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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF ECONOMIC AND BUSINESS SCIENCE

Title

AN ANALYSIS OF THE IMPACT OF WORKING CAPITAL MANAGEMENT ON PROFITABILITY: EVIDENCE FROM SOUTH AFRICA.

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A research report submitted to the Faculty of Commerce, Law and Management in fulfilment of the requirements for the degree of Master of Commerce in Finance with a 50% Research component.

February 2013

Declaration

I, Tariro Chirume declare that this research report is my own unaided work. It is submitted in partial fulfilment of the requirements for the degree of Master of Commerce in Finance at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Signature of candidate Date:26 Feb 2013

ABSTRACT

Cash flow is one of the critical factors influencing the operational, investments and financing decisions of a firm. Since working capital management deals with short-term cash flows, this research explores the interaction between working capital management and profitability. Utilising 110 South African industrial firms listed on the JSE and ALTX this study firstly investigates the impact of working capital management on the profitability of firms from 2001-2010. Secondly this study investigates the impact of different working capital policies on profitability of South African industrial firms. The results show that after removing the problems associated with panel data, the cash conversion cycle which is the main measure of working capital is negatively related to both measures of profitability (return on assets and return on equity). The results of the study have also revealed that profitable firms have less days in account receivables, days in inventory, days in accounts payables, leverage ratio and high sales revenue. Lastly the sectorial analysis was conducted and the results revealed heterogeneous working capital management patterns.

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I thank my family for taking me this far. I am grateful to my mother, father and brother Comfort Chirume for all the support. I dedicate this research (thesis) to my mother for her love towards me. Above all, I thank God for the gift of life.

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CHAPTER ONE

INTRODUCTION

A plethora of studies have shown that the discipline of corporate finance is mainly divided into three domains, namely capital budget; capital structure and working capital management (Jose, Lancaster and Stevens, 1996; Eljelly, 2004; Mathuva, 2010). The goal of corporate finance is the maximisation of firm value. Thus, the aforementioned branches play different, but complementary roles to ensure that the firm's value is maximised. Capital budgeting and capital structure are the two corporate finance branches that mainly deal with long term capital investment decision by selecting investment projects that yield maximum positive returns as well as selecting appropriate sources of capital for the firm. A lot of research that has been done in the area of corporate finance is in light of long term investment decisions (Palombini and Nakamura, 2011). The resultant theories and models from these research studies are currently being utilized in the field of corporate finance by many financial executives to maximise firm value. Some of the popularly known theories and models include the capital asset pricing model, the techniques used in capital budgeting[1], and the arbitrage pricing theory.

The area of short term financial management deals with the decisions that determine the liquidity levels of a firm. It is instructive to note that liquidity is a reflection of the firm's ability to meet its financial obligations (Gitman, 2009). The liquidity position of a company is of key importance to every stakeholder in different ways. In their study, Jose, Lancaster and Stevens (2006) highlighted some of the main concerns of today's investor. Firstly an investor is interested in the firm's ability to utilise its operating cash flows to cover its financial obligations. Secondly, the investor is concerned with the sensitivity of the operating cash flows to sales earnings. Thus, an incorrect evaluation of liquidity needs may in turn subject creditors and investors to an unanticipated risk of default.

According to Van Horne (1969) the concept of working capital evolved with the identification of components that made up working capital. Van Horne (1969)

[1] Capital budgeting techniques such as the net present value method, payback period method and internal rate of return.

acknowledged that through the work of many researchers, working capital has been defined in accordance to qualitative and the quantitative characteristics. Quantitatively working capital has been defined as a collective term for short term assets such as inventories, cash and cash equivalence (Sagan, 1955; Van Horne, 1969; Gitman, 2009). The qualitative definition of working capital was defined by the accountants with the objective that it is used to assess the liquidity position of the firm (Van Horne, 1969). Therefore working capital was defined as the excess of currents assets over current liabilities. According to Saleem and Rehman (2011) liquidity can be measured in two ways. Namely, the broader measure and narrow measure. Working capital being the broader measure of liquidity, and cash at hand being the narrower measure of liquidity.

It is the belief of recent authors such as Mathuva (2010), Saleem and Rehman (2011) that it is in defining working capital according to the different approaches (qualitative and quantitative) that paved a way to concept of managing working capital components. This gave birth to the many used techniques of managing working capital. Each of these techniques was based on different views expressed by different authors on how to manage working capital.

The early techniques to assess liquidity included the current ratio and quick ratio. These measures however have been criticised for their inability to reflect the entire range of issues affecting a firm's viability. Another weakness of these measures is that they only take into account the payment of financial obligations without recognising the timing of these repayments. The traditional measures have also been criticised for inconsistencies in the results when measuring liquidity. The usefulness of the traditional measures is also highly dependent on the accuracy in recording and maintaining the financial data. Richards and Laughlin (1980) are of the opinion that these measures are static in nature. This condition therefore limits their ability to present a true and appropriate estimation of the financial position of the company.

In an attempt to overcome the weakness of the traditional measures of working capital, alternative modern measures have been developed (Nassirzadeh and Rostami, 2010). Some of the well documented modern measures include cash conversion cycle, net trade cycle and lambda amongst others. The modern measures do take into account the aspect of the

on-going financial concerns of a firm regarding the level of liquidity of current assets and repayment of payables. In that way, the modern measures are designed to avoid default by ensuring that cash flow requirements and financial obligations are timely covered.

This study will utilise cash conversion cycle (CCC) which was developed by Richards and Laughlin (1980) as a proxy for working capital. CCC projects information about the cash flow attributes and the transformation processes within a firm's working capital position. It is a measure of the length of time the actual cash expenditure on productive resources is converted into cash inflow from sales. The CCC is also unique in that it encompasses the operating cycle. The operating cycle has been advocated as one of the useful tools in solving the problem of finding the appropriate levels of working capital (Weinraub and Visscher, 1998). Authors such as Lambert and Pohlen (2001) support the use of cash conversion cycle, as a proxy for liquidity to assess profitability for the main reason that this metric expresses the firm's operational improvement.

This research will explore the relationship between cash conversion cycle and profitability by examining the South African Industrial listed firms. Secondly, this research will also explore how different working capital policies impact profitability. Thirdly the research will investigate the significance of the sector effect on the working capital of the South African Industrial firms. Sector effect in this scenario refers to the different interplaying factors that shape the relationship between cash conversion cycle and profitability.

1.2 IMPORTANCE OF THE STUDY

The goal of working capital management is to concurrently maximise shareholder's wealth and to maintain liquidity. However, these two goals are in conflict with one another. The trade-off relationship between liquidity and profitability qualifies working capital management to be one of the most important areas in a firm's strategy. According to Van Horne (1969) the trade-off between liquidity and profitability arises when maintaining a high portion of current assets carries a cost. The cost is in two forms namely the return that could have been earned had the excessive portion of assets been invested elsewhere and secondly the cost of carrying the assets. These costs will thus have a negative bearing on the profitability of the firm.

The recent financial crisis of 2008 has put a strain on the financial resources of many firms and forced many financial executives to pay more attention to the management of working capital (Abeysinghe, 2011). Many reports have shown the effects of the economic downturn on working capital. A report by the Organisation for Economic Co-operation and Development (OECD, 2009) showed that the global financial crisis of 2008 affected the working capital of individual firms through the increased payment delays on receivables, while they suffered shrinking demand for their goods and services. Consequently this reduced working capital levels and thus decreased liquidity.

In Belgium and Netherlands almost half of the small to medium enterprises had to deal with delays in receivables in 2008 (OECD, 2009). In Sweden over 50% of small to medium enterprises declared bankruptcy in 2009 (OECD, 2009). It is therefore of paramount importance for financial executives to have a good understanding of the concept of working capital and the various relationships to variables that have an impact on the profitability of a company.

The current economic environment is also characterised by intense competition, less business activity, scarce capital resources and pressure from stock market evaluation. Havoutis (2003) has advocated for working capital efficiency as one of the vital tools for achieving sustained performance. The role of working capital is to facilitate the smooth operation of operating activities and this, could be translated into giving a competitive edge if managed efficiently. Rice and Hoppe (2001) have identified three areas of financial performance that can be driven by working capital management. These three areas are growth, profitability and capacity utilisation. Therefore, it is of paramount importance for financial executives to grasp a great deal of understanding of working capital and increased financial viability of a firm.

1.3 RESEARCH PROBLEM

The efficient management of working capital has been established by many studies to be one of the most important aspects of the improvement of a firm's profit (Rice and Hoppe, 2001; Mathuva, 2010). The management of working capital has never been as important like it is now in the current hostile economic environment. According to Abeysinghe (2011), prior to the economic crisis of the last decade, firms did not need to pay as much attention

to working capital because they could easily access credit from banks whenever it was required. However, the economic crisis of 2008 has exposed the importance for a firm to be self-reliant in terms of financing its working capital needs. Most importantly it showed how the inefficient management of working capital may have catastrophic consequences on firms.

A number of scholars such Deloof (2003); Eljelly (2004); Mathuva (2010) have explored the different relationships between working capital management and profitability in different areas of the firm's financial management. However it should be noted that much of this research has been conducted in developed countries. Also, of importance, is that much of the research yielded contradictory results. Against this background, this research is focused on exploring the extent to which working capital management has an impact on profitability of the Industrial companies in South Africa.

It is important to note that there is ambiguity with regard to which variables can appropriately be used to measure working capital. This study will use cash conversion cycle as a proxy for working capital management. According to Jose, Lancaster and Stevens (1996) cash conversion cycle is one of the simplest methods of identifying the synchronisation of cash flows patterns. Profitability will be measured using two of the most popular measures, which are, the return on assets (ROA) and return on equity (ROE) .The working capital components that will also be investigated are days in inventory, days in accounts receivables and days in accounts payables.

The working capital management strategies of a firm may also be a function of the interplay of many factors such as technology levels, different products and different markets, amongst others. International studies by authors such as Soenen (2003) found a significant sector effect of working capital on firms in United States. However, local studies by Smith (1998) found no significant sector effect on the working capital management on South African firms. The results from Smith's (1998) study concur to the findings from Erasmus (2010) on the significance of sector effect of working capital management on South African firms. As a result of the contradictory local and international studies, this research will also explore the sector effect of the working capital management on South African Industrial firms.

1.4 RESEARCH OBJECTIVES

The objective of this study is to study the impact of working capital management (cash conversion cycle) on the profitability (return on equity and return on assets) of listed firms in South Africa for the periods 2001 to 2010. This objective is broken down into the following:

a) An investigation of the relationship between cash conversion cycle and profitability.
b) This study will go on further to investigate the relationship that components of cash conversion cycle have with profitability as follows:
    - Investigation of the relationship between accounts payables and profitability.
    - Investigation of the relationship between accounts receivables and profitability
    - Investigation of the relationship between inventory and profitability
c) An investigation of how the different working capital policies impact profitability. The study will reveal the relevance of maintaining either an aggressive, moderate or conservative working capital policies as well as its impact on profitability.
d) An investigation of the sector effect of the working capital management on the South African firms. Sector effect in this scenario refers to the different interplaying factors that shape the relationship between cash conversion cycle and profitability.

1.5 OUTLINE OF THE RESEARCH REPORT

This research study will be outlined as follows:

Chapter 2 gives an overview of working capital management, describes the components working capital, and lastly it examines measures of profitability.

Chapter 3 describes the research methodology used in investigating the relationship between working capital management and profitability.

Chapter 4 present the results of research.

Chapter 5 presents conclusions and recommendations for further research.

CHAPTER TWO

2.1 LITERATURE REVIEW

This chapter provides literature review and theoretical overview of the working capital management concept. It serves as a point of departure for the empirical work to be done. The conceptual framework in the chapter will provide working definitions of working capital and related concepts and insight into the concepts of cash conversion cycle, and its components, as well as measures of profitability.

The seminal work to give flesh to the concept of working capital management was done by Sagan in 1955. Over time, the concept evolved as researchers were trying to define the concept of working capital by putting together the appropriate components that made up working capital (Van Horne, 1969). Van Horne (1969) acknowledges that through the effort of many researchers working capital was defined according to two main approaches namely the qualitative and quantitative.

These two approaches have been well accepted and utilised in many working capital management studies. A number of researchers have given different suggestions of basis and justification of these approaches. Gamble (2004) suggested that these approaches are based on utilization patterns of currents assets. The authors in their studies expressed how both current assets and fixed assets play a role in making profits for a firm. Current assets play the role of facilitating the operations of business whilst fixed assets play the role of facilitating the production of goods and services. Gamble (2004) concluded that what is most essential is for financial executives to know the amount required to facilitate smooth operations of the business. The authors both concluded that for this reason working capital was quantitatively defined as current assets.

According to Van Horne (1969) the American Institute of Accountants qualitatively defined working capital as the excess between current assets and current liabilities. This perspective of working capital allows investors ,creditors and other stakeholders to assess the financial position of company (Smith, 1980).Defining working capital as total assets has been mostly referred to as gross working capital whilst the excess of current assets over current liabilities is referred to as net working capital (Gitman ,2009).

The concept of working capital began to be more useful as financial executives tried to merge the timing of occurrences of cash inflows and cash outflows. At the same time, the development of the practise of audited financial reports resulted in the management reporting adequacy of cash reserves. The practice led to measures of liquidity such as the current ratio and acid test ratio coming into play (Hawawini, Viallet and Vora, 1986).

More theory began to develop on the short term working capital management. Traditionally, liquidity was viewed in terms of the level of assets being greater than the level of current assets. However, this view has been criticised for the inability of capturing the going concern aspect of a firm. Efforts to remedy the situation have led to the development of the modern view, which incorporates addressing the concerns for on-going financial liquidity needs of a firm (Richards and Laughlin, 1980; Nassirzadeh and Rostami, 2010).

The studies on the impact of working capital on profitability have resulted in numerous conflicting results. These studies have been conducted in different countries such as South Africa, Belgium, India and many others. However, it should be noted that these studies have utilised different measures of working capital management and profitability. The previous literature regarding the relationship of liquidity and profitability has presented inconsistent views.

As mentioned before the seminal work of working capital management research was done by Sagan (1959). His theory proposed that the objectives of management working capital should be aligned with the objectives of liquidity and profitability. He emphasised the management of cash as according to him is the most difficult to manage amongst the working capital components. Sagan (1959) also emphasized the importance of use of cash budgets or schedule which shows cash movement in the managing of working capital. Sagan (1959) suggested that financial executives should continuously examine their operating polices of accounts receivables, accounts payables and inventory. The author also advises financial executives to have investment plans in which for the excess cash available the maturity of the investments must match the time for payment of obligations.

In the same view Walker (1964) conducted an empirical study based on Sagan's theory. Walker (1964) studied the relationship between rate on return and working capital management on the on nine Indian firms. The results showed that level of working capital

was not directly related to profitability. However the author observed the changes in the working capital levels had an impact on rate of return on the Indian firms. The increase in level of working capital had a negative impact on the rate of return whilst a decrease in level of working capital had a positive impact on the rate of return of the Indian firms. Sharma and Kumar (2011) recently found no significant relationship between cash conversion cycle and return on assets in India. In their study they concluded that working capital levels had impact on profitability.

Due to the lack of theoretical work more researchers began postulate more theories on working capital management (Van Horne, 1969). Van Horne (1969) was one of the proponents of the theory of how probabilistic cash budgets could be applied to working capital management decisions. Using cash and marketable securities as liquid assets, Van Horne (1969) advocated for the use of probabilities in order to accurately forecast cash flow pattern study. Lastly the author observed that as the level of liquid assets decreased, the risk of not meeting the current financial obligations is increased.

The development of many different techniques of measuring working capital resulted in the majority of researchers focusing their attention towards examining the interaction between working capital management and profitability in many different geographical areas.

Smith (1980) firmly expresses the value of working capital in firm‘s corporate strategy because of its possible effects on profitability. Soenen (1993) however did not find any consistent relationship between net trade cycle and return on assets on the American firms. Jose, Lancaster and Stevens (1996) also conducted their study of the relationship between cash conversion cycle and return on assets in several industries in America. Contrary to Soenen (1993), the authors found a strong negative relationship in the manufacturing, natural resources, retail and professional services.

Aside from assessing the relationship between working capital management and profitability many researchers have also assessed the different relationships working capital components have with profitability. Deloof (2003) conducted a study of this nature on the Belgian companies over a period of four years (1992 to 1996). He found a negative relationship between gross operating profit and days in accounts receivables, days in inventory and days in accounts payables. These results implied that financial executives

could realise more profits by reducing the days in inventory, days in accounts receivables and days in accounts payables.

In the same vein Lazaridis and Tryfonidis (2006) investigated a sample of firms in Greece listed on the Athens Stock Exchange. The authors used a sample of 131 companies in the period of 2001-2004. The authors used both the Pearson correlation and pooled ordinary least squares in order to establish the relationship between profit and components of cash conversion cycle. They found a significantly negative relationship between cash conversion cycle, leverage and profitability. In their study a negative relationship between accounts receivable, inventory and profitability was established.

Contrary to the findings of Deloof (2003), Lazaridis and Tryfonidis (2006) found a positive relationship between accounts payables and profitability. The authors argued that profitable firms can negotiate for a longer credit period from suppliers since suppliers consider them to be less risky. The authors concluded that companies can create more profit by handling correctly the cash conversion cycle and keeping each different component to an optimum level.

A few studies have also been carried out in Africa. Mathuva (2010) analysed the relationship between cash conversion cycle, components and profitability for firms in Kenya. The results from his studies showed a negative relationship between cash conversion cycle and profitability. Further analysis showed that accounts receivables had a significant negative relationship with profitability. The relationship between accounts payables and profitability was found to be significantly positive as similarly found by Lazaridis and Tryfoninidis (2006). Contrary to all the other studies, Mathuva (2010) found a highly significant positive relationship between days in inventory and profitability. The author concluded it would be more beneficial for Kenyan firms to maintain a high level of inventory as it would increase profits.

In summary, the aforesaid literature unfolds some interesting similarities and differences on the relationships between profitability and working capital management. While the bulk of the literature advocates a negative relationship between working capital and corporate profitability, there is evidence that appears to challenge this view with a couple of studies showing no relationship. There are also various contradictory relationships that were found

between profitability and the various components of cash conversion cycle. It is therefore important to conduct additional experiments to test if there are any changes in the trend.

2.2 WORKING CAPITAL MANAGEMENT CONCEPT

2.2.1 Working capital management

As outlined in the introduction, the managing of working capital decisions must ensure that the current level of assets should be maintained at a level that is adequate to cater for any short run developments in the course of business operations (Deloof, 2003; Eljelly, 2004; Mathuva, 2010). Therefore this position implies that financial executives first have to determine the adequate levels of working capital. Secondly, they have to make decisions regarding the source of funding of working capital components. Thirdly they have to ensure that working capital is utilised efficiently.

There are various factors that affect the decisions regarding working capital of a firm. The three most important factors are, namely, the operating cycle; permanent assets distinct from fluctuating current assets, which are needed to support the day to day operations of the business; and lastly, working capital decisions which are affected by the strategy to be adopted by executives, or prevailing working capital policies. At any giving point in time in the operations of a firm there is a permanent and fluctuating level of current assets reserved for working capital. According to Kester and Bixler (1990) permanent current assets are replaced immediately after being converted into cash, whilst fluctuating current assets are only replaced when demand increases. The remaining two factors shall be explored below.

2.2.2 The operating cycle

The operating cycle refers to the time period from when the firm obtains resources, through the time when production takes place, until the time when the final product is sold and cash is finally collected. The operating cycle can be described in three phases. The first phase covers the acquisition of resources by the firm, the second is the manufacturing phase, and finally the third phase is when sales of the product occurs (Gitman, 2009).

According to Gitman (2009), the operating cycle is the total time between inventory conversion periods to the debtors' conversion period. This whole process refers to the gross operating cycle. The difference between the gross operating cycle and deferral period is the net operating cycle. The deferral period refers to credit period allowed by suppliers. The length of the operating cycle varies in accordance with the industries concerned. For example it would take more time to sell a house than to sell food. The operating cycle is significantly affected by the cash inflow and outflow patterns in the different markets.

Soenen (1993) suggests that the nature of product, days given to customers to pay credit, days given by suppliers to pay credit and the time taken for raw materials to be converted into a final product are determining factors of the amount working capital required to run a viable business in a particular market. The aforementioned factors have a bearing on the length of the operating cycle. The longer it takes to produce and collect cash from customers, the longer the operating cycle and the higher the investment in working capital is required.

2.2.3 Working capital management polices

The matching principle states that the life of assets should match with the source of financing. However, this is not always case. The type of finance used to fund fluctuating and permanent current assets mainly depends on the working capital approach. There are three different approaches that have been identified in the literature on managing working capital. These are the aggressive approach, the moderate approach and the conservative approach.

The aggressive approach refers to the strategy which a firm uses in the short term finance to finance its fluctuating and most of its permanent current assets reserved for working capital. The aggressive approach heavily relies on short term finance including supplier credit to fund the permanent and fluctuating current assets. Belt (1979) suggested that working capital strategy adopted by a firm is mainly dependant on the liquidity of current assets and deferability of current liabilities. The liquidity of current assets in this situation refers to how short a firm can make its operating cycle. The deferability of current liabilities refers to the length of time a firm can delay payment to its suppliers. This mainly depends on the bargaining power a firm has in relation to its suppliers.

However, it is important to note that a decision regarding the working capital strategy is an outcome of many interplaying factors. These factors include interest rates, risk profile and generally the economic situation of the country (Kester and Bixler, 1990). In an economy where the long term interest rates are higher than the short term rates, adopting the aggressive working capital strategy would be less costly but would still be very risky (Church, 1979). The reduction in cost of funding will thus have a positive impact on profitability. However, the aggressive strategy is risker because of the following reasons. Firstly the short term finance will have to be continuously renewed. Secondly this practice could be risky, especially during a financial meltdown were financial resources are scarce. Indeed this was painfully true during the 2008 crisis.

Researchers such as Dixon (1991) support the view that aggressive working capital management results in a higher level of profitability, based on the assumption that short term interests rates, are less costly. Jose, Lancaster and Stevens (1996) have also provided strong evidence for US companies on the benefits of aggressive working capital policies through minimising the investments in working capital. Soenen (2003) also found the aggressive strategy to be more profitable than a conservative strategy.

The conservative working capital strategy is the one that a firm uses long term finance to mostly finance the permanent and fluctuating working capital needs. This approach requires a high level of investment in working capital .It ensures that firms do not incur any shortages of funding. A moderate approach is a strategy by which a firm tries to match the working capital needs to the maturity of its sources of funds. By exploring the different working capital polices, this research aims to find out the impact of these policies on profitability on the South African firms.

2.3. CASH CONVERSION CYCLE

The cash conversion cycle is one of the well documented alternative measures of working capital. It was developed by Richards and Laughlin (1980). According to these authors, the cash conversion cycle is the time interval between cash expenditures and time of collecting cash from customers. Shin and Soenen (1998) have expressed their view of how liquidity of a company should not only be based on the liquidation value of the company's assets.

However the authors suggest that liquidity should be viewed from the perspective of how much would be generated by these assets.

The cash conversion cycle was developed based on analysing both the balance sheet and income statement, with the purpose of arriving at a measure that would emphasise the on-going concern of the firm. In this way, the cash conversion cycle measures the length of time the actual cash expenditure on productive resources is converted into cash inflow from sales as indicated in figure2.1 below.

Figure 2.1 : Operating and cash conversion cycles . Source: Ross et al (1993)

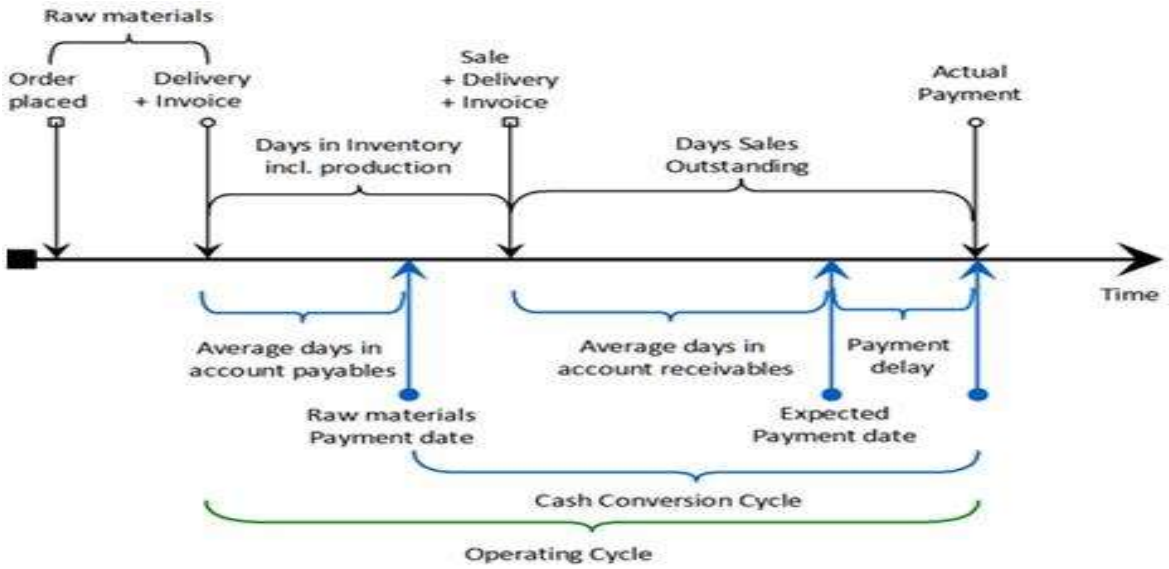


Figure 2.1 shows a residual cash flow financing period, showing the cash conversion cycle. From the above, the cash conversion cycle is influenced by three aspects. These are the inventory conversion period (the time taken to convert inventory held in the firm into sales), receivables' period (the time taken to collect cash from customers and payables period (the time taken to pay creditors). The cash conversion cycle is one of the modern measures that is able to provide adequate information about the cash flow attributes and the transformation processes within a firm's working capital position (Soenen, 1993).Gentry, Vaidyamathan and Lee (1990) have further developed the cash conversion cycle into weighted cash conversion cycle. The authors are of the view that the cash conversion cycle is inadequate as it only encapsulates the time aspect without taking into account the amount invested. The weighted cash conversion takes into account the period in which a

product goes through the cash conversion cycle as well as the amount invested in the product during the time it goes through the cash conversion cycle.

The weighted cash conversion cycle measure could have been an ideal measure to use in this study as it gives more insight into short-term liquidity of firms. However, according to Gentry, Vaidyamathan and Lee (1990) the computation of cash conversion cycle requires information regarding the actual timing of funds and actual funds invested in all forms of inventory including raw materials and work in progress. However, most firms do not keep a detailed record of such time lines. Therefore because of inadequate information to produce the weighted cash conversion this study has been restricted to using cash conversion cycle.

2.4 COMPONENTS OF WORKING CAPITAL MANAGEMENT

Working capital management involves making decisions about the composition and levels of current assets and current liabilities. Current assets include cash and accounts receivables and inventory. Cash is the most liquid of the three assets. Current liabilities include accounts payables, accruals and short term bank loans. Since this study is focused on the cash conversion cycle, the following section will explore its four components, namely cash, inventory, accounts receivables and accounts payables.

2.4.1 Cash management

Traditionally the goal of cash management was mainly focused on the ability of a firm to have enough cash to support its operations .This view neglected the other roles of excess cash, such as income generation through investments (Karamath,1989).The recent developments in the working capital management theory explains that cash should be maintained at level that allows a firm to meet its financial objectives while enhancing profitability at the lowest risk possible (Soenen, 2003).

In order for cash management to reach its goals successfully, a firm has to have the following arrangements in place. These include an adequate sales level, an appropriate credit policy and with an efficient cost control (Karamath, 1989). The advantage of maintaining a high level cash balance is that is ensures that financial obligations are met,

and on time. It also ensures that, even in the time of an economic recession when there is inadequate supply of funds from the bank, a firm's operations are not disturbed.

However, having excess cash balances is not always the most beneficial positions to be in. According to Jensen (1986), excess free cash flow is one of the agency problems. The author elaborates that, managers who have excess cash will engage in value destroying activities. Such activities include embarking on new projects and acquisition of other firms that may not be of strategic interest to the company. These activities may have a negative impact on the shareholder value. Therefore, firms should manage cash efficiently so as to strike a balance between liquidity and profitability in order to improve shareholder value in the long run.

2.4.2 Accounts receivable management

Selling on credit is used by many firms as incentive to lure customers into purchasing products as well as a strategy to stay competitive. However many empirical studies have shown that accounts receivables have a negative relationship with profitability (Jose, Lancaster and Stevens, 1996; Deloof, 2003). Researchers such as Petersen and Rajan (1997) argued based on trade credit models, profitable firms should be able to afford to a longer credit period to their customers. These authors also argued that it would be more profitable to invest in accounts receivables than short term investments. Therefore according to Petersen and Rajan (1997) a more profitable firm would allow a longer period in accounts receivables as well as have more accounts receivables.

Accounts receivables management mainly deal with the decisions of three important aspects of managing working capital. They include credit standards, credit policies and the investment in accounts receivables (Karamath, 1989).

2.4.2.1 Credit standards

Most of the time, a firm prefers to sell on cash as it is less risky than selling on credit. Cash discounts are given as incentives for cash sales rather than selling on credit. In order for a firm to give credit a firm usually assesses the credit worthiness of a customer. This can be done among other things by assessing the credit history regarding payments, the capacity of a customer and the collateral of a customer. Credit standards also include the credit terms

which specify the discounts which are normally limited to a specified period. Credit standards are important to a firm as they specify the criteria of granting credit sales. This determines the level of risk a firm is willing to take.

2.4.2.2 Credit policies

The credit policies refer to the procedure followed by firms in collecting debt. There are three important factors to consider in designing a credit policy include mainly sales volumes, risk exposure to bad debt expenses, investment in accounts receivables (Gitman, 2009). The advantage of having a strict credit policy is a reduction of risk exposure to bad debts. A strict policy also reduces the accounts receivables thereby reducing the general cost of carrying the accounts receivables asset. However, a strict policy may negatively affect sales volume.

A relaxed credit policy on other hand may increase sales and accounts receivables level but also increases the risk of bad debt expenses. This therefore increases the general cost of carrying the accounts receivables asset. A firm can establish internal controls of accounts receivables by assessing the collection period. In that way, the firm gets an indication of how long it takes to collect debt. Bad debts ratio to credit sales is also used to assess the quality of accounts receivables. Karamath (1989) suggests that the firm needs to design a policy that would enable the firm to balance profits, sales and the composition of assets.

2.4.3 Inventory management

Among all the components of current assets, inventory is the least liquid. The nature of inventory held by a firm mainly differs by type industry in which the firm operates. Inventory can be held in three forms. They can be raw materials, work in progress or finished products. It is important for a firm to hold all forms of inventory in order to cater for unplanned demand, allow flexibility in production (Gitman, 2009).

The goal of inventory management deals with the decision of maintaining inventory at adequate levels, bearing in mind the costs of holding inventory. The advantages of holding inventory at high levels is that it enables the facilitation of smooth production to take place, the ability to fulfil customer demands, and it allows gains from quantity discounts. However, the downside to this is that it increases holding costs, storage costs, general expenses met

to keep the inventory in good condition and the exposure to increased risk of damaged goods.

The economic order quantity model (EOQ) is one most well documented techniques, which is widely used to determine the optimal inventory level (Gitman, 2009). The economic order quantity aims to find the inventory level which results in minimal inventory costs. However this model is flawed because it assumes that sales can be perfectly forecasted and are evenly distributed. Secondly, it assumes that orders are received without any unexpected delays (Scherr, 1989). Authors such as Kim and Artkins (1978) have criticised the model for its inability to involve principles such as the net present value.

2.4.4 Trade credit management

There are various sources of short term finances which vary in cost and periods of maturity. These include accounts payables, accruals, secured short term borrowings and commercial paper to mention a few (Gitman, 2009). Trade credit in this case refers to the credit that is extended by suppliers to firms when they purchase inventory (Pringle and Harris, 1987). Deloof (2003) found a negative relationship between accounts payables and profitability. According to Deloof (2003) these results implied that unprofitable firms, because of their financial status would therefore negotiate for a longer credit period.

Scherr (1989) in his study recommended the use of trade credit by all firms regardless of financial status because trade credit is a non interest bearing source of finance. The author thus advises that the use of trade credit because it is a cheaper source of finance, however recommends that this cost should be weighed against the value realised from early payment discounts. The author also highlights the importance of the decision to negotiate for longer credit periods should be based on relationships with suppliers and reputation of a firm. Scherr (1989) therefore suggests that the goal of short term financing should be to adequately maintain liquidity at minimal costs.

2.5 RECOGNISED MEASURES OF PROFITABILITY

The profitability of a firm is a critical aspect to the firm which has a direct impact on the shareholders' value. Various scholars have mainly used two types of measures of

profitability namely the accounting measures and market measures. However the accounting measures are more common because the data that needed to compile the measures is readily available (Hirschey and Wischer, 1984). However Fisher and Mcgowan (1983) have criticised the use of accounting measures of profitability because of the differences in accounting practises and fact that they are subject to manipulation.

Despite these criticisms Ross (1993) is of the opinion that both accounting measures and market measures can be both very useful and both offer a unique dimension of looking at profitability. This research will however use accounting measures and will not utilise market measure. Market measures would bring complications in the study such as considering share splits and thin trade which may eliminate a large portion of the participating firms.

Gitman (2009) has classified accounting measures of profitability in various ways. They include measures relating to assets and equity. This classification allows a firm‘s earnings to be evaluated with respect to specific aspects that include levels of assets, sales and equity. The measures that are used in this research are the return on assets (ROA) and return on equity (ROE). These measures have also been chosen for use in this study in order to separate the influences of assets and the influences of leverage.

ROE is the amount of net income returned expressed as a percentage of shareholders equity. It measures profitability by revealing how much profit a company generates with the money shareholders have invested. The return on equity gives an evaluation of firm‘s income with respect to a given level of shareholder investment. It shows how management effectively utilises investors’ money. This ratio is directly affected by debt to the extent that assets are financed by debt. ROE has been chosen because it is a straight forward calculation with which investors and financial executives are familiar[2].

ROA is the amount of net income expressed as a percentage of total assets. ROA gives an indication of how profitable a firm is relative to its total assets. According to Hall (2003),

[2] Some analysts such as Rees (1995) however are of the view that ROE is not a full reflection of profitability. Calandro and Lane (2007) are of the opinion that several adjustments could be made so that ROE becomes a more useful metric than it is now. However, this discussion is beyond the scope of this study.

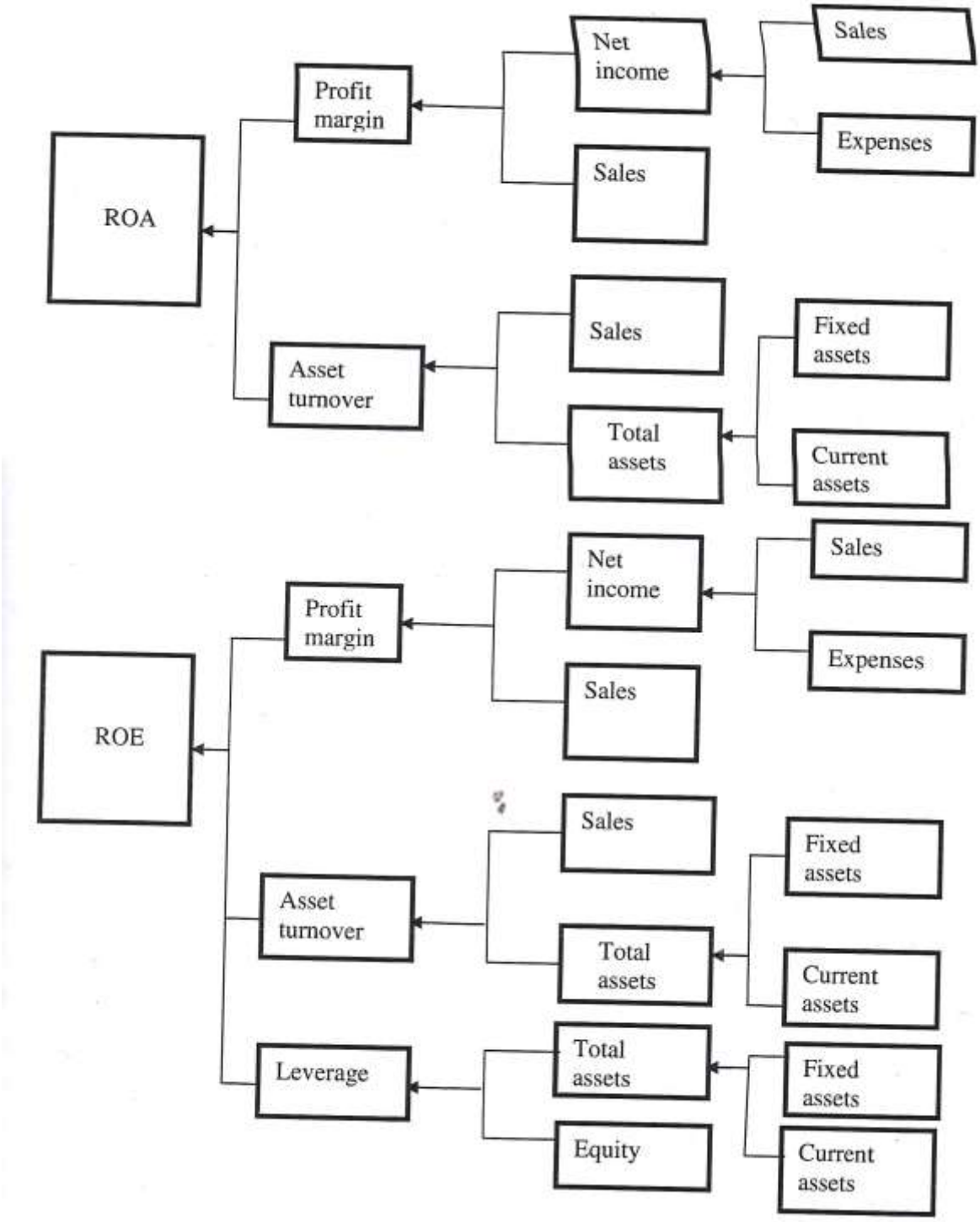
ROA is a reflection of return that is more directly under the control of management. It gives an indication of how management efficiently generates income using the available assets.

The authors also highlight the fact that unlike ROE, ROA is able to control for the effects of different amounts of leverage. Therefore, this research will use both ROE and ROA to assess the profitability of Industrial firms in South Africa.

One of the most important models that has been developed and gives a better explanation about the relationship between profitability and working capital is the Du point model. This model combines some of the key determinants of working capital. This model combines three key aspects that drive profitability. They relate to profitability, efficiency and financing decisions as shown in figure 2.2 below. The Du point model takes into account ROE and ROA measures of profitability.

ROA gives an indication of how well assets are being utilised in the production process. This is inclusive of both current and fixed assets. A reduction in current assets reduces total assets which has an impact of boosting the ROA. Making use of this model aids financial executives to determine the extent to which they can increase profitability without affecting liquidity. For example, instead of having a high level of currents assets, they could make use of short term financing. In that way they enjoy an increased flexibility in adjusting current assets to meet changes in demand (Shim and Sigel, 2000).

Figure 2.2 Du Point analysis on Profitability Source: Gibson 1999 (adapted)



This model also encompasses the aspect of leverage, which has a direct impact on ROE. Increasing leverage can boost a company's ROE if a firm can realise a return on debt which is greater than the cost of debt (Shim and Sigel, 2000). Authors such as Stein (2006) and Shim and Sigel (2000) are of the opinion that firms with significant amounts of cash on their balance sheets could boost their ROE by boosting their leverage can use the cash at hand to

pay back their debt. Therefore, the Du pont model is a comprehensive model that can be used to analyse the interplay of effects of efficiency, liquidity and leverage on profitability.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1 DESCRIPTION OF DATA

This study uses financial data of industrial companies in South Africa. Only industrial companies are used as they have all data to compute the cash conversion cycle (i.e. inventory in days, days in accounts receivables and accounts payables). The analysis uses listed firms on either the Johannesburg Stock Exchange (JSE) or its secondary board the ALTX. The results of study could possibly suffer from survivorship bias as only companies were taken into the sample frame using the availability of data points[3]. Thus, companies with missing data or delisted companies that did not cover the 10-year research period (i.e. 2001 to 2010) were excluded from the study. A total of 110 companies in the industrial sector were incorporated into the study.

I-Net Bridge financial database provided all the data used in this study. All the data on 110 firms was obtained from industrials list which is a classification under I-Net Bridge financial database. The 110 companies' data was obtained from I-Net Bridge industrials list. This list includes all the companies classified under Industrial by I-Net Bridge irrespective of the board on which they may be listed. The companies that are listed on the JSE board are 87 and 23 are listed on the secondary board ALTX. The data includes inventory in days, days in accounts receivables and accounts payables used to calculate the cash conversion cycle. Other data included the total assets, total current assets and total current liabilities used to compute investment and finance policy ratios (Jose, Lancaster and Stevens, 1996; Afza and Nazir, 2007).

[3] Survivorship bias exists when data set used only comprises of the companies that have existed throughout the full set period of the study (Strugnell and Gilbert, 2010)

3.1.1 MEASURES OF PROFITABILITY

Return on Assets

Return on assets (ROA) is one of the measures of profitability that will be used in the study. ROA is a good measure of profitability because it clearly projects how efficient firm assets are being utilised. Investors are usually interested on the asset base of firms in making investment decisions (Nordgren, 1981). Assets are employed to generate funds and other assets for the firm. ROA is the ratio of net profit to assets of the firm calculated using the following relationship:

$$\text{ROA} = \frac{\text{Profit before interest and tax}}{\text{Total Assets}}$$

Return on Equity

Return on equity (ROE) is the second measure of profitability to be used in the study. ROE measures how much the owners get in relation to the equity they have invested in the business (Calandro and Lane, 2007). Thus, ROE is the ratio of net profit to owners' equity and is calculated as follows:

$$\text{ROE} = \frac{\text{Attributable Earnings}}{\text{Equity}}$$

3.1.2 Working Capital Components

Cash Conversion Cycle

According to Richards and Laughlin (1980) the cash conversion cycle is an additive function which is computed as follows:

CCC = Days in accounts receivables + Days in inventory – Days in accounts payables

Days in Accounts Receivables

The days in accounts receivables is a period allowed in a year by a firm for which customers pay their debts. As noted in the earlier chapters the shorter the period the less risk of bad debts however a shorter period may also negatively impact sales volumes (Karamath, 1989).

Therefore it is important to keep a balanced relationship that positively impacts the profitability of a firm. The following relationship is used to compute days in receivables:

$$\text{Days in receivables} = \frac{\text{Average Trade Debtors}}{\text{Turnover}} * 365 \text{ days}$$

Days in inventory

Days in inventory are the number of days it takes in a year where stock will be held in the warehouse of the business. A shorter period would be ideal as it reduces the costs associated with holding inventory however, it may negatively impact production when demand increases unexpectedly (Jose, Lancaster and Stevens, 1996). The following relationship is used to compute inventory in days:

$$\text{Inventory in days} = \frac{\text{Average Stocks}}{\text{Turnover}} * 365 \text{ days}$$

Days in Accounts Payables

The days in accounts payables is the period which is granted to firms by suppliers to pay credit in a year. The following relationship is used to compute days in payables:

$$\text{Days in payables} = \frac{\text{Average Trade Creditors}}{\text{Turnover}} * 365 \text{ days}$$

3.1.3 OTHER VARIABLES

Logarithm of Sales

The natural logarithm of sales is used as a proxy of sales. This methodology has been used by many authors conducting studies of similar nature such as Chiou, Cheng and Wu (2006) and Lazaridis and Tryfonidis (2006). Profitability can be increased by increasing the sales of the firm. However, to remove the effect of size when running the regression model, sales were transformed into logarithm of sales. Leaving sales figures at their level values gives biased results. Sales can also measure the size of firms. Larger firms by default tend to be more profitable than small firms because of their ability to undertake projects at a diversified and magnified scale (Jose, Lancaster and Stevens, 1996).

Leverage

The leverage is taken as the debt to equity ratio (Apphumani, 2008). The availability of debt in a firm can come with debt covenants that can enforce management to be effective in the execution of their duties. Covenants can be placed on the firm's assets which controls their use hence impacting business performance. Chiou, Cheng and Wu (2006) suggested that in a case were the cost of debt is less than return on investment, a firm would thus realise more profits by using debt. Thus, leverage can be a driver of profitability. Leverage is measured as the ratio of debt to equity using the following relationship:

$$\text{Leverage} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

Financing Policy Ratio

The financing policy is the ratio between current liabilities and total assets of the firm (Afza and Nazir, 2007). It measures whether profitability is explained by changes that happen on the financing side of a firm. According to Weinraub and Visscher (1998) the capital structure of a firm can also have a role in explaining the profitability of the firm. The financing policy ratio is calculated using the following relationship. The calculations are the similar to those by Afza and Nazir (2007), in their aggressive financing policy calculation.

$$\text{Financing policy ratio} = \frac{\text{Total Current Liabilities}}{\text{Total Assets}}$$

Investment Policy Ratio

The investment policy ratio is the ratio between the total current assets to total assets of the firm. The ratio specification is the same as in Afza and Nazir (2007). It measures whether profitability is explained by changes in the asset side (investment side) of the firm. According to Weinraub and Visscher (1998) unprofitable firms have a high investment policy, the authors argued this might be as a result of holding too much current assets. The investment policy ratio is calculated as:

$$\text{Investment policy ratio} = \frac{\text{Total Current Assets}}{\text{Total Assets}}$$

3.2 MODEL SPECIFICATION

As noted previously two measures of profitability (ROA and ROE) will be used in the study. Furthermore different measures of liquidity will be employed, thus a different specification will be developed under each measure of profitability. Wang (2002); Afza and Nazir (2007); Saleem and Rehman (2011) and many others also use the return on assets and return on equity as profitability measures. The following models will be used for each measure of profitability:

$$PR_{it} = \alpha + \beta_1 CCC_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + \omega_{it} \quad (1)$$

$$PR_{it} = \alpha + \beta_1 AR_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + \omega_{it} \quad (2)$$

$$PR_{it} = \alpha + \beta_1 INV_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + \omega_{it} \quad (3)$$

$$PR_{it} = \alpha + \beta_1 AP_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + \omega_{it} \quad (4)$$

Where:

PR_{it} = Profitability measured by return on assets (ROA) or return on equity (ROE) for firm *i* for period *t*

CCC_{it} = Cash conversion cycle for firm *i* for period *t*

AR_{it} = Days in Accounts receivable period for firm *i* for period *t*

INV_{it} = Days in inventory for firm *i* for period *t*

AP_{it} =Days in Accounts payable period for firm *i* for period *t*

IP_{it} = Investment Policy (Total Current Assets to Total Assets Ratio) of Firm *i* for time period *t*

FP_{it} = Financing Policy (Total Current Liabilities to Total Assets Ratio) of Firm *i* for time period *t*

LEV_{it} = Leverage (Debt to equity ratio) for firm *i* for period *t*

LOS_{it} = Natural logarithm of sales which is a proxy of size of firm for firm *i* for period *t*

α = Constant

β = Coefficient of explanatory variables

ω_{it} = error-term

3.3 REGRESSION ANALYSIS

The regression tests to be run on the variables that explain profitability are namely the pooled Regression, Fixed Effects Model (FEM), Random Effects Model (REM), to mention a few. These tests are used when one is presented with panel data (Wooldridge, 2002). However, before running the regression, a covariance coefficient matrix should be examined. Using highly correlated independent variables together distort results. As the variables really causing the relationship between the dependent and independent variables to hold cannot be clearly identified.

3.3.1 THE HAUSMAN TEST

The Hausman test is used to verify the appropriate model to be used between the FEM and REM. This is a normal approach used by researchers (Garcia-Teruel and Martinez-Solano, 2007). The difference between FEM and REM model is on the assumptions that are used in building these two models. The FEM assumes that there exists a relationship between the independent variables and the unobserved elements. The REM assumes that there is no correlation between unobserved elements and the independent variables (Greene, 2007). The Hausman test is stated as follows:

H0: the difference in coefficients is not systematic

H1: the difference in coefficients is systematic

Accepting the null hypothesis means that the REM should be used and rejecting the null hypothesis means that the FEM should be used.

3.3.2 REGRESSION MODELS

This study will use pooled regression, fixed effects model and random effects model to estimate variables that explain profitability of the South African industrial sector from the period 2001-2010.

3.3.2.1 Fixed Effects Model (FEM)

As noted earlier, the FEM is built with certain assumptions that need to be first elaborated before employing it. One of the assumptions is that the unobserved elements should be correlated with the independent variables for one to use FEM (Greene, 2007, and Garcia-Teruel and Martinez-Solano, 2007). If this relationship holds, then it means that estimates obtained by Pooled Regression will be biased. However, the model specification should change when using FEM as indicated below. The problem of fixed effects is that it does not capture time-invariant elements in the model (Deloof, 2003).

$$PR_{it} = \beta_1 CCC_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + z_i\alpha + \omega_{it} \quad (5)$$

$$PR_{it} = \beta_1 AR_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + z_i\alpha + \omega_{it} \quad (6)$$

$$PR_{it} = \beta_1 INV_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + z_i\alpha + \omega_{it} \quad (7)$$

$$PR_{it} = \beta_1 AP_{it+} \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + z_i\alpha + \omega_{it} \quad (8)$$

Where:

z_i = Unobserved elements

3.3.2.2 Random Effects Model (REM)

The REM model is built on the assumption that there is no correlation between the independent variables and omitted heterogeneity. The specification of the models should change when assumptions of the REM hold. The models are rewritten as follows:

$$PR_{it} = \alpha + \beta_1 CCC_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + u_i + \omega_{it} \quad (9)$$

$$PR_{it} = \alpha + \beta_1 AR_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + u_i + \omega_{it} \quad (10)$$

$$PR_{it} = \alpha + \beta_1 INV_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + u_i + \omega_{it} \quad (11)$$

$$PR_{it} = \alpha + \beta_1 AP_{it} + \beta_2 IP_{it} + \beta_3 FP_{it} + \beta_4 LEV_{it} + \beta_5 LOS_{it} + u_i + \omega_{it} \quad (12)$$

Where:

u_i = Random heterogeneity specific to firm i

The random heterogeneity elements (u_i) are similar to the error term in the regression model. They should also be constant over time.

3.3.2.3 POOLED REGRESSION

Pooled regression is specified as the normal Ordinary Least Squares (OLS) (Wooldridge, 2002). As the name suggest it pools the data of different companies into one and regresses it. It is most suitable when one is using time series panel data. For instance, the study will check whether profitability is industry specific. It will assess whether the variables used to explain profitability hold in all industries. Thus, for this study pooled regression will be used to check whether the relationship between the dependent and independent variables holds in all the different sub-sectors of the industrial sector. Six sub-sectors will be used to carry out this analysis: these are the basic materials, consumer goods, consumer services, health care, industrials and technology. These sub-sectors are as per McGregor BFA classification. The analysis is similar to that carried out by Wang (2002) on Japanese and Taiwanese firms.

3.3.3 ROBUSTNESS CHECKS

There are various problems related to using panel data. These problems include endogeneity, homoskedasticity and autocorrelation. These problems should be controlled for, to give efficient results (Garcia-Teruel and Martinez-Solano, 2007). The presence of these problems will be checked and if present in the data they will be corrected to make the results more reliable.

3.3.3.1 MULTICOLLINEARITY

Multicollinearity is a problem of having independent variables that are highly correlated in the same model which gives distorted results. The presence of multicollinearity can lead to high R^2 which measures whether the model holds (i.e. are the variables in the model correctly specified). Lazaridis and Tryfonidis (2006) use the variance inflation factor (VIF) to detect the presence of multicollinearity. Higher values of VIF suggest that variables of the model are highly correlated (Lazaridis and Tryfonidis, 2006). Multicollinearity can be

reduced by changing the specification of variables in the model or not including highly correlated independent variables in one econometric model. This is the approach that will be taken in this study if multicollinearity is to be detected.

3.3.3.2 HETEROSKEDASTICITY

Heteroskedasticity occurs when the variance of the disturbances (i.e. error term) is not the same (Wooldridge, 2002). The disturbance term captures all unobserved variables that are not included as independent variables in a regression model. These omitted variables can explain the dependent variables but otherwise excluded in the model because of difficulties in measuring them. For instance, profitability of a firm can be influenced by the product line, management's style of leadership, worker morale and many others. These variables are difficult to measure hence are captured by the disturbance term.

The presence of heteroskedasticity can cause the coefficient to have wrong signs or accepting coefficients instead of rejecting them. Heteroskedasticity can also be controlled by transforming variables, for instance, taking the logarithm of sales than using the actual sales figures (Jose, Lancaster and Stevens, 1996). Jose, Lancaster and Stevens (1996) also show that transforming data reduces the effect of outliers.

3.3.3.3 AUTOCORRELATION

Autocorrelation is when past values of the independent variables explain the dependent variable. Profitability can be explained by past values of the cash conversion cycle instead of the current values of the cash conversion cycle. There are different tests that check the presence of autocorrelation, in this study the Wooldridge test will be performed to check the presence of autocorrelation. The hypothesis for testing autocorrelation is stated as:

H0: there is no first order autocorrelation

H1: there is first order autocorrelation

If autocorrelation is present in the relationship, then it should be removed to give results that are reliable and free from bias. One way of removing autocorrelation is to use the differenced models. The Prais-Winston regression will be run to remove autocorrelation hence giving results that are not biased and free from autocorrelation. Garcia-Teruel and

Martinez-Solano (2007) controlled endogeneity problems (e.g. autocorrelation) by including lagged values of independent variables in the model.

3.3.3.4 CROSS-COMPANY DEPENDENCE

Cross-company dependence happens when activities affecting one company are translated to affect another company. The profitability of a firm can be affected by decisions being implemented by stakeholders such as suppliers, competitors and others (Rumelt, Schendel and Teece, 1991). Bad management policies and profitability problems affecting the firm's suppliers can result in raw materials not being delivered in time hence affecting the firm's own profitability. If cross-company dependence is present in the data it gives results that are not reliable. Pesaran test for cross-company dependence will be used to check activities of cross-company dependence in the data. The hypothesis to check cross-company dependence is stated as follows:

H0: there is no cross-company dependence

H1: there is cross-company dependence

The problem of cross-company dependence is that it makes it difficult to clearly identify the independent variables that make the relationship to hold. Thus, if cross-company dependence is present it should be corrected. The Driscoll-Kraay regression will be used if cross-company dependence is detected. Driscoll-Kraay regression gives results that are free from cross-company dependence.

CHAPTER FOUR

4. RESULTS OF THE RESEARCH

This chapter presents the results of the empirical analysis. The study, among other things, sought to assess the impact of working capital management on profitability in the South African Industrial listed firms. Results from regression analyses of data include those from pooled regression, fixed effects and random effects model analysis. Robustness checks included tests on autocorrelation and cross-company dependence, which showed satisfactory results to justify the use of pooled regression analyses of data for this study. The results of the autocorrelation and cross-company dependence tests will be presented towards the end of this chapter. The results of this study may be biased because of the problem of survivorship bias. This happens when only using information for companies that have survived in an industry without capturing information for companies that have delisted and closed. The results of this analysis, thus does not capture elements in delisted and closed companies therefore only looking at effects of working capital on listed surviving firms.

4.1 DESCRIPTIVE STATISTICS

The descriptive statistics table gives a summary of statistical variables of mean, standard deviation, minimum and maximum values of the data. These variables are summarised in table 4.1.

Table 4.1 Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
roe	overall	28.64898	35.49117	.348405	643.9681	N = 1100
	between		22.07672	3.295666	150.4791	n = 110
	within		27.86096	-97.53758	524.5082	T = 10
roa	overall	15.85186	8.926493	0	74.29341	N = 1100
	between		6.69594	3.433769	39.47468	n = 110
	within		5.934124	-12.35641	61.93701	T = 10
lev	overall	.7544157	1.991703	0	38.28782	N = 1100
	between		1.21508	0	8.970749	n = 110
	within		1.581946	-3.966393	34.63073	T = 10
los	overall	20.99946	3.271391	0	25.83463	N = 1100
	between		2.884948	0	25.17837	n = 110
	within		1.564364	1.298486	32.20277	T = 10
ar	overall	59.91962	69.82169	0	972.7302	N = 1099
	between		48.88934	0	354.9917	n = 110
	within		50.02785	-287.2564	702.7481	T-bar = 9.99091
inv	overall	35.03978	35.64548	0	506.3611	N = 1100
	between		27.72116	0	122.0987	n = 110
	within		22.54841	-79.70423	426.6569	T = 10
ap	overall	57.57756	55.04093	0	972.6934	N = 1100
	between		41.50484	0	426.4611	n = 110
	within		36.345	-282.886	603.8098	T = 10
ccc	overall	37.32735	60.43995	-111.4617	687.2762	N = 1100
	between		46.44283	-71.46939	231.2141	n = 110
	within		38.90649	-151.9293	640.9405	T = 10
ip	overall	.547791	.2696006	0	.9878504	N = 1095
	between		.2552717	.0001856	.9480238	n = 110
	within		.0903865	-.1757352	1.042361	T = 9.95455
fp	overall	1.002005	2.580733	0	71.15038	N = 1100
	between		1.40956	.1391202	9.580054	n = 110
	within		2.165547	-7.880129	62.70322	T = 10

.

Results in Table 4.1 show that the two measures of profitability, the return on assets' mean and standard deviation were lower than that of return on equity with approximate values of 35.4% and 8.9% respectively. Larger standard deviation values would indicate higher levels of risk and market volatility. The data for return on equity is more widely spread than that of return on assets. The minimum values of return on assets and return on equity are about 0% and 0.35%, respectively to maximum values of about 74% and 644% respectively.

On the measures of working capital, days in accounts receivables have the highest mean of about 60 days. The days in inventory records the lowest figure of about 35 days. Days in accounts receivables also reflects the widest data variation of all the working capital components with days in inventory showing the least variation. A minimum of zero days was recorded in all the three components of the cash conversion cycle (i.e. days in accounts receivables, days in inventory and days in accounts payables). The maximum number of days in both the days in accounts receivables and days in account payables were about 973 days with a maximum of about 506 days for days in inventory. The minimum for the cash conversion cycle was a negative 111 days and maximum is 687 days. According to Ryan (2005) a negative cash conversion flow is possible for any or all of the three reasons. Firstly if a firm holds low levels of inventory and secondly if a firm has a strict debt collection

policy, this reduces the cash conversion cycle period. Thirdly, according Ryan (2005) negative cash conversion cycle could also imply that a firm pays its suppliers only after selling its stock. This could result from credit policies which may depend on the firm's ability to negotiate for a longer credit period from suppliers[4]. Moreover, the type of firms that could also have longer credit periods maybe those that sell inventory on consignment[5]. Such types of firms pay suppliers only after they have sold and received payments, thus they may have a longer credit period which results in a negative cash conversion cycle.

4.2 CORRELATION COEFFICIENT MATRIX

The correlation coefficient matrix shows how variables are related (Wooldridge,2002). There is high correlation between days in accounts payables and days in accounts receivables with a correlation coefficient of 72.03%. The cash conversation cycle is highly correlated to the days in accounts receivables, and also to the days in inventory with a correlation coefficient of 48.22% and 60.06% respectively. These highly correlated variables cannot be analysed in the same model as both are independent variables. If this happens, one cannot safely distinguish one from the other variable's effect on the results of the model.

There is a negative correlation between the return on equity and the following components of working capital; days in accounts receivables (-0.0619), days in inventory (-0.1452) and account payables (-0.0024). Return on equity is positively correlated to the following variables: leverage (0.1834), sales measured as logarithm of sales (0.1443), investment policy (0.0654) and finance policy (0.0220). Return on assets is negatively correlated to leverage (-0.1330), as well as all components of working capital (days in accounts receivables -0.0841; days in inventory -0.1404; days in accounts payables -0.1325) and cash conversion cycle -0.0621 and the finance policy (-0.0043). A positive correlation exists between return on assets and the following variables: sales (0.0801), investment policy (0.1341). Table 4.2 summarises the correlation between variables.

[4]For example Amazon has a negative cash conversion cycle because it holds low levels of inventory as well; it only pays its suppliers after selling the books (Amazon had a negative cash conversion cycle of 58.97 as at 31 December 2007).

[5]Consignment means a firm places goods with another firm so that they can be sold however with the expectation that payment will done after the goods have been sold.

Table 4.2 Correlation Coefficient Matrix

	roe	roa	lev	los	ar	inv	ap	ccc	ip	fp
roe	1.0000									
roa	0.2609	1.0000								
lev	0.1834	-0.1321	1.0000							
los	0.1443	0.0802	0.0546	1.0000						
ar	-0.0619	-0.0841	-0.0160	0.0023	1.0000					
inv	-0.1452	-0.1404	-0.0575	0.1375	-0.0000	1.0000				
ap	-0.0024	-0.1325	-0.0067	0.0966	0.7203	0.0266	1.0000			
ccc	-0.1595	-0.0621	-0.0481	-0.0004	0.4822	0.6006	-0.0788	1.0000		
ip	0.0654	0.1343	-0.0846	0.2716	0.0361	0.1082	0.0454	0.0671	1.0000	
fp	0.0220	-0.0043	0.0601	-0.1403	-0.0453	-0.0797	0.0007	-0.1024	-0.1924	1.0000

4.3 REGRESSION RESULTS

4.3.1 HAUSMAN TEST RESULTS

The Hausman test is used to establish which of the models are to be used between fixed or random effects model to run the regressions. The Hausman test was run on all the models of the two distinct measures of profitability (i.e. return on assets and return on equity). The results of the models that show when using return on assets, the fixed effects model is more appropriate to use than random effects. At 5% significant level, the null hypothesis is rejected. It is concluded that the difference in coefficients is systematic. Thus, the regression results given by the fixed effects model are better than using random effects model. From Table 4.3 below the findings of Hausman test shows a p-value of 0% which is below 5% level of significance hence the null hypothesis is rejected. The results of the Hausman test presented are for the main measure of working capital (i.e. cash conversion cycle).

The Hausman test was also run on models having return on equity as the measure of profitability. In all those models, the random effects model was superior to the fixed effects model. The Hausman test shows that at 5% or 10% significant level, the null hypothesis is accepted. It is concluded that the difference in coefficients is not systematic. Thus, the random effects model was used to run a regression having the return on equity as the dependent variable. The results of the Hausman test are presented in Table 4.4 below.

Table 4.3 Return on Assets: Hausman Test Results

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
         lev |    -.400257    -.4221179        .0218609        .0164272
         los |     .299692     .1859626        .1137294        .0552311
         ccc |   -.0324322    -.0277467       -.0046854        .0017019
          ip |    17.37653     11.54286        5.833669        1.181434
          fp |   -.0960536    -.0678858       -.0281678         .006234
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       41.82
                Prob>chi2 =      0.0000
```

Table 4.4 Return on Equity: Hausman Test Results

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
         lev |    2.077997     2.415281       -.3372842        .1742523
         los |     .452283     .8692738       -.4169908          .38424
         ccc |   -.0524142    -.0699982        .017584        .0133277
          ip |    21.97671     13.18386        8.792846        7.504421
          fp |    .1742061     .2060625       -.0318564        .1011284
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        8.71
                Prob>chi2 =      0.1214
```

4.3.2 Results for Fixed Effects and Random Effects Models

The results for fixed and random effects models are presented in Table 4.5 and 4.6 respectively.

Table 4.5 Return on Assets: Fixed Effects Model

	(1) roa	(2) roa	(3) roa	(4) roa
lev	-0.40*	-0.41**	-0.41**	-0.42**
	(0.01)	(0.01)	(0.01)	(0.01)
los	0.30**	0.29**	0.34**	0.31**
	(0.00)	(0.00)	(0.00)	(0.00)
ccc	-0.032***			
	(0.00)			
ip	17.4***	16.4***	16.8***	15.9***
	(0.00)	(0.00)	(0.00)	(0.00)
fp	-0.096	-0.076	-0.082	-0.065
	(0.26)	(0.40)	(0.34)	(0.47)
ar		-0.023***		
		(0.00)		
inv			-0.039**	
			(0.01)	
ap				-0.023***
				(0.00)
_cons	1.66	2.45	1.38	2.27
	(0.59)	(0.44)	(0.69)	(0.50)
N	1095	1094	1095	1095
R-sq	0.11	0.11	0.10	0.10
F	9.72	10.1	6.86	11.2
df_m	4	4	4	4
df_r	109	109	109	109

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 4.6 Return on Equity: Random Effects Model

	(1) roe	(2) roe	(3) roe	(4) roe
lev	2.42	2.40	2.40	2.40
	(0.14)	(0.14)	(0.14)	(0.14)
los	0.87*	0.87*	1.01*	0.86*
	(0.03)	(0.03)	(0.02)	(0.04)
ccc	-0.070***			
	(0.00)			
ip	13.2*	12.1*	12.9*	12.0*
	(0.02)	(0.04)	(0.02)	(0.04)
fp	0.21	0.28	0.24	0.28
	(0.56)	(0.42)	(0.50)	(0.41)
ar		-0.012		
		(0.44)		
inv			-0.11***	
			(0.00)	
ap				0.0051
				(0.82)
_cons	3.85	2.46	2.06	1.69
	(0.52)	(0.67)	(0.74)	(0.77)
N	1095	1094	1095	1095
R-sq				
F				
df_m	5	5	5	5
df_r				

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Cash Conversion Cycle

The cash conversion cycle (CCC) is significant in all the profitability measures at 1% level of significance with a p-value of 0% in return on assets and return on equity models. There is a negative relationship between the cash conversion cycle and profitability with a beta coefficient of -0.032 for the return on assets model and -0.070 for the return on equity model. The results are similar to the findings by Erasmus (2010), and Lazaridis and Tryfonidis (2006). A shorter CCC period would enhance profitability in the following ways. Firstly a shorter CCC implies that a firm would get cash invested in shorter period of time, and the cash can be used to embark on other profitable projects. In this way, the firm's overall profitability is enhanced. Secondly according to Jose, Lancaster and Stevens (1996) a shorter CCC allows management to hold less in terms of unproductive assets such as cash, short-term marketable securities and inventory. Therefore this reduces the cost of carrying the assets which improves the profitability of firms.

The negative relationship between CCC and profitability could also be explained by the bargaining power that firms have over suppliers. Firm that can delay payment to creditors can use resources available for pursuing other profitable projects, which positively affects profitability (Mathuva, 2010).

Leverage

Leverage is significant only in the return on assets model at 1% level of significance with a p-value of 0.01. The beta coefficient of -0.40 shows a negative relationship exists between leverage and return on assets. The negative relationship of leverage and return on assets is similar to the findings by Garcia-Teruel & Martinez-Solano (2007) and Erasmus (2010). This implies that as leverage increases, profitability tend to fall in the long term. There are costs that are associated with an extra debt to the firm. Costs of servicing the debt increases as leverage increases, which reduce the profitability of the firm. Debt may come with certain covenants on the use of assets, as well. Some of these covenants may place restrictions on the use of certain assets, causing inefficient asset utilization, leading to unprofitability of the firm.

Leverage is a useful indicator of solvency (Cheng, Chiou and Wu, 2006). A high leverage ratio may be an indication of solvency issues of a firm, which could potentially lead to profitability problems. Thus, profitable firms are solvent with low levels of leverage. Solvent firms can alter the use of their assets to make them profitable. This also explains the negative relationship between leverage and profitability.

Logarithm of Sales

The logarithm of sales was taken as a proxy of sales to reduce the effect of large numbers in the regression model. Logarithm of sales is significant in the return on assets model at 1% level and 5% in the return on equity model. There is a positive relationship between sales and the profitability of firms with a beta coefficient of 0.30, confirming the positive relationship found by Lazaridis and Tryfonidis (2006). As sales increase, the cash resources of firms increase also, giving firms a pool of cash resources to extract from when embarking on more profitable projects. These results are also similar to the work of Deloof (2003) although gross profit was taken as the measure of profitability. Sales can be a measure of growth opportunities available to a firm which can be utilised to increase the profitability of the firm (Garcia-Teruel & Martinez-Solano, 2007).

Investment Policy

Investment policy is significant at 1% and 5% in return on assets and return on equity measures of profitability, respectively. Both measures show that there is a positive relationship between profitability and the investment policy of firms. The investment policy gives an indication of how the firm's total assets are proportional to investments into current and fixed assets. The positive relationship shows that profitability increases when more of the firm's assets are invested in current assets. If the firm's resources are invested in current assets, those resources can quickly turn into cash, which can be ploughed back into the firms operations. In this way, the profitability of the firm is enhanced. These are similar to the findings of Afza and Nazir (2007) who also found a positive relationship between the investment policy and profitability.

Days in Accounts Receivables

Days in accounts receivables are significant only in the return on assets model at 1% level of significance and the p-value is 0%. The beta coefficient of -0.023 shows there is a negative

relationship between days in accounts receivables and profitability similar to the findings by Deloof (2003) and Mathuva (2010). Firms improve profitability by reducing the payment period offered to customers (Lazaridis and Tryfonidis, 2006). A restrictive credit policy improves the cash reserves of firms which can be used to embark on other profitable projects (Mathuva, 2010). The negative relationship could be explained by the fact that selling on credit carries a higher risk due to high level of bad debts thus negatively affecting profitability. Deloof (2003) also argued that customers take long to pay unprofitable firms because they need time to assess the quality of products offered by these firms as unprofitable firms are believed to compromise on quality. This reason also aids in explaining the negative relationship between profitability and days in accounts receivables. Customers of unprofitable firms pay after getting the proof that the firm's products are satisfactory.

Days in Inventory

Days in inventory are significant in all measures of profitability (return on assets and return on equity) at 1% level of significance with a p-value of 1% and 0% in the return on assets and return on equity models, respectively. Days in inventory is negatively related to profitability as illustrated by the negative beta coefficient is -0.039 and -0.11 for return on assets and return on equity models, respectively. An increase in inventory levels that is not accompanied by an increase in sales leads to a situation of a negative relationship with profitability. The results are similar to findings by Deloof (2003) and Lazaridis & Tryfonidis (2006). Holding inventory for too long, increases cost of holding stock. Examples of these costs include costs of insurance costs, warehousing costs. These costs reduce the profitability of firms. Lazaridis and Tryfonidis (2006) show that an increase of days in inventory accompanied by fall in sales lead to capital being tied up in unprofitable ventures. However, the negative relationship between days in inventory and profitability is in contrast to the positive relationship in Mathuva (2010)'s findings.

Days in Accounts Payables

Days in accounts payables are significant only in the return on asset model at 1% level of significance with a p-value of 0%. The beta coefficient of -0.023 shows a negative relationship between profitability and days in accounts payables exist. Similarly to Deloof (2003)'s results, these results imply that the earlier the firms pay creditors the more profitable they are. The negative relationship can be explained by that an that increase in

account payables leads to an outflow of resources which negatively profitability. Secondly suppliers may also give extended payment periods to unprofitable firms encouraging them to delay payment against completely writing off the debt.

4.3.3 RESULTS FOR ROBUSTNESS CHECKS

4.3.3.1 Wooldridge Autocorrelation Results

The Wooldridge autocorrelation test shows autocorrelation is present in all the models where return on assets is taken as the measure of profitability. The p-value of Wooldridge test in the return on asset model is 0.0005 which is less than 0.05. Thus, at the 5% level of significance, the null hypothesis is rejected and, we accept that there is first order autocorrelation in the data. This shows that the past values of independent variables should be taken into the model since they influence profitability. However, in all the return on equity models, autocorrelation is not present because the p-value is 0.0703 which is above 5% level of significance. The results of the Wooldridge autocorrelation test are presented in Table 4.7 and 4.8 for the return on assets and return on equity models, respectively. Wooldridge test results which shown below, are only for the main component of working capital (i.e. cash conversion cycle).

Table 4.7 Return on Assets: Wooldridge Test

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     109) =     13.051
           Prob > F =      0.0005
```

Table 4.8 Return on Equity: Wooldridge Test

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     109) =      3.340
           Prob > F =      0.0703
```

4.3.3.2 Autocorrelation Corrected Results

The Prais-Winston regression gives results that are free from autocorrelation and regression was run only on the model having the cash conversion cycle as it main proxy of working capital. Cash conversion cycle, leverage and the investment policy are the only variables that are significant when autocorrelation is removed. The p-values of cash conversion cycle, leverage and investment policy are 0.002, 0.002 and 0.000 respectively which are less than 0.005. Thus, at 5% level of significance, cash conversion cycle, leverage and investment

policy are significant. The cash conversion cycle and leverage beta coefficients of -0.0181017 and -0.3583088 means they still maintained their negative relationship with profitability even when autocorrelation is removed. The investment policy is also still positively related to profitability and the beta coefficient is 8.99415. The results of Prais-Winston regression are shown below in table 4.9.

Table 4.9 Results for Prais-Winston Regression

```
Iteration 0:  rho = 0.0000
Iteration 1:  rho = 0.7473
Iteration 2:  rho = 0.7599
Iteration 3:  rho = 0.7607
Iteration 4:  rho = 0.7607
Iteration 5:  rho = 0.7607
Iteration 6:  rho = 0.7607

Cochrane-Orcutt AR(1) regression -- iterated estimates

      Source |       SS       df       MS              Number of obs =     985
-------------+------------------------------           F(  5,   979) =    9.61
       Model |  1520.46214     5  304.092429            Prob > F      =  0.0000
    Residual |  30979.3379   979  31.6438589            R-squared     =  0.0468
-------------+------------------------------           Adj R-squared =  0.0419
       Total |   32499.8   984  33.0282521            Root MSE      =  5.6253

------------------------------------------------------------------------------
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |  -.3583088   .1170832    -3.06   0.002    -.5880716   -.1285459
         los |   .2066606   .1425574     1.45   0.147    -.0730927    .4864139
         ccc |  -.0181017   .0059653    -3.03   0.002    -.0298079   -.0063955
          ip |    8.99415   1.740473     5.17   0.000     5.578663    12.40964
          fp |  -.0431778   .0753819    -0.57   0.567    -.1911066    .1047509
       _cons |   7.724268   3.271513     2.36   0.018     1.304284    14.14425
-------------+----------------------------------------------------------------
         rho |   .7607288
------------------------------------------------------------------------------
Durbin-Watson statistic (original)    0.437097
Durbin-Watson statistic (transformed) 1.874792

.
```

4.3.3.3 Results for Pesaran Test for Cross-Company Dependence

Pesaran test for cross-company dependence was run to check for cross-company activities that can influence profitability of other firms. The evidence of profitability and cross-company dependence was detected in all the models. Profitability of firms is not only influenced by variables under the management's control. It can also be influenced by the actions of suppliers and clients, thereby impacting the firm's profitability. Cross-company dependence was found to be at 1% level of significance as suggested by the p-values for both return on assets and return on equity models is 0% which is below 1% level of significance. Tables 4.10 and 4.11 present the results of Pesaran test for the return on assets and return on equity models, respectively.

Table 4.10 Return on Assets: Pesaran Test

```
Pesaran's test of cross sectional independence =     8.237, Pr = 0.0000

Average absolute value of the off-diagonal elements =     0.360
```

Table 4.11 Return on Equity: Pesaran Test

```
Pesaran's test of cross sectional independence =      8.234, Pr = 0.0000

Average absolute value of the off-diagonal elements =     0.364
```

4.3.3.4 Correction of Cross-Company Dependence

Cross-company dependence was corrected by running a regression using the Driscoll-Kraay regression model. Cash conversion cycle, leverage, logarithm of sales and the investment policy are significant at the 5% level because their p-values of 0; 0; 0.004 and 0 respectively, are less than 0.05. The relationship of these variables and profitability is still the same as before. Driscoll-Kraay regression uses the fixed effects model only. Hence a regression was run only using return on assets as the measure of profitability as indicated before by the Hausman test. The results of Driscoll-Kraay results are summarised below in Table 4.12 and only the model having the cash conversion cycle is presented.

Table 4.12 Driscoll-Kraay Regression ROA

```
Regression with Driscoll-Kraay standard errors   Number of obs     =      1095
Method: Fixed-effects regression                 Number of groups  =       110
Group variable (i): id                           F(  5,     9)     =    201.91
maximum lag: 4                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.1148

------------------------------------------------------------------------------
             |               Drisc/Kraay
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |   -.400257   .0609887    -6.56   0.000    -.538223   -.262291
         los |    .299692   .0795021     3.77   0.004     .1198458   .4795383
         ccc |  -.0324322   .0034851    -9.31   0.000    -.0403161  -.0245483
          ip |   17.37653   1.431581    12.14   0.000     14.13807    20.615
          fp |  -.0960536   .0695203    -1.38   0.200    -.2533194   .0612122
       _cons |   1.662644   .9976187     1.67   0.130    -.5941262   3.919414
------------------------------------------------------------------------------
```

4.3.4 Results for Sectorial Regressions

Sectorial regressions were performed to check the presence of sectorial effect on profitability in the industrial sub-sectors of South Africa is sector determined. Garcia-Teruel and Martinez-Solano (2007) used pooled regression to check effects of sectorial profitability. This study also used pooled regression analysis in order to identify if any differences existed in the variables that affect profitability in the different sub-sectors. Every model was tested on the different sub-sectors of the industrial sector as per McGregor BFA classification (i.e. the basic materials, consumer goods, consumer services, health care, industrials and technology). The results show that the factors that influence profitability are not the same in the different sub-sectors of the industrial sector as shown by variation in the significance of variables. The coefficients and p-values for the pooled regression results for the six sub-sectors are shown below:

Table 4.13

Sector	Variable	Coefficient	P-Value
Consumer Goods	CCC	-0.040	0.00
	Financing policy	-0.560	0.00
	Investment policy	4.700	0.05
	Days in accounts receivables	-0.043	0.00
	Days in inventory	-0.031	0.02
Consumer Services	Investment policy	-6.35	0.03
	Financing policy	-1.58	0.04
	Days in account receivables	0.03	0.03
	Days in inventory	-0.19	0.00
	Days in accounts payables	-0.093	0.01
Health Care	CCC	-0.11	0.03
	Investment policy	26.00	0.02
Industrials	Leverage	-0.59	0.00
	Logarithm of sales	-0.89	0.00
	Investment policy	7.61	0.00
	Financing policy	2.03	0.00
	Days in account receivables	-0.077	0.00
	Days in accounts payables	-0.083	0.00
Technology	Leverage	-4.46	0.01
	Logarithm of sales	-2.95	0.01
	Investment policy	37.3	0.00
	Financing policy	-7.22	0.03
	Days in accounts payables	-0.14	0.01

The results above show that the factors that influence profitability are not the same in the different sub-sectors of the industrial sector. In the health care sector only the cash conversion cycle and sales have an impact on profitability whilst in all the other sectors many other variables are identified. The significance of variables is not the same in different sub-sectors as shown above, thus the results shows the presence of sectorial variation in South Africa's industrial sub-sectors. The differences in variables reflect the differences in the nature of product, thus different factors affect profitability in different ways.

The above results also show that the differences in the relevancy of investment policies and finance policies. In the consumer goods and technology sectors there is a positive

relationship between return on assets and investment policy and a negative relationship between return on assets and financing policy. According Afza and Nazir (2007) as the positive ratio of total current assets and total assets (TCA/TA) increases, degree of aggressiveness decreases, and positively impacts return on assets. The higher the negative ratio of total current liabilities and total assets (TCL/TA) ratio, more aggressive the financing policy, which negatively impacts return on assets.This implies that the consumer goods and technology sectors may yield a higher return on assets by maintaining a higher current assets level whilst minimising the current liabilities thus following a conservative working capital strategy.

In the consumer services sector there is a negative relationship between return on assets and investment policy and financing policy. This implies that the consumer services may yield a higher return by increasing the proportion of current assets and reducing current liabilities in their working capital strategy.

In the industrial sector the financing and investment policy both have a positive relationship with return on assets. This implies that in this sector can enjoy a higher return by maintaining a high level of current assets whilst maintaining a high level of current liabilities.

4.4 SUMMARY

In summary, this study was aimed at exploring the impact of working capital management on profitability. The results show that after removing the problems of panel data, the cash conversion cycle which is the main measure of working capital is negatively related to both measures of profitability (return on assets and return on equity). The results show negative relationship between days in accounts receivables and days in inventory with profitability. These results imply shortening debt period to customers and the inventory conversion period will result in a shorter cash conversion cycle. The results of the study also revealed a negative relationship between days in accounts payables and profitability. This also implies that shortening the credit period would enhance profitability. However this also has an impact of shortening the cash conversion cycle. The above results therefore corroborates with the negative relationship found between cash conversion cycle and profitability. The results also show that leverage has negative impact on return on assets. The results from

this study suggested that there are different factors that affect the different sub sectors differently within the South African Industrial firms. This is however contrary to the local study by Smith (1998) which could be as a result of the different time periods of the study. Alternatively the contradiction could be explained by the new developments in the different sectors such technology and many other factors. The final chapter follows with further discussions of the findings and recommendations of the study.

CHAPTER FIVE

CONCLUSION

5.1 SUMMARY OF RESEARCH REPORT

The aim of this study was to assess the relationship between working capital management and profitability of South African Industrial firms. Secondly this study aimed to investigate the impact of different working capital policies on the profitability of firms. This study uses return on assets and the return on equity as estimates of profitability, and uses cash conversion cycle as proxy for working capital. Correlation analysis and regression analysis (fixed effects and random effects) were conducted on 110 industrial firms.

The results found in this study describe a negative relationship between cash conversion cycle and the two main measures of profitability return on assets and return on equity. Similar results were found in by studies by Jose, Lancaster and Stevens (1996) and Lazaridis and Tryfonidis (2006). The results from this study imply that management have to concentrate on ways of shortening the cash conversion cycle in order to maximise on profits.

The results from this research report revealed a negative relationship between days in accounts receivables and return on assets. These results imply that the quicker a firm collects its debt from customers the more it will enhance its return on assets. A more stringent debt collection policy is more efficient in that it avoids writing off larger amounts in bad debts. A shorter debtor collection period also aids in shortening the cash conversion cycle (Richards and Laughlin, 1980).

A negative relationship was found between days in inventory and all profitability measures. These results imply that the quicker inventory is sold off the more it will enhance the return on assets and the return on equity. Fewer days in inventory would aid in cutting storage costs, insurance and warehouse costs, such cost cutting measures enhance profitability and shorten the cash conversion cycle.

A negative relationship was also found between days in accounts payables and both measures of profitability. This implies that profitable firms quickly meet their financial

obligations. Such profitable firms may be gaining in terms of discounts which enhance profitability. On the other hand unprofitable firms take long to meet their financial obligations. Rather than writing off bad debts, creditors probably give extended payments periods to unprofitable firms. A shorter creditor's period shortens cash conversion cycle.

The results of this research report also revealed a negative relationship between return on assets and leverage. These results imply that as leverage increases, it negatively impacts return on assets. The cost associated with debt can be detrimental to the profitability of a firm.

Furthermore, the results of this dissertation revealed a positive relationship between logarithm of sales and profitability. These results are consistent with the results of authors such as Deloof (2003). The results imply that higher levels of sales have a positive impact on profitability. A higher sales level also implies that a firm can increase its cash resources which can be utilised in embarking in profitable projects.

This study secondly assesses the relevancy of investment policies and financing policies of the South African industrial firms on profitability. The results revealed levels of investment of current assets in proportion to total assets have a positive relationship with both measures of profitability. These results imply that firms with higher level of investment in current assets would enhance return on assets and return on equity. This however is contrary to the modern view of working capital management as current assets are considered to generate lesser return than fixed assets would. Yet for South African firms, the results suggest that the risk associated with maintaining a low level of current assets as a proportion of total assets could be greater than the rewards. Therefore the currents assets should be maintained at a level that strikes a balance between profitability and the overall liquidity.

Broadly looking the South African Industrial firms financing policy did not seem to have much impact on profitability. However taking a closer look at the different sectors financing policy is relevant to consumer goods and consumer services, technology and industrials. The results from the study show that in the consumer goods, technology sector and consumer services, maintaining a high level of current liabilities in proportion to total assets would negatively impact the return on assets. Whilst in the industrial sector maintaining high level

of current liabilities in proportion to total assets could be has a positive impact on the return on assets.

The differences in how the financing policy affects return on assets could possibly suggest the presence of sector effect amongst the South African Industrial sub-sectors. The presence of sector effect is further supported by the evidence from the differences in the significance level of the variables affecting the different sectors as well as differences in variables affecting the sub-sectors. This is however consistent with fact that working capital is dependent on different factors such as products, methods of production and many other factors. All these factors combined play a different role in defining the different working capital management employed by a firm.

5.2 AREAS OF FURTHER RESEARCH

- As many studies have mainly focused on the impact of working capital management using measures of profitability such as return on assets, return on equity and return on sales. Studies could be conducted using profitability measures that take into account cost of capital such as the Economic Value Added (EVA).
- This and many other empirical studies have established that working capital management is of importance to corporate strategy of a firm as it has impact on profitability. Therefore further studies could make use of weighted cash conversion cycle as it gives more insight into the liquidity of firms.
- Further avenues into the area of working capital management could be the investigations into risk measures such as business risk, interest risk, foreign exchange risk and many others. This could help financial executives understand vital information on how to address working capital management issues during the financial crisis.

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APPENDIX

ROA (return on assets) and ROE (return on equity)

Appendix-A Results for the cash conversion cycle components- ROA Hausman Test

```
                 ---- Coefficients ----
                   (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                  fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
         lev |  -.4106651     -.427448        .0167829        .0178858
         los |   .2931889      .186925        .1062638        .0558311
          ar |  -.0226489    -.0211179       -.001531        .0009421
          ip |   16.41831     10.99042        5.427889        1.182692
          fp |  -.0761552    -.0496392       -.026516        .0092937
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =          28.44
                Prob>chi2 =         0.0000
```

```
                 ---- Coefficients ----
                   (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                  fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
         lev |  -.4112424    -.4319723        .0207299         .018849
         los |   .3355535     .2294513        .1061023        .0572562
         inv |  -.0387758    -.0391428         .000367        .0023428
          ip |   16.80091     11.15484        5.646073        1.208123
          fp |  -.0820635    -.0556151       -.0264484        .0090318
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =          27.86
                Prob>chi2 =         0.0000
```

```
                 ---- Coefficients ----
                   (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                  fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
         lev |  -.4189313    -.4350374        .0161061        .0192814
         los |   .3140436     .2137697        .1002739        .0570469
          ap |  -.0234046    -.0240089        .0006042        .0013407
          ip |   15.94681     10.59738        5.349427        1.205971
          fp |  -.0646476     -.037026       -.0276216        .0096276
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =          24.93
                Prob>chi2 =         0.0001
```

Appendix-B Results for the cash conversion cycle components- ROE Hausman Test

```
                 ---- Coefficients ----
                   (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                  fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
         lev |   2.053435     2.399809       -.3463741        .1710008
         los |   .4437739      .873149       -.4293751        .3808743
          ar |  -.0025029    -.0123277        .0098248        .0077679
          ip |   20.21834       12.073        8.145344        7.425414
          fp |   .2287005      .282226       -.0535255         .104739
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =           8.91
                Prob>chi2 =         0.1125

.
```

```
                 ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |     fixed        random       Difference          S.E.
--------------+----------------------------------------------------------------
          lev |    2.061352     2.395778      -.3344261        .1739332
          los |     .5211441    1.014138      -.4929934        .3858956
          inv |   -.0726646     -.10563        .0329654        .0181356
           ip |    21.17894      12.9142       8.264739        7.495795
           fp |     .1927614    .2395592      -.0467978        .1013602
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =          10.38
                Prob>chi2 =         0.0651
```

```
                 ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |     fixed        random       Difference          S.E.
--------------+----------------------------------------------------------------
          lev |    2.055218     2.396586      -.3413678        .1702099
          los |     .4301088    .8629201      -.4328112        .3789722
           ap |      .013271    .0050776       .0081934        .0103039
           ip |    20.40891     12.02842       8.380491        7.412622
           fp |     .2212672    .2838348      -.0625676        .0995584
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =           8.38
                Prob>chi2 =         0.1363
```

Appendix-C Results for the cash conversion cycle components- ROA Wooldridge Test for auto-correlation

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     109) =      13.163
           Prob > F =       0.0004
```

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     109) =      13.888
           Prob > F =       0.0003
```

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     109) =      13.783
           Prob > F =       0.0003
```

Appendix-D Results for the cash conversion cycle components- ROE Wooldridge Test for auto -correlation

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     109) =       3.356
           Prob > F =       0.0697
```

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     109) =       3.338
           Prob > F =       0.0704
```

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     109) =      3.379
           Prob > F =      0.0688
```

Appendix-E Results for the cash conversion cycle components- ROA Correction of auto-correlation

```
Iteration 0:  rho = 0.0000
Iteration 1:  rho = 0.7465
Iteration 2:  rho = 0.7563
Iteration 3:  rho = 0.7567
Iteration 4:  rho = 0.7567
Iteration 5:  rho = 0.7567

Cochrane-Orcutt AR(1) regression -- iterated estimates

      Source |       SS       df       MS              Number of obs =     984
-------------+------------------------------           F(  5,   978) =    9.65
       Model |  1527.65663     5  305.531325            Prob > F      =  0.0000
    Residual |   30963.724   978  31.6602495            R-squared     =  0.0470
-------------+------------------------------           Adj R-squared =  0.0421
       Total |  32491.3806   983  33.0532865            Root MSE      =  5.6267

------------------------------------------------------------------------------
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |  -.3618108   .1173874    -3.08   0.002    -.592171   -.1314506
         los |   .1966298   .1421346     1.38   0.167    -.0822941    .4755537
          ar |  -.0153361   .0049308    -3.11   0.002    -.0250122   -.0056601
          ip |   8.252159   1.736089     4.75   0.000     4.84527    11.65905
          fp |  -.0366302   .0752844    -0.49   0.627    -.1843678    .1111074
       _cons |   8.604311   3.279491     2.62   0.009     2.168664    15.03996
-------------+----------------------------------------------------------------
         rho |   .7567241
------------------------------------------------------------------------------
Durbin-Watson statistic (original)    0.437581
Durbin-Watson statistic (transformed) 1.874349
```

```
Iteration 0:  rho = 0.0000
Iteration 1:  rho = 0.7410
Iteration 2:  rho = 0.7534
Iteration 3:  rho = 0.7542
Iteration 4:  rho = 0.7542
Iteration 5:  rho = 0.7542
Iteration 6:  rho = 0.7542

Cochrane-Orcutt AR(1) regression -- iterated estimates

      Source |       SS       df       MS              Number of obs =     985
-------------+------------------------------           F(  5,   979) =    9.40
       Model |  1488.48656     5  297.697311            Prob > F      =  0.0000
    Residual |  31000.5166   979  31.6654919            R-squared     =  0.0458
-------------+------------------------------           Adj R-squared =  0.0409
       Total |  32489.0032   984  33.0172796            Root MSE      =  5.6272

------------------------------------------------------------------------------
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |  -.3639244   .1175747    -3.10   0.002    -.5946518    -.133197
         los |   .2249245   .1419482     1.58   0.113    -.0536333    .5034822
         inv |  -.0267405   .0091517    -2.92   0.004    -.0446998   -.0087812
          ip |   8.798942   1.727171     5.09   0.000     5.409559    12.18833
          fp |  -.0367037   .0753029    -0.49   0.626    -.1844774     .11107
       _cons |   7.767364   3.241939     2.40   0.017     1.405415    14.12931
-------------+----------------------------------------------------------------
         rho |   .7542056
------------------------------------------------------------------------------
Durbin-Watson statistic (original)    0.450282
Durbin-Watson statistic (transformed) 1.862670
```

```
Iteration 0:  rho = 0.0000
Iteration 1:  rho = 0.7427
Iteration 2:  rho = 0.7520
Iteration 3:  rho = 0.7524
Iteration 4:  rho = 0.7524
Iteration 5:  rho = 0.7524

Cochrane-Orcutt AR(1) regression -- iterated estimates

      Source |       SS       df       MS              Number of obs =     985
-------------+------------------------------           F(  5,   979) =    9.20
       Model |  1458.03389     5  291.606778            Prob > F      =  0.0000
    Residual |  31029.1893   979  31.6947797            R-squared     =  0.0449
-------------+------------------------------           Adj R-squared =  0.0400
       Total |  32487.2232   984  33.0154707            Root MSE      =  5.6298

------------------------------------------------------------------------------
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |  -.3655859   .1177632    -3.10   0.002    -.5966833   -.1344886
         los |   .2077581    .141593     1.47   0.143    -.0701026    .4856188
          ap |  -.0171947   .0062118    -2.77   0.006    -.0293846   -.0050048
          ip |   8.005545   1.735451     4.61   0.000     4.599913    11.41118
          fp |  -.0286427   .0752553    -0.38   0.704    -.1763228    .1190375
       _cons |   8.617325   3.263132     2.64   0.008     2.213786    15.02086
-------------+----------------------------------------------------------------
         rho |   .7523901
------------------------------------------------------------------------------
Durbin-Watson statistic (original)    0.445376
Durbin-Watson statistic (transformed) 1.865129
```

Appendix-E Results for the cash conversion cycle components- ROA Cross Company dependence Pesaran

```
Pesaran's test of cross sectional independence =     8.373, Pr = 0.0000
Average absolute value of the off-diagonal elements =     0.364
```

```
Pesaran's test of cross sectional independence =     8.654, Pr = 0.0000
Average absolute value of the off-diagonal elements =     0.358
```

```
Pesaran's test of cross sectional independence =     8.674, Pr = 0.0000
Average absolute value of the off-diagonal elements =     0.362
```

Appendix-F Results for the cash conversion cycle components- ROE Cross Company dependence Pesaran

```
Pesaran's test of cross sectional independence =     7.043, Pr = 0.0000
Average absolute value of the off-diagonal elements =     0.367
```

```
Pesaran's test of cross sectional independence =     8.521, Pr = 0.0000
Average absolute value of the off-diagonal elements =     0.359
```

```
Pesaran's test of cross sectional independence =     7.151, Pr = 0.0000
Average absolute value of the off-diagonal elements =     0.362
```

Appendix-G Results for the cash conversion cycle components- ROA Cross Company dependence Discoll kray test

```
Regression with Driscoll-Kraay standard errors   Number of obs     =      1094
Method: Fixed-effects regression                 Number of groups  =       110
Group variable (i): id                           F(  5,     9)     =    488.81
maximum lag: 4                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.1112

------------------------------------------------------------------------------
             |               Drisc/Kraay
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |  -.4106651   .0573814    -7.16   0.000    -.5404709   -.2808593
         los |   .2931889   .0753184     3.89   0.004     .1228068    .463571
          ar |  -.0226489   .0015507   -14.61   0.000    -.0261568   -.019141
          ip |   16.41831   1.625799    10.10   0.000     12.74049    20.09612
          fp |  -.0761552    .068561    -1.11   0.295    -.2312509    .0789405
       _cons |    2.44607   1.315328     1.86   0.096    -.5294076    5.421548
------------------------------------------------------------------------------
```

```
Regression with Driscoll-Kraay standard errors   Number of obs     =      1095
Method: Fixed-effects regression                 Number of groups  =       110
Group variable (i): id                           F(  5,     9)     =    138.47
maximum lag: 4                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.1025

------------------------------------------------------------------------------
             |               Drisc/Kraay
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |  -.4112424    .057319    -7.17   0.000    -.5409069   -.2815779
         los |   .3355535   .0926678     3.62   0.006     .1259245    .5451826
         inv |  -.0387758   .0092271    -4.20   0.002    -.0596488   -.0179028
          ip |   16.80091   1.451767    11.57   0.000     13.51679    20.08504
          fp |  -.0820635   .0626402    -1.31   0.223    -.2237654    .0596384
       _cons |   1.383788   1.130055     1.22   0.252    -1.172575     3.94015
------------------------------------------------------------------------------
```

```
Regression with Driscoll-Kraay standard errors   Number of obs     =      1095
Method: Fixed-effects regression                 Number of groups  =       110
Group variable (i): id                           F(  5,     9)     =    268.05
maximum lag: 4                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.1008

------------------------------------------------------------------------------
             |               Drisc/Kraay
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |  -.4189313   .0548475    -7.64   0.000     -.543005   -.2948577
         los |   .3140436   .0788575     3.98   0.003     .1356556    .4924317
          ap |  -.0234046     .00232   -10.09   0.000    -.0286528   -.0181565
          ip |   15.94681   1.629872     9.78   0.000     12.25978    19.63384
          fp |  -.0646476   .0646836    -1.00   0.344    -.2109721    .0816769
       _cons |   2.265919   1.385671     1.64   0.136    -.8686881    5.400525
------------------------------------------------------------------------------
```

Appendix-H Results for the cash conversion cycle components ROE Cross Company dependence Pesaran

```
Regression with Driscoll-Kraay standard errors   Number of obs     =      1094
Method: Fixed-effects regression                 Number of groups  =       110
Group variable (i): id                           F(  5,     9)     =     12.08
maximum lag: 4                                   Prob > F          =    0.0009
                                                 within R-squared  =    0.0186

------------------------------------------------------------------------------
             |               Drisc/Kraay
         roe |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |   2.053435   1.764078     1.16   0.274    -1.937188    6.044057
         los |   .4437739   .2977422     1.49   0.170    -.2297658    1.117314
          ar |  -.0025029    .011248    -0.22   0.829    -.0279477    .0229419
          ip |   20.21834   4.604657     4.39   0.002     9.801882    30.6348
          fp |   .2287005    .123377     1.85   0.097    -.0503976    .5077986
       _cons |   6.668031   5.155111     1.29   0.228    -4.993641    18.3297
------------------------------------------------------------------------------
```

Regression with Driscoll-Kraay standard errors Number of obs = 1095
Method: **Fixed-effects regression** Number of groups = 110
Group variable (i): **id** F(5, 9) = 33.63
maximum lag: **4** Prob > F = 0.0000
 within R-squared = 0.0221

roe	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	2.061352	1.761426	1.17	0.272	-1.92327	6.045974
los	.5211441	.3172126	1.64	0.135	-.1964408	1.238729
inv	-.0726646	.0150514	-4.83	0.001	-.1067132	-.038616
ip	21.17894	4.542559	4.66	0.001	10.90296	31.45492
fp	.1927614	.1282656	1.50	0.167	-.0973955	.4829184
_cons	6.94509	5.448833	1.27	0.234	-5.381025	19.27121

Regression with Driscoll-Kraay standard errors Number of obs = 1095
Method: **Fixed-effects regression** Number of groups = 110
Group variable (i): **id** F(5, 9) = 20.93
maximum lag: **4** Prob > F = 0.0001
 within R-squared = 0.0189

roe	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	2.055218	1.766264	1.16	0.275	-1.94035	6.050785
los	.4301088	.2980835	1.44	0.183	-.2442029	1.104421
ap	.013271	.0123602	1.07	0.311	-.0146898	.0412318
ip	20.40891	4.282471	4.77	0.001	10.72129	30.09653
fp	.2212672	.1154294	1.92	0.087	-.0398523	.4823867
_cons	5.9492	5.187967	1.15	0.281	-5.786797	17.6852

Appendix-I Results for sub-sectors-

Consumer goods-ROA

	(1) roa	(2) roa	(3) roa	(4) roa
lev	-0.022	-0.018	-0.052	-0.067
	(0.81)	(0.84)	(0.67)	(0.57)
los	-0.52	-0.60	-0.38	-0.40
	(0.68)	(0.62)	(0.78)	(0.76)
ccc	-0.015			
	(0.16)			
ip	0.81	-0.51	0.84	-1.01
	(0.92)	(0.94)	(0.92)	(0.88)
fp	-0.63***	-0.63***	-0.63***	-0.63***
	(0.00)	(0.00)	(0.00)	(0.00)
ar		-0.022*		
		(0.05)		
inv			-0.020	
			(0.35)	
ap				-0.036
				(0.45)
_cons	26.7	29.4	24.0	26.0
	(0.36)	(0.30)	(0.45)	(0.38)
N	139	139	139	139
R-sq	0.08	0.09	0.08	0.08
F	652.9	526.9	566.6	533.6
df_m	4	4	4	4
df_r	13	13	13	13

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Consumer goods-ROE

	(1) roe	(2) roe	(3) roe	(4) roe
lev	4.38	4.34	3.69	3.93
	(0.33)	(0.35)	(0.37)	(0.37)
los	3.39*	3.44*	3.77*	4.00
	(0.03)	(0.03)	(0.02)	(0.05)
ccc	-0.18***			
	(0.00)			
ip	-73.7	-78.6*	-82.1*	-74.6*
	(0.05)	(0.04)	(0.03)	(0.02)
fp	0.53	0.81	0.49	1.02
	(0.38)	(0.25)	(0.38)	(0.27)
ar		-0.087		
		(0.32)		
inv			-0.26**	
			(0.01)	
ap				-0.34
				(0.34)
_cons	2.98	-0.80	3.70	-3.77
	(0.76)	(0.94)	(0.68)	(0.79)
N	139	139	139	139
R-sq				
F				
df_m	5	5	5	5
df_r				

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Consumer services-ROA

	(1) roa	(2) roa	(3) roa	(4) roa
lev	0.54	0.58*	0.54	0.59
	(0.09)	(0.04)	(0.10)	(0.05)
los	0.43**	0.48**	0.47**	0.52**
	(0.00)	(0.00)	(0.00)	(0.00)
ccc	-0.084**			
	(0.00)			
ip	26.7*	25.8*	25.7*	25.2*
	(0.02)	(0.02)	(0.03)	(0.03)
fp	0.12	-0.14	0.016	-0.38
	(0.94)	(0.93)	(0.99)	(0.81)
ar		-0.069*		
		(0.05)		
inv			-0.17***	
			(0.00)	
ap				-0.066
				(0.36)
_cons	-4.70	-4.22	-2.28	-4.69
	(0.49)	(0.55)	(0.76)	(0.59)
N	280	280	280	280
R-sq	0.26	0.22	0.27	0.19
F	5.99	5.23	12.8	4.37
df_m	4	4	4	4
df_r	27	27	27	27

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Consumer services-ROE

	(1) roe	(2) roe	(3) roe	(4) roe
lev	18.1*	18.3*	18.0*	18.2*
	(0.04)	(0.04)	(0.04)	(0.04)
los	1.18	1.37	1.31	1.46
	(0.14)	(0.09)	(0.11)	(0.09)
ccc	-0.20***			
	(0.00)			
ip	37.2***	29.8***	35.9***	25.1**
	(0.00)	(0.00)	(0.00)	(0.01)
fp	2.79	2.41	2.73	2.01
	(0.44)	(0.50)	(0.47)	(0.57)
ar		-0.17**		
		(0.00)		
inv			-0.34***	
			(0.00)	
ap				-0.10
				(0.40)
_cons	-17.3	-14.9	-14.6	-16.7
	(0.33)	(0.42)	(0.43)	(0.40)
N	280	280	280	280
R-sq				
F				
df_m	5	5	5	5
df_r				

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Health care-ROA

	(1) roa	(2) roa	(3) roa	(4) roa
lev	-1.67	0.14	-1.32	-1.06
	(0.10)	(0.80)	(0.12)	(0.17)
los	-3.30	-7.68	-3.11	-6.05
	(0.44)	(0.13)	(0.54)	(0.50)
ccc	-0.16			
	(0.12)			
ip	8.39	-15.9	19.0	5.10
	(0.68)	(0.21)	(0.49)	(0.90)
fp	-1.75	-8.03	3.75	-5.72
	(0.60)	(0.33)	(0.67)	(0.65)
ar		-0.47		
		(0.24)		
inv			-0.28	
			(0.25)	
ap				-0.011
				(0.58)
_cons	101.0	233.7	90.5	158.4
	(0.37)	(0.08)	(0.48)	(0.49)
N	20	20	20	20
R-sq	0.88	0.91	0.89	0.79
F	.	.	.	.
df_m	0	0	0	0
df_r	1	1	1	1

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Health care -ROE

	(1) roe	(2) roe	(3) roe	(4) roe
lev	3.06	5.27*	3.88*	2.70
	(0.06)	(0.02)	(0.03)	(0.22)
los	-1.51	-7.80	-2.80	-7.07
	(0.76)	(0.16)	(0.60)	(0.18)
ccc	-0.30*			
	(0.01)			
ip	79.4***	58.2*	93.0**	41.5
	(0.00)	(0.03)	(0.00)	(0.11)
fp	32.8**	24.0	37.7*	17.4
	(0.01)	(0.15)	(0.02)	(0.39)
ar		-0.42		
		(0.08)		
inv			-0.35*	
			(0.04)	
ap				0.18
				(0.48)
_cons	17.2	181.8	33.5	144.0
	(0.87)	(0.15)	(0.78)	(0.21)
N	20	20	20	20
R-sq				
F				
df_m	5	5	5	5
df_r				

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Industrials-ROA

	(1) roa	(2) roa	(3) roa	(4) roa
lev	-0.56***	-0.56***	-0.50***	-0.55***
	(0.00)	(0.00)	(0.00)	(0.00)
los	0.68	0.47	0.77	0.33
	(0.31)	(0.55)	(0.30)	(0.66)
ccc	-0.10***			
	(0.00)			
ip	12.7**	14.1***	11.0**	14.0***
	(0.00)	(0.00)	(0.01)	(0.00)
fp	-0.41**	-0.36*	-0.38*	-0.37*
	(0.01)	(0.02)	(0.01)	(0.02)
ar		-0.10*		
		(0.02)		
inv			-0.17***	
			(0.00)	
ap				-0.019
				(0.48)
_cons	-2.86	3.48	-0.95	1.43
	(0.84)	(0.84)	(0.95)	(0.93)
N	340	340	340	340
R-sq	0.26	0.23	0.25	0.17
F	102.9	44.2	69.0	42.7
df_m	4	4	4	4
df_r	34	34	34	34

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Industrials -ROE

	(1) roe	(2) roe	(3) roe	(4) roe
lev	0.40	0.38	0.50	0.39
	(0.67)	(0.69)	(0.62)	(0.68)
los	-1.34	-1.05	-0.60	-0.68
	(0.33)	(0.42)	(0.60)	(0.58)
ccc	-0.17**			
	(0.00)			
ip	20.2**	22.7**	23.2***	22.4**
	(0.00)	(0.00)	(0.00)	(0.00)
fp	4.54***	4.56***	4.37***	4.61***
	(0.00)	(0.00)	(0.00)	(0.00)
ar		-0.19*		
		(0.03)		
inv			-0.21**	
			(0.00)	
ap				-0.044
				(0.34)
_cons	44.4	42.2	28.5	25.8
	(0.14)	(0.17)	(0.26)	(0.32)
N	340	340	340	340
R-sq				
F				
df_m	5	5	5	5
df_r				

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Technology-ROA

	(1) roa	(2) roa	(3) roa	(4) roa
lev	-7.14***	-7.02***	-7.11***	-6.88***
	(0.00)	(0.00)	(0.00)	(0.00)
los	1.75	2.55	1.55	1.72
	(0.24)	(0.11)	(0.32)	(0.22)
ccc	0.0088			
	(0.84)			
ip	25.7**	23.6***	23.9**	22.0**
	(0.00)	(0.00)	(0.00)	(0.00)
fp	9.34	6.44	8.29	11.0
	(0.38)	(0.55)	(0.46)	(0.20)
ar		-0.17		
		(0.13)		
inv			-0.079	
			(0.55)	
ap				-0.12
				(0.23)
_cons	-41.7	-44.1	-33.8	-31.2
	(0.11)	(0.09)	(0.24)	(0.17)
N	60	60	60	60
R-sq	0.65	0.68	0.65	0.68
F	251.8	262.3	5169.0	915.5
df_m	4	4	4	4
df_r	5	5	5	5

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Technology -ROE

	(1) roe	(2) roe	(3) roe	(4) roe
lev	14.2	9.71	14.8	12.9
	(0.12)	(0.25)	(0.08)	(0.17)
los	-12.3	-10.7**	-9.58	-14.0**
	(0.07)	(0.00)	(0.11)	(0.00)
ccc	-0.15			
	(0.56)			
ip	162.5*	152.2***	151.5*	168.8**
	(0.05)	(0.00)	(0.03)	(0.01)
fp	11.6	17.5*	17.0*	9.05
	(0.21)	(0.03)	(0.01)	(0.37)
ar		1.06*		
		(0.04)		
inv			-0.31*	
			(0.03)	
ap				0.23
				(0.23)
_cons	135.6*	45.3	90.3	149.7**
	(0.04)	(0.31)	(0.17)	(0.00)
N	60	60	60	60
R-sq				
F				
df_m	5	5	5	5
df_r				

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001