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IMPACT OF WORKING CAPITAL ON THE PROFITABILITY OF SOUTH AFRICAN FIRMS LISTED ON THE JOHANNESBURG STOCK EXCHANGE

by

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Thesis submitted in fulfilment of the requirements for the degree of
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at the

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DECLARATION

I, Mkhululi Ncube declare that the research work reported in this dissertation is my own, except where otherwise indicated and acknowledged. It is submitted for the degree of Master of Management in Finance and Investment in the University of the Witwatersrand, Johannesburg. This thesis has not, either in whole or in part, been submitted for a degree or diploma to any other universities.

Signature of candidate Date: 31 December 2011

ABSTRACT

This study examines the influence of working capital management components on the profitability of South African firms listed on the Johannesburg Stock Exchange ("JSE"). In addition, the study investigates how the influence of the selected working capital management components changes as macroeconomic conditions change. The study used accounting based secondary data obtained from I-Net Bridge and BF McGregor for 254 firms from 2004 to 2010. The Pooled Ordinary Least Squares ("OLS") regression models were used in the analyses. The key findings from the study indicate the following: (1) that there exists a significant negative relationship between the net time interval between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales (cash conversion cycle) and profitability. This negative relationship suggests that managers can create value for the shareholders of the firm by reducing the cash conversion cycle; (2) that there exists a significant negative relationship between days sales in receivables and profitability. This indicates that slow collection of accounts receivables is associated with low profitability and suggests that corporate managers can improve profitability by reducing credit period granted to their customers; (3) that an increase in the length of a firm's cash (operating) cycle tends to increase profitability during an economic recession than during an economic boom. This result indicates that firms adopt a more generous trade credit policy during an economic recession than during a boom in an attempt to boost sales which would ordinarily dwindle during a recession. The implication of this positive relationship in comparison with a negative relationship between the normal cash conversion cycle and profitability is that corporate managers need to streamline their trade credit policy and change it accordingly as the macroeconomic environment changes in ensuring that the company's sales are not adversely impacted as economic conditions change.

Furthermore, the study finds that there exists a highly significant negative relationship between profitability and the following respective ratios: days payables outstanding, current ratio, and capital structure. The negative relationship found between profitability and debt to equity ratio (used as a proxy for capital structure) indicates that South African firms' profitability tends to decrease at excessively high and increasing levels of debt.

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1 INTRODUCTION

1.1 Introduction

This study empirically examines the impact of working capital management components on the profitability of quoted companies in South Africa. In addition, the study determines how the impact of working capital management components changes as macroeconomic conditions change from a boom to a recession. This chapter is organised as follows: Section 1.2 sets-out background on working capital management as well as on the trade-off between liquidity preservation and profit maximisation faced by companies. Section 1.3 describes the problem statement under investigation and further expounds on the trade-off emanating from managing working capital. Section 1.4 chronicles the main objectives of the study and is followed by section 1.5 which specifies the key questions to be examined by the study. Section 1.6 highlights the significance of this study and pin-points the gaps in theoretical and previous studies that this research seeks to fill in. The last section of the chapter outlines how the entire research paper is organized.

1.2 Context of the study

Corporate financial management primarily deals with three core areas that have a bearing on a firm's financial goals. As postulated by Firer *et al* (2008), these three core areas of corporate finance are as follows: (1) capital budgeting, which encapsulates the process of planning and managing a firm's long-term investments; (2), capital structure, which outlines the specific mixture of long-term debt and equity maintained by a firm and last, (3) working capital management, which deals with management of a firm's short-term assets and liabilities.

The literature on both capital structure and working capital management is rich in as far as explaining how these two corporate finance areas directly affect firms' profitability and liquidity (e.g., Lemke, 1970; Kaveri, 1985; Hamlin and Heathfield, 1991; Deloof, 2003; Lazaridis and Tryfonidis, 2006; Biger *et al*, 2010).

In their respective studies of working capital management, Deloof (2003) and Nasr and Raheman (2007) find that current assets of a typical manufacturing firm accounts for more than half of the total assets and that the high levels of current assets within a firm may directly affect its profitability and liquidity. In the same vein, Demirgunes and Samiloglu (2008) affirm that while excessive levels of working capital can result in substandard return on investments, inconsiderable levels may result in shortages and difficulties in maintaining day-to-day operations. Laughlin and Richards (1980) hold the same view and confirm that inattention to working capital management, which essentially reflects the firm's liquidity position, may cause severe difficulties and losses due to adverse short-run developments even for the firm with favourable long-run prospects. The upshot of the foregoing is that incorrect evaluation of liquidity implications of a firm's working capital needs may result in unanticipated risks of company failure.

Instructive to note is that while the ultimate goal of a firm is to maximise profit, preserving liquidity is also an important objective considering that increasing profits at the cost of liquidity can bring problems to the firm. Thus, there is a trade-off between these two objectives and disregarding liquidity may result in insolvency and bankruptcy (Nasr and Raheman, 2007). It is partly as a result of this trade-off between profit maximization and liquidity preservation that this research determines the relationship between various working capital management components and profitability of South African firms listed on the JSE.

The primary components of working capital management include inventory levels, trade credit (accounts receivables), accounts payables, as well as cash conversion cycle (Biger *et al*, 2010). Cash conversion cycle is a popular measure of working capital management that reflects the *net time interval* between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales (Laughlin and Richards, 1980). From this definition, the insinuation therefore is that the longer this time lag, the larger the investment in working capital. As Deloof (2003) and Biger *et al* (2010) proclaim, a longer cash conversion cycle might increase firm profitability given that it leads to higher sales, primarily as a result of generous trade credit policy that allows customers to assess product quality before paying, as well as a result of a reduction in risk of stock-out, which essentially reduces the jeopardy of business operations interruption. Notwithstanding the possible increase in profitability as a result of a generous trade credit policy and/or reduction in risk of stock-out, it is not unthinkable that corporate profitability may decrease as cash conversion cycle elongates, particularly if the costs of

higher investment in working capital rise faster than the benefits of holding more inventory and/or granting more trade credit to customers. It is precisely on the back of this dichotomy that this research determines whether or not working capital management components have an impact on profitability of South African firms and if so, gauge the direction and extent to which working capital management components impact on profitability.

Lazaridis and Tryfonidis (2006) did an almost similar study and examined three components of working capital management, namely accounts payables, accounts receivables and inventory. They conclude that these three working capital management components can be managed in different ways in order to maximize corporate profitability. They argue that while some firms use trade credit as a vehicle to attract new customers, these firms will be prone to cash flow and liquidity problems since capital will be invested in customers. The problem created by trade credit is that while it may lead to improved sales as well as increased market share, it is not certain that it will lead to increased profitability and vice versa. This study explores the relationship between South African firms' profitability with the following variables: (1) cash conversion cycle, (2) days sales in inventory, (3) days sales in receivables, (4) days payables outstanding, (5) current ratio, (6) capital structure, and (7) market/economic conditions.

Additional analysis explores the difference and the extent to which working capital management components impact on profitability of South African firms as economic conditions change; i.e. from an economic boom to an economic recession. The underpinning for the assessment of the impact as economic conditions change is that economic conditions in which firms operate might arbitrarily change necessitating the change in a firm's strategy in as far as management of working capital is concerned. Hamlin and Heathfield (1991) uphold that the ability of managers to respond to rapidly changing circumstances is a vital aspect of their companies' competitiveness. They argue that those who can react quickly and appropriately to unanticipated events such as raw material price shocks gain a competitive advantage over their rivals. Given that inventory forms part of working capital and in view of the implications of changes in economic circumstances on inventory prices, this research explores if there is a difference in how working capital management components impact profitability as economic conditions change.

While current ratio does not form part of the cash conversion cycle, the paper explores its impact on profitability precisely because it is one of the key measures of liquidity. Lemke (1970) asserts

that current ratio has been almost venerated by accountants and other financial decision-makers as a prime criterion of liquidity. Similarly, Laughlin and Richards (1980) concur and state that financial analysts traditionally have viewed the current ratio as a key indicator of a firm's liquidity position.

Although the primary focus of this particular research is to investigate how profitability is impacted by working capital management components, the research further investigates how profitability is impacted by capital structure, which is viewed by many researchers such as De Angelo and Masulis (1980), Salawu (2009) and Brabete and Nimalathasan (2010) as the most vital of all aspects of corporate capital investment decision.

While it is not implausible that income smoothing (defined by Schipper (1989) as a purposeful intervention in the external financial reporting process of a firm with the intention of obtaining some private gain) may be employed by firms by manipulating composition of working capital management, the primary focus of this paper is not to assess how working capital management is used in earnings manipulation but to examine the relationship between various working capital management components and profitability.

1.3 Problem statement

Deloof (2003) and Biger *et al* (2010) state that a longer cash conversion cycle might increase firm profitability given that it leads to higher sales, primarily as a result of generous trade credit policy that allows customers to assess product quality before paying, as well as a result of a reduction in risk of stock-out, which essentially reduces the risk of business operations interruption. It is however not inconceivable that corporate profitability may decrease as cash conversion cycle elongates, particularly if the costs of higher investment in working capital rise faster than the benefits of holding more inventory and/or granting more trade credit to customers. The problem is, we do not know and we are not aware of any study that investigates whether or not working capital management has an impact on profitability of South African firms. In the same vein, we do not know if the impact (if any) of working capital management components on profitability of South African firms is positive or negative. Furthermore, we do not know how and the extent to which the impact changes as economic conditions change.

Although studies on working capital management have been carried out by various scholars such as Lazaridis and Tryfonidis (2006), Demirgunes and Samiloglu (2008), and Biger *et al* (2010), it is instructive to note that there is still ambiguity regarding the appropriate variables that might serve as proxies for working capital management. This study will investigate the following working capital management variables: (1) cash conversion cycle, (2) days sales in inventory, (3) days sales in receivables, (4) days payable outstanding, (5) current ratio (6) capital structure, and (7) market conditions. Previous studies provide no clear-cut direction of the relationship between any of the aforementioned variables and firm's profitability

While considerable amount of research on working capital management has been undertaken by a number of researchers (for example, Lazaridis and Tryfonidis, 2006; Demirgunes and Samiloglu, 2008 and Mathuva, 2010), their studies are primarily on companies in geographic jurisdictions other than South Africa. Much of the currently available empirical literature on working capital management is focussed on its impact on firms in developed countries/regions such as the United States of America (U.S.) and Europe. This paper focuses on South African firms where only limited research has been conducted.

Similarly, there is relatively little evidence available on the effect of capital structure on the profitability of listed companies in South Africa. This study bridges this gap by examining the effect of capital structure on profitability of quoted firms in South Africa.

1.4 Objectives of the study

This study has three main objectives and these are:

One: to empirically examine if working capital management components, namely: cash conversion cycle, days sales in inventory, days sales in inventory, days payables outstanding, current ratio, and capital structure impact on profitability of South African listed firms; two: to build a model that gauges how working capital management, particularly cash conversion cycle, impact on profitability when the economy moves from a boom to a recession, and three: to determine if the impact of working capital management components on profitability of companies in the industrial sector and those in the rest of the other sectors is different. The underpinning for this investigation of the impact in different sectors is that, relative to the rest of the companies in

the other sectors, companies in the industrial sector (which comprise manufacturing and production led firms) have significantly higher levels of current assets (which form part of working capital) on their respective balance sheets. Thus, the objective is to examine if there is a difference in the direction and extent of the impact on profitability if working capital levels change from significantly high levels to relatively low levels.

1.5 Research questions

The key questions to be investigated by this study are as follows:

(i) Do firm's liquidity measures impact on profitability of South African companies; i.e. are the working capital management variables statistically significant in explaining variation in profitability?

(ii) If statistically significant, what is the direction of the impact of each variable; i.e. is it a negative or a positive relationship?

(iii) Does liquidity affect profitability of companies within the industrial sector and the rest of the sectors different?

(iv) Is there any difference in how working capital management impacts on profitability as the economy moves from a boom to a recession?

(v) Does capital structure impact on profitability of South African firms, and if so, is the relationship between capital structure and profitability positive or negative?

1.6 Significance of the study

In addition to determining if working capital management components impact on profitability of South African firms, this study has many contribution-enhancing positive features which include the following: Firstly, unlike previous studies that examined working capital by not differentiating between different market conditions, this paper explores the level of the impact of working capital management on profitability as market conditions change. Specifically, it dissects the impact of working capital management under both an economic downturn as well as under an economic boom. This information will be enlightening in trade credit policy formulation in that it will give guidance to company corporate managers in implementing and adapting an appropriate trade

credit policy fitting for each market condition, as opposed to having a one size fits all trade credit policy. Secondly, the study investigates the relationship between capital structure and profitability of South African firms where limited empirical research exists. Given that capital structure is viewed by a number of researchers such as De Angelo and Masulis (1980), Salawu (2009), and Brabete and Nimalathasan (2010) to be the most vital of all the aspects of capital investment decision, the study therefore examines its relationship with profitability so as to give guidance to management in their attempt to identifying the optimal capital structure of the firm that maximizes market value.

Thirdly, the scope of the research has been extended to explore if the selected liquidity measures impact on profitability of companies in the industrial sector and those in the rest of the other sectors different. This will give guidance to corporate managers in adopting an appropriate trade credit policy applicable in their sector.

1.7 Outline of the study

This research paper comprises five chapters including this introduction section and is organised as follows. Chapter 2 provides literature review of the earlier work undertaken on working capital management and how it affects profitability of firms in other geographic jurisdictions. In addition, chapter 2 defines key terms and variables used in the study. Chapter 3 describes the methodological approach that will be followed to address research questions put forward under section 1.5 above. Chapter 4 presents and analyses results of the study. It is followed by chapter 5 which discusses the results in comparison with findings from previous studies and then concludes by suggesting further work to be done in congruence with this study.

2 LITERATURE REVIEW

2.1 Introduction

This chapter highlights the contribution of some of the previous studies on working capital management across the globe. Section 2.2 discusses key definitions and concepts relevant to working capital management. Section 2.3 captures comprehensive literature review on working capital management and its components and how they affect profitability in other geographic jurisdictions. Section 2.4 gives an overview of key findings from previous studies. Furthermore, it highlights how this study bridges the pointed-out gaps in literature.

2.2 Definition of key terms and concepts

Working Capital

The term "working capital" refers to the investment in current assets which are required to carry on the operations of the business (Firer *et al*, 2008). Kaveri (1985) refers to it as the difference between current assets and current liabilities. Managing the firm's working capital is a day-to-day activity that ensures that the firm has sufficient resources to continue its operations and avoid costly interruptions.

Trade Credit

Trade credit is an element of working capital. In its wider sense, it refers to both trade dues (sundry creditors or trade payables) and trade receivables/sundry debtors (Bhole and Mahakud, 2004). While the former serves as a source of funds, the latter represents the use for them. The concept of trade credit originates from a widespread practice in the business world where transactions take place without spot payments.

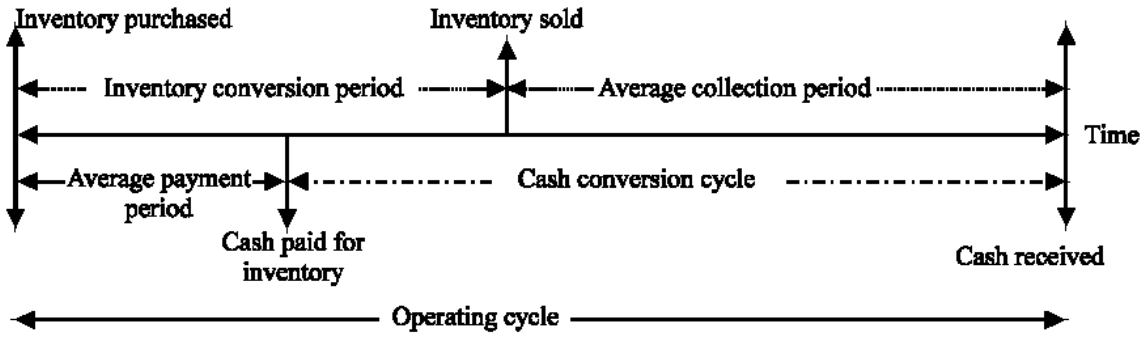
Components of Working Capital Management

Biger *et al* (2010) proclaim that a popular measure of working capital management is the 'cash conversion cycle' which is calculated as 'days of sales in receivables', plus 'days sales in

inventory' minus 'days payable outstanding'. This cycle essentially denotes the number of days a company's cash is tied up by its current operating cycle (Fried *et al,* 2003).

The various interrelationships among working capital components are shown in Figure 1 below.

Fig. 1: Operating and cash conversion cycles



Source: Jordan *et al*, 2003.

The cash conversion cycle depicted in Fig. 1 above captures the interrelationship of sales, cash collections, and trade credit in a manner that the individual numbers may not. To the extent a firm uses credit, the length of the cash (operating) cycle is reduced.

Capital Structure: Firer *et al* (2010) refer to capital structure as the specific mixture of long-term debt and equity the firm uses to finance its operations. The problem of how firms choose and adjust their strategic financial mix has drawn interest in corporate literature primarily because the mix of the funds (leverage ratio) affects the cost and availability of capital and thus firm's investment's decisions (Salawu, 2009).

2.3 Existing and relevant literature

Working capital management has been revisited by a considerable number of scholars such as Deloof (2003), Lazaridis and Tryfonidis (2006) and Demirgunes and Samiloglu (2008) in postulating its impact on firm's profitability. While the primary focus of the studies by these scholars has been to ascertain if there is a relationship between working capital management and profitability, it is instructive to note that the studies were conducted primarily for companies operational in developed countries within the European Union and in the U.S. Equally important

to note is that there is no clear-cut conclusion on direction of the impact of working capital management components impact on profitability. Also, the choice of explanatory variables differs from one research to another.

2.3.1 Working Capital Management Components

In their research paper, Lazaridis and Tryfonidis (2006) examine a sample of 131 companies listed in Greece on the Athens Stock Exchange for a period of four years from 2001-2004. The primary focus of their study was to establish whether there is a relationship that is statistically significant between profitability (defined as gross operating profit) and the cash conversion cycle and its components (accounts receivables, accounts payables, and inventory). They used both Pearson correlation and pooled ordinary least squares (OLS) to analyse the relationship. They found that lower gross operating profit is associated with an increase in the numbers of days of accounts payables. Furthermore, they conclude that managers can create profits for their companies by handling correctly the cash conversion cycle and keeping each different component of cash conversion cycle to an optimum level.

From the perspective of Belgian firms, Deloof (2003) undertook a study of 1,009 large non-financial firms for a period of five years from 1992-1996 to determine if working capital affects profitability of Belgian firms. Unlike other researchers such as Nasr and Raheman (2007) who used return on investment (ROI) as a profitability measure, Deloof (2003) measured profitability by gross operating income, which he calculated as (‘sales’ minus ‘cash costs of goods’) divided by (‘total assets’ minus ‘financial assets’). Deloof’s justification in deducting financial assets from total assets in the formula above is that in a number of firms in his sample, financial assets, which mainly comprise shares in other firms, are a significant part of the total assets and as such, operating activities would have contributed little to the overall ROI. Thus, the above formula associates profitability with the operating activities of the company for the defined period. By using correlation and regression analysis, Deloof found a significant negative relationship between gross operating income and the number of days in accounts receivables, inventories, and accounts payables of Belgian firms. While it is not unthinkable to assume that an increase in the number of days in payables increases the cash-flow position of a company and therefore increases a company’s profitability, Deloof found that for Belgian firms, there is a negative relationship

between number of days accounts payable and gross profit income. He argues that this negative relationship is underpinned by the fact that less profitable firms wait longer to pay their bills.

An almost similar research to Lazaridis and Tryfonidis's (2006) paper was undertaken by Biger *et al* (2010). The paper is an extension of Lazaridis and Tryfonidis's (2006) research and differed in that it looked precisely at American manufacturing firms listed on the New York Stock Exchange. They used a sample of 88 American firms for a period of three years from 2005-2007 to determine the relationship between working capital management and corporate profitability. Based on regression analysis and consistent with Lazaridis and Tryfonidis's (2006) findings, the study found a statistically significant relationship between cash conversion cycle and profitability, measured as gross profit margin. They conclude that profitability can be enhanced if firms manage their working capital in a more efficient way.

Nasr and Raheman (2007) conducted a research to establish the effect of different working capital variables such as cash conversion cycle and its components, as well as current ratio, on profitability of Pakistani firms. They measured profitability as net operating profit. They used a sample of 94 Pakistani firms listed on Karachi Stock Exchange for a period of six years from 1999-2004. Using Pearson correlation and regression analysis based on pooled least squares and general least squares, they found that there is a strong negative relationship between variables of working capital management and profitability of Pakistani firms. They conclude that as the cash conversion cycle increases, profitability decreases. Also, they found that there is a significant negative relationship between liquidity of firms and profitability and that there is a positive relationship between size of the firm (another explanatory variable they used) and profitability. Another explanatory variable they used was debt, which they found to have a significant negative relationship with profitability.

From an African perspective, Mathuva (2010) used a sample of 30 firms listed on the Nairobi Stock Exchange in Kenya for a period of 16 years from 1993-2008 to examine the influence of working capital management components on corporate profitability. Using both the pooled OLS and the fixed effects regression models, Mathuva (2010) found that the following: (1) that there exists a highly significant negative relationship between the time it takes for firms to collect cash from their customers and profitability; (2) there exists a highly significant positive relationship between the period taken to convert inventories into sales and profitability. This finding however

is contrary to the findings of other researchers such as Deloof (2003) and Nasr and Raheman (2007), who found that there is a negative relationship between days sales in inventory and profitability for companies in their respective jurisdictions and (3) there exists a highly significant positive relationship between the time it takes the firm to pay its creditors and profitability, implying that the longer a firm takes to pay its creditors, the more profitable it is. While Mathuva found a positive relationship between the time it takes to pay creditors and profitability, it is also noted that Deloof (2003) found that there is a negative relationship between days accounts payable and profitability. The difference in the direction of impact in Kenyan firms compared to Belgian firms discussed above could be attributable to their different characteristics.

Another similar research on the effect of working capital management on firm profitability was studied by Demirgunes and Samiloglu (2008) on Turkish firms. They used a sample of manufacturing firms listed on the Istanbul Stock Exchange for the period of 1998-2007. Using multiple regression model, their empirical findings show that accounts receivables period, inventory period and leverage affect profitability negatively while growth in sales affects firm profitability positively.

Similarly, empirical research by Garcia-Teruel and Martinez-Solano (2006) on the effect of working capital management on profitability of small to medium enterprises (SMEs) in Spain demonstrates that shortening the cash conversion cycle by reducing a firm's number of accounts receivable and inventories improves firm's profitability. Their sample included 8,872 SMEs covering the period 1996-2002.

2.3.2 Capital Structure

The other variable that will be used in the study is capital structure. While it does not form part of working capital management, it is included in the study mainly because: (1) it is viewed by a number of researchers such as De Angelo and Masulis (1980), Salawu (200), and Brabete and Nimalathasan (2010) to be the most vital of all the aspects of capital investment decision, and (2) it has called for a great deal of attention and debate among corporate financial literature. Fried *et al* (2003) state that the analysis of a firm's capital structure is essential in evaluating a company's long-term risk and return prospects as it measures the solvency of a company. While theoretical and empirical analysis of capital structure has been done by many researchers such as Modigliani

and Miller (1958 and 1963), De Angelo and Masulis (1980), and Salawu (2009) there is no clear-cut conclusion on its impact on profitability. For example, Modigliani and Miller (1958 and 1963) postulate that in a frictionless world, financial leverage is unrelated to firm value, but in a world with tax deductible interest payments, firm value is positively related to capital structure.

Modigliani and Miller (1963) argue that, as a result of the tax deductibility of interest payments, companies may prefer debt to equity, thus, presupposing that highly profitable companies tend to have high levels of debt. In contrast, De Angelo and Masulis (1980) argue that interest tax shields may be unimportant to companies with other tax shields such as depreciation. In his research on the effect of capital structure on profitability of Nigerian firms, Salawu (2009) found that there is a negative association between the ratio of total debt to total assets (which ratio will be used as a proxy of capital structure in this research) and profitability. In contrast, Brabete and Nimalathasan (2010) found that for Sri Lankan firms, debt to assets ratio is positively and strongly associated with profitability. Thus, it is evident that there is some level of ambiguity on the association between capital structure and profitability between counties. Considering the relatively little evidence on the association between capital structure and profitability of the listed companies in South Africa, this research attempts to determine how profitability of South African firms is impacted by capital structure, to be measured as total debt to total assets.

2.3.3 Earnings Manipulation using Working Capital

While composition of working capital management may be used by a firm in earnings management manipulation, the main focus of this paper is not necessarily to examine how working capital management is manipulated in earnings management but to examine the relationship between various working capital management components and profitability. Gunny (2010) assessed the relationship between earnings management using real activities manipulation and future company performance and finds that real activities manipulation is positively associated with firms meeting earnings benchmarks. In their paper, Dechow and Skinner (2000) postulate that earnings management can be classified into two categories: accruals management and real activities manipulation, where accruals management involves within generally accepted accounting principles (GAAP) accounting choices that try to “obscure” or “mask” true economic performance. On the other hand, real activities manipulation occurs when managers undertake

actions that change the timing or structuring of an operation, investment, and/or financing transaction in an effort to influence the output of the accounting system. Gunny (2010) elaborates on this earnings management concept and states that accruals management is not accomplished by changing the underlying operating activities of the firm, but through the choice of accounting methods used to represent those activities. In contrast, she states that real activities manipulation involves changing the firm's underlying operations in an effort to boost current-period earnings. It is not inconceivable that working capital management components are vulnerable to manipulation using real activities manipulation which changes the underlying operations of a firm in an attempt to boost earnings. Gunny (2010) lists the examples of real activities manipulation as follows:

Firstly, overproduction reflecting an intention to cut prices or extend more credit terms to boost sales and/or overproduction to decrease cost of goods sold (COGS) expense. Given that extending credit terms results in creation of "days sales in receivables", which forms part of working capital management components, it is therefore not implausible that days sales in receivables, in addition to other working capital management components can be manipulated in boosting sales/earnings of a firm. Secondly, timing the sale of assets (both non-current assets and current assets, which form part of working capital management) to report gains. Thirdly, decreasing the discretionary selling, general, and administrative (SG&A) expenses to increase income. Fourthly, decreasing research and development (R&D) expense.

The foregoing activities indicate that working capital management components may be manipulated by firms in boosting sales/earnings. While this manipulation may be undertaken by firms, the primary focus of this study is not to examine how working capital management components are manipulated by firms in boosting sales/earnings but to examine the relationship between various working capital management components and profitability of South African firms listed on the JSE.

2.4 Conclusion of Literature Review

The upshot of the foregoing literature review on working capital management is that while working capital management components may impact on profitability of firms, there is ambiguity regarding both the appropriate variables that might serve as proxies for working capital management as well as on the direction of the impact of different components on profitability. For

example, in his research, Mathuva (2010) finds that there exists a highly significant positive relationship between the period taken to convert inventories into sales and profitability, which finding is contrary to that of Deloof (2003) whose study findings conclude that there is a negative relationship between days sales in inventory and profitability. This therefore shows that there is no clear-cut direction of the relationship between any of the variables of working capital management and firms' profitability. The differences in the direction of the impact could be attributable to any one of the following factors: (1) different characteristics of firms per country, (2) difference in the nature of the industries selected in different studies, and (3) differences in the economic conditions for the selected time frames.

Also noted in literature review is that there is no clear-cut direction on the impact of capital structure on profitability from one country to another. For example, findings by Salawu (2009) show a negative relationship in clear contrast with findings by De Angelo and Masulis (1980) that show a positive relationship.

The other consideration noted in literature review is that working capital management components can be manipulated by firms in boosting sales. This however is not the focal point of this study.

3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that will be followed in order to address the research questions formulated in section 1.5. Section 3.2 discusses the data and data source with the following section presenting the different variables used in the regression models. Section 3.2 further defines how variables used in the study are measured. Section 3.4 shows the predicted direction of the impact of each respective explanatory on the profitability. It is followed by section 3.5 which highlights the approach used in determining the economic boom period as well the recession period. Section 3.6 presents the research design of the study. In essence, it gives a description of the methodological approaches adopted in analysing the impact of working capital management on profitability.

3.2 Data and data source

The data used in the study is solely accounting based data mainly contained in the firm's financial statements. The financial statements are obtained from both I-Net Bridge and BF McGregor. The following ratios were extracted from I-Net Bridge: (1) days sales in inventory, (2) days sales in receivables, (3) days payables outstanding, and (4) current ratio. Ratios extracted from BF McGregor are the debt to equity ratio and the operating profit margin. The other variables such as cash conversion cycle and dummy variables were calculated from the extracted data.

Consistent with Lazaridis and Tryfonidis (2006) and Mathuva (2010) who collected financial data of firms listed on respective stock exchanges, this paper collects data exclusively on JSE listed firms. The reason we chose this market is primarily due to availability and reliability of the financial statements in that they are subject to mandatory audit by recognised audit firms. Furthermore, firms listed on the stock exchange present true operational results in comparison with unlisted companies (Lazaridis and Tryfonidis, 2006). The number of all non-financial firms across different sectors of the JSE whose data is available for the period under investigation (2004-2010) totals 254 firms. Under these 254 firms, there are 1,461 firm year observations for the seven year period starting in January 2004 to December 2010.

It is noted that while the focus of the study is to analyse all companies listed on the JSE, both I-Net Bridge and BF McGregor do not have some working capital management components for financial institutions that this study explores. For example, ratio of "days sales in inventory" is not available under financial institutions given that financial institutions' current assets do not contain inventory unlike non-financial institutions. In view of this nature of the financial statements for the financial institutions, this study excludes financial institutions from the study and includes all non-financial institutions across all sectors.

3.3 Variables and how they are measured

As mentioned in chapter 1, the explanatory variables to be used as proxies of working capital management are (1) cash conversion cycle, (2) days sales in receivables, (3) days sales in inventory, (4) days payables outstanding, and (5) current ratio. In addition, the seventh (7) explanatory variable to be explored by the study is capital structure (whose proxy in this study is debt to equity ratio) and the eighth (8) variable in the study is the market condition, which is used to examine the difference and the extent (if any) of the impact of working capital, particularly cash conversion cycle, on profitability as economic conditions change.

While this study explores the impact of the aforementioned seven variables on profitability, it is noted that this list of the selected variables is not exhaustive as there are a number of liquidity and capital structure measures that may impact profitability. The choice of explanatory variables is based on the following factors: 1) alternative theories related to working capital management (for example, one theory stating that a longer cash conversion cycle increases firm profitability given that it leads to higher sales, and the opposing theory stating that corporate profitability decreases as cash conversion cycle elongates, particularly if the costs of higher investment in working capital rise faster than the benefits of holding more inventory and/or granting more trade credit to customers) and 2) working capital management variables used in previous studies conducted in other geographic jurisdictions such as Greece, Belgium, U.S., Kenya, and Turkey.

Below is a Table showing all variables used in the study. It is followed by a succinct description of how they are measured.

Table 1: Variables used in the study

Variable	Abbreviation
Cash Conversion Cycle	CCC
Days Sales in Receivables	DSR
Days Sales in Inventory	DSI
Days Payables Outstanding	DPO
Current Ratio	CRA
Debt to Equity Ratio	DTE
Operating Profit Margin	OPM
Dummy Variable - Economic Conditions	D^
Dummy Variable - Industry	D^^

Cash Conversion Cycle

The cash conversion cycle is used as a measure to gauge profitability. It measures the *net time interval* between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales (Laughlin and Richards, 1980). It is measured as follows:

$$CCC = DSR + DSI - DPO \quad (1)$$

In turn, the three components of cash conversion cycle are specified below.

Days Sales in Receivables

Days sales in receivables measures the number of days it takes to collect cash from debtors. Fried *et al* (2003) state that days sales in receivables measure the effectiveness of the firm's credit policy. It indicates the level of investment in receivables needed to maintain the firm's sales level and is measured as follows:

$$DSR = (\text{Trade Receivables} / \text{Sales}) * 365 \quad (2)$$

Days Sales in Inventory

Days sales in inventory measures the number of days inventory is held by the company before it is sold. The less number of days sales in inventory indicate that inventory does not remain in warehouses or on shelves but rather turns over rapidly from the time of acquisition to sale (Fried *et al*, 2003). This ratio is measured as follows:

DSI = (Inventory / Cost of Goods Sold) * 365 (3)

Days Payables Outstanding

Days payables outstanding measure the number of days a firm takes to pay its suppliers. Thus, this ratio represents an important source of financing for operating activities. The ratio is measured as follows:

DPO = (Accounts Payable / Purchases) * 365 (4)

Where purchases are computed as cost of goods sold plus the change in inventory.

The two other variables to be used in the study which do not form part of the cash conversion cycle are given below:

Current ratio

Current ratio is the best-known and widely used ratio that measures short-term liquidity. In essence, it measures the ability of the firm to meet its short-term obligations. While it might be good for a firm to have a high current ratio as it indicates liquidity, it may also indicate inefficient use of cash and other short-term assets. This ratio is measured as follows:

Current Ratio = Current Assets / Current Liabilities (5)

Capital Structure

Capital structure measures the extent to which a company is funded through debt relative to equity. For the purpose of this study, the proxy for capital structure is the "debt to equity", which was readily available on I-Net Bridge. Debt is expressed as both current and long term debt. While the definition of short-term debt used in practice may include operating debt (accounts payable and accrued liabilities), short-term debt used in this particular study excludes operating

debt because: (1) it is a function of the firm's operations and its essential business and contractual relationship to its suppliers rather than external lenders, and (2) the operating debt such as accounts payable is already accounted for in equation 4 above (days payables outstanding). The "debt to equity" ratio is expressed as follows:

$$\text{Debt to Equity} = (\text{Total Debt} / \text{Total Equity}) \quad (6)$$

Dependant Variable: Profitability

Finally, the dependant variable used is operating profit margin (OPM). Unlike other researchers such as Nasr and Raheman (2007) who used return on investment (ROI) as a profitability measure, this study uses operating profit, consistent with researches by Deloof (2003) and Biger *et al* (2010).

Operating profit margin measures profitability of sales resulting from regular business and measures the proportion of a company's revenue left over after deducting direct costs and overhead and before taxes and other indirect costs such as interest. It is selected in this research as a profitability measure primarily because it is an operating ratio and relates with operating explanatory variables used in the study, e.g. cash conversion cycle and days sales in inventory.

The OPM formula is as follows:

$$\text{OPM} = (\text{Operating Income} / \text{Sales}) * 100 \quad (7)$$

Economic Conditions

Considering that the research analyses the impact of working capital management, particularly cash conversion cycle, on profitability as economic conditions change, the years under economic boom as well as economic recession are taken as dummies in ascertaining if economic conditions have an impact on profitability as well as in determining the explanatory power (if any) of cash conversion cycle as economic conditions change. The years under economic boom (years 2004 to 2007) are assigned dummy digit 0; i.e. D = 0, while the years under economic recession (years 2008 to 2010) are assigned D = 1.

Industry Variable

To determine if working capital management, particularly cash conversion cycle, impacts profitability of industrial companies and the rest of the companies in other sectors different, the study uses industry as a dummy, wherein D = 0 denotes industrial companies and D = 1 denotes the rest of the firms from other sectors.

3.4 Variables Predicted Sign(s)

Table 2 below summarizes the theoretical predicted signs that each of the six explanatory variables is expected to have on firm profitability. It shows that the relationship of each explanatory variable with profitability could either be positive or negative.

Table 2: Proxy variables and predicted relationship

	Proxy Variable	Predicted Sign
1	Cash Conversion Cycle (CCC)	+/-
2	Days Sales in Inventory	+/-
3	Days Sales in Receivables	+/-
4	Days Payable Outstanding	+/-
5	Current Ratio	+/-
6	Debt to Equity	+/-
7	Dummy - Economic Conditions	+/-
8	Dummy - CCC as Economic Conditions change	+/-
9	Dummy - Industry	+/-

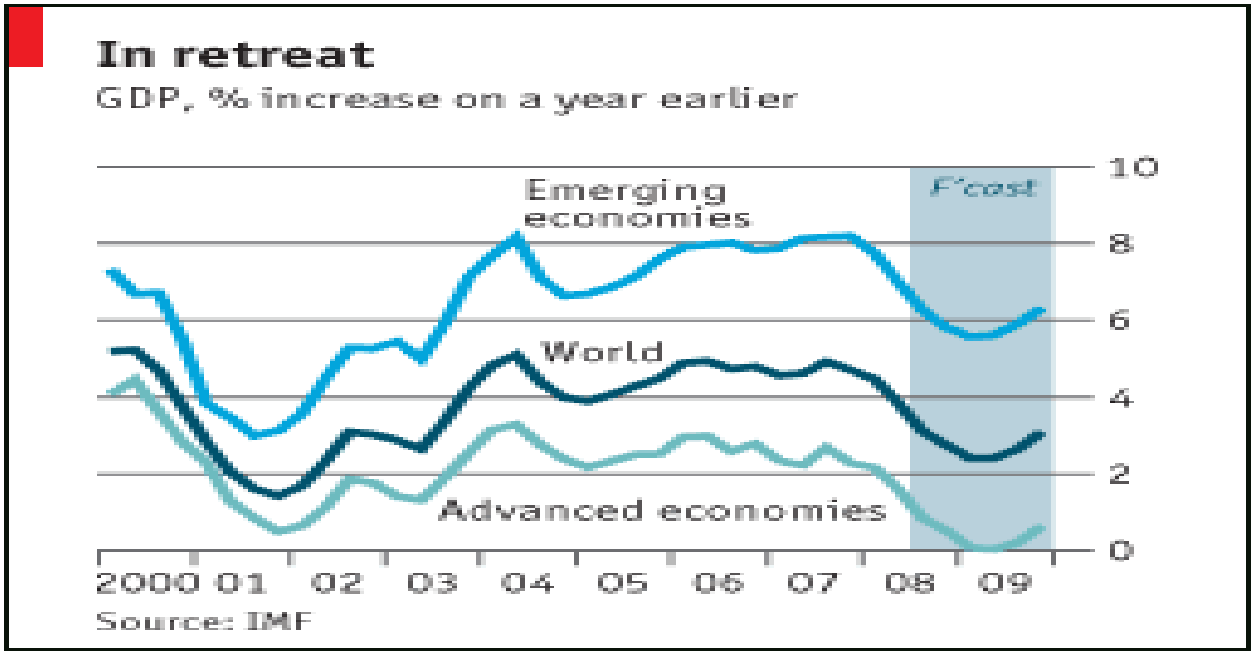
3.5 Determining economic boom and recession periods

Blanchard (2011) states that while the recent global recession, which he defined as the general slowdown in economic activity resulting in business cycle contraction, was triggered by the U.S. housing price decline, its effects were enormously amplified throughout the world. He states that from mid-2007 to the end 2008, stock prices lost more than half of their value. Blanchard (2011) further states that although growth in advanced economies and emerging market countries is different and that emerging market countries had less negative growth than advanced countries, -2.5% and -4% in the last quarter of 2008 and the first quarter of 2009 respectively, compared to -7.8% and -7.9% respectively for advanced countries (reflecting the fact that emerging countries have higher average growth than advanced countries) the decrease in growth was however

roughly the same for both groups. Thus, the sharp decline in output in both groups marked a global crisis.

In determining which period denotes economic boom and which one represents economic recession, the research is guided by IMF data depicted in Fig 2 below.

Fig 2: Yearly Global GDP Growth



Source: IMF, International Financial Statistics (2009).

Fig 2 above shows that the GDP growth for the whole of the emerging markets was above 6% from 2004 through to 2007, after which it drastically contracted. This data is in tandem with another IMF data shown in Table 3 below which depicts a sharp decline in year on year South African GDP growth from 2008.

In view of the foregoing, the period taken in this study to represent economic recession is 2008 to 2010. On the other hand, the period taken to represent economic boom period is 2004 to 2007 (wherein average growth for the emerging markets, which includes South Africa, was above 6%).

Table 3: South Africa - annual GDP growth

Annual data and forecast

	2006[a]	2007[a]	2008[a]	2009[a]	2010[a]	2011[b]	2012[b]
GDP							
Nominal GDP (US$ m)	261,266	286,103	275,361	284,443	363,998	395,245	373,063
Real GDP growth (%)	5.6	5.6	3.6	-1.7	2.8	3.7	4.8
Expenditure on GDP (% real change)							
Private consumption	8.3	5.5	2.2	-2.0	4.4	6.3	5.7
Government consumption	4.9	4.1	4.7	4.8	4.6	6.5	6.0
Gross fixed investment	12.1	14.0	14.1	-2.2	-3.7	5.1	4.8
Exports of goods & services	7.5	6.6	1.8	-19.5	4.7	5.7	7.6
Imports of goods & services	18.3	9.0	1.5	-17.4	9.6	13.9	11.0
Origin of GDP (% real change)							
Agriculture	-5.5	2.7	16.1	-3.0	0.9	4.0	3.7
Industry	4.9	4.8	1.1	-6.5	4.5	4.0	4.5
Services	6.3	6.1	4.5	0.7	2.2	3.6	4.9

Source: Statistics South Africa (2011).

3.6 Research Design

3.6.1 Model Specifications

To analyse the impact of working capital management on profitability, the study uses the following methods: (i) descriptive statistical analysis wherein a description of features of the data in the study such as mean and standard deviation of each variable is presented; (ii) correlation matrix, which measures the degree of association between all the variables under consideration. In essence, the matrix explores whether or not the relationship between variables is positive or negative, in addition to determining the degree of the association between variables under consideration; and (iii) regression analysis is used to gauge the extent to which a unit change in each respective explanatory variable has on profitability, while other independent variables are held fixed. Pooled ordinary least squares method is used in regression analysis, wherein time series and cross-sectional observations is combined in determining the causal relationship between profitability variable and the independent variables used in the study.

3.6.2 General Regression Model

The impact of working capital management components on profitability is modelled using the following general regression equation:

$$Y_{it} = \alpha 0 + \sum_{all}^{n} \beta_i X_{it} + \varepsilon_{it} \qquad (8)$$

Where: Y_{it} = *Operating Profit Margin of firm i at time t.*

α_o = *The intercept of equation*

β_i = *Coefficient of* X_{it}

X_{it} = *Independent variable at time t.*

t = *time = 1, 2…. 7 years (from year 2004 to 2010)*

ε_{it} = *The error term.*

The research uses panel data regression analysis of cross-sectional and time series data. In line with studies by Deloof (2003), Garcia-Teruel and Martinez-Solano (2006), and Mathuva (2010), this study determines the impact of working capital on profitability using pooled regression ordinary least squares, wherein each respective variable for all the companies under study and for all the corresponding years is pooled together in a single column in running the ordinary least squares regression models. While some researchers such as Dermirgunes and Samiloglu (2008) and Mathuva (2010) used fixed effects regression model, which, according to Mathuva (2010), explains the variations in profitability within firms, this study uses the pooled ordinary least squares regression model which explains the variations in profitability between firms. The choice of the model is underpinned by the fact that the aim of this research is not necessarily to examine variations in profitability within firms but to examine variations in profitability between all firms listed on the JSE during an economic recession as well as during an economic boom. According to Nasr and Raheman (2007), pooled regression model is one where both intercepts and slopes are constant, wherein cross-section firm data and time series data for each variable are pooled together in a single column.

Given that CCC in equation 1 is made up of other ratios used in the study, namely DSR, DSI and DPO, to avoid multicollinearity problem, defined by Koop (2006) as a problem that arises if some

or all of the explanatory variables are highly correlated with one another, in addition to avoiding endogeniety problem wherein an exogenous explanatory variable impacts on another explanatory variable within the same regression model and therefore distorting impact of both explanatory variables on independent variable, the study uses different model specifications wherein the model containing CCC ratio is separated from the one containing DSR, DSI, and DPO ratios.

3.6.3 Specific Regression Models

(i) Model specification (I) – containing Cash Conversion Cycle

$$OPM_{it} = \alpha_0 + \beta_1 CCC_{it} + \beta_2 CRA_{it} + \beta_3 DTE_{it} + \beta_4 D_{it} + \beta_5 CCC_{it} * D_{it} + \varepsilon_{it} \qquad (9)$$

Where: α_0 = *intercept of the regression,*

$\beta_1, \beta_2, \beta_3, \beta_4$ & β_5 = *coefficients on each respective explanatory variable,*

OPM_{it} = *operating profit margin – for company i at corresponding time t.*

CCC_{it} = *cash conversion cycle - for company i at corresponding time t.*

CRA_{it} = *current rati0 - for company i at corresponding time t.*

DTE_{it} = *debt to equity - for company i at corresponding time t.*

D_{it} = *dummy representing economic conditions, for company i at time t.*

$CCC*D_{it}$ = *transformed variable – working capital during different economic conditions for company i at corresponding time t,*

t = *time; year 1, 2…. 7 (from year 2004 to 2010), and*

ε_{it} = *is the error term of the regression - for company i at time t.*

Model specification (I) above determines the impact of: (1) cash conversion cycle, (2) current ratio, and (3) debt to equity ratio on profitability for all the selected years, i.e. from year 2004 to 2010. In addition, the specification gauges whether or not profitability of South African companies is affected by changes in economic conditions, i.e. as the economy moves from a boom to a recession. The dummy variable is denoted as follows: D = 0 represents years under economic boom and D =1 represents years under economic recession.

Also, given that one of the objectives of the study is to determine how profitability of South African firms is affected by working capital management; whose primary proxy under this study is the cash conversion cycle, as economic conditions change, the study uses model specification (I) above to measure the impact of cash conversion cycle as the economy moves from a boom to a recession. The methodological approach is structured such that the CCC ratio for each company is multiplied by the Dummy variable for the corresponding year, wherein D = 0 denotes economic boom and D = 1 denotes economic recession. Profitability is then regressed against this transformed variable (CCC*D – market conditions).

In essence, a resultant positive coefficient on this transformed variable will indicate that an increase in the length of the cash (operating) cycle tends to increase profitability during an economic recession (D = 1) than during an economic boom. In the same vein, a negative coefficient will indicate that an increase in the length of the cash conversion cycle tends to lessen profitability during an economic recession than during an economic boom.

(ii) Model specification (II) – without unmodified Cash Conversion Cycle

$$OPM_{it} = \alpha_0 + \beta_1 DSI_{it} + \beta_2 DSR_{it} + \beta_3 DPO_{it} + \beta_4 CCC_{it}*D_{it} + \varepsilon_{it} \qquad (10)$$

Where: α_0 = *intercept of the regression,*

$\beta 1, \beta 2, \beta 3,$ *and* $\beta 4$ = *coefficients on each respective explanatory variable,*

OPM_{it} = *operating profit margin – for company i at time t,*

DSI_{it} = *days sales in inventory – for company i at time t,*

DSR_{it} = *days sales in receivables – for company i at time t,*

DPO_{it} = *days payable outstanding – for company i at time t,*

t = *time; year 1, 2…. 7 (from year 2004 to 2010), and*

$CCC*D_{it}$ = *transformed variable – industry, for company i at time t, and*

Model specification (II) above measures the impact of the rest of working capital management components used in the study, namely days sales in receivables, days sales in inventory, days payables outstanding, and industry. Following research question 3 posed in chapter 1, section 1.5,

which seeks to determine if liquidity affects profitability of industrial companies and the rest of the companies in other sectors different, the study uses a dummy variable, wherein dummy (D) in model specification (II) above denotes the industry (i.e. D = 0 denotes companies in the industrial sector and D = 1 denotes companies in the rest of the sectors). The transformed variable (CCC*D - industry) in model specification (II) above determines if cash conversion cycle impacts on profitability of companies in the industrial sector and those in the rest of the other sectors different. In the same vein as the interpretation to be made under model specification (I), a resultant positive coefficient on this transformed industry variable under model specification (II) indicates that an increase in the length of the cash (operating) cycle tends to increase profitability of companies in the industrial sector than those in the rest of the other sectors and a negative sign indicates the opposite.

3.7 Diagnostic Tests

Diagnostic tests are robust statistical tests carried out to verify if the data used have met the assumptions underlying the ordinary least squares regression and where possible to remove problems associated with panel time series data. Some of the problems of panel time series data include heteroskedasticity, multicollinearity, and autocorrelation, among others. The diagnostic tests carried out in the study are detailed below.

3.7.1 Test for Heteroskedasticity

One of the main assumptions for the ordinary least squares regression is the homogeneity of the variance of the residuals. If the variance of the residuals is non-constant, then the residual variance is heteroskedastic making the regression estimates, namely coefficients and standard errors, to be biased if the models are not re-specified or variables not transformed. As per equation 11 below, heteroskedasticity means that the variance of the error term is not constant overtime.

$$e_i^2 \neq \sigma_i^2 \text{ for all } i, \qquad (11)$$

This study uses the Breusch-Pagan test in all the two regression model specifications to verify whether or not heteroskedasticity is present in the models. The null hypothesis is that the variance of the residuals is homogenous. Thus, if the *p*-value is very small (less than 0.05), we would reject the null hypothesis and accept the alternative hypothesis that the variance is not homogenous. Tables 4 and 5 below present the Breusch-Pagan test results for heteroskedasticity for model specification I and II respectively. The results show that the variance of the error term in each model specification is not constant, which if not corrected leads to biased standard errors. The presence of heteroskedasticity was however controlled by using the "robust" command when performing both regressions, resulting in generation of "robust standard errors". Montgomery and Peck (2007) state that the "robust standard errors" address the problem of errors that are not independent and identically distributed and that the use of "robust standard errors" does not change the coefficient estimates provided by the ordinary least squares, but change the standard errors and significance tests.

Table 4: Breusch-Pagan Test for Heteroskedasticity – Model I

```
------------------------------------------------
estat hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of opm
         chi2(16)       =      320.31
         Prob > chi2    =      0.0000
------------------------------------------------
```

Table 5: Breusch-Pagan Test for Heteroskedasticity – Model II

```
------------------------------------------------
estat hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of opm
         chi2(115)      =     1139.91
         Prob > chi2    =      0.0000
------------------------------------------------
```

3.7.2 Test for Multicollinearity

Both regression models were tested for multicollinearity. The primary concern with multicollinearity is that, as the degree of multicollinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients can get inflated. The variance inflation factor (VIF) is used to detect whether one predictor has a strong linear association with the remaining predictors (the presence of multicollinearity). Lazaridis and Tryfonidis (2006) proclaim that VIF measures how much of the variance of an estimated regression coefficient increases if predictors are correlated. Montgomery and Peck (2007) suggest that when VIF is greater than 5-10, then the regression coefficients are poorly estimated. In this study, we used the VIF command when regressing profitability against the explanatory variables. The predictors had resultant variance inflation factors ranging between 1.4 and 3.7 across both model specifications as shown in Table 6 below. The results indicate that there is absence of multicollinearity between predictors in the regression models. Tolerance, defined as 1/VIF, is the inverse of VIF. A tolerance value lower than 0.1 is comparable to a VIF of 10.

Table 6: Variance Inflation Factor

Model Specification I

vif

Variable	VIF	1/VIF
CCC	3.13	0.319488818
CRA	2.42	0.41322314
DTE	1.42	0.704225352
D	1.98	0.505050505
CCC*D^	3.73	0.268096515
Mean VIF	2.536	

Model Specification II

vif

Variable	VIF	1/VIF
DSI	2.34	0.427350427
DSR	2.87	0.348432056
DPO	3.53	0.283286119
CCC*D^^	3.15	0.317460317
Mean VIF	2.9725	

Given that the cash conversion cycle is made up of other ratios used in the study, namely days sales in receivables, days sales in inventory, and days payables outstanding, to avoid

multicollinearity problem, the two model specifications were developed separating one model containing the cash conversion cycle from the other containing days sales in receivables, days sales in inventory, and days payables outstanding.

3.8 Summary

This chapter described the methodological approaches followed in examining the impact of all selected working capital management components on the profitability of JSE listed companies. In particular, the approaches used in the study are: (1) descriptive statistics, (2) correlation matrix, and (3) regression analysis. Regression model specification I was developed to examine the impact on the endogenous variable (profitability) by five exogenous working capital management variables, namely cash conversion cycle, current ratio, debt to equity, years, and economic conditions. On the other hand, model specification II is used to regresses profitability against days sales in inventory, days sales in receivables, days payables outstanding, and industry. The models were separated into two so as to circumvent multicollinearity problem given that the cash conversion cycle is made up of days sales in inventory, days sales in receivables and days payables outstanding.

Diagnostic tests were carried out to verify if the data used have met the assumptions underlying the ordinary least squares regression and where possible to remove problems associated with panel time series data. Although the diagnostic results show presence of heteroskedasticity in both models, this problem was however controlled by using “robust standard errors” resulting in non-spurious regression results, which are presented in Chapter 4 below.

4 PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents results obtained by the models. First, descriptive statistics showing relevant phenomena such as median and mean of variables used in the study are presented under section 4.2. It is followed by section 4.3 which presents the conventional correlation matrix which measures the degree of association between different variables under consideration.

Section 4.4 presents the regression analysis which outlines an in-depth examination of the causal relationship between profitability of South African firms and the various explanatory variables under consideration. The regression analysis uses pooled ordinary least squares regression to determine the influence of the various explanatory variables under consideration on profitability. Lastly, a summary highlighting key findings of the study is presented under the last section.

4.2 Descriptive Statistics

Table 7 below presents descriptive statistics of the collected variables. It shows the mean, median and standard deviation of the variables used in the study. In addition, it shows the minimum and maximum values of each respective variable which essentially gives an indication of how wide ranging each respective variable can be.

Table 7: Descriptive Statistics

254 South African Firms listed on the JSE, 2004 - 2010: 1,461 Firm Year Observations

	No. (N)	*Minimum*	*Median*	*Maximum*	*Mean*	*St. Dev*
Days Sales in Inventory	1 461	1.29	42.35	8 811.58	157.57	798.23
Days Sales in Receivables	1 461	13.67	46.61	12 382.63	180.93	1079.26
Days Payables Outstanding	1 461	19.41	55.44	7 169.08	188.32	700.1
Debt to Equity Ratio	1 461	-2.40	0.02	2.47	0.07	0.53
Operating Profit Margin	1 461	-7 601.25	14.95	227.21	-100.35	781.08
Cash Conversion Cycle	1 461	-1 196.87	28.45	13 883.69	150.18	1244.3
Current Ratio	1 461	0.06	1.44	33.86	2.08	3.05

Source: Calculations based on annual reports of firms from 2004-2010

The cash conversion cycle, which is used as a proxy to determine the efficiency in managing working capital, has a median of almost one month (at 28 days) and an average of five months (150 days). Firms under the study receive payment on sales after just over a month (median 46.6 days) and on average 180.1 days. The descriptive statistics show that it takes about 43.4 days and on average 157.6 days to sell inventory and firms wait on average 188.3 days to pay for their purchases (median 55.4 days).

A traditional measure of liquidity (current ratio) shows that on average South African firms keep current assets at 2.1 times current liabilities. The highest current ratio for a company in a particular year is 33.9, with the lowest at 0.06. The debt to equity ratio for South African firms is quite modest, with a minimum debt used by a company at 2% of equity, maximum at 247% and an average of 7%. The operating profit margin has a median of 15%, with a very wide range showing a maximum of 227.2% and a stretching minimum.

4.3 Correlation Matrix

The correlation matrix is used to measure the degree of association between the different variables under consideration.

Table 8 below presents correlation coefficients for working capital management variables used in the study.

Table 8: Correlation Matrix - Coefficients

254 South African Firms listed on the JSE, 2004 - 2010: 1,461 Firm Year Observations

OPM measures operating profit margin, CCC cash conversion cycle, CRA current ratio,DTE debt to equity ratio, DSR days sales in receivables, DSI days sales in inventory, and DPO days payables outstanding

	OPM	*CCC*	*CRA*	*DTE*	*DSI*	*DSR*	*DPO*
OPM	1						
CCC	-0.9134*	1					
CRA	-0.4755**	0.4748**	1				
DTE	-0.0301***	-0.0518***	-0.1760***	1			
DSI	0.0639	0.9377*	0.5519**	-0.0354***	1		
DSR	-0.9535*	0.9866*	0.4520**	-0.0244**	0.9590**	1	
DPO	-0.9454**	0.8127*	0.4822**	0.0141***	0.9520*	0.8815*	1

*Significant at 90 percent. **Significant at 95 percent. ***Significant at 99 percent.

The results in Table 8 above show that there is a negative relationship between profitability (measured as OPM) and the following measures of working capital management: cash conversion cycle, days sales in receivables, days payables outstanding, current ratio, and debt to equity. The negative relationship between profitability and cash conversion cycle is consistent with Deloof's (2003) view that the time lag between the expenditure for purchases of raw materials and the collection of sales of finished goods can be too long, and that decreasing this time lag increases profitability.

In the same vein, the negative relationship between profitability and days sales in receivables is consistent with the view that the less the time taken by a firm's customers to pay their bills, the more cash is available to the firm to replenish the inventory hence leading to more sales which result to an increase in profitability (Mathuva, 2010). The results also show that there is a negative relationship between profitability and days payables outstanding. This negative relationship is consistent with the view that less profitable firms wait longer to pay their bills in which case profitability affects days payables outstanding policy as opposed to days payables outstanding policy affecting profitability. An alternative explanation proffered by Deloof (2003) is that a negative relationship between the number of days payables outstanding and profitability could be that speeding up payments to suppliers might increase profitability primarily because firms often receive a substantial discount for prompt payment.

Current ratio has a negative relationship with profitability indicating an inverse relationship between profitability and liquidity. Also, results in Table 8 indicate that profitability is inversely proportional to debt. In other words, the larger the debt, the lower the profitability. The positive relationship between profitability and days sales in inventory can be attributable to having costs of higher investment in inventory not rising faster than the benefits of holding more inventory, particularly in an inflationary environment.

The other expected outcome shown in Table 8 is that there is a positive relationship between days sales in inventory and the cash conversion cycle. This positive relationship means that if a firm takes an extended period of time to sell inventory, it will result in the cash conversion cycle increasing.

The correlation matrix analyses indicate that in general, there exists an inverse relationship between profitability of South African firms and the majority of liquidity measures. The results indicate that excessive levels of working capital result in decreased profitability. The analyses also indicate that high levels of debt adversely impact on profitability of South African firms.

Although the correlation matrix gives proof of the relationship between variables, its shortcoming, as spelt out by Deloof (2003), is that it does not identify causes from consequences. For example, it is hard to say whether a shorter cash conversion cycle leads to higher profitability or a higher profitability is as a result of the shorter conversion cycle. This therefore means that care must be exercised when interpreting correlation coefficients because they cannot provide reliable indicator of association in a manner which controls for additional explanatory variables. This is further proclaimed by Mathuva (2010) who state that examining a simple correlation in a conventional correlation matrix does not take into account each variable's correlation with all other explanatory variables. The main analysis will be derived from the regression models estimated using ordinary least squares, which is subject of the following section.

4.4 Regression Analysis

Following descriptive statistics and correlation matrix presented in sections 4.2 and 4.3 respectively, the regression analysis in this section is used to shed more light on the impact of working capital management components on firm profitability. Following model specifications (I), and (II), the study examines the endogenous variable which is profitability (measured by operating profit margin) against the nine exogenous variables.

Consistent with Garcia-Teruel and Martinez-Solano (2006) and Mathuva (2010), the study estimates determinants of corporate profitability using pooled ordinary least squares which explain variations in profitability between firms. The determinants of profitability are investigated for all the 1,461 firm year observations from 2004 to 2010. Table 9 below presents empirical results for all the two regression model specifications.

Table 9: Regression - Relationship between profitability and working capital

254 South African Firms listed on the JSE, 2004 - 2010: 1,461 Firm Year Observations

Dependent variable = OPM

OPM measures operating profit margin, CCC cash conversion cycle, CRA current ratio, DTE debt to equity ratio, DSR days sales in receivables, DSI days sales in inventory, and DPO days payables outstanding

Independent variables	Coefficient	Standard error	*P*-Values	*t*-stat	R Square
			Model Specification I		
Intercept	60.82	10.5833	1.10×10^{-08}	5.7470	
CCC	-0.57	0.0064	0.0000	-90.162	
CRA	-15.75	2.6089	1.98×10^{-09}	-6.0374	88.68%
DTE	-106.17	13.3194	3.15×10^{-15}	-7.9712	
D	-94.71	13.9495	1.64×10^{-11}	-6.7893	
CCC*D^	1.09	0.0484	6.21×10^{-97}	22.5668	
			Model Specification II		
Intercept	69.24	4.4344	6.16×10^{-51}	15.6146	
DSI	0.01	0.0305	0.6726	0.4227	95.93%
DSR	-0.40	0.0145	3.73×10^{-132}	-27.2102	
DPO	-0.53	0.0209	6.62×10^{-118}	-25.3721	
CCC*D^^	0.10	0.2191	0.6329	0.4777	

Where:
D^ : denotes dummy variable representing years (economic conditions)
D^^ : denotes dummy variable representing industry

Both regressions were performed at 95 percent confidence levels and are all statistically significant

4.4.1 Model specification (I)

Model specification (I) regressed profitability against cash conversion cycle, current ratio, debt to equity ratio, and market condition. In addition, the model regressed profitability against transformed variable (CCC*D^) wherein dummy still denotes the years under economic boom and recession. This transformed variable (economic condition) examines the impact of cash conversion cycle on profitability when economic conditions change from boom to recession (D = 0 represents years under economic boom and D = 1 represents years under economic recession). Profitability was regressed separate against CCC and other ratios that have ratios making up CCC so as to avoid problems of multicollinearity and endogeniety.

The R square in model specification (I) is high at 88.68%. This high level of R square indicates that the explanatory variables in the regression, taken together, help explain profitability. With a significant *F* of less than 0.05, the variables are significant in explaining profitability at 95% confidence interval. The relationships between the 5 explanatory variables used in model specification (I) and profitability are explained below:

(i) Relationship Between Cash Conversion Cycle and Profitability

The coefficient on the cash conversion cycle is negative and statistically significant (*p*-value < 0.05). This indicates that when the net time interval between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales shortens by a day, operating profit margin of South African firms listed on the JSE increases by 0.57%, holding all other explanatory variables constant. In essence, this negative relationship suggests that corporate managers can increase profitability of their firms by shortening the time lag between a firm's expenditure for purchases of raw materials and the collection of sales of finished goods. This finding is consistent with findings by Mathuva (2010) whose explanation for the negative relationship is that by minimizing investment in current assets, firms boosts their profits as liquid cash, which has low returns, is not maintained in the business for too long as it is used to generate profits for the firm.

(ii) Relationship Between Current Ratio and Profitability

Empirical results of the study show that current ratio has a negative relationship with profitability. The results are statistically significant with a *p*-value of less than 0.05 at 5% significance level. This shows that current ratio has explanatory power in explaining variation in profitability. The current ratio coefficient of -15.75 indicates that an increase in current ratio by 1x leads to a decrease in operating profit margin by 15.75% holding all other factors constant.

The upshot of this finding is that there exists an inverse relationship between liquidity and profitability. While empirical results show that reducing current ratio increases profitability of South African firms, it is to be noted that disregarding liquidity may result in insolvency and bankruptcy (Nasr and Raheman, 2007). The inference of this trade-off between profit maximising and liquidity preservation is that corporate managers need to minimise current ratio to the extent that it maximises profitability without compromising the solvency and bankruptcy of a firm.

(iii) Relationship Between Debt to Equity and Profitability

The study uses debt to equity as a proxy for capital structure. The results of the regression show a negative coefficient which is statistically significant at 95% confidence level. The results indicate that a 1% increase in debt relative to equity leads to a 1.06% decrease in operating profit margin, *ceteris paribus*. This result is in conformity with findings by Salawu (2009) who asserts that the negative relationship between debt to equity ratio and profitability has implications for financial stability as the higher ratio makes the corporate sector highly vulnerable to changes in economic conditions and may result in economy wide impact of a financial crisis.

Furthermore, what this means is that management should strive to identify the optimal capital structure of the firm and also maintain it since it represents the point where the market value of the firm is maximized.

(iv) Relationship Between Economic Conditions and Profitability

Hamlin and Heathfield (1991) proclaim that the ability of managers to respond to rapidly changing economic circumstances is a vital aspect of their companies' competitiveness and that those companies that can react quickly and appropriately to unanticipated events such as raw material price shocks gain a competitive advantage over their rivals. It is on the back of this proclamation that this study examines if changes in economic conditions have any impact on profitability of South African firms and if so, how so.

The coefficient is statistically significant (p-value < 0.05) and negative, as can be seen under annexure 1. The negative coefficient indicates that when the economy moves from an economic boom to an economic recession, profitability of companies tend to decrease. Intuitively, this result makes sense given that economic recession results in slowdown in economic activity which in turn leads to business contraction and reduction in profitability.

(v) Relationship Between CCC under different Economic Conditions and Profitability

Following research question 4 under section 1.5 in chapter 1 which seeks to examine if there is a difference in how working capital management, particularly the cash conversion cycle, impacts on profitability as the economy moves from a boom to a recession, the empirical results of the study show a positive coefficient of 1.09 on this transformed cash conversion cycle, which is

statistically significant at 5% significance level. The positive coefficient on the transformed cash conversion cycle variable indicates that an increase in the length of the cash (operating) cycle tends to increase profitability during an economic recession (D = 1) than during an economic boom. This positive relationship, which is contrary to the negative relationship between normal cash conversion cycle and profitability, could be attributed to the fact that during an economic recession, trading conditions and demand for a firm's products tends to be subdued to an extent that a firm adopts a generous trade credit policy in an attempt to attract sales and increase profitability. The generous trade credit policy essentially increases the time lag between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales, with its net effect being that of increasing profitability.

The other reason for the positive relationship could be that during economic recession, firm's debtors are likely to pay for the products purchased if they are given extended payment period as their (debtors') cash inflows will be spread-out and protracted due to slowdown in trading conditions. Thus, without the cushioning payment period offered to debtors, they (debtors) are unlikely to have sufficient cash resources to meet payment obligations. The implication of this is that, corporate managers need to assess their debtors' ability to pay during different economic conditions and restructure the trade credit policy to ensure it does not adversely impact on profitability.

4.4.2 Model specification (II)

In model specification (II), profitability is regressed against the rest of the working capital management components used in the study, namely: days sales in inventory, days sales in receivables, days payable outstanding, and industry. R square for this model specification is also high at 95.93% and statistically significant with a significant *F* of less than 0.05 at 95% confidence interval.

The relationships between these four explanatory variables used in model specification (II) and profitability are explained below:

(vi) Relationship Between Days Payables Outstanding and Profitability

The coefficient on days payables outstanding is negative and highly significant (p-value < 0.05) suggesting that a decrease in the number of days accounts payable by one day leads to an increase in operating profit margin by 0.53%. The positive relationship found in the study is consistent with findings by Deloof (2003) but contrary to findings by Mathuva (2010) whose explanation for a positive relationship is that the longer a firm delays its payments to its creditors, the higher the level of working capital levels it reserves and uses in order to increase profitability. On the contrary, results of South African firms listed on the JSE show that less profitable firms have high number of days in accounts payable suggesting that less profitable firms wait longer to pay their bills.

(vii) Relationship Between Days Sales in Receivables and Profitability

Consistent with Garcia-Teruel and Martinez-Solano (2006) and Nasr and Raheman (2007) findings, a negative relationship exists between days sales in receivables and profitability of South African firms (p-value < 0.05). This result implies that an increase in number of days accounts receivable by one day leads to a decline in operating profit margin by 0.40%, suggesting that firms can improve their profitability by reducing the number of days accounts receivables are outstanding. The interpretation of this result is that the less the time it takes for customers to pay their bills, the more cash is available to replenish inventory hence higher sales realized leading to higher profitability of the firm. The implication of this finding is that for a firm to improve its profitability, there needs to be adoption of a more restrictive trade credit policy giving customers less time to make their payments.

(viii) Relationship Between Days Sales in Inventory and Profitability

The days sales in inventory coefficient is positive but not significantly different from zero (p-value = 0.67). Although not statistically significant, the positive coefficient from the study is contrary to findings by Deloof (2003) and Lazaridis and Tryfonidis (2006) but in line with findings by Mathuva (2010) who asserts that maintaining high levels of inventory reduces the cost of possible interruptions in the production process and the loss of business due to scarcity of products. Furthermore, maintaining high levels of inventory helps in reducing the cost of supplying the products and protects the firm against price fluctuations as a result of macroeconomic factors.

(ix) Relationship Between Industry and Profitability

Model specification (II) further regressed profitability against the transformed variable (CCC*D^^ - industry) representing industry, wherein the dummy D = 0 denotes companies in the industrial sector and D = 1 denotes the rest of the companies listed on the JSE. This variable examines if cash conversion cycle impacts profitability of industrial companies and the rest of the companies different. Given that the assets of production and manufacturing firms (which are classified under the industrial sector) are mostly composed of current assets, the research examines whether or not the direction and extent of the impact of the cash conversion cycle on profitability changes on the back of considerably disparate working capital levels. The findings of the study show a positive coefficient on this transformed (industry) cash conversion cycle variable which could imply that an increase in the length of the cash (operating) cycle tends to increase profitability of companies in the industrial sector than those in the other sectors. The result is however not statistically significant with a *p*-value of 0.63. This indicates that this transformed industry variable does not have any explanatory power in explaining variation in profitability between companies in the industrial sector and those in the rest of the other sectors. In essence, we cannot conclude that working capital management impacts profitability of companies in the industrial sector and those in the rest of the other sectors different. The implication of this finding is that strategic working capital management initiatives that enhance profitability of industrial companies also enhance profitability of companies in the rest of the other sectors.

4.5 Summary

The upshot of the foregoing presentation of empirical results is that there exists statistically significant relationship between liquidity measures and profitability of South African firms listed on the JSE. In particular, the results reveal a negative relationship between cash conversion cycle; a key proxy of working capital management that measures the *net time interval* between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales, and profitability. This negative relationship suggests that managers can create value for the shareholders of the firm by reducing the cash conversion cycle to an extent that it enhances firm profitability.

Also, results show that other measures of working capital management used in the study, namely: days sales in receivables, days payables outstanding, current ratio, and debt to equity ratio have explanatory power in explaining variation in profitability. These four variables all have negative relationship with profitability, respectively.

The only measure of working capital management used in the study that shows a positive relationship with profitability is days sales in inventory. While the coefficient on this variable (days sales in inventory) is not statistically significant (*p*-value = 0.67), the explanation for the positive relationship could be that maintaining high levels of inventory reduces the cost of possible interruptions in the production process. Also, it could mean that maintaining high levels of inventory helps in reducing the cost of supplying the products and protects the firm against price fluctuations as a result of macroeconomic factors.

The interesting outcome of the study is that whereas normal cash conversion cycle is negatively related with profitability, the transformed cash conversion cycle dummy variable (liquidity under different economic conditions) used to examine how cash conversion cycle impacts on profitability when macroeconomic conditions change - from boom to recession - is positively related with profitability. This positive relationship, which is statistically significant, indicates that an increase in the length of the cash cycle tends to increase profitability during an economic recession than during an economic boom, inferring that trading conditions and demand for a firm's products tend to be subdued during a recession to an extent that firms adopt a generous trade credit policy so as to attract sales and increase profitability. Thus, the generous trade credit policy leads to an increase in the time lag between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales, however, its net effect is increasing profitability. The implication of the respective relationships, which are different, between (1) the normal cash conversion cycle and profitability and (2) the transformed cash conversion cycle variable under different economic conditions and profitability is that corporate managers need to restructure their trade credit policy and change it accordingly as macroeconomic environment changes in ensuring that profitability remains at least afloat. The other notable outcome of the results is that in general, profitability of companies tends to decrease when the economy moves from an economic boom to an economic recession. This result makes sense considering the slowdown in economic activity during an economic recession as there is business contraction which in turn leads to reduction in profitability.

5 DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter discusses and compares results of the study with findings by other studies elsewhere that explored the relationship between working capital management and firm profitability. Section 5.2 highlights linkages between findings of this study and those of previous studies. Furthermore, the section provides suggestions on what could be the underlying differences between findings of this study and those of previous studies. Section 5.3 concludes the chapter and is followed by section 5.4 which suggests further work to be done in congruence with this study.

5.2 Discussion

This study explored the relationship between a number of working capital management components and profitability of South African firms listed on the JSE given the dilemma that exists between liquidity preservation and profitability. This dilemma is evident in that while increasing the length of the cash (operating) cycle might increase firm profitability given that it leads to higher sales, primarily as a result of generous trade credit policy that allows customers to assess product quality before paying, as well as a result of a reduction in risk of stock-out, which reduces the risk of business operations interruption, firm profitability may however decrease as the length of the cash (operating) cycle elongates particularly in instances where the costs of higher investment in working capital rise faster than the benefits of holding more inventory and/or granting more trade credit to customers. Thus, in examining how South African firms are impacted by working capital management components, corporate managers will be better equipped in designing policies that ensure enhancement of firm profitability.

Furthermore, knowing how the impact of working capital management components changes as macroeconomic conditions on the ground change is imperative in that, as proffered by Hamlin and Heathfield (1991), the ability of managers to respond to rapidly changing economic circumstances is a vital aspect of their companies' competitiveness and that reacting quickly and appropriately to changing events and shocks gives a firm competitive advantage over its rivals.

In line with findings by Deloof (2003), Garcia-Teruel and Martinez-Solano (2006), Lazaridis and Tryfonidis (2006), Mathuva (2010), Biger *et al* (2010), empirical results of this study show a significant negative relationship between accounts receivables (days sales in receivables) and corporate profitability. This negative relationship indicates that slow collection of accounts receivables is correlated with low profitability. It suggests that corporate managers can improve profitability by reducing the credit period granted to their customers.

Contrary to findings by: (1) Biger *et al* (2010) who did not find a statistically significant relationship between days payables outstanding and profitability and (2) Mathuva (2010) who found significant positive relationship between days payables outstanding and profitability, this study finds that there exists a significant negative relationship between days payables outstanding and profitability of South African firms. This finding is in line with findings by Deloof (2003) who analyses the relationship between Belgian firms. The negative relationship can be explained by that, contrary to Mathuva (2010) who states that profitable companies withhold their payment to suppliers so as to take advantage of the cash available for their working capital needs, a decrease in the days payables outstanding leading to an increase in profitability is as a result of less profitable firms waiting longer to pay their bills. The difference in the relationship as shown by this study in contrast with findings by Mathuva (2010) and Biger *et al* (2010) could be attributable to different characteristics of firms operating in different geographic jurisdictions. For example, the difference could be as a result of the dissimilarity in different countries' costs and benefits of being granted credit. The costs of being granted credit may rise faster than the benefits of being granted credit in one country and slower than the benefits of being granted credit in another.

Although the study finds that there is no statistically significant relationship between days sales in inventory and profitability, the coefficient on this variable is positive and consistent with findings by Mathuva (2010) who found a positive coefficient. It is however contrary to the negative relationship found by Deloof (2003) and Lazaridis and Tryfonidis (2006). Whereas the negative relationship could suggest that maintaining inventory at high levels may result in substandard returns, the positive relationship infers that maintaining high levels of inventory reduces the cost of possible interruptions in the production process. Furthermore, it infers that maintaining high levels of inventory helps in reducing the cost of supplying the products and protects the firm

against price fluctuations particularly in environments with volatile price movements influenced by volatile exchange rates and/or other macroeconomic factors.

In this paper, the results show that there exists a significant negative relationship between the time lag from the expenditure for purchases of raw materials and the collection of sales of finished goods can be too long and profitability. This result is in line with studies by Deloof (2003), Garcia-Teruel and Martinez-Solano (2006), Lazaridis and Tryfonidis (2006), Mathuva (2010), Biger *et al* (2010). It can be explained by that minimizing investment in current assets can help boost profits as liquid cash is not maintained in the business for too long and that it is used to generate more profits for the firm.

Unlike other studies conducted on the impact of working capital management on firm profitability that did not differentiate the impact under different market conditions, this study has remarkable contribution-enhancing positive features in that it empirically examined how working capital management components' impact changes as the economy moves from a boom to a recession. The results show that an increase in the length of the cash (operating) cycle tends to increase profitability during an economic recession than during an economic boom. This could be attributable to the fact that trading conditions and demand for a firm's products tend to be subdued during an economic recession to an extent that a firm adopts a more generous trade credit policy so as to attract sales and increase profitability. Thus, the generous trade credit policy leads to an increase in the time lag between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales, with the net effect being an increase in profitability. The implication of this is that corporate managers need to restructure their trade credit policy and change it accordingly as macroeconomic environment changes in ensuring that firm profitability is not adversely impacted by an unfavourable change in the macroeconomic conditions.

In the same vein, the study reveals that profitability of South African firms tend to decrease as the economic conditions change from an economic boom to a recession. This can be explained by inter-linkages between the South African economy and the global economy, which linkages result in less profit for South African firms as global demand, particularly for mineral resources, dwindles.

Furthermore and in line with findings by Nasr and Raheman (2007), empirical results of the study show that current ratio has a negative relationship with profitability, showing that there exists an inverse relationship between liquidity and profitability of South African firms. While the study shows that reducing current ratio increases profitability of South African firms, it is to be noted that disregarding liquidity may result in insolvency and bankruptcy. Thus, given the trade-off between profit maximization and liquidity preservation, corporate managers need to minimize current ratio to the extent that it maximizes profits without adversely affecting firm solvency.

The study examined the impact of capital structure on firm profitability wherein debt to equity ratio was used as a proxy for capital structure. Contrary to findings by Brabete and Nimalathasan (2010) and in line with findings by Salawu (2009), the study finds that there exists a negative association between profitability and debt to equity. This negative association between debt to equity ratio and profitability has implications for financial stability as the higher debt to equity ratio makes the corporate sector highly vulnerable to changes in economic conditions and may result in economy wide impact of a financial crisis. Furthermore, what this means is that management should strive to identify the optimal capital structure of the firm and also maintain it since it represents the point where the market value of the firm is maximized.

Lastly, the study examined if there is a difference in the impact of working capital management components on profitability between companies in the industrial sector and those in the rest of the other sectors. Results of the study show that there is no significant difference in the impact. The implication of this finding is that working capital management strategies that enhance profitability of companies in the industrial sector are also applicable for companies in the rest of the other sectors.

5.3 Conclusion

Based on the key findings of the study, the following conclusions can be held: (1) that management of a firm can create value for the shareholders by reducing: (a) the *net time interval* between actual cash expenditures on a firm's purchase of productive resources and the ultimate recovery of cash receipts from product sales, (b) the number of days accounts receivable, (c) the debt to equity ratio to the extent that it increases firm profitability, (d) the current ratio to the extent that it does not adversely impact on the solvency of the firm, and (e) the days payables

outstanding. (2) Also, management of a firm can create value for the shareholders by increasing the days sales in inventory to an extent that it reduces cost of supplying the products as well as protecting the firm against price fluctuations. (3) Furthermore, firms are capable of enhancing their profits by restructuring their trade credit policy and changing it accordingly as macroeconomic environment changes.

The direction that each explanatory variable has to take so as to increase profitability is depicted in Table 10 below.

Table 10: Direction explanatory variable to take to increase profitability

No.	Explanatory Variable	Direction to move in	Profitability - direction
1	Cash Conversion Cycle	↓ (decrease)	↑ (increase)
2	Days Sales in Receivables	↓ (decrease)	↑ (increase)
3	Days Payables Outstanding	↓ (decrease)	↑ (increase)
4	Days Sales in Inventory	↑ (increase)	↑ (increase)
5	Debt to Equity	↓ (decrease)	↑ (increase)
6	Current Ratio	↓ (decrease)	↑ (increase)
7	CCC - from boom to recession	↑ (increase)	↑ (increase)

While acknowledging that working capital management components may be manipulated by firms in boosting sales/earnings through for example, extending more credit terms to boost sales, the primary focus of this study is not to examine how working capital management components are vulnerable to manipulation by firms in boosting sales/earnings but to examine the relationship between various working capital management components and profitability of South African firms listed on the JSE

5.4 Future Research

Future research should investigate how various working capital management components are manipulated by South African companies through real activities earnings manipulation which alters the timing or structuring of an operation, investment, and/or financing transaction in an effort to influence sales/earnings.

Also, the scope of further research may be extended to small to medium enterprises and include additional working capital management components such as cash and marketable securities.

REFERENCES

Bhole, L.M., Mahakud, J. (2004). "Behaviour of trade Credit: Time Series and Panel Data Analysis". *Economic and Political Weekly*, 39:12, pp 1277-1278.

Biger, N., Gill, A., Mathur, N. (2010). "The Relationship Between Working Capital Management and profitability: Evidence from the United States". *Business and Economics Journal*. pp BEJ-10.

Blanchard, O. (2010). "Macroeconomics". Fifth Edition. *Pearson Education, Inc.,* ISBN – 10:0-13-03877-1, pp 22-24.

Brabete, V., Nimalathasan, B. (2010). "Capital Structure and its impact on Profitability: A study of listed manufacturing companies in Sri Lanka". *Young Economists Journal*, 8:15, pp 7-16.

De Angelo, H., Masulis, R. (1980). "Optimal Capital Structure under Corporate and Personal Taxation". *Journal of Financial Economics,* 8:1, pp 3-29.

Dechow, P., Skinner, D.J. (2000). "Earnings Management: Reconciling the views of Accounting Academics, Practitioners, and Regulators". *Accounting Horizons,* 14:2, pp 50-235.

Deloof, M. (2003). "Does Working Capital Management Affect Profitability of Belgian Firms"? *Journal of Business Finance & Accounting*, 30: 3&4, pp 573-587.

Dermirgunes, K., Samiloglu, F. (2008). "The Effect of Working Capital Management on Firm Profitability: Evidence from Turkey". *The International Journal of Applied Economics and Finance*, 2:1, pp 44-50.

Firer, C., Jordan, B.D., Ross, S.A. Westerfield, R.W. (2008). "Fundamentals of Corporate Finance". 4th Edn. *The McGraw-Hill, New York,* NY, ISBN: 10- 0077114787, pp 4-9.

Fried, D., Sondhi, A.C., White, G.I. (2003). "The Analysis and Use of Financial Statements". 3rd Edn. *John Wiley & Sons*, ISBN 978-0471-37594-4, pp 124.

Garcia-Teruel, P.J., Martinez-Solano, P. (2006). "Effects of Working Capital Management on SME Profitability". *International Journal of Finance,* 3, pp 164-177.

Gunny, K.A. (2010). "The Relation Between Earnings Management Using Real Activities Manipulation and Future Performance: Evidence from Meeting Earnings Benchmarks". *Contemporary Accounting Research,* 3, pp 855-888.

Hamlin, A.P., Heathfield, D.F. (1991). "Competitive Management and Working Capital". *Managerial and Decision Economics*, 12:3, pp 207-217.

International Monetary Fund (IMF). (2009). "International Financial Statistics"; Haver Analytics.

Jordan, B.D., Ross, S.A., Westerfield, R.W. (2003). "Fundamentals of Corporate Finance". 6thEdn. *McGraw-Hill Irwin Publications, New York*, ISBN: 0-07-246974-9, pp 167.

Kaveri, V.S. (1985) "Financing of Working Capital in Indian Industry". *Economic and Political Weekly*, 20:35, pp 123-128.

Koop, G. (2006). "Analysis of Financial Data". *John Wiley & Sons Ltd*, ISBN-13 978-0-470-01321-2, pp 102.

Laughlin, E.J., Richards, V.D. (1980). "A Cash Conversion Cycle Approach to Liquidity Analysis". *Financial Management Association International*, 9:1, pp 32-38.

Lazaridis, I., Tryfonidis, D. (2006). "Relationship Between Working Capital Management and Profitability of listed companies in the Athens Stock Exchange". *Journal of Financial Management and Analysis*, 19: 1, pp 26-35.

Lemke, K.W. (1970). "The Evaluation of Liquidity: An Analytical Study". *Journal of Accounting Research*, 8:1, pp 47-77.

Mathuva, D. (2010). "The Influence of Working Capital Management Components on Corporate Profitability: A Survey on Kenyan Listed Firms". *Research Journal of Business Management*, 4:1, pp 1-11.

Modigliani, F., Miller, M.H. (1958). "The Cost of Capital, Corporation Finance and the Theory of Investment". *American Economic Review*, 48, pp 261-277.

Modigliani, F., Miller, M.H. (1963). "Corporate Income Taxes and the Cost of Capital: A correction". *American Economic Review*, 53, pp 433-443.

Montgomery, D., Peck, A., Vining, G. (2007). "Introduction to Linear Regression Analysis". 4th Edn., *John Wiley*, New York, ISBN: 978-0-470-12506-9, pp:34-38.

Nasr, M., Raheman, A. (2007). "Working Capital Management and Profitability – Case of Pakistani Firms". *International Review of Business Research Papers*, 3:1, pp 279-300.

Schipper, K. (1989). "Earnings Management". *Accounting Horizons*, 3:1, pp 91-102.

Salawu, R. O. (2009). "The effect of Capital Structure on Profitability: An empirical analysis of listed firms in Nigeria". *The International Journal of Business and Finance*, 3:2, pp 121-129.

Statistics South Africa. (2011). "Gross Domestic Product – First Quarter 2011". www.statssa.gov.za.

APPENDICES

Annexure 1 - Specification (I) – regression at 95% confidence level:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.941707
R Square	0.886813
Adjusted R Square	0.886424
Standard Error	263.2331
Observations	1461

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	7.9E+08	1.58E+08	2279.9669	0
Residual	1455	1.01E+08	69291.65		
Total	1460	8.91E+08			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	60.8219	10.58326	5.74699	1.105E-08	40.06182016	81.58199	40.06182	81.58198543
CCC	-0.57593	0.006388	-90.162	0	-0.5884563	-0.5634	-0.588456	-0.5633962
CRA	-15.751	2.608892	-6.03744	1.984E-09	-20.8686282	-10.6334	-20.86863	-10.6334455
DTE	-106.171	13.31937	-7.97118	3.15E-15	-132.298224	-80.0438	-132.2982	-80.0438023
D	-94.7074	13.94952	-6.78929	1.636E-11	-122.070701	-67.3441	-122.0707	-67.3440723
CCC*D	1.092749	0.048423	22.56682	6.21E-97	0.997762642	1.187735	0.9977626	1.18773454

Annexure 2 - Specification (I) – regression at 90% confidence level:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.941707497
R Square	0.88681301
Adjusted R Squa	0.886424052
Standard Error	263.2330737
Observations	1461

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	789913342.3	157982668.5	2279.966865	0
Residual	1455	100819352.3	69291.65107		
Total	1460	890732694.7			

	Coefficients	*Standard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 90.0%*	*Upper 90.0%*
Intercept	60.8219028	10.58326247	5.746989926	1.10486E-08	40.06182016	81.58198543	43.40289457	78.24091103
CCC	-0.575926254	0.006387682	-90.16200745	0	-0.588456305	-0.563396204	-0.586439751	-0.565412758
CRA	-15.75103686	2.608891956	-6.037443145	1.98406E-09	-20.86862822	-10.6334455	-20.04501621	-11.45705751
DTE	-106.171013	13.31936551	-7.971176474	3.15036E-15	-132.2982237	-80.0438023	-128.0933775	-84.24864852
D	-94.70738647	13.94951747	-6.789294803	1.63623E-11	-122.0707006	-67.34407235	-117.6669191	-71.74785387
CCC*D^	1.092748591	0.048422795	22.5668219	6.20951E-97	0.997762642	1.18773454	1.013049437	1.172447745

Annexure 3 - Specification (I) – regression at 99% confidence level:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.941707497
R Square	0.88681301
Adjusted R Squa	0.886424052
Standard Error	263.2330737
Observations	1461

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	789913342.3	157982668.5	2279.966865	0
Residual	1455	100819352.3	69291.65107		
Total	1460	890732694.7			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 99.0%*	*Upper 99.0%*
Intercept	60.8219028	10.58326247	5.746989926	1.10486E-08	40.06182016	81.58198543	33.5254194	88.11838619
CCC	-0.575926254	0.006387682	-90.16200745	0	-0.588456305	-0.563396204	-0.592401445	-0.559451064
CRA	-15.75103686	2.608891956	-6.037443145	1.98406E-09	-20.86862822	-10.6334455	-22.47992374	-9.02214998
DTE	-106.171013	13.31936551	-7.971176474	3.15036E-15	-132.2982237	-80.0438023	-140.5244877	-71.81753832
D	-94.70738647	13.94951747	-6.789294803	1.63623E-11	-122.0707006	-67.34407235	-130.686157	-58.72861592
CCC*D^	1.092748591	0.048422795	22.5668219	6.20951E-97	0.997762642	1.18773454	0.96785591	1.217641272

Annexure 4 - Specification II – regression at 95% confidence level:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.979420452
R Square	0.959264421
Adjusted R Square	0.95915251
Standard Error	157.7304046
Observations	1461

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	853014972.6	213253743.2	8571.677604	0
Residual	1456	36223650.07	24878.88054		
Total	1460	889238622.7			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	69.24197934	4.43444353	15.61458137	6.15518E-51	60.54339875	77.94055992	60.54339875	77.94055992
DSI	0.01288558	0.030487289	0.422654162	0.672610013	-0.04691812	0.072689282	-0.046918123	0.072689282
DSR	-0.395471702	0.014533924	-27.21024903	3.7301E-132	-0.42398137	-0.366962034	-0.42398137	-0.366962034
DPO	-0.53098083	0.020927719	-25.3721316	6.6154E-118	-0.57203253	-0.48992913	-0.57203253	-0.48992913
CCC*D	0.104644973	0.21906411	0.477691087	0.632941792	-0.32507001	0.534359954	-0.325070008	0.534359954

Annexure 5 - Specification II – regression at 90% confidence level:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.979420452
R Square	0.959264421
Adjusted R Squar	0.95915251
Standard Error	157.7304046
Observations	1461

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	853014972.6	213253743.2	8571.677604	0
Residual	1456	36223650.07	24878.88054		
Total	1460	889238622.7			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 90.0%*	*Upper 90.0%*
Intercept	69.24197934	4.43444353	15.61458137	6.15518E-51	60.54339875	77.94055992	61.943325	76.54063368
DSI	0.01288558	0.030487289	0.422654162	0.672610013	-0.046918123	0.072689282	-0.037293475	0.063064634
DSR	-0.395471702	0.014533924	-27.21024903	3.7301E-132	-0.42398137	-0.366962034	-0.4193931	-0.371550304
DPO	-0.53098083	0.020927719	-25.3721316	6.6154E-118	-0.57203253	-0.48992913	-0.56542578	-0.49653588
CCC*D	0.104644973	0.21906411	0.477691087	0.632941792	-0.325070008	0.534359954	-0.255912831	0.465202777

Annexure 6 - Specification II – regression at 99% confidence level:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.979420452
R Square	0.959264421
Adjusted R Squa	0.95915251
Standard Error	157.7304046
Observations	1461

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	853014972.6	213253743.2	8571.677604	0
Residual	1456	36223650.07	24878.88054		
Total	1460	889238622.7			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 99.0%*	*Upper 99.0%*
Intercept	69.24197934	4.43444353	15.61458137	6.15518E-51	60.54339875	77.94055992	57.80461724	80.67934143
DSI	0.01288558	0.030487289	0.422654162	0.672610013	-0.046918123	0.072689282	-0.065747548	0.091518707
DSR	-0.395471702	0.014533924	-27.21024903	3.7301E-132	-0.42398137	-0.366962034	-0.432957748	-0.357985656
DPO	-0.53098083	0.020927719	-25.3721316	6.6154E-118	-0.57203253	-0.48992913	-0.584957816	-0.477003844
CCC*D	0.104644973	0.21906411	0.477691087	0.632941792	-0.325070008	0.534359954	-0.46036742	0.669657366

Annexure 7 – Expanded Descriptive Statistics:

OPM		CCC		CRA		DTE		D		CCC*D		DSI		DSR		DPO	
Mean	-100.347	Mean	150.1789	Mean	2.080957	Mean	-7.4E-05	Mean	0.466119	Mean	2.047281	Mean	157.5734	Mean	180.9252	Mean	188.3197
Standard I	20.43488	Standard I	32.55354	Standard I	0.07989	Standard I	0.013834	Standard I	0.013056	Standard I	3.765107	Standard I	20.88359	Standard I	28.23572	Standard I	18.31608
Median	14.95	Median	28.44764	Median	1.435581	Median	-0.00245	Median	0	Median	0	Median	42.34736	Median	46.60767	Median	55.43664
Mode	0	Mode	37.76241	Mode	1.394393	Mode	0.106838	Mode	0	Mode	0	Mode	45.78438	Mode	40.52148	Mode	27.49924
Standard I	781.0831	Standard I	1244.295	Standard I	3.053619	Standard I	0.528783	Standard I	0.499022	Standard I	143.9138	Standard I	798.234	Standard I	1079.255	Standard I	700.0962
Sample Va	610090.9	Sample Va	1548270	Sample Va	9.324588	Sample Va	0.279612	Sample Va	0.249023	Sample Va	20711.18	Sample Va	637177.5	Sample Va	1164791	Sample Va	490134.6
Kurtosis	78.08799	Kurtosis	97.84931	Kurtosis	65.48347	Kurtosis	6.707554	Kurtosis	-1.98423	Kurtosis	46.70719	Kurtosis	90.808	Kurtosis	102.4523	Kurtosis	64.28036
Skewness	-8.65807	Skewness	9.785816	Skewness	7.270836	Skewness	0.284474	Skewness	0.135975	Skewness	-3.63756	Skewness	9.331919	Skewness	10.04635	Skewness	7.667783
Range	7828.46	Range	15080.56	Range	33.80734	Range	4.870958	Range	1	Range	2154.359	Range	8810.282	Range	12368.96	Range	7149.663
Minimum	-7601.25	Minimum	-1196.87	Minimum	0.056981	Minimum	-2.40456	Minimum	0	Minimum	-1196.87	Minimum	1.293939	Minimum	13.66686	Minimum	19.4133
Maximum	227.21	Maximum	13883.69	Maximum	33.86432	Maximum	2.466399	Maximum	1	Maximum	957.4884	Maximum	8811.576	Maximum	12382.63	Maximum	7169.076
Sum	-146607	Sum	219411.4	Sum	3040.278	Sum	-0.10821	Sum	681	Sum	2991.077	Sum	230214.7	Sum	264331.8	Sum	275135.1
Count	1461	Count	1461	Count	1461	Count	1461	Count	1461	Count	1461	Count	1461	Count	1461	Count	1461

Annexure 8 - Correlation Matrix

254 South African Firms listed on the JSE, 2004 - 2010: 1,461 Firm Year Observations

OPM measures operating profit margin, CCC cash conversion cycle, CRA current ratio,DTE debt to equity ratio, DSR days sales in receivables, DSI days sales in inventory, and DPO days payables outstanding

	OPM	*CCC*	*CRA*	*DTE*	*DSI*	*DSR*	*DPO*
OPM	1						
CCC	-0.9134*	1					
CRA	-0.4755**	0.4748**	1				
DTE	-0.0301***	-0.0518***	-0.1760***	1			
DSI	0.0639	0.9377*	0.5519**	-0.0354***	1		
DSR	-0.9535*	0.9866*	0.4520**	-0.0244**	0.9590**	1	
DPO	-0.9454**	0.8127*	0.4822**	0.0141***	0.9520*	0.8815*	1

*Significant at 90 percent. **Significant at 95 percent. ***Significant at 99 percent.