant, when a firm uses more short-term debt relative to total debt, that is, if it pursues an aggressive short-term

financing policy, financial health suffers. In other words when cost of capital is low, higher levels of CLTL reduces financial health. However, when cost of capital is high, firms may increase the usage of current liabilities (as they are cheaper), which results in a higher CLTL since current liabilities are a cheaper source of financing and this helps in producing better financial health levels.

The crux of the study reveals that cost of capital plays a moderating role in the relationship between a firm's short-term asset financing policy (CLTL) and its financial health. Since cost of capital (WACC) and the ratio of current liabilities to total liabilities (CLTL) are both continuous variables, this sort of interaction is called a [16]continuous by continuous interaction. A small p-value (< 0.05) on this continuous by continuous interaction (WACC*CLTL) means that the moderating effect is significant. It suggests that the slope of this ratio (CLTL) on financial health (LnFH) changes when WACC changes. When a firm's cost of capital is low, the results seem to suggest that there is a significant negative relationship between a firm's short-term asset financing policy and financial health. This means that more aggressive short-term asset financing policies result in lower financial health levels when a firm's cost of capital is low.

Baron and Kenny (1986) have reiterated in general terms a few types of moderator effects with the main premise that moderators are variables that affect the direction and/or strength of the relationship. In this case, the type of effect which occurs is one whereby a relationship is substantially reduced (not reversed) due to changes in the moderator values. In this study, it can be inferred that when the cost of capital

[16] Aiken & West (1991) and Jaccard, Turrissi & Wan (1990) both propose this useful way to look at regression equations whereby both the predictor and moderator variables are continuous in nature.

increases, the (negative) relationship between CLTL and financial health is substantially reduced but not reversed (thus the positive sign in the interaction term).

A deeper understanding of the role played by the moderating variable comes from the sign and size of the interaction term. The positive sign on the coefficient of this interaction term (WACC*CLTL) suggests that when a firm's cost of capital increases, there is a reduction in the negative effect of an aggressive short-term asset financing policy on financial health. The results of the interaction effect suggest that firms with low cost of capital must be cautious about pursuing a more aggressive short-term asset financing policy as a more aggressive policy reduces financial health significantly. On the other hand, when cost of capital becomes higher, that is, when the stakeholders (debt-holders and equity holders) demand higher returns on their investment, the relationship between CLTL and financial health seem to be weakening, in which case, the firm may pursue a slightly more aggressive short-term asset financing policy in order to attain better financial health. The results of this study clearly indicate that the slopes of financial health against a firm's short-term financing policy can change at different levels of cost of capital.

5.3 Limitations of the Study and Future Research.

This research was conducted using firms listed in the Malaysian Stock Exchange which come from the trading and services and consumer products industry. Trading and services are listed as a sector by itself and consumer products are crudely assumed as having similar working capital structures. As such, the results are valid for firms in these sectors and any generalizations made with respect to this study are confined to firms in these sectors. The industry specific nature of working capital

management means that a more comprehensive study detailing differences in the effects of working capital management on firm performance can be seen as an opportunity for future research. Future research can involve comparisons between these sectors and others such as manufacturing and plantation sectors.

In terms of variables used to explain financial health levels, in addition to the focus variables related to financial health, some control variables were used in this study. The choice of control variables (firm size, leverage and firm growth) is supported by prior research on their associations with financial performance. Nevertheless, it is acknowledged that, notwithstanding these control variables, a potential omitted variable problem can never entirely be overcome. For example, the models used do not control for variables such as quality of human resource, age of the firm and macroeconomic conditions which may contribute to understanding changes in financial health levels.

As moderated relationships were investigated, a word of caution is that in principle, Jaccard and Turissi (2003) recognize that there are many varieties of moderated relationships and the variety discussed in this study is the traditional interaction model with a specific form called a bilinear interaction. As can be seen, the product terms such as (CLTL*WACC) are used to test for the presence of a moderated relationship. The estimated coefficient of this product term gives an idea on how (from its sign and size) cost of capital moderates the relationship between short-term asset financing policy (CLTL) and financial health. Other forms of interaction may be present and an exploratory analysis using these forms can be performed to

determine the correct specification. However, this aspect of interaction is left for future research.

As far as methodology is concerned, the study uses static panel data techniques in contrast to more simplistic methods such as pooled multiple regression. While static panel data analysis is widely used, and relatively superior to pooled regression methods, there are other more sophisticated models such as dynamic panel data analysis which could be used to uncover relationships between the various working capital variables and firm financial health.

5.4 Conclusion

Although a number of studies have explored the relationship between working capital management variables and a firm's financial performance, most of the focus was on narrow versions of financial performance using performance measures such as the Return on Assets (ROA) and other profitability ratios such as ROE (return on equity). This study instead uses a firm's financial health as its criterion variable as it encompasses elements of liquidity, solvency, and risk in addition to profitability.

Financial health is modeled as a function of three types of factors; the control variables, the focus variables and the interaction variables. The tests performed have strengthened empirical support for the premise that working capital management variables do significantly impact financial health when control variables are taken into account. The effect of a variety of working capital management policies is documented using the fixed effects method. By controlling for firm heterogeneity, the study finds that decisions on short-term asset investment policies, short-term

asset financing policies and working capital efficiency have an effect on a firm's financial health after controlling for firm size, leverage and firm growth.

If financial health is to be improved by using a short term asset investment policy as measured by the ratio of current assets to total assets (CATA), the result advocates the use of a conservative short-term asset policy. Liberal use of current assets may hamper a firm's profitability but can improve its overall financial health as it reduces the effects of facing liquidity issues. The study also provides empirical support that the liberal use of current liabilities relative to total liabilities (a more aggressive short-term asset financing policy) is detrimental to a firm's financial health. Although a more aggressive short-term asset financing policy may improve a firm's profitability, the study shows that if liquidity issues are taken into account, the firm's overall financial health may suffer. Therefore, it can be inferred from the sample data that firms in these sectors (trading, services and consumer firms) should attempt to practice a moderate to conservative short-term financing policy. By reducing its payables and inventory to avoid the risk of unnecessary liquidity issues or in worst case scenario solvency issues, these firms can improve their financial health index significantly.

The third working capital management variable, that is the cash conversion cycle, has proved to be a useful tool in firms wanting to improve financial health. The evidence from this study shows that lowering the cash conversion cycle helps improve financial health. The lower the cash conversion cycle, the more efficient its handling of receivables, payables and inventory and this enhances firm financial health. By reducing the cash conversion cycle, a manager has to find ways to

decrease the inventory conversion period, reduce the receivables collection period and/or prolong the trade payables days in order to achieve better overall financial performance. There is empirical evidence from the results of the analysis to suggest that finance managers in the trading, consumer and services sectors can create value for their firms (taking into account risk factors) by reducing the cash conversion cycle and practicing conservative short-term asset investment and financing policies.

Since the focus of this research is on the interaction between cost of capital and the three working capital management variables, there must be some clear distinction between the effects of these variables directly and/or indirectly with financial health. The contingency approach to seeking relationships between working capital management policies and financial health has been invoked to clarify ambiguities that may exist in other approaches. Besides confirming the effect of a firm's working capital management policies on its financial health (direct effects), the study also found some role (indirect effect) of cost of capital on the relationship between these policies and financial health.

The study has implications on theoretical and managerial perspectives. From a theoretical perspective, using the resource-based view, working capital items constitute important firm resources as the results of the study imply that conservative short-term asset investment and financing policies are directly related to a firm's financial health while reducing a firm's cash conversion cycle helps improve financial health. Since working capital is considered an important resource to the firm, it is imperative that managers use them with care to avoid falling into unhealthy levels.

From a managerial perspective, only a firm's short-term asset financing policy's effect on financial health is contingent upon the value of its cost of capital. Thus, the findings from the study should help managers decide on proper short-term asset financing policies taking into account the firm's cost of capital. However, the same cannot be said regarding the role of cost of capital on the impact of its short-term asset investment policy and the impact of its efficiency in managing its working capital on financial health. The results of the research provide guidance for firms in the consumer, trading and services sectors in terms of strategies to be utilized in enhancing financial health.

The study thus provides empirical evidence that a firm's cost of capital does not affect a firm's financial health directly but nevertheless plays a moderating role in determining the relationship between its short-term asset financing policy and its financial health. Although a firm's aggressive short-term asset financing policy can have a negative effect on its financial health, when its cost of capital becomes high, it is possible to continue pursuing this policy as its impact on financial health becomes weaker.

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