Determinants of Working Capital Requirement on Manufacturing Firms

(With Special Reference to Food and Beverage Manufacturing Industries in Addis Ababa, Ethiopia)

A thesis Submitted to the School of Graduate Studies of Jimma University in Partial Fulfillment of the Award of the Degree of Masters of Science in Accounting and Finance

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I

DECLARATION

I, Damot Alehegne, hereby declare that this thesis entitled "The determinants of working capital requirement on manufacturing firms', with reference to food and beverage manufacturing industries in Addis Ababa, Ethiopia" is my own work except where otherwise indicated and acknowledged. This thesis has been carried out by me under the guidance and supervision of Dr. Deresse Mersha and Ato Mohammed Getahun.

The thesis is original and has not been submitted for the award of degree or diploma in any university or institution.

Name: Damot Alehegne Signature……………….

CERTIFICATE

This is to certify that the thesis entities "The determinants of working capital requirement on manufacturing firms, with reference to food and beverage industries in Addis Ababa, Ethiopia" submitted to Jimma University for the award of the Degree of Master of Science in Accounting and Finance is a record of Valuable research work carried out by Damot Alehegne Workea , under our guidance and supervision.

Therefore we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.

Name of Advisors

1. Dr. Deresse Mersha   Date ………………… Signature …………..

2. Mohammed Getahun   Date ……… Signature ……………

Abstract

Working capital investments are essential for daily business operations of an entity. For that matter firms make huge amounts of investments in working capital that enables them to pay recurring obligations. Current asset investments are, however, the least profitable assets of an entity. Thus, in order to maintain the optimum level of working capital required for the daily operation business managers involve in trade-off decisions between profitability and liquidity. In response to this, researchers from developed economies have been striving to investigate the determinants of working capital requirement, since recent years. But, those researches have not considered the issue in underdeveloped economies and there exist a knowledge gap on the literature, with only scanty of studies available in such economies. Therefore in an attempt to fill this research gap, this study investigated the determinants of working capital requirement of 35 large taxpayer manufacturing firms from food and beverage industry of Addis Ababa by employing explanatory research design with quantitative approach. Firms' financial statements were collected for five years period from 2011 to 2015.Cash conversion cycle, return on asset, operating cash flow, leverage,firm size ,growth rate ,real GDP growth rate and inflation rate were used as an explanatory variables to measure the size or level of working capital requirement, and net working capital deflated by total asset were used as a dependent variable. Data was analyzed with the help of STATA (version 13) and, descriptive and correlation analysis and pooled panel data regression models of cross-sectional and time series data were employed. Results from the analysis revealed that there is statistically significant negative relationship between working capital requirement with leverage, firm size, real GDP growth rate and inflation rate. And there is positive and significant relationship between working capitai requirement with cash conversion cycle. This study recommended that managers of large firms that have an excess leverage should have to pay more attention on minimizing the level of loan at the optimum level and diverting the investment in to profitable long term asset.Finally this study has recommend that managers of those firms should have to pay more attention on shortening the cash conversion cycle by accelerating cash collection and lengthen the payament periodto improve the profitability of those firms.

Key words: Working capital requirement, large tax payers, manufacturing firms food and beverage, Addis Ababa

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Saint Mary, mother of God, pray for us sinners now and at the time of our death. Bless, protect and intercede for us. AMEN!

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List of Acronyms /Abbreviations

CCC: Cash Conversion Cycle

EBIT: Operating Profit

E.C: Ethiopian Calendar

ERCA: Ethiopian Customs and Revenue Authority

GR :   Growth rate

INR >   Inflation rate

LEV: Leverage

LNFS :   Natural logarizm of firm size

NWC- TA :   Net working capital deflated by total asset

OCF-TA: Operating cash flow deflated by total asset

OLS :   Ordinary least square

RGDPGR: Real gross domestic product growth rate

ROA: Return on asset

CHAPTER ONE

Introduction

1.1 Background of the Study

The corporate finance literature has traditionally focused on the study of long-term financial decisions, particularly investments, capital structure, dividends or company valuation decisions. However, short-term assets and liabilities are important components of total assets and need to be carefully analyzed. Management of these short-term assets and liabilities warrants a careful investigation, since the working capital management plays an important role in a firm's profitability and risk as well as its value (Smith, 1980).

One of the integral components of the overall corporate strategy is to manage working capital efficiency. This needs to control short term obligation as well as decrease investment in liquid assets as much as possible in order to create shareholder value (Eljelly 2004). Efficient management of working capital is very essential in the overall corporate strategy in creating shareholder value.

Firms try to maintain an optimum level of working capital that maximizes the value (Deloof, 2003; Howorth and Westhead, 2003; and Afza and Nazir, 2007) In practice, working capital management has become one of the most important issues in organizations, where many financial managers are finding it difficult to identify the important drivers of working capital and the optimum level of working capital (Lamberson, 1995). Consequently, companies can minimize risk and improve their overall performance if they can understand the role and determinants of working capital.

A firm may adopt an aggressive working capital management policy with a low level of current assets as percentage of total assets, or it may also be used for the financing decisions of the firm

in the form of high level of current liabilities as percentage of total liabilities. Excessive levels of current assets may have a negative effect on a firm's profitability, whereas a low level of current assets may lead to lower levels of liquidity and stock outs, resulting in difficulties in maintaining smooth operations (Van Horne and Wachowicz, 2004). Knowing that working capital investment should be kept to as minimum as possible, why do companies still have billions tied up in working capital? According to Vijayakumar and Venkatachalam (1996, p647), "the developing economies are generally faced with the problem of inefficient utilization of resources available to them" and while fixed assets and working capital are both "contributors to the total capital of the developing country", working capital makes utilization of the production capacity generated by the fixed assets possible.

When a firm invests in a large amount of working capital, funds are tied up in less profitable assets and it reveals the firm's operational problems (Marttonen et al., 2013). The funds tied up in such unprofitable assets have to be freed and diverted in to more profitable investments. But as Rehn (2012) stated it cannot be lowered to a minimum amount unless other operational benefits, liquidity and solvency are compromised. Indeed as Raheman & Nasr (2007) explained that, though the ultimate objective of any business organization is maximizing the profit, maintaining liquidity is important objective as well. Whereas increasing profitability at the expense of liquidity causes serious operational difficulties because both of those objectives have their respective importance that; if the business is not profitable it cannot survive, on the other hand if it is not liquid it will face insolvency or bankruptcy problems, there must involve a tradeoff between those two objectives. Hence, effective working capital management attempts to balance the tradeoff between profitability and liquidity.

Though the degree of working capital requirement varies across firms because of several factors such as nature of business, scale of operation, production cycle, business cycle, seasonality and production policy, credit policy, growth and expansion opportunities, operating efficiency and availability of raw materials, it is hardly found that a company survives without working capital. Just as human body cannot function without blood, business too will not function as a business unless some resources are reserved as working capital in order to meet requirements of daily business operations. But from economics point of view those resources are scarce, nothing is

freely available. Thus management of those resources is of high value for any business striving to generate more from this world of scarcity.

. Determining the important factors affecting working capital requirement, would help managers to determine the optimal level of investment in current assets as well as the appropriate sources to finance them. In addition, they would be well prepared and ready for unpredicted situations that have unexpected effects on firms performance.

The main objective of working capital management is to maintain an optimal balance among each of the working capital components. Business success heavily depends on the ability of the financial managers to effectively manage receivables, inventory, and payables (Filbeck and Krueger, 2005). Firms can reduce their financing costs and/or increase the funds available for expansion projects by minimizing the amount of investment tied up in current assets. Most of financial managers' time and efforts are consumed in identifying the non-optimal levels of current assets and liabilities and bringing them to optimal levels (Lamberson, 1995).

An optimal level of working capital is the one in which a balance is achieved between risk and efficiency. It requires continuous monitoring to maintain the optimum level of various components of working capital, such as cash receivables, inventory and payables.

In the financial theory and economic practice, a high level of current assets, through the generation of excessive liquidity costs, exercises a negative influence on the company profitability, whereas their insufficient level may increase a risk of the loss of liquidity, and as a consequence, lead to a range of difficulties in maintaining undisturbed operation of an enterprise (Van Horne and Wachowicz, 2004). The level of current assets should thus be optimized in every company. Nonetheless, this optimization should concern not only the assets level itself, but also their sources of financing. This entails a need of working capital management, which is taking decisions that maintain a balance between two contrary objectives of the ability of value creation and liquidity (Shin and Soenen, 1998).

Keep the above in mind it is a critical issue to know and understand about the required level of working capital and its relationship with firm's performance. Indeed, some studies have been conducted across the world to examine the determinants of working capital requirement. However, most of the studies are from developed economies (e.g. Deloof, 2003; Lazaridis &

Tryfonidis, 2006; Gill et al., 2010), and only few studies are available in the developing nations context. Besides, as can be evidenced from preliminary research studies, findings in the determinants of working capital requirement lack consistency. Likewise the extent to which the determinant factors and the level of net working capital is considerably differs across research findings. Therefore, the topic "*The determinant of working capital requirement?*" Is an important concern for businesses and remain an open research ground in the corporate finance literature

1.2 Statement of the Problem

Working capital management is an important component of corporate finance because of its direct impact on profitability and liquidity of a business entity (Raheman & Nasr, 2007). Owing to this strategic role in value creation, and following the recent global financial crisis (Charitou et al., 2010; Marttonen et al., 2013), numerous research studies addressing the determinants of working capital requirement have begin to appear in the corporate finance literature. However, as Enow & Brijlal (2014) contended that the findings are quite mixed. They lack cohesiveness which is attributable to variations in factors such as culture, perceptions, market size, industry variations, market depth, efficiency, and regulations.

Firms can maximize their profits by maintains appropriate level of working capital (Deloof, 2003). Firms have large inventory and liberal trade credit policy leads to higher sales. Larger inventory reduces the risk of stock-outs and decrease cost of production during inflation. Trade credit stimulates sales because it allows customers to assess product quality before paying (Gill et al., 2010; Shin &Soenen, 1998). On the other hand the more firm invest on receivable and inventory leads to reduction of profitably and harm the present value of cash follows (Deloof, 2003). Thus, the greater the investment in current assets, the lower the risk, but also the lower the profitability obtained (Charitou, et al., 2010). The existence of excessive and inadequate working capital level leads to reduction of profit of business and unable to meet day to day obligation (Samiloglu&Demirgunes, 2008). In order to maintains optimal level of working capital it should be strike between profitability and liquidity.

Another component of working capital is accounts payable. Delaying payments to suppliers allows a firm to assess the quality of the products bought, and can be an inexpensive and flexible

source of finance. On the other hand, late payment of invoices can be very costly if the firm is offered a discount for early payment (Raheman&Nasr, 2007). Therefore, any financial manager should maintain appropriate level of working capital by avoiding excess and inadequate investment on the amount of working capital since; the main objective of working capital management is to certain that a firm has sufficient cash follows to meet short term debt and to satisfy some unexpected cash needs. However, making decision on working capital is more challenging to many financial managers because, working capital decision is continues until the life of business ends and very sensitive to change to various factors.

There is no actual standard or rule of thumb on the amount of working capital needs for the day to day operations of the firm. It depends on many factors such as nature and size of business, production policy, growth and expansion, supply and demand of market, sales volume, management ability, external environment, price level change, and working capital management policy (Brigham & Houston, 2003). In order to make optimal decision on working capital management a firm should maintains appropriate amount working capital component by considering the balance between profitability and liquidity of the firm. Profitability position should not be at expense of the liquidity position, and liquidity should not be at the expense of profitability because both have their own importance for long lasting success of firm. Therefore, the level of working capital should balance between profitability and liquidity (Raheman&Nasr, 2007).

Studies regarding working capital are mostly related with improving models to determine optimal liquidity and cash balance, rather than analyzing underlying reasons of relationships between liquidity, working capital management practices and profitability. Johnson and Aggarwai (1998), developed a cash management model focusing on cash flows and argued that cash collection and cash payment processes should have to be handled independently.

Working capital management has magnificent importance, especially, in developing countries (Sebhatleab, 2002; Akbar, 2014), where firms have no access of external finance due to the absence of capital markets and even if the capital markets exist the firms would not be public due to their small size. Furthermore, as Chan (2010) stated that the need for working capital is relevant in developing countries because of the nonexistence of external credits, thus businesses in such economies have to resolve the time delay involved in operating cycle to freed the cash

tied up in working capital. In addition, as pointed out by Panigrahi (2014), developing economies are weak in efficiently utilizing the resources available to them. For those reasons, therefore, working capital management is particularly more important to firms in developing nations.

Most studies in the determinants of working capital requirement in developing and emerging countries as found in the extant literature examined the relationship between determinant factos and the size of net working capital. Factors that determine the working capital requirement are often not explored. And the present study wants to fill the gap on lack of clarity about the determinant factors of working capital requirement especially in developing economy like Ethiopia is the motivating factor for this study.

Even though several studies about the determinants of working capital requirement has been undertaken, in most developed countries; As it stands to most of developing nations, various researches were conducted on the impact of working capital management on profitability and firm performance in Ethiopian context such as (Tewodros, 2010; Ephrem, 2011; Tirngo,2013; Wobshet, 2014; Mifta, 2016; Abenet & Venkateswarlu, 2016; Arega et al., 2016). But to the best of the researchers knowledge it appears there has not been any study conducted on the determinants of working capital requirement in Ethiopian context and this study wants to fill the gap noticed above by having an intention to test how and to what extent different financial and economic factors determine the level or size of net working capital of Ethiopian manufacturing companies with a special emphasis on Addis Ababa.

Finally this study wants to add body of literature to the existing stock of knowledge on the factors that determine working capital requirement.

In general lack of prior empirical evidence on working capital requirement in Ethiopian manufacturing companies and the presence of working capital requirement problem in the industry, the importance of working capital management, its different Components and its determinant factors inspire the researcher that wants to put his contribution on How, What and to what extent various financial and economic factors determine the required level or size of net working capital of manufacturing firms in Addis Ababa , Ethiopia.

1.3 Objective of the Study

1.3.1 General Objective of the Study

The general objective of this study is to find the important factors that determine the size of working capital requirement in selected food and beverage manufacturing firms in Addis Ababa.

1.3.2 Specific Objective of the Study

More specifically, the key objectives are:

(i) To identify the internal factors of working capital requirement for selected food and beverage manufacturing companies in Addis Ababa

(ii) To find out the external factors that determines the working capital requirement of selected food and beverage manufacturing companies in Addis Ababa

1.4. Hypothesis of The Study

As per the objective of the study stated above, the following testable research hypotheses are developed with their respective basis and on the view of preliminary studies.

Hypothesis 1

H1: There is a significant relationship between cash conversion cycle and working capital requirements of Ethiopian manufacturing companies.

Hypothesis 2

H2: There is a significant relationship between return on assets of Ethiopian manufacturing companies and working capital requirements.

Hypothesis 3

H3: There is a significant relationship between operating cash flows and working capital requirements of Ethiopian manufacturing companies

. Hypothesis 4

H4: There is a significant relationship between amount of leverage and working capital requirements of Ethiopian manufacturing companies

 Hypothesis 5

H5: There is a significant relationship between the size of Ethiopian manufacturing companies and its working capital requirements

.Hypothesis 6

H6: There is a significant relationship between sales growth and working capital requirements of Ethiopian manufacturing companies

. Hypothesis 7

H7: There is a significant relationship between level of economic activity and working capital requirements of Ethiopian manufacturing companies

Hypothesis 8

H8: There is a significant relationship between inflation rate and working capital requirements of Ethiopian manufacturing companies

1.5. Significance of The Study

As this study intended to determine the working capital requirement of manufacturing firms' with special reference to food and beverage manufacturing companies in Addis Ababa, it is expected that it would contribute to the corporate finance literature and practical business endeavors of those manufacturing firms.

The theoretical contribution of this study is that it can provide additional insights to the existing Stock of knowledge in the determinants of working capital requirement by providing empirical evidence from underexplored business environment, the Ethiopian manufacturing industries.

To the practical business undertakings, the findings of this study can provide an understanding on the relationship between working capital requirement and its determinants. As a result it would assist managers of the manufacturing companies to improve performance of their businesses by setting the required level of their working capital. Additionally, this research can have implications to policy makers by studying financial and economic matters affecting working capital requirement of the manufacturing industries that can be used as additional information to design policies and regulations to the sector. Moreover, this study would be used as reference material for future researchers and other students taking related project works, besides the requirement for the academic qualification of the researcher.

1. 6. Scope and Limitation of The Study

The scope of this study is delimited to the determinants of working capital requirement of food and beverage industries of Addis Ababa for the period of five years, 2011 up to 2015. As per the objective of the research, those firm having operating life of five and above years has been included in the sample. Five year data enough to analyze the determinants of working capital requirement of manufacturing companies, because the study would employ both cross sectional and time series data simultaneously. Even if, many manufacturing companies are found in Addis Ababa, as far as the time, cost and capacity of the researcher is concerned this study has mainly focus on food and beverage industries of Addis Ababa.

This study would also be constrained by different limitation from those the first would be associated with methodology, example in variable selections and quantitative analysis procedures.

The other limitation of this study has only include food and beverage companies that are found in Addis Ababa and those which are registered in large tax payers. Thus, this study can only be limited to large tax payers of food and beverage firms found in Addis Ababa. From the sample result generalization would be made to all food and beverage firms found in Addis Ababa.

Therefore, the study is limited to the sample size and it would be hardly to generalize fully about the manufacturing industry of Addis Ababa. Finally, this study can only focus on the research objective and hypothesis drawn, But there may be other variables related to working capital requirement that are not included in this study

1.7. Organization of The Study

This study has organized in to five chapters. Chapter one includes background of the study, statement of the problem, research objectives and hypothesis, significance of the study, scope of the study and limitation of study, and organization of the paper are under this chapter. Chapter two includes literature review from both theoretical and empirical evidence on the determinants of working capital requirement. Chapter three contains the population, sampling technique, the research design, and data source and collection procedures. It also includes description of variable included in model and data analysis techniques. Chapter four includes data analysis, result and interpretation of the study. Finally, chapter five includes findings, conclusion and recommendation would be made by researcher

CHAPTER TWO

REVIEW OF RELATED LITERATURES

Introduction

This chapter provides a review of related theoretical and empirical works by previous researchers on the determinants of working capital requirement. Moreover, this chapter helps in gaining further insights about the research problem and methodologies to be employed.

2.1. Review of theoretical literatures

Every single decision made in any business entity has financial implication, and any decision that involves the use of money is a corporate financial decision (Damodaran, 2004). Corporate finance, a discipline concerned with acquisition and allocation of firm's economic resources basically involves three decisions, which are:

1) Long-term investment decisions: also called capital budgeting are decisions which deals with determination of the type and composition of firms productive assets.

2) Long-term financing decisions: are decisions which deals with the sources, costs, and timings of the funds required for the long term investment decisions.

3) Working capital management or short term financing decisions: refers to financial decisions which are concerned with efficient and effective utilization of firm's short term assets and liabilities.

As Damodaran (2004) argued that while making those financial decisions, corporate finance is single minded about the ultimate objective of value maximization, which is the long term objective of any firm. However as Sebhatleab (2002) pointed out that the long term value of a firm is a sum of the short term values (such as profit maximization and risk minimization), and working capital management is the one that takes care of the short term values.Thus, the concern of this study is on the determinants of working capital requirement.

2.1.1. The Meaning and Nature of Working Capital

The term working capital originated with the old Yankee peddler who would load up his wagon and go off to peddle his wares. The merchandise was called "working capital" because it was what he actually sold, or "turned over," to produce his profits. The wagon and horse were his fixed assets. He generally owned the horse and wagon (so they were financed with "equity" capital), but he bought his merchandise on credit by loans obtained from bank. Those loans were called working capital loans, and they had to be repaid after each trip to demonstrate that the peddler was solvent and worthy of a new loan. Banks that followed this procedure were said to be employing "sound banking practices." The more trips the peddler took per year, the faster his working capital turned over and the greater his profits (Brigham & Houston, 2009).

In today's business venture several authors define working capital in various terms. Fabozzi & Peterson (2003) defines working capital as a capital that managers can immediately put in to work to generate benefits of the capital investments made. Working capital represents a net investment in short-term assets which continually flow to and from the business (Atrill, 2009). According to Baker & Powell (2005) working capital refers to current assets of a business used in operations, including cash and marketable securities, accounts receivable, and inventory. The term working capital is also known as circulating capital, a term which signifies for assets that are convertible with relative speed from one form to another *i.e.*, starting from cash, changing to raw materials, converting into work-in-progress and finished products, sale of finished products and ending with realization of cash from debtors (Nair, 2011).

The term working capital, all in all, is used to denote the capital required for day-to-day operations of a business concern, such as for purchasing raw materials and for paying operational expenditure on salaries, wages, rents, advertising and etc (Nair, 2011). Nonetheless, the literature reveals some disagreements among various authors and financial experts as to the exact meaning of the term working capital.

The disagreement on the term working capital has based its foundation on the working capital concept, which has passed through considerable changes over the past years. A few decades ago the concept was considered as a measure of debtor's ability to cover the creditors claim in case of liquidation. By that time the main emphasis was on examining whether or not the current assets are immediately realizable and available to pay debts in case of liquidation (Donkor, 2014). However, since recent years the focus has changed from liquidation point of view to the firm's ability in paying the maturing obligations from the funds generated by its operation (going on concern). In view of this, working capital is used to examine the firm's level of margin or buffer to meet the current obligations. In support of this, Bragg (2011) stated that if an entity is to liquidate in near future the current asset and current liability classifications are in appropriate. Thus, the concept working capital should assume the going on concern.

According to Horne & Wachowicz (2008) there are two concepts related with the term working capital, gross working capital concept and net working capital concept. The gross working capital concept refers to the firm's total investment in current assets such as cash and near cash securities, receivables and inventory. The net working capital concept, on the other hand, refers to the difference between the current assets and current liabilities. The meaning for working capital, however, rests on the net working capital concept (Horne & Wachowicz, 2008). It is because the net concept comprises both current assets and current liabilities which are the focus of working capital management.

The accounting definition for current assets and liabilities are given by Bragg (2011) as, current assets consist of cash and other assets that are reasonably expected to be converted in to cash or sold or consumed during firm's normal operating cycle. When the normal operating cycle is less than one year, a one-year period is used to distinguish current assets from noncurrent assets. But, when firm's operating cycle exceeds one year, the operating cycle is the proper period to use for current asset identification. Current assets include cash and short term securities, receivables,

supplies and inventories. Current liabilities on the other hand are obligations classified on the balance sheet statement as current liabilities are to include debts that management of the reporting entity expects to settle in cash within one year of the statement of financial position date, or within one operating cycle, if that period is longer than one year (Bragg, 2011). Current liabilities include accounts and notes payables, and accrued salaries and other outstanding expenses.

2.1.2. Classifications of Working Capital

Classifications on working capital can be made based on two perspectives (Donkor, 2014); *i.e.* value perspective and time perspective.

1. From the value perspective: working capital can be classified as gross working capital (GWC) and net working capital (NWC). The gross working capital refers to the firm's total investment in current assets such as cash and near cash securities, receivables and inventories, whereas, the net working capital refers to the dollar difference between firm's current assets and the current liabilities required to finance those assets (Horne & Wachowicz, 2008). Mathematically net working capital can be expressed as: NWC = Total current assets − Total current liabilities.

2. From the time perspective: because firms face seasonal fluctuations in their operation they would not keep the same level of working capital and based on this timing variability working capital can be classified as permanent and temporary (Donkor, 2014). Permanent working capital refers to portion of the investment in total current assets which remains fixed regardless of the variations in sales; there is always a fixed minimum level of cash, inventories, and accounts receivables maintained in the business even if sales are reduced to a minimum. Whereas temporary working capital represents the additional investment in current assets needed during prosperity and favorable seasons (Mathur, 2010). It increases with seasonal demand and some other special requirements.

2.1.3. The Importance of Working Capital

In an ideal world, net working capital is always zero but in practice, this is not the case as the current assets of a firm are unlikely to ever drop to zero (Ross et al. 2008). Each component of working capital has its own costs and benefits. For instance, holding inventory helps managers to minimize the risk of 'stock-outs' and to deal with seasonal sales but carrying costs will be high. However, having too little inventory could mean running short and losing sales and customer goodwill and may result in disruption in production (Brigham & Daves 2004). With respect to receivables, Salek (2005) lists two conflicting objectives where tradeoffs will be required in order to achieve efficient receivables management. Firstly, in order to boost sales, the criteria for allowing credit needs loosening up but this can result in high bad debt losses. However, tightening it would reduce receivables and bad debt losses but result in lower sales. The second conflicting objective is "to achieve strong receivables management results and provide excellent financial service to customers versus minimizing the cost of the function" (Salek 2005, p7). Finally, firms may be able to get discounts for early payment of their trade credit (Banos-Caballero et al. 2010a) but as pointed out by Berk DeMarzo & Harford (2009), a firm should only choose to borrow using accounts payables if it is the cheapest source of funding, i.e. the free component should always be used but the costly component should be first analysed with respect to its cost and compared with the costs of other sources of funds. Thus, the efficient management of working capital requires the efficient management of these components.

But, as Sebhatleab (2002) further maintained that, the problem of working capital exists because these ideal assumptions are never realistic and, accordingly Berk & Demarzo (2014) regarded working capital accounts as results of market imperfections. In general, as Gupta (2012) stated that, non-ideal production technology and imperfect market and distribution systems of firms are the reasons for existence of current assets that, results in blocked funds of a firm. Hence, every business, regardless of its size and nature, requires a minimum amount of working capital (Awan et al., 2014), though, as Deeposhree (2013) affirmed that the level of working capital requirements differs across firms given the various determinant factors.

Working capital investment and financing needs, in general, are resulted from firm's operating cycle. Operating cycle is the period of time that is extended from the cash investment in goods and services to the time that investment produces cash (Fabozzi & Peterson, 2003). Operating cycle is a product of three main business activities which create unsynchronized and uncertain

cash flows (Moyer et al., 2006), namely: purchasing resources, producing the product, and distributing the product. They are unsynchronized because the cash disbursements are usually taken place before the cash collections, and they are uncertain that the sales and costs cannot be forecasted a head with accuracy. Operating cycle comprises four basic phases for a typical manufacturing company:

i. Purchase raw material, process the raw materials to produce the finished goods.

ii. Sell the finished goods to generate revenue, which may/mayn't be for cash.

iii. Extend credit for customers, creating accounts receivable.

iv. Collect the credits from customer, then generating cash.

Mathematically operating cycle can be calculated as:

Operating Cycle = inventory conversion period + receivables conversion period

2.1.4. Determinants of working capital requirements

The corporate finance literature has no conventional rules or formulas used to determine the working capital requirement of a company. Several factors significantly affect the working capital requirement of an entity (Paramasivan & Subramanian, 2009; Mathur, 2010). For simplicity purpose those factors classified as internal factors and external factors. The following are the list of main factors for working capital requirement with their brief explanation.

Internal factors

Nature and size of the business: The working capital requirements of a business mainly depend on the nature and size of the business. Those firms operated in constriction and trading needs large amount of working capital. However, those firms participate in rendering of public utilities such as transport service needs less amount of working capital. Similarly size also determines working capital needs. Size measured in terms of the scale of operation the firm engaged. A firm with larger scale of operations needs more working capital than a small firm that participates in limited operations.

Firm's production policy: it is also an important factor to determine working capital requirement of firm. The production cycle starts with the purchase and use of raw material and continues until the final finished goods will be produced. The longer manufacturing cycle the more need of working capital. The production policy the firm follows also affect working capital needs. If the firm follows uniform production policy, there is a need of regular working capital on the other hand, if the firm follows seasonal production policy, working capital requirement will depend upon the conditions laid down by the company.

Firm's credit policy: The credit policy of a firm adapts has an impact on working capital requirement of the business. If the company follows liberal credit policy to collect its credit sales from its customers, the firm needs to have more working capital. On the other hand, the firm follows rigid credit policy and grant credit facilities too few potential customers, the firm require less amount of working capital.

Growth and expansion of business: Working capital requirement of a business increase with growth and expansion business. A growing firm needs additional funds to invest in fixed assets and in current assets in order to fulfil its growing production and sales volume. Thus, a growing firm needs additional funds continuously in order to sustain its growth.

Volume of sales: This is another most important factor affecting the size and component of required working capital. Any entity maintains current assets because they support the operational activities which results in sales. The volume of sales and the size of the working capital are directly related to each other. Because *a*s the volume of sales increases, there is an increase in the investment of working capital in the cost of operations, in inventories and in receivables.

Nature of the industry: An asset composition of a business is related to its size and the industry to which it belongs. Small companies have smaller requirements of working capital than large companies, because their scales of operation are limited.

Liquidity and profitability: if a firm is to take greater risks for greater gains or losses, it reduces the size of its working capital in relation to its sales. If it is interested in improving its liquidity, it increases the level of its working capital. However, this policy is likely to result in a reduction of

sales volume and, therefore, of profitability. A firm, therefore, should choose between liquidity and profitability and decide about its working capital requirements accordingly.

External factors

Business cycle: when there are good economic conditions companys' will expand their business operation but will decline an economy is at depression. Consequently, more working capital is required during periods of prosperity and less during periods of economic depression.

Changes in the technology: the technological advancement in the area of production also has effects on the requirement for working capital. When a firm improves the existing machine by latest technology; the new technology may operated in cheap raw materials and the time require during production may be reduced this in turn leads to redaction of working capital needs.

Taxation policy: The tax policies that the governments adopt influence the working capital needs. If the government adapts regressive taxation policy, *i.e.* imposing heavy tax burdens on business firms, the amount of profit for distribution and for reinvestment in business will be reduced. Because of this the firm should borrows additional funds to meet their increased working capital needs. However when a firm adapts relaxed taxation policy, the need for working capital will be reduced. Thus, a typical financial manager of a firm should decide on level of working capital, by considering the above internal and external factors.

2.1.5. Working Capital Management Strategy

As Robles (2016) explained that, working capital decisions that increase profitability normally mean low levels of liquidity, and working capital decisions that maximize liquidity levels would tend to lower firm's profitability. Thus, to keep the balance between those two contradicting goals a firm must design an optimal policies or strategies concerning the levels of each working capital components. According to Moyer et al. (2006) optimal working capital policy is the one that is expected to maximize the shareholders wealth. With reference to this Horne & Wachowicz (2008) maintained that a sound working capital management of a firm underlies two

fundamental decision issues or strategies, which are influenced by the trade-off between profitability and risk. Those decision issues are:

i. The determination of the optimal level of investment in current assets (working capital investment policies).

ii. The determination of the appropriate mix of short-term and long-term financing used to support this investment in current assets (working capital financing policies).

2.1.5.1. Policies on Level of Working Capital Investment

Working capital investment policy deals with issue on how much of firm's resources should be invested in working capital and it is measured by the proportion of current assets to the total assets. Both excessive and inadequate levels of working capital investment are dangerous for a firm. Excessive level of working capital bears high carrying costs and an opportunity cost, a lost profit which could have been generated from other profitable projects, because current assets are the least profitable assets of the firm. Inadequate level of working capital on the other hand represents poor liquidity position of the firm which would cause serious operational problems. Therefore, a firm should adopt an effective working capital investment policy that balances the strike between those costs and benefits (trade-off between liquidity and profitability). In connection with this, a firm may have an optimal level of working capital that maximizes its value (Deloof, 2003; Rahman & Nasr, 2007). But, as Moyer et al. (2006) maintained that there is no unique optimal working capital investment policy equally applicable for all firms, because the various determinants of working capital does not equally influence firms working capital needs. Given those variations, in general, there are three alternative policies with regard to the level of current asset holdings (Brigham & Houston, 2009); namely relaxed or aggressive investment policy, restricted or conservative investment policy and moderate investment policy, which Watson & Head (2007) defined them as follow:

1) An aggressive policy with regard to the level of investment in working capital means that a company chooses to operate with lower levels of stock, debtors and cash for a given level of activity or sales. An aggressive policy will increase profitability since less cash will be tied up in

current assets, but it will also increase risk since the possibility of cash shortages or running out of stock (stock outs) is increased.

2) A conservative policy is associated with maintaining a larger cash balance, perhaps even investing in short-term securities, offering more generous credit terms to customers and holding higher levels of stock. Such a policy will give rise to a lower risk of financial problems or stock problems, but this is at the expense of profitability.

3) The moderate policy falls in a middle path between the aggressive and conservative approaches, the two extreme limits of working capital investment policies.

2.1.5.2. Working Capital Financing Policies

Investments in working capital must be financed; and the primary sources of funds include both current liabilities such as bank loans, credit from suppliers (accounts payable) and accrued liabilities, and long-term finances such as bonds and equities. Each of which have advantages and disadvantages (Brigham & Houston, 2009). Watson & Head (2007) pointed out that short term sources of finance are cheaper and more flexible than the long-term sources of finance. But, on the other hand short-term sources of finance are riskier than long-term sources from the borrower's point of view that they may not be renewable or even when they are, the terms are not favorable. In addition to that, short term interest rates are more volatile than the long term interest. Thus a company must carefully determine a level and mix of those sources of finance which is optimal for it. Then this is about what the working capital financing policy is concerned with. In general there are three alternative policies with regard to the levels and mixes of those short term and long term funds to finance working capital, namely matching working capital funding policy, conservative working capital funding policy and aggressive working capital funding policy (Watson & Head, 2007); which are defined as below:

1) Matching funding policy: also known as moderate financing policy is a WC financing strategy which uses short-term funds to finances the temporary working capital and longterm funds to finance the permanent working capital along with fixed assets. This financing policy tries to match the life of the assets with maturities of the liabilities, though; in reality exact matching is difficult

2) Conservative funding policy: is the WC financing strategy which uses long-term funds to finance not only fixed assets and permanent current assets, but parts of the temporary working capital as well. The risk of such financing policy is lower as there is less reliance on short-term finance, but long term finances have high cost than the short term finance, hence the profitability will be reduced.

3) Aggressive funding policy: this is a reverse of the conservative WC financing strategy which uses short term funds to finance not only the temporary working capital, but parts of the permanent working capital as well. This policy bears high risk of solvency as payment for short term finance are recurrent, but also results in higher profits and increased shareholders value because the costs of short term finance are lower.

2.1.6. Working Capital Operating Cycle

Working capital cycle is also known as operating cycle. Working capital cycle measure the length of time between actual cash expenditure for purchase of factor of production and cash collection from sales of final produced goods. In other terms it is combination of various components of working capital periods. According to Arnold (2008, p.530) operating cycle refers to the length of the time between from procurements of inventory until cash from receivables is accepted.

According to Khan and Jain (2007) operating cycle can be considered as the blood vessel for working capital management. Working capital cycle shows the money invested in various components of working capital follows continuously. Therefore, working capital cycle represents the continuous follows of funds in various components of working capital. Machiraju (1999), suggest that conversion cycle captures the fact that different components of working capital have different life expectancies and are transformed to liquidity flows in different ways. The imbalance between cash inflows and outflows indicate that there is a need of investment in current assets. Cash conversion cycle used as an indicator to determine the net cash conversion and the amount to be financed by working capital.

2.1.7. Theoretical Model on the Determinants of Working Capital

Recent studies indicate three theoretical model that can help us to identify which firm characteristics determine the size of working capital requirement: Trade-off theory, Pecking order theory and Free-cash flow theory.

2.1.7.1. Trade –off Theory

Managers maximize shareholder wealth, the main cost experienced by holding cash is the opportunity cost of the capital invested in liquid assets (Ferreira & Vilela, 2004). With respect to **Dittmar, A., Mahrt-Smith, J., & Servaes, H. (2003).** This cost is often called the cost-of-carry, which means the difference between the return on cash and the interest that would have to be paid to finance an additional dollar of cash. On the other hand, if managers don't maximize shareholders' value, they increase their cash holdings to increase assets under their control and so to be able to increase their managerial discretion (Saddour, 2006). As a result, the cost of cash holdings will increase and include the agency cost of managerial discretion.

The benefits of holding cash stems from two motives. According to the transaction costs motive, the main advantage of holding cash is that the firm saves transaction costs to raise funds and does not have to liquidate assets to make payments. Consequently, firms will hold more cash when it is likely to incur higher transactions costs to convert non-cash assets to cash. Alternatively, firms will tend to hold lower amount of cash when the opportunity costs of cash retention are greater (Bates, Kahle, & Stulz, 2009; Baumol, 1952; Miller & Orr, 1966). The precautionary motive emphasizes that a firm can use the liquid assets to finance its activities and investments if other sources of funding are not available or are excessively costly (Dittmar et al., 2003).

2.1.7.2. Pecking Order

The pecking order theory of Myers (1984) and Myers and Majluf (1984) asserts that to minimize asymmetric information costs and other financing costs, firms should finance investments first with retained earnings, then with safe debt and risky debt, and finally with equity. Extending this theory to the explanation of the determinants of cash leads to the conclusion that there is no optimal cash level but instead, cash is used as a buffer between retained earnings and investment needs. Under this theory, the cash level would just be the result of the financing and investment decisions. Consequently, when current operational cash flows are enough to finance new investments, firms repay debt, to pay dividends and finally to accumulate cash. When retained earnings are insufficient to finance current investments, firms use the accumulated cash holdings and, if needed, issue new debt and finally when they get out of their debt servicing capacity they will issue securities.

2.1.7.3. Free Cash Flow Theory

As argued by Jensen (1986), entrenched managers would rather retain cash than increase payouts to shareholders when the firm has poor investment opportunities. They have incentive to hoard cash to increase the amount of assets under their control and to gain discretionary power over the firm investment decision. By retaining excess cash flow, managers reduce the ongoing need for raising finance from the capital markets, thereby giving them the freedom from capital providers' monitoring. Dittmar and Mahrt-Smith (2007) and Pinkowitz, Stulz, and Williamson (2006) show that cash is worth less when agency problems between insiders and outside shareholders are greater.

2.2. Empirical literature

Because of the ever increasing market competitions and following the recent global financial crisis, businesses have recognized the importance of working capital requirement decisions since recent years. Likewise researchers are unreservedly examining the determinants of working capital requirement, Though the extent of coverage widely varies between the developed and developing economies, researches on the determinants of working capital requirement have been

conducted across the globe. To the knowledge of the researcher it appears there has not been any research conducted in Ethiopia. As a result this study has reviewed relevant literatures from overseas, and presented them as follows :

2.2.1. Overseas Studies

Suleiman, M. & Rasha, T. (2012) have conducted a study on the determinants of working capital requirement in Palestinian industrial corporation by taking a sample of 11 industrial firms that are listed on the Palestine Securities Exchange for eight years time period that ranges from (2004-2011). To investigate the determinants of worling capital requirement they have used Working Capital as the endogenous variable, and some financial and economic variables, such as cash conversion cycle, operating cash flow, leverage, firm size, return on assets, interest rate on loans, and economic growth rate, as exogenous variables. In this study an econometric model were employed and parameters were estimated based on the panel data for 11-industrial companies for eight years (2004 2011). The study found that the cash conversion cycle, return on assets and operating cash flow are a significant determinant and positively related to the working capital requirements,while leverage and firm size are significant but negatively related to the working capital requirements. On the other hand economic variables such as: the interest rate and real GDP growth rate has no significant impact on the working capital. These findings are consistent with several previous studies, for other countries such as Jordan, Brazil, Pakistan, India, Greece, Thailand, Cyprus and Sri Lanka. In addition, it was found that Palestinians firms maintain a sizable working capital which may be due to a long cash conversion cycle (over six months) and to conservative policies due to instable economic and political conditions.

Wasiuzzaman, S & Arumugam, Veeri Chettiar (2013) conducted a study on the determinants of level of investment in net working capital by taking Malaysian public listed firms. And the data were taken from 192 companies spanning a period of 8 years (2000- 2007) and they were employed OLS regression techniques to analyze the collected data. The study were used Net working capital as a dependent variable and different financial and economic variables as an independent variable such as; leverage, age of the firm, operating cash flow, asymmetric

information, board size, board characterstics, growth opportunity, asset tangibility, economic condition, size or capital market access, revenue volatility, board independence and profitability of the firm. The study finds that in times of economic expansion, younger and smaller firms with less tangible assets, low leverage, high immediate sales growth, high operating cash flows, less volatile revenues and low levels of asymmetric information are likely to have the highest investments in operating working capital. Board characteristics, namely size and the independence of the board, are not found to have any significant influence on the working capital investment of firms.

Binti M, Siti B (2013) investigated the practice of working capital management in Malaysian context, particularly in Malaysian public listed companies. For the purpose of the study a total of 150 public listed companies from 7 different sectors that is listed in Bursa Malaysia main market covering the period of 2002 up to 2011 was undertaken. The study were used cash conversion cycle and working capital as a proxy for working capital requirement while debt, capital expenditure, free cash flow, growth domestic product and growth of the firm used as a determinant variable. The study were analyzed by employing correlation and pooled ordinary least square regression model. The study reveals that out of five components selected for the study, DEBT shows negative significant relationships with CCC and WCR. Whereas, Capital expenditure shows positive significant with CCC and negative significant with WCR while Free cash flow shows negative significant with CCC and positive significant with WCR. To conclude, by applying correlations and regression analysis, the result shows that there are significant associations between working capital and its determinants factors.

Guizani, M. (2017) have conducted a research on the financial determinants of corporate cash holding of in an oil rich country : Evidenced from Kingdom of Saudi Arabia the study were investigated for the sample of Saudi firms over a period of 3006- 2014, and the collected rata were analyzed by using static and dynamic panel regression model. In this study corporate cash holding were used as dependent variable and several financial factors such as ; leverage, dividend payment, profitability, growth opportunity, capital expenditure, firm size, cash flow

volatility, net working capital and oil price were considered as an independent variable. The results of the study show that leverage, firm size, capital expenditure, net working capital and cash flow volatility are the main determinants of cash holdings of Saudi firms and profitability, dividend payment, growth opportunity, and oil price were not significant factors for the determination of the corporate cash holding of Sadi Arabian selected firms.

A study by Azeem, M and Marsap, A. (2015) investigated on determinant factors and working capital requirement of Pakistani non-financial firms by taking into account different economic and financial variables relating to the business over a period of six years (2004–2009). Pooled Ordinary Least Square (OLS) regression models were used to estimate the determinants of working capital requirement. The study found that operating cycle, return on assets, leverage, size and level of economic activity is negatively related to working capital requirements of a firm whereas operating cash flows and sales growth are positively related to working capital requirements. And the study concluded that working capital requirement has a significant relationship with operating cycle, in the same way there is significant relationship between operating cash flow and working capital requirement of Pakistan firms, there is no significant relationship between level of economic activity and working capital requirement, the study also found there is significant relationship between working capital requirement and return on asset, there is no significant relationship between sales growth and working capital requirement of Pakistan firms, the other finding is that there is significant relationship between debt of the firm and working capital requirement and finding relating to size of the firm is that there is significant relationship between working capital requirement and size of the firm.

According to the study of Manoori , E & Joriah ,M. (2012) on the determinants of working capital management in the case of Singapore firms by employing panel data analysis including Pooled OLS, random effects and fixed effects estimations For the data that were gathered from Data Stream database that included the secondary data of the financial statement of firms listed in the main board of Singapore Exchange (SGE. The study found the ratio of operating cash flow to sales is negatively correlated to the working capital management at significant level 10%.

Both GDP and firm size are correlated negatively to CCC at significant level 1%. Meanwhile, the debt ratio is positively correlated to the cash conversion cycle. It reveals that Singapore firms might use long-term debts to finance their working capital. Moreover, firm's sales growth positively is correlated to the working capital management. Generally the result of the study were the result of fixed effect estimation shows that the Cash flow to sale, Capital expenditure and GDP negatively and significantly are correlated to the cash conversion cycle. Moreover, Return on asset and sales growth are positively correlated to the Cash conversion cycle.

A study of Nazir, M & Afza, T.(2009) Working capital requirement and the determining factors in Pakistan by employing a study of 132 manufacturing firms from 14 industrial groups that were listed on Karachi Stock Exchange (KSE) between the periods 2004-2007 was undertaken. While the working capital requirement were used as the dependent variable, various financial and economical factors, such as operating cycle of the firm, level of economic activity, leverage, growth of the firm, operating cash flows, firm size, industry, return on assets and Tobin's q, were used as the determining factors of working capital management. The pooled panel regression model result found that Leverage of a firm is strongly and negatively related to the working capital management of a firm, indicating that with a rising debt to total assets ratio, the firms are supposed to pay more attention to efficient management of working capital to avoid much capital being tied up in accounts receivables and inventories. So, companies with an increasing debt to total assets ratio (high leverage) show lower working capital requirements. That is in accordance with the Pecking Order theory , OCF_TA is positively associated with the working capital requirements, though it is not statistically proved. Level of economic activity is not found to have any significant effect on working capital management practices of firms in Pakistan. Further, the study is unable to find any statistically significant relationship between the working capital requirements and size of the firms and sales growth.

A study of Adekunle, A (2015) investigated on the determinants of working capital requirement of Nigerian firms and the study examine the determinants of working capital requirements of thirty non-financial firms listed on the Nigerian Stock Exchange between 2004 and 2011. Panel

data methodology were employed and Ordinary Least Squares (OLS) used as estimation technique. The Working capital requirements (firm's net working capital deflated by total assets) were used as dependent variable. Regression results reveal that five explanatory variables- firm's leverage, size, industry classification, return on asset and operating cycle are significant factors that determine the firms' working capital requirements for the period under study. The outcome of the study supports the findings of some previous studies and is also consistent with financial theory. The finding of the study is strong positive and significant relationship between ROA and working capital requirements. Operating cycle is seen to be positive and significantly related with working capital requirements. This indicates that firm with high operating cycle will require high investment in working capital items. Industrial sector classification and working capital requirements are seen to be positively and significantly related in 13 out of the 14 industrial sector classifications. The relationship between working capital requirements and both growth rate and level of economic activities is negative but not significant.

2.3. Literature Summary and Knowledge Gap

Finance scholars have provided many theoretical explanations and dozens of empirical studies associated with firms financial decision makings. Even so, still there are an addressed knowledge aspects with regard to the financial decision makings, specifically on the determinants of working capital requirement . This study has identified the following knowledge gaps

Though, since recent years the topic how different determinant factors affect the level of net working capital requirement has gained considerable researchers attention, still there is no clear cut explanation whether different determinant factors is positively or negatively affecting the level of net working capital requirement . The literature remained full of controversies and confusions regarding the direction of the relationship between net working capital requirement and key determinant factors.

Most of the extant theoretical explanations and empirical evidences on the literature had based their argument in the context of developed economies. Little attention has been paid to developing economies, where firms of small size operate in undeveloped or nonexistent capital markets. Besides, the inadequate evidence that is available on the literature from developing

nations' context is delimited to the Asian and western African countries. Hence, it would be difficult to generalize the findings of those scanty researches to other developing nations, countries with different cultural endowments, economic developments and regulatory frameworks.

As it is the case for most developing nations, research on the determinants of working capital requirement in Ethiopia, is a recent phenomenon and not yet examined and there is scanty evidence available on the database evidencing from Ethiopian business organizations.

2.4. Conceptual Framework of the Study

A conceptual framework shows the existing relationship between independent and dependent variables. It is developed from the theoretical explanations and prior empirical findings, reviewed so far in this study. The dependent variable in this study is working capital requirement, which is measured by(current asset- current liability /total asset) (NWC-TA). While the independent variables in this study are cash conversion cycle, return on asset, operating cash flow, leverage, firm size, fiem growth, real GDP growth rate and inflation rate. Thus, this study has made inclusions of these variables. The conceptual framework for this study seems as follow:

Figure 2.1; Coneptual framework of the study

Internal factors

Growth rate

Cash conversion cycle

Return on asset

Operating cash flow

Leverage

Working capital requiremen t

External Factors

Real GDP growth rate

Inflation rate

Source: Researcher's own 2018
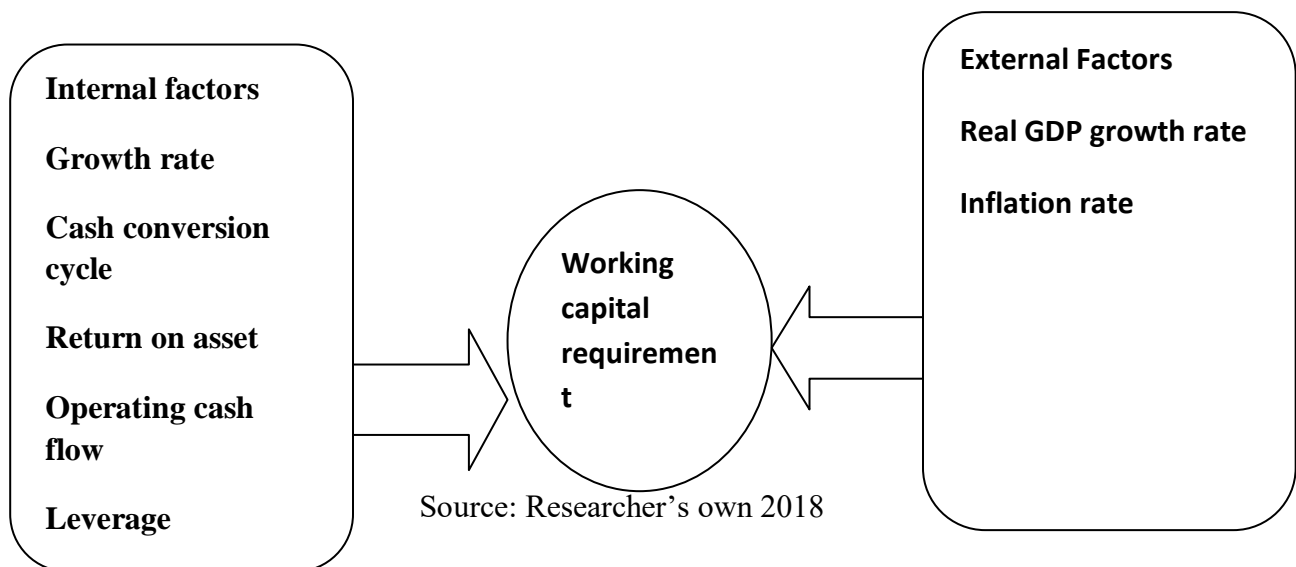
CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

The purpose of this chapter is to explain how the research would be undertaken to achieve the stated research objectives. This includes the research design, sampling design, data sources and collection methods, variable descriptions and measurements, data and statistical models which would be used to examine the determinants of working capital requirement measures.

3.1. Research Design

Research design is the conceptual structure within which a research is to be conducted and it involves decisions regarding what, where, when, how much and by what means the research study will be conducted (Kothari, 2004). It is the blueprint or structural plan for data collection, measurement and data analysis activities of a particular study. There are three main alternatives of research approach exists in which their main difference is based on nature of research, the objective of the study and the instruments used during data collection, analysis and interpretations. These are quantitative, qualitative and mixed methods approach (Creswell, 2009).

The main purpose of this study is to examine the determinants of working capital requirement and by considering the nature of the problem and objective of the study quantitative approach is appropriate for this study. Quantitative approach is one of the approaches of research which is structured, systematic and scientific investigation of variables and their relationship. This approach starts from theory and known facts and mathematically proofs that theory by using different analysis techniques and finally objective generalizations are made. According to Abiy Z, Alemayehu W, & Daniel T, (2013) explained that research objective and hypothesis developed will determined research design which used by the researcher. In order to achieve the

objective of this research, the study adapts explanatory research. The rational for choosing explanatory research design is ; it used to examine the cause and effect relation between dependant and independent variable, to explain how they affect and the reason and to know the magnitude of relation between them. It also used to examine the trends over time and to compare across different firms and to proof already existing theory and to made prediction and generalization (Abiy et al., 2013). Therefore, in order examine the determinants of working capital requirement , to determine the magnitude of the relationship between how and to what extent various financial and economic factors affect the level pf working capital requirement and this study adapts explanatory research design which is appropriate.

3.2. Data Type and Data Sources

The required data to analyze the determinants of working capital requirement was quantitative in nature, accounting figures extracted from audited annual financial statements (basically the balance sheet statement and income statement) prepared by the sample companies for the past five most recent consecutive years covering from 2011 to 2015. The reason to limit the time period with in those five years is due to data unavailability for years beyond. Data from most of the companies is available only for those years. From the financial statements, values for the study variables were computed through the help of accounting ratio analysis. Thus, the data required for this study were solely obtained from secondary sources (financial statements) and was collected through document review.

The data for this study (the financial statements) was collected from authoritative governmental agency of Ethiopian Revenue and Customs Authority (ERCA), large taxpayers' branch in Addis Ababa. Due to the confidentiality nature of those financial data and the prevailing inexperience to publicly release information, Ethiopian companies are in general reluctant to provide the required data. For that matter and due to difference in operational locations data was collected exclusively from ERCA. The data is highly reliable because the financial statements are submitted for income tax purpose and ERCA assures their reliability for its own purpose. Addis Ababa was also be selected as study location due to the fact that it is the economic and commercial center of the nation where most manufacturing and other business activities takes

place with good business practices. In addition, its relative proximity for data collection makes it convenient for the researcher.

3.3. Sampling Design

Sampling design signifies for the definite plan designed to obtain a sample units from a given population; it includes the technique or the procedure the researcher has adopted while selecting Items for inclusion in the sample, and the total number of the items included in the sample (Kothari, 2004). The target population of the study was defined to Food and Beverage manufacturing firms in Addis Ababa city administration that are registered in ERCA large taxpayers' branch office. In view of the International Standard Industrial Classification (ISIC), manufacturing business enterprises in Ethiopian context are classified as follow (MOT, 2013):

✓ Manufacture of food products, beverages and tobacco products

✓ Manufacture of textiles, clothing and leather goods

✓ manufacture of wood & of products of wood & cork, except furniture; manufacture of articles of straw & plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media

✓ Manufacture of other non-metallic mineral products

✓ Manufacture of basic metals, fabricated metal products, machinery and equipment

✓ Manufacture of electrical machinery and apparatus

✓ Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks.

✓ Manufacture of furniture; Manufacturing of office and household furniture, manufacturing of recreational equipments, recycling of metals and non metal wastes and scraps etc.

In addition to this industrial classification, lists of manufacturing industries with similar characteristics are amalgamated, for brevity purpose, into eight broad categories in Ethiopian revenue and customs authority (ERCA) database. Those categories include food and beverage products industries, textiles and apparel products industries, leather and leather products

industries, wood, paper and paper products industries, chemical and chemical products industries, rubber and plastic products industries, other non-metallic mineral products industries, and metal and engineering products industries. On this regard, the manufacturing sector has been exclusively considered while specifying the study area. This is due to the fact that manufacturing companies have all components of working capital (cash and marketable securities, inventories, receivables and payables), therefore, they are the most appealing sector of an economy for working capital purpose. In addition, preliminary works on the topic are most dominantly in this sector and therefore, for the sake of comparison this study sought to be consistent with those studies.

Then after, when coming to define the population framework, the researcher deliberately delimited his considerations only to large taxpayer industries of food and beverage manufacturing firms. The logic behind this delimitation emanated from review of related researches in Ethiopian context and also it is for the reason that, data for most of the manufacturing firms is available in ERCA large taxpayers' branch. With reference to the tax payment category, Ethiopian revenues and customs authority (ERCA) has increased the entry point of large taxpayer category to Birr 27 million in annual sales turnover, which previously has been Birr 15 million. This change has been in effect since August 7, 2013 and it was made to revise the decree passed on July 2010, for the 15 million entry point

Since the year 2010 there have been several empirical studies on the impact of working capital management on the profitability of Ethiopian manufacturing industry , specifically in Addis Ababa with the exception of the determinants of working capital requirement. Earlier studies on the impact of working capital in the profitability of manufacturing companies including Mulualem (2011) and Mifta (2016) have defined their population frameworks to include all manufacturing companies and have been involved in stratified sampling based on which they stratify the samples in to industry classes. Thus, they have taken proportionate samples from each of those industry classes, proportionate to their total number. While doing this, however, industry classes with relatively lower number of companies were given less weight and less coverage on the topic. The determinants of working capital requirement of the selected industries is not yet examined , and in the pretext of the name manufacturing companies, its reality remained hidden. In addition data availability to undertaken the study induce the researcher to do

so. Thus, this study paid its due attention to the hidden realities of those industry classes and the determinants of working capital requirement of manufacturing companies were examined with data from member companies of those industries that met further selection criteria imposed by the researcher.

Then, certain sampling yardsticks were employed to arrive at the final sample unit. First to be included in the sample a company should have its financial statement, specifically balance sheet and income statement for the entire period under investigation, covering from 2011 up to 2015. Second, companies with special figures and unusable values in some items of balance sheet and income statements were deliberately excluded. Third, balanced panel data were chosen over the unbalanced one, with an intention to give equal chances of observations, therefore companies with missing yearly figures in one or more variables of the study were removed from the sample. Due to the application of those criteria, manufacturing companies that belong to food and beverage classes were included in the final sample.

3.4. Data Analysis Techniques

Once the required data has obtained, data computations and entries were made with the help of Microsoft Excel. Values of measurement variables were derived from combinations of two or more balance sheet and income statement items in Excel. Then, having entered and computed the values of the variables, data were processed by using STATA version 13 software program for meaningful analysis. Analysis of data was undertaken to show important relatinships of the selected variables in the study. To this end, mix of both descriptive and statistical analysis were employed.

3.4.1. Descriptive Analysis

This is the first analysis used in any study and normally helps the researcher to obtain a summary detail of the collected data. In this study descriptive analysis were used to describe patterns of behavior or relevant aspects of the data values and detailed information about the variable selected. This descriptive analysis shows the average and standard deviation of the different variables of interest in the study. It also present the minimum and maximum values of the

variables. Thus, it was helpful in gaining a picture about the maximum and minimum values of a variable can achieve.

3.4.2. Quantitative Analysis

Quantitative analysis were used to determine the nature and extent of the relationships of financial and economic factors and working capital requirement measures. It helps to test the hypotheses of the research. This study were employed two types of quantitative analysis methods namely: correlation and regression analysis.

3.4.2.1. Correlation Analysis

This study was designed to assess the relationship between various financial and economic factors and working capital requirement and thereby to test certain hypotheses developed for the extant relationship. The correlation coefficient of any two variables lies between -1 to +1. If the coefficient is 0, it is to mean that there is no association between the two variables. A correlation coefficient of +1 it indicates the existence of strong positive correlation between the variables, whereas a correlation coefficient of -1 indicates the existence of strong negative relationship between the variables. The positive sign indicates increase in one variable will increase the other variable. On the other hand a negative sign means increases in one variable will reduce the other variable.

3.4.2.2. Regression Analysis

To examine the determinants of working capital requirement and to test the research hypotheses this study were employed pooled panel data regression analysis, because the data has both time series and cross-sectional dimensions. Panel data is more useful in studying the dynamics of adjustment, and is better able to identify and measure effects that are simply not detectable in pure cross-sections or pure time series data. Moreover, many variables can be more accurately measured at the micro level and biases resulting from aggregation over firms or individuals are eliminated (Rahman & Nasr, 2007). In pooled ordinary least squares time series and cross-

sectional observations are combined in determining the causal relationship between net working capital and the independent variables of working capital requirement measure (Ncube, 2011). From the ongoing explanation, it is apparent that ordinary least squares (OLS) regression analysis was used. For this reason, diagnostic tests of classical linear regression model assumptions were run prior to the regression analysis. Classical tests of normality, heteroscedasticity, multicollinearity and hausman were made specifically.

3.5. Variable Descriptions

While reviewing related researches that analyzed the determinants of working capital requirement this research identify key proxy variables that have been used to measure the size of net working capital ,and other factors that inherently affect the size of net working capital measure were used as dependent variable, and net working capital measures (Leverage , Size of the form , Cash conversion cycle,Operating cash flow, Growth opportunity, Return on asset, Inflation rate , and Real gross domestic product (GDP) were the independent variables employed in this study.The variable selection was influenced by previous studies conducted on the determinants of working capital requirement across a globe.

3.5.1. Dependent Variable

Dependant Variable is variables that depend on other variable and some wants to estimate. This study were used Net Working Capital Deflated by total asset (NWC-TA). The study were tried to find the determinants of working capital requirements of the manufacturing firms, so the researcher were employed net working capital deflated by total assets as a dependent variable and measured NWC-TA = (current assets- current liabilities)/ total assets

The use of Net working capital deflated by total asset as a dependent variable to measure the size of net working capital is in line with the prior studies such as Suleiman M . Abbadi & Rasha T,(2012).

3.5.2. Independent Variables

A variable that influences the dependent variable in either a positive or negative way is termed as independent variable. For every unit of increases or decreases in the independent variable, there is an increase or decrease in the dependent variable. In this study the explanatory or independent variables of net working capital measures were used to examine the extent that the dependent variable (Net working capital of the manufacturing companies) changes every year, depending on the changing values of those independent variables.

1. Cash Conversion Cycle (CCC), cash conversion cycle is defined as the number of days needed to convert its purchases from raw materials to finished product and sell it for cash. The longer the cash conversion cycle, the greater the net investment in current assets, and hence the greater the need for financing of current assets, and it is calculated by:

CCC= Average collection period + inventory turnover in days – Average payment period.

2. Operating Cash Flow (OCF), is the cash the firm will obtain from its routine operations. The researcher was collected the data from the income statement then it is deflated by total assets. Positive operating cash flow enables firms to finance positive working capital requirements allowing a more conservative operating working capital strategy, thereby facilitating future sales growth; however firms with negative operating cash flows must finance positive working capital requirements through other sources (Ranjith 2008), (Hill et.al. 2010). It is calculated by: OCF=(EBIT + Depreciation – Taxes)/Total Assets

3. Firm Size (Size), Pendey and Perera (1977), and Moussawi (2006) verify that the size of the company has an influence on the overall working capital policy and approach. They used the natural logarithm of total assets of the firm. Some other studies used log of sales as size measure (Deloof 2003). *SIZE=Log (Total Assets)*

4. Leverage (LEV) which is the financial debt ratio that is used in order to establish the relation between the external financing of the firm and its total assets. According to the Pecking Order Theory, a company with short funds will tend to raise capital from inside before issuing new

stocks or borrowing money from outside, since raising capital via new securities will have issuing costs besides more outside monitoring and limitations. Narendre et,al. (2009) found that a higher debt ratio is due to less capital available for daily operations, so the firm may have to raise capital from outside in response to a lack of funding, plus exercise caution in working capital management so as not to aggravate the shortage of funds. Nazir and Afza (2009) also used the leverage ratio as an independent variable in their study to determine the factors that affect working capital management in Pakistan. This variable can be measured through the following equation: LEV= (Short Term Loans+ Long Term Loans)/Total assets

5. **Real GDP Growth Rate (RGDPR)** Economic growth is probably one of the most reliable economic indicators; it is the best measure of changes in economic activities. The changes in economic conditions may have an effect on managing the firm more efficiently. Lamberson (1995) stated that small firms respond differently in working capital management to changes in economic activities. The working capital policy is not static over time; it varies with the changes in the state of the economy. Rate of growth of GDPR is used as an indicator of economic growth.

6. **ROA** is the variable that is mostly used in empirical studies to proxy financial performance. Following the prediction of the Pecking Order Theory, a negative relationship between ROA and working capital requirement should be expected. However, Nazir and Afza (2008) posit that since highly profitable firms have the cash to invest in investment activities, they would not be concerned with efficient working capital management. Thus, they submit a positive relationship between ROA and working capital level. Thus, the effect of ROA on working capital requirements can be either positive or negative

7. **Firm growth:** The effect of growth opportunities on working capital can be done via trade credit grant or investment in inventories. Anticipation of the future sales growth might cause to increase the amount of investments in inventories. We were used the ratio of sales growth as a proxy for firm growth as used by Gill (2011), Zariyawati, et al (2010) and Caballero, et al,(2009).

8. **Inflation rate**: The term inflation refers to rise in general (on an average basis) price level of goods and services in the economy, i.e., fall in purchasing power of money. Working Capital is the money used to make goods and attract sales. During the period of rising prices, a firm needs

more funds to finance working capital. Hence, it should be planned properly. Not under-standing the impact of inflation on working capital has been the cause of many business failures. Cost of financing the working capital rises because of increase in interest rates.

3.6. Analytical Model Specification

On this study the determinants of working capital requirements of selected manufacturing companies were analyzed using panel data regression of cross-sectional and time series data. Pooled Ordinary least square regression, also called the constant coefficients model is a regression model in which both the intercepts and slopes are constant, where the cross section firm data and time series data are pooled together in a single column assuming that there is no significant cross-section or temporal effects (Rahman & Nasr, 2007). This study were employed bpooled ordinary least squares regression analysis for the same reason which Ncube (2011) has pointed out that, the prime objective of this study was not necessarily to investigate the net working capital requirement variations within the manufacturing companies. Rather it is to examine the variation in net working capital requirement due to the determinant factors of those manufacturing industries. The objective of this study was to establish statistical significant relationships between different determinant factors and working capital requirement of the selected manufacturing industries. Moreover this choice was made with the intent of maintaining consistency with many previous studies. The study were used panel data for the period 2011-2015 and an OLS regression model to estimate the determinants of working capital requirement. The model is as follows:

$NWC\_TA\ t_i = \alpha + \beta 1 ti + CCC\ t_i + \beta 2\ OCF\text{-}TA\ t_i + \beta 3\ LN\ Size\ t_i + \beta 4\ LEV\ t_i + \beta 5\ ROA\ t_i + \beta 6\ GR\ t_i + \beta 7\ RGDPGR\ t + \beta 8\ IR_t + €$ Where; NWC-TA is net working capital deflated by total asset (current asset – current liability) ÷ Total asset . α is constant term of the model, CCC is cash conversion cycle, OCF-TA is operating cash flow deflated by total asset , LN Size Natural log of total assets as proxy for the size of firm, *Lev is* Leverage as measured by debt to total assets ratio of firm, ROA is Return on assets for firm *I, GR is* Sales Growth of firm *,* RGDPGR is the real gross domestic product growth rate change, INR is inflation rate and € is the error term.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This chapter has presented the processed output from the raw data collected through the methodology specified in the previous chapter. Values for the dependent and independent variables were extracted from data sources and computed by the help of Microsoft excel. Then raw data was entered in to STATA software to further process it. Finally the data has presented in this chapter with the help of descriptive statistics, correlation and regression analysis. In addition, Diagnostic tests of classical linear regression model assumptions were made in order to verify whether the data used have met the assumptions underlying the ordinary least squares regression and if possible to remove the diagnostic problems.

4.1. Results of Descriptive Statistics

Descriptive analyses were used to describe patterns of behavior or relevant aspects of the data values and detailed information about the variable selected in this study. This descriptive analysis revealed the mean values and standard deviations of the different variables of interest in the study. It has also presented the minimum and maximum values of the variables. It is helpful in gaining a picture about the maximum and minimum values a variable that can achieve

This study used a total of 9 continuous variables containing one dependent variable (Net working capital), 8 independent variables (cash conversion cycle, return on asset, operating cash flow, leverage, firm size, growth of sales, real GDP growth rate and inflation rate as measures of determinants of working capital, This section, the descriptive statistics, has presented the mean distribution, standard deviations, minimum and maximum values of the variables during the study period of 2011 to 2015, for the whole sample units.

From Table 4.1 below, the mean value of net working capital is 25.74 percent with standard deviation of 42.20 percent and the minimum value of net working capital is -85.18 percent while the maximum is 98.79 percent. Those figures shows that, net working capital of the sample firms as measured by net working capital deflated by total asset, was about 25.74 percent on average throughout the five years study period covering from 2011 to 2015 and it deviates from the mean value to both sides by 42.20 percent. A minimum of -85.18 percent NWC -TA is observed, indicating that a negative net working capital of 85.18 percent have been incurred while a maximum of 98.79 percent NWC -TA have been generated by the manufacturing firm, i.e. there is a wide range of NWC –TA among the sample firms.

Table 4.1: descriptive statistics of all variables

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
NWC-TA	175	0.2574349	0.4220049	-0.8518	0.9879
CCC	175	151.1042	172.2579	-747.0196	943.6585
ROA	175	0.1132531	0.2504263	-0.7095	0.9985
OCF-TA	175	-0.0140434	0.3422458	-0.8273	0.9879
LEV	175	0.4073503	0.2306466	0.0021	0.9956
LNFS	175	7.933429	0.6324003	6.5433	9.8922
GR	175	0.1891977	0.3106931	-0.223	2.3676
RGDPGR	175	0.1014	0.0087566	0.087	0.114
INR	175	0.163	0.0971407	0.077	0.341

Source : financial statements of sample firms (STATA out put)

Regarding the independent variables a descriptive summary statistics of Net working capital ratios. Of the determinants of net working capital ratios, one is the cash conversion cycle, a proxy variable to measure the number of days needed to convert its purchases from raw materials to finished product and sale it for cash. . On this table, the mean value for cash conversion cycle (

CCC) is 151 days with a standard deviation of 172 days. This shows that firms in the sample take around 151 days long, on average, to convert their inventories into sales, collect cash from their credit sales and finally to make cash payment for their credit purchases, and it deviates by around 172 days to both sides of the mean distribution. In addition to, a minimum value of cash conversion cycle, -747 days, was observed implying that some firms in the sample take longer period of time to pay for their creditors than the days they take to sell their inventory and collect cash from their credit sell. The maximum value is about 944 days and it shows that firms in the sample wait up to 944 days to make cash inflows from sale of inventories even after they made payments for creditors

Another measure of net working capital is return on asset one of the most widely used measure of financial performance of a firm, as it shown from the above table the mean value of return on asset (ROA) is 11 percent with a standard deviations of 25 percent .The minimum values of return on asset is – 70.95 percent. Those figures shows that, profitability of the sample firms as measured by return on asset, was about 11 percent on average throughout the five years study period covering from 2011 to 2015 and it deviates from the mean value to both sides by 25 percent..

Operating cash flow ratio has a mean value of 14.04 percent with standard deviations of 34.22 percent that deviates from the mean in both sides of the distributions. The minimum value of operating cash flow ratio is – 82.73 percent and the maximum value is 98.79 percent of the total asset.

.The mean value of leverage or debt ratio for the sample firms is around 40.74 percent with standard deviation of 23.06 percent showing that on average 40.74 percent of the total investment in the sample firms is financed by debt. The minimum and maximum values of this variable are around 2.1 percent and 99.56 percent respectively, the maximum value showing a little troublesome on the going on concern of some sample firms.

Firm size, expressed in natural log of total assets, was the other independent variable used and the mean value for this variable was around 7.93 with standargfvd deviation of 0.6324. This shows that firm in the sample have a size of around 7.93 on average and it deviates by 0.6324 to

both sides of the mean distribution. The minimum value for firm size was 6.54 representing while the maximum is 9.89 among the sample firms.

The average growth rate among the sample firm is around 18.92 percent with a standard deviations of 31.07 percent. The minimum and maximum growth rate among the sample firm is 22.3 percent and 237 percent showing that there is a wide range in between.

Real GDP growth rate has a mean value of 10.14 percent with a standard deviation of 0.876. The minimum and maximum rate is about 8.7 and 11.4 percent.

Inflation rate has a mean value of 16.3 percent with a standard deviations of 9.71 percent and the minimum and maximum value is about 7.7 and 34.1 percent.

4.2. Correlation Analysis

Prior to regression analysis it is important to check the correlation between the different variables of the study. Correlation analysis were used to explain how two variables react to each other or what change will occur in one variable with a unit change in other variable. Correlation analyses is used to examine the degree of linear association between two variables (Brooks, 2008). The value of correlation lies between +1 and-1. A correlation coefficient close to either –1 or +1 indicates that there was strong inverse or direct relationship between variables respectively; where as a correlation coefficient of zero indicates that the variables are uncorrelated.

Correlation analysis was conducted in this section in order to analyze and examine the relationship between net working capital and its determinant.

4. 1Table 4.2 Correlation matrix between variables

NWC-TA	CCC	ROA	OCF-TA	LEV	LNFS	GR	RGDPGR	INR
1.000								
0.1979	1.000							
0.3056	0.1211	1.000						
0.0865	-0.006	0.1696	1.000					
0.0019	0.0532	0.0417	0.0373	1.000				
-0.5197	0.1422	-0.205	0.0666	-0.085	1.000			
-0.0246	0.0990	-0.027	-0.001	0.1419	-0.023	1.000		
-0.082	-0.098	0.0220	-0.078	0.0006	-0.023	-0.257	1.000	
-0.028	0.0060	-0.064	0.0819	-0.084	0.0420	0.0269	-0.6205	1.000

Source : Financial statements of sample firm (STATA out put)

As shown from the correlation table 4.2 , there is a positive correlation coefficient between NWC –TA and CCC of 0.1979. This implies that the longer the cash conversion cycle, the greater the net investment in current asset.

Net working capital and return on asset has a positive correlation coefficient of 0.3056 which indicates the more the firm is profitable, the greater the cash to invest in investment activities.

In similar fashion, the correlation coefficient between net working capital and operating cash flow is 0.0865. This positive relationship implies that the higher the operating cash flow, the larger would be the amount to be invested in working capital items and vice versa.

Likewise, the correlation coefficient between net working capital and firm size is (- 0.5197). This negative relationship between net working capital and size of a firm may be due to the power over their supplier to get credit on their purchases.

The correlation coefficient between net working capital and growth of the firm is (- 0.0246). This negative relationship implies that the higher the growth of the firm as measured by sales growth, the lower the net investment in working capital items.

Finally the correlation coefficient between net working capital and inflation rate is (-0,0288). This negative relationship implies that as the purchasing power of money decreases over time there will be a greater investment in working capital items (current liabilities). In the correlation analysis conducted for this study relatively higher correlation coefficient are observed between the independent variables of GDP and firm size by the amounts of -0.2571. To sum up in this correlation coefficient analysis the highest correlation coefficient is observed between NWC – TA and INR by the amounts of -0.6205 which is acceptable by most researchers. According to Brooks.(2009) up to 0.90 correlation between variable is accepted which is by far greater than the results of this study.

4.3. Diagnostic Tests of OLS Assumptions

 This study is going to examine the determinants of working capital requirement in selected food and beverage manufacturing firms in Addis Ababa. And an analysis that involves in examining and describing the relationship between two or more variables is known as regression analysis. Owing to its instinct attractiveness and with relatively less mathematical complexity involved, ordinary least squares remained the most extensively used method of regression analysis (Gujerati, 2004). But, the instinct attractiveness and other spectacular theoretical and practical merits of using OLS in regression analysis are bounded by sets of restrictive assumptions, under which the violations of such bounds impose another threat to the regression analysis and the attractiveness of OLS is depleted. Thus, in order to have an analysis with sense of rationality and as a result to generate reliable results, a study using this OLS method should pass tests of those restrictive assumptions. In line with the studies by Ncube (2011) and Donkor (2014) the following specific diagnostic tests have been conducted for this study;

4.3.1. Normality Test

One classical assumption of the ordinary least squares regression analysis is the normality of the error terms, in which the error terms are assumed to be normally distributed with a mean of zero and constant variance term, As Rawlings et al. (1998) stated that the assumption that the error terms are normally distributed is not necessary for estimation of the regression parameters and partitioning of the total variation rather it is needed only for tests of significance and construction of confidence interval estimates of the parameters. This assumption is particularly essential if the sample size is small however, for sample sizes that are sufficiently large, violation of the normality assumption is virtually not a big concern.

According to a central limit theorem, the test statistics will asymptotically follow the appropriate distributions even in the absence of error normality. However, in case of small sample size important to meet the assumption of normality for the p- values of   the F- test should have to be greater than 0.05 to be valid (Brooks, 2008).

4. 2Table 4.3.Shapiro – Wilk test for normality

Variable	Observation	W	V	Z	Prob> Z
Residual	175	0.98759	1.649	1.143	0.12660

Source : Financial statements of sample firm (STATA output)

As it presented in table 4.3 the probability of Shapiro-wilk w test is 0.12660, which is greater than 0.05 so that the data that have been used in this study is normally distributed.

4.3.2. Multicollinearity tests

Another classical assumption of the ordinary least squares is that there is no correlation between the independent variables. Because if there is a relationship between two or more independent variables, adding or dropping one variable in a model would result in change of the value of another variable's coefficient, making precision coefficient determination difficult. In practical context, however, value of the linear relationship between the independent variables would be a non-zero and the concern is not in the nature rather in the degree of their relationship.

However, a serious difficulty arises when the relationship between the independent variable is highly strong and this is what the so called problem of multicollinearity in econometrics modeling. In this juncture, as Brooks (2008) explained that two classes of multicollinearity can be identified, perfect multicollinearity and near multicollinearity. Accordingly, perfect multicollinearity happens when there is an exact relationship between two or more independent variables, and in the presence of this perfect multicollinearity it would not be possible to estimate all coefficients of the model. The other class, near multicollinearity, involves when there is minor and not perfect relationship between two or more independent variables, and is not a prime concern as it would not pose a serious difficulty to the precision of the coefficient parameters. There is no clearly defined rule how much correlation between variables causes multicollinearity. According to Hair et al. (2006) multicollinearity may not a serious problem for the correlation coefficient among the variables are less than 0.90. Pallant (2005) argues that multicollinearity is a serious problem when the correlation between two independent variables is more than or equal to 0.9. Multi-correlinearity exists only when the correlation coefficient between explanatory variables is greater than 90% (stat notes, 2007)

Table 4.4. Correlation matrix between explanatory variables

	NWC-TA	CCC	ROA	OCF-TA	LEV	LNFS	GR	RGDPGR	INR
NWC-TA	1.000								
CCC	0.1979	1.000							
ROA	0.3056	0.1211	1.000						
OCF-TA	0.0865	-0.006	0.1696	1.000					
LEV	0.0019	0.0532	0.0417	0.0373	1.000				
LNFS	-0.519	0.1422	-0.205	0.0666	-0.085	1.000			
GR	-0.024	0.0990	-0.027	-0.001	0.1419	-0.023	1.000		
RGDPGR	-0.082	-0.098	0.0220	-0.078	0.0006	-0.023	-0.257	1.000	
INR	-0.028	0.0060	-0.064	0.0819	-0.084	0.0420	0.0269	-0.6205	1.000

Source : Financial statements of sample firm (STATA output)

As it presented in the above correlation matrix table 4.4 , there is no correlation greater than 0.9 which indicate that there is no multi-corelinearity problem in the model.

4.3.3. Heteroskedasticity Tests

Another main assumption of the ordinary least squares regression is that the homogeneity of the variance of the residuals, i.e. error terms in the model have a constant variance. If the variance of the residuals or error terms is non-constant, then the residuals variance is heteroskedastic. In presence of heteroskedasty, as Brooks (2008) stated that, OLS estimators will still give unbiased (and also consistent) coefficient estimates, but they are no longer BLUE, that is, no longer have the minimum variance among the class of unbiased estimator.

Heteroskedasticity makes ordinary least square estimators not efficient because the estimated variances and covariance of the coefficients (βi) are biased and inconsistent and thus, the tests of

hypotheses are no longer valid. In this study, the presence of heteroskedasticity problem is tested using modified wild test for groupwise hetroskedasticity is really appropriate and most widely accepted for fixed effect model. Based on this test the null hypothesis that states variance is

constant, is rejected if p value is less than 0.05. On this study the P value for regression are below the threshold (P ≤ 0.05) and this leads to the rejection of the null hypothesis for the model. Thus, this study is encountered with the problem of heteroskedasticity

Having detected the presence of heteroscedasticty problem, then what matters is how to deal with it and econometricians have proposed other estimation alternatives to the OLS. According to Brooks (2008) one of those alternatives available in most software packages is the generalized least squares, in which the weighted sum of the squared residuals is minimized instead of the unweighted squared residuals of the OLS. But as Brooks (2008) further maintained that due to inherent technical drawbacks of a researcher this method of estimation is not widely used in practice and using heteroscedasticity consistent standard error estimates, modified standard errors of the OLS adjusted for heteroscedasticity using a robust button, is the advisable means of handling heteroscedasticty.

In line with this view, this study has used the robust standard errors of the regression coefficients. Robust standard errors of the coefficients are employed throughout the regressions of models. Then as Brooks (2008) added that modifying the standard errors of the slope coefficients relative to the usual OLS standard errors would make the hypothesis testing more conservative, requiring more evidence before rejecting the null hypothesis.

Test for hetroskedasticity

```
. xttest3


Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model


H0: sigma(i)^2 = sigma^2 for all i


chi2 (35)  =   2581.50
Prob>chi2 =    0.0000
```

Source : Financial statements of sample firm (STATA output)

4.3.4. Random Effect versus Fixed Effect Models

There are broadly two classes of panel estimator approaches that can be employed in financial research. These are fixed effects models and random effects models. Fixed effects models allow the intercept in the regression model to differ cross-sectionally but not over time, while all of the slope estimates are fixed both cross-sectionally and over time. As with the same as fixed effects, the random effects approach proposes different intercept terms for each entity and again these intercepts are constant over time, with the relationships between the explanatory and explained variables assumed to be the same both cross-sectionally and temporally. In order to identify which model is appropriate the study used Hausman test.

   H0= Random effect model is appropriate

   H1= Fixed effect model is appropriate

      b = consistent under Ho and Ha; obtained from xtreg

     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test: Ho: difference in coefficients not systematic

$$\text{chi2(10)} = \text{(b-B)'[(V\_b-V\_B)^(-1)](b-B)}$$

$$= \quad 16.45$$

Prob>chi2 =   0.0479

(V_b-V_B is not positive definite)

According to the above table Hausmen specification test, the P- value of the models is 0.0479 which is less than 5% level of significance. This shows that the null hypothesis of the model which is Random effect model is appropriate is rejected at 5 percent of significant level. Therefore, Fixed effect model is appropriate for this study and regression analysis would be made based on fixed effect estimates.

4.4. Regression Analysis

Regression analysis is used in this study to investigate the extent to which the dependent variable changes for each unit change in the explanatory variable, while other independent variables, are held fixed. Pooled ordinary least squares method is used in regression analysis, wherein time series and cross-sectional observations are pooled together in examining the underlying relationship between net working capital measured by (current asset – current liability/ total asset) and independent variables (cash conversion cycle , return on asset, operating cash flow defilated by total asset, leverage, firm size, growth of the firm, real GDP growth rate and inflation rate).

Table 4.5. Regression result

NWC-TA	Coefficent	Robust Std, Err	T	P > [t]	(95% Conf, interval)	
CCC	0.0001876	0.0001031	1.82	0.078	-0.0000219- 0.0003971	
ROA	0.0965012	0.1130066	0.85	0.399	-0.1331559 -0.3261584	
OCF-TA	-0.0472753	0.0641289	-0.74	0.466	-0.1776009-0.0830503	
LEV	-0.0371220	0.1297967	-2.86	0.007	-0.634999,-0.1074416	
LNFS	-0.2530517	0.0504744	-5.01	0.000	-0.3556281,-0.1504754	
GR	-0.0797755	0.0651864	-1.22	0.229	-0.2122502- 0.0526992	
RGDPGR	-9.14444	3.071388	-2.98	0.005	-15.38625,-2.92628	
INR	-0.6069733	0.278664	-2.18	0.036	-1.173287,-0.04066	
Cons	3.417554	0.4605239	7.42	0.000	2.481657,4.353451	
sigma-u	0.3012284					
Sigma-e	0.22363231					
Rho	0.64467904					

Obs= 175

 R-sq   =0.3059

F(8,34)   = 6.72

Prob> F = 0.0000

Source : Financial statements of sample firm (STATA output)

The result of regression in table 4.5 show the model R^2 30.59% , this implies that 30.59.% of the variations in the level of net working capital requirement of the firms are explained by the independent variables of the model. The overall model is significant to explain the variations in working capital requirement with a significant F statistics of 6.72 and P value of 0.0000, less

than the threshold ($P \leq 0.05$). The variables used in this model jointly are statistically significant in explaining the working capital requirement variation at the 95 percent confidence interval.

C is the coefficient of the intercept of the model and it represent the average value of net working capital when all explanatory variables took a value of zero. The average value of NWC is 3.4176 if all explanatory variables took zero which is statistically highly significant at 1% with a p- value of 0.000.

4.4.1. Relationship Between Cash Conversion Cycle and Net working Capital

The fixed effect regression results revealed that the coefficient of CCC is 0.0001876 and with a p- value of 0.078 which is statistically significant at 10% significance level. This implies that keeping other variables remain constant an increase in one day of cash conversion cycle would lead to a change of around 0.0001876 percent increase in the level of net working capital required for selected food and beverage manufacturing firms in Addis Ababa. This finding is in agreement with the research hypothesis developed and it failed to reject the hypothesized significant association between CCC and NWC-TA thus hypothesis one is accepted.

This positive and significant relationship between cash conversion cycle and net working capital is coming from because of the longer the cash conversion cycle, the greater the net investment in current asset, and hence the greater the need for financing of current asset and the results of this study is contrary to the findings of Narender et al. (2009), but consistent with Lamberson (1995), Chiou and Cheng (2006), Nazir and Afza (2009),and Ranjith (2008) .

4.4.2. Relationship Between Return on Asset and Net Working Capital

The fixed effect regression result shows that the coefficient of ROA is 0.09650 which is statistically insignificant with a p-value of 0.399. This means that keeping all other variables citrus paribus an increase in one percent of return on asset would create a change of 0.09650 percent increase in the level of net working capital required for the sample manufacturing firms. This finding is in contrary with the research hypothesis developed and it reject the hypothesized significant association between ROA and NWC-TA, thus hypothesis two is rejected.

We used the ROA as a proxy for profitability; it shows insignificant positive relationship with the dependent variable, which means that the firms with higher profits are less concerned with the efficient working capital and additionally it suggests that firms with high profitability can also keep high working capital requirements without any problem whatsoever And this is consistent with Nazir and Afza's (2009) results, as well as Mehomet and Eda (2009) and Wu (2001) who showed that there is a positive relationship between return on assets and the working capital requirements.

4.4.3. Relationship Between Operating Cash Flow and Net Working Capital

The fixed effect regression result indicate that the regression coefficient of OCF-TA is (-0.047275) which is statistically insignificant with a p- value of 0.466. This indicates that all other variables are held fixed an increase in one percent of operating cash flow would lead to a reduction of around 0.047275 percent of net working capital items for the sample firms taken from food and beverage manufacturing firms in Addis Ababa. This finding is in contrary with the research hypothesis developed and it reject the hypothesized significant association between OCF-TA and NWC-TA, thus hypothesis three is rejected.

This negative but statistically insignificant relationship between operating cash flow and net working capital is due to the fact that higher cash flows result in leniency in terms of pay operation related liabilities and accelerated collection of accounts receivables, thus resulting in lower working capital requirements This result is supported by Appuhami (2008). and (Chiou et al. 2006). who found that companies tend to reduce investment in working capital with an increase in operating cash flow.

4.4.4. Relationship Between Leverage and Net Working Capital

The regression result that are shown in the above table indicate that the regression coefficient of leverage is (-0.3712) which is statistically highly significant at 1% of level of significant with a p- value of 0.007. This revealed that an increase in one percent of leverage would result in a reductions (-0.37120) percent of net working capital investment for selected food and beverage manufacturing firms in Addis Ababa. This finding is in agreement with the research hypothesis

developed and it failed to reject the hypothesized significant association between LEV and NWC-TA , thus hypothesis four is accepted

Leverage of a firm is strongly and negatively related to the working capital requirements of a firm, indicating that with a rising debt to total assets ratio, the firms are supposed to pay more attention to efficient management of working capital to avoid much capital being tied up in accounts receivables and inventories. So, companies with an increasing debt to total assets ratio (high leverage) show lower working capital requirements. That is in accordance with the Pecking Order theory.

Leverage is found to be negative and significantly related with working capital requirement at 1% level of significant. It posits that financial manager can practice efficient working capital management by reducing the firm's debt level so as to avoid unnecessary tying up of capital in accounts receivables and inventories. This outcome is in accordance with the predictiony6 of Pecking Order Theory and find support in the studies conducted by Chiou and Cheng (2006), Suleiman, M. & Rasha, T. (2012 Nazir and Afza (2009), Deesomsak and Chau (2011), Nakamura and Palombini (2012), Akinlo (2012), Asmawi and Faridah (2012) and Wasiuzzaman et al (2013).

4.4.5. Relationship Between Firm Size and Net Working Capital

In the above fixed effect regression result the regression coefficient of firm size is (-0.2530517) which is statistically highly significant at 1% level of significant with a p- value of 0.000. This implies that an increase in one unit of firm size would lead to a reduction of (-0.2530517) percent of net working capital investment for selected food and beverage manufacturing firms in Addis Ababa. This finding is in agreement with the research hypothesis developed and it failed to reject the hypothesized significant association between firm size and NWC-TA, thus hypothesis five is accepted

The size of the firm has a negative and significant effect on working capital. The larger the firm the less working capital to total assets is required. Large firms may require larger investment in working capital because of larger volume of revenues or because they use their market power to force relationship with suppliers and get a reduction in payment term (Mousawi et al. 2006). But

here we found that larger firms require lower investment in working capital which may be due to their power over suppliers and thus can have longer period for their payable.

The negative relationship between firm size and working capital requirement implies that larger firms have shorter cash conversion cycle. Moss and Stine (1993) asserted that the better access of larger firms to money market make able those to afford and keep a lower amount of current assets, since larger firms can finance their short- term needs through borrowing as quickly as possible. Moreover, Niskanen & Niskanen (2006) did argue that larger firms have stronger bargaining power with credit suppliers, and would use these advantages to finance their working capital.

The negative relationship between size of a firm and working capital investment may be because larger firms are better at managing their cash cycles as is shown by Moss and Stein (1993). Or it may be as argued by Moussawi et al. (2006) that when a firm is large, it is able to reduce its investment in working capital due to its good relationship with its suppliers. The result of this study is consistent with the studies by Moss and Stein (1993), Suleiman, M. & Rasha, T. (2012 Chiou et al. (2006) and Nazir and Afza (2008). However, it is contrary to those of Banos-Caballero et al. (2010a), Hill et al. (2010) and Moussawi et al. (2006).

4.4.6. Relationship Between Growth of the Firm and Net Working Capital

The above fixed effect regression result shows that the coefficient of growth rate is (-0.0797755) which is statistically insignificant with a p-value of 0.229. This means that an increase in one percent of sales would lead to a   (-0.0797755)   percent reduction in net working capital investment for selected food and beverage manufacturing firms in Addis Ababa. This finding is in contrary with the research hypothesis developed and it   reject the hypothesized significant association between firm growth and NWC-TA, thus hypothesis six is rejected.

This negative but statistically insignificant relationship between sales growth of the firm and net working capital is contrary to the findings of Blazenko and Vandezande (2003). Appuhami (2008), and they found that anticipation of high sales growth could result in firms stocking up on inventory which could outweigh the effect on trade credit . And the result of this study is also consistent with the study of Chiou et al. (2006) and Hill et al. (2010) and they found that a firm

with high growth rate will keep operating-related working capital and liabilities at relatively low levels would create an opportunity for a negative relationship between growth and the working capital requirement of a firm.

4.4.7. Relationship Between Real GDP Growth Rate and Net Working Capital

According to the above fixed effect regression result the coefficient of real GDP growth rate is (-9.14444) which is statistically significant with a p- value of 0.005. This implies that an increase in one percent of real GDP growth rate would lead to a reduction of (-9.14444) percent in net working capital investment for the selected food and beverage manufacturing firms in Addis Ababa. This finding is in agreement with the research hypothesis developed and it failed to reject the hypothesized significant association between real GDP growth rate and NWC-TA, thus hypothesis seven is accepted

This negative and statistically significant relationship between economic condition as measured by real GDP growth rate and net working capital investment is found to be highly significant in affecting working capital investment. Abundance of funds during economic boom periods will not be a cause for worry and firms will thus not be too concerned about their level of working capital, but during recession periods, as much money as possible needs to be squeezed out and the easiest way is through working capital improvements.

4.4.8. Relationship Between Inflation Rate and Net Working Capital

The regression result shows that the coefficient of inflation rate is (-0.6069733) which is statistically significant with a p- value of 0.036. This indicate that keeping all other variables remain constant an increase in one percent of inflation rate would lead to a reduction of (-0.6069733) percent of net working capital investment for the selected food and beverage manufacturing firms in Addis Ababa. This finding is in agreement with the research hypothesis developed and it failed to reject the hypothesized significant association between inflation rate and NWC-TA , thus hypothesis eight is accepted

This negative and statistically significant relationship between inflation rate and net working capital is due to the fact that Inflation will result in the increase of raw material price and hike in the payment for expenses and as a result increase in balance of trade creditors and creditors for expenses.

Results summary of relationship between working capital requirement as proxy of NWC-TA and independent variables cash conversion cycle, return on asset ,operating cash flow,leverage, firm size, growth rate, real GDP growth rate and inflation rate

Table 4.6. Result summary of the study

Variables	Hypothesis	Expected	Actual	Conclusion
Cash conversion cycle	H -1	Significant	+ significant	Accepted
Return on asset	H-2	Significant	+ Insignificant	Rejected
Operating cash flow	H-3	Significant	-Insignificant	Rejected
Leverage	H=4	Significant	-Significant	Accepted
Firm size	H-5	Significant	- Significant	Accepted
Growth rate	H-6	Significant	-Insignificant	Rejected
Real GDP growth rate	H-7	Significant	- Significant	Accepted
Inflation rate	H-8	Significant	-Significant	Accepted

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction
This chapter is a continuation of the previous chapter and summarizes the results obtained from the analysis. This chapter presents the recommendations forwarded by the researcher based on the findings.

5.1. Summary and Conclusions

Several preliminary works of corporate finance researchers have proven that working capital is considered as a blood for any business entity and its efficient management is felt just like a healthy and well functioning blood vessel.

To this end, this study has been designed to examine the determinants of working capital requirement on manufacturing firms. Financial statements of 35 selected large taxpayer manufacturing firms in Addis Ababa, exclusively from food and beverage industry classes of the manufacturing sector, for five years study period from 2011 to 2015 were collected. Eight variables; namely, cash conversion cycle, return on asset, operating cash flow , leverage, firm size, ,growth of the firm, real GDP growth rate and inflation rate were used to measure the required level of net working capital. In addition data values for those variables have been computed and extracted from balance sheet and income statements of the sample firms. Then the data values have been entered into STATA software package, and statistical results are displayed in the previous chapter with the help of descriptive, correlation and regression analysis.

Correlation analysis was made using the Pair-wise correlation matrix and results of the analysis have shown that NWC- TA was negatively related with firm size, growth rate, real GDP growth rate and inflation rate. But NWC- TA was positively related with cash conversion cycle, return on asset, operating cash flow and leverage.

Finally multiple regression analysis of the model framework developed to examine the determinants of working capital requirement after diagnostic tests of OLS assumptions. The statistical regression results of the model have shown that cash conversion cycle is positively related with net working capital is due to the fact that the longer the cash conversion cycle, the greater the net investment in current asset

The regression analysis of return on asset have shown that insignificant positive relationship with net working capital in such a way that firms with higher profits are less concerned with the efficient working capital and they keep high working capital requirements without any problem.

The regression results of operating cash flow have shown that there is negative relationship with net working capital. Because of the fact that higher cash flows result in leniency in terms of pay operation related liabilities and accelerated collection of accounts receivables, thus resulting in lower working capital requirements.

The regression analysis of leverage have shown that there is strong and negative relationship with net working capital requirement indicating that with a rising debt to total assets ratio, the firms are supposed to pay more attention to efficient management of working capital to avoid much capital being tied up in accounts receivables and inventories and the result is in accordance with pecking order theory.

The regression analysis of firm size revealed that there is strong and negative relationship with net working capital requirement. The larger the firm the less working capital to total assets is required and additionally large firms have shorter cash conversion cycle and they have better access to money market to finance their short term needs.

The growth of the firm has a negative but statistically insignificant relationship with net working capital requirement. Firm with high growth rate will keep operating-related working capital and liabilities at relatively low levels.

The regression results of real GDP growth rate indicate that there is strong and negative relationship with net working capital required for the selected food and beverage manufacturing

firms. Abundance of funds during economic boom periods will not be a cause for worry and firms will thus not be too concerned about their level of working required for the firm.

Finally, inflation rate has a strong and negative relationship with net working capital requirement. Inflation will result in the increase of raw material price and increase in the payment for expenses and as a result increase in balance of trade creditors and creditors for expenses.

5.2. Recommendations

This study has revealed a close association between net working capital requirement and different firm specific and macro economic factors in manufacturing industries. Thus, managers or/and owners of those industries should pay due attention to their working capital investments. In general, based on the empirical results of this study, the researcher forwards the following recommendations to the food and beverage manufacturing industries of Addis Ababa.

Cash conversion cycle has a positive and significant relationship with the level of working capital required for the firm. Thus the financial managers of that firm should have to pay more attention to shorten the cash conversion cycle by accelerating cash collection period and lengthen the payment period and this would give an opportunity to minimize the working capital required for daily operation and this might cause the shift in firms investment in to other profitable long term investment other than investing in short term asset.

Leverage has strong negative relationship with net working capital requirement for the selected food and beverage manufacturing firms in Addis Ababa. Thus financial managers of those firms should have to pay more attention to efficient management of working capital to avoid much capital being tied up in unprofitable items like accounts receivables and inventories.

Firm size has strong negative relationship with net working capital requirement of the firm. Thus financial managers and owners of large firms should have to give due consideration for the bargaining power with credit suppliers and maintain good relationship with suppliers and this would give an advantage to finance their working capital required for the daily operation and this

could give the chance to divert the working capital finance to the other profitable long term investment.

Real GDP growth rate is found to be strong negative relationship with net working capital requirement for selected food and beverage manufacturing firms in Addis Ababa..Thus in the times of economic expansion the financial managers of those firms should have to pay more attention on long term investment by minimizing investing on short term asset in order to be the beneficiary from the advantages of economic expansion.

5.3. Future Research Directions

The issue, the determinants of working capital requirement, is a recent phenomenon and underexplored research area in Ethiopia. Thus, the growing business environment is in demand of more researches to be undertaken with respect to determinants of working capital requirement.. This study tried to investigate the determinants of working capital requirement paying due attention to underexplored manufacturing companies from food and beverage product industries.

While examining the case in those industries, this study used particular variables to measure the working capital requirement. But, there are varieties of variables in the literature to measure working capital requirement. Thus, future research can be undertaken in those industries, simply by adding variables that are not used in this study. In addition, due to sampling criteria employed in this study, companies with missing yearly observations were excluded to arrive at balanced panel data sets. But, the excluded companies could be taken into account by future researchers by employing unbalanced panel observations. And, due to data unavailability this research was delimited to only five years but this could be extended for the future by incorporating data for the upcoming years.

Given that the issue is a recent phenomenon in Ethiopia, there are various unexplored industries classes and sectors calling for related researches and similar studies should be undertaken in the

underexplored area of studies. Above all, there is no similar evidence from the service sector in general and financial industry in particular. Therefore, future researchers should consider the service sector also while studying determinants working capital requirement.

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APPENDICES

Appendix1 : Descriptive statistics

```
. summarize nwcta ccc roa ocfta lev lnfs gr rgdpgr inr
```

Variable	Obs	Mean	Std. Dev.	Min	Max
nwcta	175	.2574349	.4220049	-.8518	.9879
ccc	175	151.1042	172.2579	-747.0196	943.6585
roa	175	.1132531	.2504263	-.7095	.9985
ocfta	175	-.0140434	.3422458	-.8273	.9879
lev	175	.4073503	.2306466	.0021	.9956
lnfs	175	7.933429	.6324003	6.5433	9.8922
gr	175	.1891977	.3106931	-.223	2.3676
rgdpgr	175	.1014	.0087566	.087	.114
inr	175	.163	.0971407	.077	.341

Appendix2 : Correlation matrix between variables

```
. pwcorr nwcta ccc roa ocfta lev lnfs gr rgdpgr inr

               nwcta       ccc       roa     ocfta       lev      lnfs        gr
   ───────────────────────────────────────────────────────────────────────────
     nwcta     1.0000
       ccc     0.1979    1.0000
       roa     0.3056    0.1211    1.0000
     ocfta     0.0865   -0.0067    0.1696    1.0000
       lev     0.0019    0.0532    0.0417    0.0373    1.0000
      lnfs    -0.5197    0.1422   -0.2052    0.0666   -0.0854    1.0000
        gr    -0.0246    0.0990   -0.0278   -0.0014    0.1419   -0.0233    1.0000
     rgdpgr   -0.0826   -0.0983    0.0220   -0.0784    0.0006   -0.0232   -0.2571
       inr    -0.0288    0.0060   -0.0645    0.0819   -0.0842    0.0420    0.0269

               rgdpgr       inr
   ─────────────────────────────
     rgdpgr    1.0000
       inr    -0.6205    1.0000

.
```

Appendix 3: Normality test

```
. swilk resid

        Shapiro-Wilk W test for normal data

    Variable |    Obs         W         V         z      Prob>z
-------------+------------------------------------------------------
       resid |    175    0.98759     1.649     1.143    0.12660
```

.

Appendix 4 : Multicolinearity test

```
. pwcorr nwcta ccc roa ocfta lev lnfs gr rgdpgr inr, star(5)

             |    nwcta      ccc      roa    ocfta      lev     lnfs       gr
-------------+---------------------------------------------------------------
       nwcta |   1.0000
         ccc |   0.1979*   1.0000
         roa |   0.3056*   0.1211   1.0000
       ocfta |   0.0865   -0.0067   0.1696*   1.0000
         lev |   0.0019    0.0532   0.0417    0.0373   1.0000
        lnfs |  -0.5197*   0.1422  -0.2052*   0.0666  -0.0854   1.0000
          gr |  -0.0246    0.0990  -0.0278   -0.0014   0.1419  -0.0233   1.0000
      rgdpgr |  -0.0826   -0.0983   0.0220   -0.0784   0.0006  -0.0232  -0.2571*
         inr |  -0.0288    0.0060  -0.0645    0.0819  -0.0842   0.0420   0.0269

             |   rgdpgr      inr
-------------+------------------
      rgdpgr |   1.0000
         inr |  -0.6205*   1.0000
```

.

Appendix 5 : Hetroskedasticity test

. xttest3

Modified Wald test for groupwise heteroskedasticity

in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (35) =   2581.50

Prob>chi2 =   0.0000

Appendix 6; Hausman specification test

	───── Coefficients ─────			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
ccc	.0001876	.0002945	-.0001069	.0000288
roa	.0965012	.1494005	-.0528993	.0147275
ocfta	-.0472753	.0046503	-.0519256	.0101777
lev	-.3712203	-.2819438	-.0892766	.0392854
lnfs	-.2530517	-.2886781	.0356264	.0196608
gr	-.0797755	-.0823536	.0025781	.
rgdpgr	-9.14444	-8.511911	-.6325287	.
inr	-.6069733	-.5511029	-.0558704	.

                b = consistent under Ho and Ha; obtained from xtreg
        B = inconsistent under Ha, efficient under Ho; obtained from xtreg

   Test: Ho: difference in coefficients not systematic

          chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                =   14.19
        Prob>chi2 =   0.0479
        (V_b-V_B is not positive definite)

.

Appendix 7: Regression result

. xtreg nwcta ccc roa ocfta lev lnfs gr rgdpgr inr, fe vce(robust)

```
Fixed-effects (within) regression            Number of obs      =       175
Group variable: country1                     Number of groups   =        35

R-sq:  within  = 0.3059                       Obs per group: min =         5
       between = 0.3046                                      avg =       5.0
       overall = 0.2978                                      max =         5

                                              F(8,34)            =      6.72
corr(u_i, Xb)  = 0.1314                       Prob > F           =    0.0000
```

(Std. Err. adjusted for 35 clusters in country1)

nwcta	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
ccc	.0001876	.0001031	1.82	0.078	-.0000219	.0003971
roa	.0965012	.1130066	0.85	0.399	-.1331559	.3261584
ocfta	-.0472753	.0641289	-0.74	0.466	-.1776009	.0830503
lev	-.3712203	.1297967	-2.86	0.007	-.634999	-.1074416
lnfs	-.2530517	.0504744	-5.01	0.000	-.3556281	-.1504754
gr	-.0797755	.0651864	-1.22	0.229	-.2122502	.0526992
rgdpgr	-9.14444	3.071388	-2.98	0.005	-15.38625	-2.902628
inr	-.6069733	.278664	-2.18	0.036	-1.173287	-.04066
_cons	3.417554	.4605239	7.42	0.000	2.481657	4.353451
sigma_u	.3012284					
sigma_e	.22363231					
rho	.64467904	(fraction of variance due to u_i)				

Appendix 8 : Raw data used in the study

YEAR	NWC-TA	CCC	ROA	OCF-TA	LEV	LN FS	GR	RGDPGR	INR
2,011	0.3541	113.6538	0.0479	0.5234	0.4650	7.6039	0.0000	0.1140	0.1810
2,012	0.4217	148.6948	-0.0377	-0.1818	0.3536	7.6378	-0.0400	0.0870	0.3410
2,013	0.2535	135.3641	0.7885	0.4449	0.5873	7.8604	0.1379	0.0990	0.1350
2,014	0.0900	161.9988	-0.0473	-0.1498	0.7386	7.9547	0.1454	0.1030	0.0810
2,015	0.0210	123.2808	0.0703	-0.0336	0.8310	8.1291	0.3604	0.1040	0.0770
2,011	0.2464	106.5262	0.1167	-0.2760	0.4088	7.7140	0.0000	0.1140	0.1810
2,012	0.3009	127.3026	0.0410	-0.4260	0.4959	7.7327	0.0083	0.0870	0.3410
2,013	0.4563	157.6527	0.1636	-0.3759	0.4847	7.7429	0.2883	0.0990	0.1350
2,014	0.4166	32.8269	0.0373	-0.0019	0.1379	8.4979	0.2635	0.1030	0.0810
2,015	0.2225	135.8590	0.0147	-0.0407	0.1511	8.4990	0.0891	0.1040	0.0770
2,011	0.4953	99.8103	0.0883	-0.0937	0.3307	7.8862	0.0000	0.1140	0.1810
2,012	0.2670	107.6371	0.0620	0.2673	0.2538	8.1316	0.1644	0.0870	0.3410
2,013	0.1995	-10.3499	0.0103	-0.0406	0.4629	8.4402	0.2369	0.0990	0.1350
2,014	-0.1830	69.7673	-0.0056	-0.1605	0.8147	8.4129	0.1341	0.1030	0.0810
2,015	-0.1395	48.4582	-0.1693	-0.4066	0.9956	8.3643	0.3717	0.1040	0.0770
2,011	0.4671	23.1012	0.1569	-0.1798	0.1098	7.2172	0.0000	0.1140	0.1810
2,012	0.6432	28.0116	0.1369	-0.1218	0.0678	7.2463	0.2256	0.0870	0.3410
2,013	0.3455	32.4780	0.0670	0.3252	0.0488	7.5512	0.0122	0.0990	0.1350
2,014	0.5839	30.9269	0.2038	-0.1767	0.0607	7.3122	0.1691	0.1030	0.0810
2,015	0.0277	4.5054	0.1817	-0.2293	0.1031	7.3327	0.1071	0.1040	0.0770
2,011	0.0965	39.3161	-0.0135	-0.2290	0.5088	7.8256	0.0000	0.1140	0.1810
2,012	0.0396	48.7081	0.0258	0.4330	0.2273	8.1551	0.0141	0.0870	0.3410
2,013	0.0412	13.8465	0.2543	0.3656	0.4915	6.8168	0.0923	0.0990	0.1350
2,014	-0.0573	-1.2315	0.2527	0.5451	0.2541	7.8848	0.0615	0.1030	0.0810
2,015	-0.0538	48.8858	0.1545	-0.1073	0.3203	7.9958	0.0044	0.1040	0.0770
2,011	0.4843	200.2336	0.1244	0.2790	0.2896	7.8994	0.0000	0.1140	0.1810

2,012	0.4818	193.5142	0.1261	0.2961	0.2177	7.9563	0.2084	0.0870	0.3410
2,013	0.5179	275.9460	0.0998	0.2729	0.2167	8.0302	0.0411	0.0990	0.1350
2,014	0.1908	151.3183	0.1020	0.2566	0.3068	8.1635	0.2642	0.1030	0.0810
2,015	0.3775	192.5518	0.1232	-0.0364	0.5050	8.1623	0.2322	0.1040	0.0770
2,011	0.5190	435.2146	0.1501	-0.1419	0.0810	8.8677	0.0000	0.1140	0.1810
2,012	0.2442	559.2094	0.0784	0.3488	0.0560	9.2507	0.3188	0.0870	0.3410
2,013	0.4282	549.1153	0.1677	-0.1049	0.1133	9.0124	0.0420	0.0990	0.1350
2,014	-0.0621	451.2180	0.1019	-0.0618	0.4511	9.2634	0.2930	0.1030	0.0810
2,015	0.4035	382.2672	0.1283	-0.0789	0.1606	9.0846	0.0860	0.1040	0.0770
2,011	0.0556	85.9459	0.1319	0.3269	0.2173	8.3147	0.0000	0.1140	0.1810
2,012	0.1131	123.1347	0.1346	0.2961	0.1815	8.3791	0.1091	0.0870	0.3410
2,013	0.0549	61.1880	0.1089	-0.0426	0.3039	8.2815	0.0258	0.0990	0.1350
2,014	0.0749	66.2153	0.0874	-0.0782	0.2599	8.3105	0.0618	0.1030	0.0810
2,015	0.2015	118.6491	0.1704	-0.0311	0.2373	8.3475	0.1353	0.1040	0.0770
2,011	-0.2402	234.9184	0.0115	-0.4386	0.0794	8.2377	0.0000	0.1140	0.1810
2,012	-0.2360	219.3177	0.0607	0.7733	0.0436	8.0859	0.1017	0.0870	0.3410
2,013	-0.1277	163.4673	0.0112	-0.3644	0.0299	8.3086	0.0572	0.0990	0.1350
2,014	0.0229	132.1469	0.0457	-0.3956	0.0967	8.2300	0.1980	0.1030	0.0810
2,015	0.5100	56.7281	0.0831	-0.1869	0.5323	7.7361	0.2390	0.1040	0.0770
2,011	0.1234	180.0033	0.1169	-0.2129	0.3056	7.7328	0.0000	0.1140	0.1810
2,012	0.3425	299.0458	0.1138	-0.1479	0.3134	7.8775	-0.0068	0.0870	0.3410
2,013	0.4123	166.6966	0.1376	-0.3158	0.2747	7.7073	0.1431	0.0990	0.1350
2,014	0.5123	160.7697	0.7712	-0.1275	0.5843	7.5927	0.4653	0.1030	0.0810
2,015	0.5138	112.4352	0.4234	0.1134	0.5719	8.1570	0.3426	0.1040	0.0770
2,011	-0.0252	103.0176	0.0078	-0.0458	0.2786	8.1619	0.0000	0.1140	0.1810
2,012	0.0357	115.2583	0.0045	0.1594	0.5181	8.1746	0.4371	0.0870	0.3410
2,013	0.0054	222.8549	0.0067	-0.0560	0.7132	8.2120	-0.0445	0.0990	0.1350
2,014	0.0944	598.9510	0.0056	-0.0150	0.8587	8.2278	-0.0583	0.1030	0.0810
2,015	-0.2373	432.4565	0.1461	-0.7665	0.8071	7.5305	0.8340	0.1040	0.0770
2,011	0.8765	134.0405	-0.7095	-0.8273	0.0935	7.5227	0.0000	0.1140	0.1810

2,012	0.9775	197.8555	0.1056	-0.4487	0.1032	7.7113	0.1509	0.0870	0.3410
2,013	0.8876	323.2042	0.1020	-0.3676	0.0485	7.8762	0.0506	0.0990	0.1350
2,014	0.7654	165.2501	0.0266	0.2941	0.0375	7.9097	0.0545	0.1030	0.0810
2,015	0.6178	167.1498	-0.1405	0.0475	0.0544	8.0073	0.0594	0.1040	0.0770
2,011	0.0330	180.7506	0.0085	0.0670	0.7175	8.0295	0.0000	0.1140	0.1810
2,012	0.0321	244.3016	0.0023	0.0140	0.4365	8.3944	0.1096	0.0870	0.3410
2,013	0.0331	202.1956	0.0003	0.0118	0.4410	8.4953	0.0535	0.0990	0.1350
2,014	0.1561	264.8310	-0.0108	0.1322	0.4930	8.2281	0.4022	0.1030	0.0810
2,015	0.1235	444.6543	0.0446	-0.6201	0.5496	7.8357	0.7807	0.1040	0.0770
2,011	-0.1124	44.1432	0.0168	0.0488	0.5520	7.9826	0.0000	0.1140	0.1810
2,012	-0.1360	55.5436	0.0182	-0.7880	0.5209	8.0364	0.1409	0.0870	0.3410
2,013	-0.1800	99.8188	0.0911	-0.1154	0.2201	7.9541	0.8934	0.0990	0.1350
2,014	-0.1191	105.7741	0.0215	-0.3201	0.3009	8.4732	0.2964	0.1030	0.0810
2,015	0.1324	63.7554	0.0313	0.0116	0.2188	8.4946	0.0310	0.1040	0.0770
2,011	0.1432	285.4485	0.0320	0.1273	0.6643	7.6153	0.0000	0.1140	0.1810
2,012	0.5205	107.8399	-0.0318	0.5943	0.4615	7.7345	0.1645	0.0870	0.3410
2,013	0.7865	215.7858	0.0926	0.1807	0.6075	7.8052	0.5246	0.0990	0.1350
2,014	0.7765	203.9612	0.2883	0.1707	0.5391	7.8073	0.0416	0.1030	0.0810
2,015	-0.3605	28.8239	0.0563	0.1736	0.5333	8.2314	0.8409	0.1040	0.0770
2,011	-0.1819	87.8223	-0.0801	-0.0140	0.5458	8.4037	0.0000	0.1140	0.1810
2,012	-0.2668	38.9936	-0.1120	-0.0177	0.5169	8.4970	2.3676	0.0870	0.3410
2,013	-0.3420	-33.9573	-0.0229	0.0046	0.9210	8.6619	0.4126	0.0990	0.1350
2,014	0.4432	11.4532	-0.4875	-0.1765	0.5568	6.7574	0.1599	0.1030	0.0810
2,015	0.5643	17.1354	0.1435	-0.0427	0.5403	6.6537	0.0066	0.1040	0.0770
2,011	0.7898	352.0692	0.7132	0.1134	0.2340	6.7520	0.0000	0.1140	0.1810
2,012	0.9123	235.9828	0.7965	0.1342	0.3178	6.8531	0.9664	0.0870	0.3410
2,013	0.9234	161.6621	0.1145	0.1453	0.2495	6.7849	0.0022	0.0990	0.1350
2,014	0.5623	94.3807	0.4071	0.6664	0.3527	8.3489	0.6543	0.1030	0.0810
2,015	0.5137	76.2397	0.4859	0.5234	0.3919	8.3700	0.0180	0.1040	0.0770
2,011	-0.1374	17.4663	-0.0251	-0.1473	0.6685	8.1584	0.0000	0.1140	0.1810

2,012	-0.0625	423.6052	-0.0070	0.0631	0.6092	8.5226	0.1892	0.0870	0.3410
2,013	-0.0785	378.8367	0.0265	0.1941	0.2782	8.1954	1.3422	0.0990	0.1350
2,014	-0.0878	118.0489	0.0140	-0.0434	0.2235	8.5433	0.1667	0.1030	0.0810
2,015	-0.1444	66.1299	0.0138	-0.0236	0.5226	8.6757	0.6417	0.1040	0.0770
2,011	-0.1655	3.3757	0.0006	-0.0591	0.1054	8.8089	0.0000	0.1140	0.1810
2,012	-0.2532	9.3857	0.0006	-0.0716	0.3168	8.8228	0.1006	0.0870	0.3410
2,013	-0.3585	5.5267	0.0010	-0.1362	0.2533	8.6741	0.0933	0.0990	0.1350
2,014	0.0781	27.7407	0.0002	0.0134	0.5327	7.7000	0.1607	0.1030	0.0810
2,015	0.1091	25.5462	0.0088	0.0311	0.5192	7.7747	0.0217	0.1040	0.0770
2,011	-0.0238	123.5436	0.0049	0.0029	0.4356	8.0496	0.0000	0.1140	0.1810
2,012	0.0416	195.3519	-0.0075	0.0011	0.0525	8.0346	0.0235	0.0870	0.3410
2,013	0.4576	304.7114	0.0204	0.0041	0.4420	7.5463	1.6665	0.0990	0.1350
2,014	0.5543	118.2749	0.4011	-0.4231	0.2150	6.5433	0.0125	0.1030	0.0810
2,015	0.5436	109.3841	0.6255	0.5463	0.0547	6.6983	0.0798	0.1040	0.0770
2,011	0.6678	43.9778	0.5769	-0.7654	0.4047	6.6937	0.0000	0.1140	0.1810
2,012	0.9284	13.2400	0.5485	0.1234	0.6702	6.9291	0.3796	0.0870	0.3410
2,013	0.8719	81.8385	0.9110	-0.2543	0.4391	6.9610	0.2752	0.0990	0.1350
2,014	0.9110	169.6923	0.1245	0.1435	0.3155	6.9596	0.4414	0.1030	0.0810
2,015	0.9330	136.5384	0.2365	-0.1656	0.3327	6.9966	0.1629	0.1040	0.0770
2,011	0.7676	327.5862	0.2531	0.3876	0.6076	7.2893	0.0000	0.1140	0.1810
2,012	0.7898	282.9583	-0.1423	-0.4989	0.5896	7.1712	-0.2230	0.0870	0.3410
2,013	0.8786	152.1433	-0.1132	-0.5463	0.7984	7.0604	0.0358	0.0990	0.1350
2,014	0.9156	302.3490	0.7844	-0.4592	0.3102	7.0162	0.1990	0.1030	0.0810
2,015	0.8234	230.6716	-0.2543	-0.1546	0.7526	7.1287	1.4495	0.1040	0.0770
2,011	-0.3444	324.5436	-0.3840	0.2675	0.5546	7.2694	0.0000	0.1140	0.1810
2,012	0.4457	339.6536	0.5085	0.2315	0.4955	7.5099	0.4076	0.0870	0.3410
2,013	0.6675	342.5436	0.5010	0.4769	0.4402	7.5906	0.0273	0.0990	0.1350
2,014	0.8798	357.3081	0.2245	0.6425	0.0877	7.7990	0.0401	0.1030	0.0810
2,015	0.9011	366.8335	0.3037	0.4544	0.4763	8.0279	0.4119	0.1040	0.0770
2,011	-0.0338	166.5389	0.0132	0.0247	0.3813	8.3022	0.0000	0.1140	0.1810

2,012	0.4648	124.6289	-0.5427	-0.3948	0.3325	7.7109	0.8653	0.0870	0.3410
2,013	0.0722	47.9307	0.0765	0.1030	0.3239	7.8077	0.3935	0.0990	0.1350
2,014	0.0005	97.1355	0.0295	0.0414	0.5463	8.2573	0.1199	0.1030	0.0810
2,015	0.6740	196.3624	-0.5705	-0.3493	0.2866	7.8020	0.3221	0.1040	0.0770
2,011	-0.1685	-49.1033	0.0000	-0.0083	0.5408	7.8395	0.0000	0.1140	0.1810
2,012	0.1887	80.1067	0.0000	0.0104	0.6719	7.8158	0.0749	0.0870	0.3410
2,013	0.8159	595.8655	-0.2395	0.1068	0.3976	7.3971	0.2715	0.0990	0.1350
2,014	0.8243	-37.0284	-0.3679	-0.0407	0.4227	7.2072	0.0000	0.1030	0.0810
2,015	0.8214	121.2284	-0.1505	-0.0095	0.5324	7.4009	0.1353	0.1040	0.0770
2,011	0.1155	138.8756	0.2453	0.1298	0.3856	8.3549	0.0000	0.1140	0.1810
2,012	0.2235	263.5516	0.1436	0.7786	0.3450	7.7417	0.3125	0.0870	0.3410
2,013	0.3342	226.4277	0.1976	0.1067	0.3491	7.7428	0.2224	0.0990	0.1350
2,014	0.4578	197.9220	0.1865	0.9879	0.2477	7.7634	0.1711	0.1030	0.0810
2,015	0.6546	66.0346	0.9985	-0.8085	0.3008	7.9126	0.0305	0.1040	0.0770
2,011	-0.0167	113.5426	0.2624	-0.7342	0.1784	8.0474	0.0000	0.1140	0.1810
2,012	-0.1366	202.2186	0.1932	0.4987	0.3229	8.3411	0.1366	0.0870	0.3410
2,013	-0.8424	225.8472	0.0567	0.1965	0.4817	8.8911	0.4118	0.0990	0.1350
2,014	-0.8466	94.9811	0.0004	-0.2214	0.5080	8.9236	0.0052	0.1030	0.0810
2,015	-0.8518	79.4354	0.0122	0.0085	0.4063	8.9527	0.0106	0.1040	0.0770
2,011	0.1124	-1.6667	0.4976	0.2435	0.7941	7.5245	0.0000	0.1140	0.1810
2,012	0.3245	173.1157	0.3243	0.1875	0.5468	6.9954	0.5564	0.0870	0.3410
2,013	0.5467	215.8205	-0.1254	-0.1324	0.3134	7.5100	0.0436	0.0990	0.1350
2,014	0.6543	206.6504	-0.1154	-0.1122	0.5122	7.3803	0.0067	0.1030	0.0810
2,015	0.7867	943.6585	0.9756	-0.6745	0.6529	7.5713	0.2854	0.1040	0.0770
2,011	0.8987	14.3836	0.2314	0.9788	0.8282	7.4383	0.0000	0.1140	0.1810
2,012	0.8745	11.6906	0.3342	0.1024	0.8998	7.1727	0.0405	0.0870	0.3410
2,013	0.8734	14.2623	0.3346	0.1435	0.9421	7.3164	0.2057	0.0990	0.1350
2,014	0.9113	23.1420	0.4653	0.2341	0.6028	7.3542	0.2699	0.1030	0.0810
2,015	0.9342	217.0178	0.3216	0.2054	0.9624	7.6144	0.2402	0.1040	0.0770
2,011	-0.3979	131.6547	0.2243	0.2145	0.4803	7.6748	0.0000	0.1140	0.1810

2,012	-0.2485	187.6758	0.1768	0.1675	0.4920	7.6614	0.2705	0.0870	0.3410
2,013	-0.2899	-747.0196	-0.0068	0.1254	0.5064	7.6692	0.1859	0.0990	0.1350
2,014	-0.3128	115.3938	-0.0494	-0.2265	0.5198	7.6694	0.2170	0.1030	0.0810
2,015	-0.1784	-3.9223	-0.0641	-0.1065	0.1784	7.7295	0.1875	0.1040	0.0770
2,011	-0.3229	-523.8999	-0.0004	-0.6675	0.3229	8.0320	0.0000	0.1140	0.1810
2,012	-0.4085	137.8756	-0.0863	-0.6687	0.4817	8.1164	0.2946	0.0870	0.3410
2,013	-0.2962	469.2814	-0.0090	-0.5542	0.5080	8.1055	0.1504	0.0990	0.1350
2,014	-0.1983	528.9204	-0.0048	-0.6954	0.4063	8.1284	0.0989	0.1030	0.0810
2,015	-0.2091	186.5463	-0.0005	-0.0729	0.4533	9.0554	0.1949	0.1040	0.0770
2,011	0.0426	234.6543	0.2230	0.2228	0.3245	9.2005	0.0000	0.1140	0.1810
2,012	0.2320	342.5643	0.0746	0.0745	0.5882	9.5454	0.1046	0.0870	0.3410
2,013	0.2824	565.4536	0.0977	0.0747	0.7754	9.4829	0.0659	0.0990	0.1350
2,014	0.4118	342.6547	0.0738	0.0663	0.7720	9.5490	0.0188	0.1030	0.0810
2,015	0.5123	176.8734	0.6453	0.5440	0.8610	8.7966	0.1404	0.1040	0.0770
2,011	0.6574	71.8722	0.3758	0.2265	0.1124	7.7931	0.0000	0.1140	0.1810
2,012	0.6235	103.0764	0.0178	0.1987	0.9435	7.9334	0.1260	0.0870	0.3410
2,013	0.8543	69.7935	0.3245	0.1754	0.2254	7.8705	0.0788	0.0990	0.1350
2,014	0.8876	115.2455	0.1879	-0.1879	0.4257	6.8044	0.1872	0.1030	0.0810
2,015	0.9346	139.1892	0.1241	-0.2964	0.4356	7.0039	0.1543	0.1040	0.0770
2,011	-0.1269	7.8603	-0.0003	-0.0448	0.0021	9.8922	0.0000	0.1140	0.1810
2,012	-0.1439	75.4835	0.0001	-0.0881	0.0143	9.7200	0.2050	0.0870	0.3410
2,013	0.1878	30.2953	0.0148	0.7754	0.3592	7.8238	0.0502	0.0990	0.1350
2,014	0.2931	56.8761	0.0135	-0.1165	0.6679	7.8193	0.0778	0.1030	0.0810
2,015	-0.0151	46.0894	0.0115	-0.1657	0.4607	7.8189	0.0307	0.1040	0.0770
2,011	-0.4949	1.9341	0.0130	-0.3356	0.0087	7.8191	0.0000	0.1140	0.1810
2,012	0.9879	5.5336	0.0122	-0.5546	0.0260	7.8374	0.0156	0.0870	0.3410
2,013	0.1045	1.5985	0.0135	-0.5564	0.2763	7.7525	0.2079	0.0990	0.1350
2,014	-0.3380	-9.0928	0.0396	-0.1254	0.2931	7.6748	0.0620	0.1030	0.0810
2,015	-0.3759	-34.3334	0.0469	-0.1675	0.3161	7.6614	0.1927	0.1040	0.0770