



ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ACCOUNTING AND FINANCE

**DETERMINANTS OF FINANCIAL DISTRESS IN THE ETHIOPIAN MANUFACTURING
SECTOR: THE CASE OF SELECTED FOOD AND BEVERAGE FIRMS**

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF SCIENCE IN ACCOUNTING AND
FINANCE**

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SUBMITTED TO;

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JUNE, 2023

ADDIS ABABA, ETHIOPIA

Declaration

I, Shimels Dagne Haile, hereby declare that this MSc thesis entitled “*Determinants of financial distress in the Ethiopian manufacturing sector: the case of selected food and beverage firms*” is my original work and has not been presented for a degree in any other university, and all sources of material used for this thesis have been duly acknowledged. This thesis has been carried out by me under the guidance and supervision of Habtamu Berhanu (PhD).

Researcher’s Name

Date

Signature

Certificate

This is to certify that the thesis entities' 'Determinants of Financial Distress with reference to food and beverage manufacturing firms in Addis Ababa, Ethiopia' Submitted to Addis Ababa University for the award of the Degree of Master of Science in Accounting and Finance is a record of Valuable research thesis work carried out by Shimels Dagne Haile under my guidance and supervision. Therefore, I 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.

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Approval Sheet

As members of the Examining Board of the Final Open Defense, we certify that we have read and evaluated the thesis prepared by Shimels Dagne Haile, entitled ‘Determinants of Financial Distress with reference to food and beverage manufacturing firms in “Addis Ababa, Ethiopia, and recommend that it be accepted as fulfilling the thesis requirements for the award of the degree in Master of science in Accounting and Finance.

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Acknowledgement

Above all, my dearest gratefulness and adoration goes to the Almighty God for giving me the chance and all those exertions to complete this research work. Next, I would like to extend my deep indebtedness to my advisors Habtamu Brhanu (PhD) for his persistent support from title selection up to the final writing of report, precious time, positive criticism, suggestions, valuable guidance and comments, my debts are innumerable.

I would like to address my sincere gratitude to my family members for their immense moral support and prayers, encourage me throughout the course of my life. I really admire their full interest and effort towards my success. My thanks also go to employees of Ministry of Revenue and Central Bank of Ethiopia for their priceless information that has enriched this study.

Finally, I would like to express my deepest gratitude and appreciation to all those who participate directly or indirectly contributed to the successful preparation of this research.

Acronyms

EBIT/TA: Earnings before Interest and Taxes to Total Asset

FD: Financial Distress

GDP: Gross Domestic Product

LOG: Natural Logarithm

LTP: Large tax Payers

LTD/TE: Long Term Debt to Total Equity

PROFI: Profitability of Firm

STD/TE: Short Term Debt to Total Equity

SOL: Solvability of Firm

TA: Total Assets of firm

TL: Total liability of firm

Abstract

Financial distress is one of the most significant threats to many firms globally despite their size and nature. The term financial distress is used to describe the financial situation of a firm confronted with the arduousness that ensues in settling financial obligations on schedule, and to the full extent. The main causes of corporate failure (financial distress) are the firms' inability to create value like inefficient use of the asset portfolio as a result of poor operational efficiency firms increase their financial leverage and insufficient liquidity, the increment of firms fixed costs, poor corporate governance measures, competition within the industry, technological change, illiquidity of assets and revenue sensitivity to economic situations like recession. The main objective of the study was to investigate empirically financial distress determinants in the case of selected food and beverage manufacturing firms (large taxpayers) in Ethiopia. 11 firms included in the sample that had at least twelve years annual report Document review was used for collecting data from 2011 to 2022 annual reports. To achieve the stated objectives quantitative approaches and explanatory research design was employed. The study used long-term debt to total equity and short-term debt to total equity as dependent variables of financial distress measure, and firm age, efficiency, profitability, liquidity, firm size, solvency, firm growth, GDP and Inflation as independent variables. For data analysis, the study used a panel data model with its random effect estimates. The result of random effect regression revealed that profitability, liquidity, solvency, and GDP have a negative and significant relationship with financial distress. In contrast, efficiency has a positive and significant relationship with financial distress. Firm size, firm age, firm growth, and inflation have a negative and insignificant relationship with financial distress. Large tax payer's food and beverage manufacturing companies, corporate managers, investors, and lender are recommended to give attention for the profitability, liquidity, solvability, efficiency, and the general economic condition via GDP than the firm's age, size, growth, and inflation is a wise decision before they make decisions. Finally, it's better for the Government to intervene and support their operation to make them financially viable.

Key words: Long Term Debt to Total Equity, Short Term Debt to Total Equity

Table of Contents

Declaration.....	ii
Certificate.....	iii
Approval Sheet.....	iv
Acknowledgement	v
Acronyms.....	vi
Abstract.....	vii
List of Tables	0
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the study	1
1.2 Statement of the Problem.....	2
1.3 Research Questions	4
1.4 Objective of the Study	5
1.4.1 General Objective	5
1.4.2 Specific Objectives	5
1.5 Significance of the Study	5
1.6 Scope and Limitation of the study	5
1.7. Organization of the Study	6
CHAPTER TWO: REVIEW OF RELATED LITERATURES.....	7
2.1. Review of Theoretical Literatures.....	7
2.1.1. The concept of Financial Distress.....	7
2.2 Theories related to financial distress.....	9
2.3 Costs of Financial Distress.....	13
2.4 Financial Distress and Bankruptcy Models	14
2.5 Determinants of Financial Distress	16
2.5.1 Firm Specific Factors	16
2.5.2 Macroeconomic Factors.....	20
2.6 Empirical Literature	20
2.6.1. Overseas Studies	20
2.6.2 Studies in Ethiopian context	24
2.7 Conclusion and Knowledge Gap.....	25

2.8. Conceptual Framework of this Study.....	28
CHAPTER THREE: RESEARCH METHODOLOGY.....	29
3.1. Research Design.....	29
3.2 Research Approach	29
3.3. Sampling Design.....	29
3.3.1. Target Population and Sample Size	30
3.3.2 Sampling Techniques.....	30
3.4 Data Type and Data Sources.....	30
3.5 Data Analysis Techniques.....	30
3.6 Model Specifications	31
CHAPTER FOUR: DATA PRESENTATION AND DISCUSSION.....	38
4.1 Descriptive Statistics.....	38
4.2 Correlation Analysis	42
4.3 Diagnostic tests of the CLRM.....	44
4.4 Regression analysis	50
4.5. Discussion of the Regression Result.....	56
CHAPTER FIVE	61
SUMMARY OF FINDING, CONCLUSIONS AND RECOMMENDATIONS	61
5.1 Summary of Findings.....	61
5.2 Discussion of the Result Implications.....	64
5.2.1 STDTE and LTDTE with Financial Distresses.....	64
5.2.2 Profitability and Financial Distress.....	64
5.2.3 liquidity and Financial Distress.....	64
5.2.4 Solvability and Financial Distress.....	65
5.2.5 Efficiency and Financial Distress	65
5.2.6 GDP and Financial Distress	65
5.2.7 Firm Size, Firm Age, Firm Growth and Inflation with Financial Distress	66
5.3 Conclusions	66
5.4. Recommendations	67
5.5 Suggestions for Further Research	68
Bibliography	lxix
Appendices.....	lxxvi

Appendix 1- Descriptive Statistics..... lxxvi
Appendix 2- Correlation Matrixes lxxvi
Appendix 3- Heteroscedasticity Test..... lxxvii
Appendix 4 -Autocorrelation Test lxxviii
Appendix 5- Multi-Collinearity Test lxxviii
Appendix 6- Normality Test lxxix
Appendix 7- Ramsey RESET Tests lxxix
Appendix 8 -Hausman Test lxxx
Appendix 9- Breusch and Pagan Lagrange multiplier test for random effects..... lxxxii
Appendix 10 –Regression Results lxxxiii
Appendix 11 -The raw data..... lxxxv

List of Tables

Table 2.1 Summary of major literatures	26
Table 3.1 Variable description.....	37
Table 4.1: Descriptive statistics of all variables	39
Table 4.2 correlation matrix between variables included in the study	42
Table 4.3: Normality test for Short term debt to Total equity	44
Table 4.4: Normality test for Long term debt to Total equity	44
Table 4.5: Heteroskedasticity test for Short term debt to Total equity	45
Table 4.6: Heteroskedasticity test for Long term debt to Total equity	45
Table 4.7 Autocorrelation test.....	47
Table 4.8 Multi-collinearity test	48
Table 4.9 Ramsey RESET Tests.....	49
Table 4.10 Breusch and Pagan Lagrange multiplier test for random effects.....	50
Table 4.11: Regression result of STDTE (Model 1).....	51
Table 4.12: regression result of LTDTE (Model 2).....	54
Table 4.13 Variables Summary.....	60



CHAPTER ONE: INTRODUCTION

This chapter discusses the background information on the study. The chapter is organized as follows. The first section sets out problem statement. The second section provides the research objective. The research question is presented in section three. Significance of the study and scope of the study are presented in section four, and five.

1.1 Background of the study

This study was focused on the determinants of financial distress in manufacturing firms in least developed country, Ethiopia. The sector plays significant economic role by creating job opportunity, supply of commodities, replace imported goods and mitigate the problems of foreign exchange shortage. Due to high cost of investment in this sector, in particular on fixed assets, and difficulties to access external financing (especially equity) in Ethiopia, financial distress might be the major factors in the manufacturing firms. The existing literature in finance including Altman (2005) and Andrade and Kaplan (1998) defined financial distress as the situation when a company does not have capacity to fulfill its liabilities to the third parties or to the creditors and as the likelihood that a firm will be unable to meet its financial obligations as and when they fall due. A firm in financial distress usually falls in a tight cash situation in which it is difficult to pay the owed amounts on the due date.

In the past years, many cases of corporate failures are recorded, companies becoming financially distressed or labeled totally bankrupt. Remarkably among these giants are Campbell's Soup, Aeropostale, Payless, American International Group Inc., Philipp Holzmann, Enron, WorldCom, Swissair, Parmalat, Bank of Credit and Commerce International (BCCI). These cases have sent intriguing message across the globe Cheluget, J. (2014)

As per of Palinko (2016) and Hui and Jhao (2008) the primary causes of corporate failure are the firms' inability to create value like inefficient use of the asset portfolio as a result of poor operational efficiency firms increase their financial leverage and insufficient liquidity. In the same manner as per of Andrade and Kaplan (1998), the increment of firms fixed costs, poor corporate governance measures, competition within the industry, technological change, illiquidity of assets and revenue sensitivity to economic situations like recession considered as the main causes of financial distress.

Business failure results in enormous economic consequences. Altman (2005), Andrade and Kaplan (1998) and Palinko (2016) states that the financial distress leads to resignation of management of the firms, reduction of stock dividend as well as cash dividends and it is compounded by the fact that banks and other financial institutions refuse to lend to those in serious distress this leads to the winding up of the firm.

The impact is especially colossal for stakeholders of trustworthy Lin (1999). Beyond the microeconomic effect financial distress of specific firm or industry perhaps goes to macroeconomic disorder through high unemployment rate and spillover effect on financial institutions by increase their non-performing loan.

According to the wrecker's theory (2005), there are micro (or firm specifics) and macro (or market factors) explains the vulnerability of firms for financial distress. Empirical evidences in developed economy indicate that firm specific as well as market specific factors as the basic to explain financial distress. Similarly, in developing countries and least developed countries these factors also considered but the degree of influence each factor is different. In particular, financial distress also varied due to the characteristics of its industry, for example, manufacturing firms are so sensitive due to high operating leverage and the possibility of large amount fixed payment and in banking industry the liquidity issue may give less priority. Thus, the main aim of this study was to examine the determinants of financial distress in manufacturing firms in least developed country Ethiopia Addis Ababa , the case of selected food and beverage (large tax payer)firms.

1.2 Statement of the Problem

As part of the globe, as per of Ufo, A (2011) most of the manufacturing firms in Ethiopia experience financial distress situation, due to low level of debt service coverage. The financial report of most manufacturing firm shows that on average the debt service coverage ratio of less than fifty percent. This indicates that the firm's available cash is unable to cover the principal and interest on the bank loan. The liquidity position of the firms, which is measured by current assets to current liabilities, is below the theoretical industry average. As long as liquidity is not maintained, many highly leveraged firms are not able to renegotiate their debt agreement if they are breached contract; rather they go for reorganization, acquisition, merger or liquidation.

According to Platt & Platt (2002) The terms 'financial distress' and 'bankruptcy', have commonly been often used synonymously; however, the two situations differ substantially in terms of the fundamental variables related to firm's financial health as well as in the sequence of events. Bankruptcy, insolvency or liquidation is the situation, preceded by financial distress. Platt & Platt (2002) also emphasized that financial distress is the late stage of firm decline, which can be followed by the winding up of the firm..

According to Hui and Jhao (2008) financial distress could be understood as is used in a negative connotation in order to describe the financial situation of a company confronted with a temporary illiquidity and with the difficulties that ensure in settling financial obligations on schedule and to the full extent.

In this regard, internationally, much of empirical evidence has relied on financial models in financial distress prediction incorporating different factors. These models have proved that firm characteristics cannot be ignored during decision making process. Different researchers provide single and multi-variable bankruptcy prediction models. Altman (1968) is the first person to provide multi-variable bankruptcy prediction models by applying multiple detachment analysis method and using financial ratios as explained variables, he was trying to predict bankruptcy of companies. He presented the famous pattern titled Z-score which is well-known in predicting corporate bankruptcy. As per of Altman emphasizes multiple distinctive analysis has several advantages over single-variable analysis. Memba (2013) carried a study on the causes of financial distress and its effects on firms. The study concluded that financial distress is caused by

poor capital decisions, poor internal management, and shortage of skilled labor and lack of access of credit. The influence underlying non-financial and macro-economic factors have been ignored to the detriment of many firms.

However, most of the studies on financial distress focused in developed economies where researchers have identified several significant variables that cause financial distress.

There are only a few studies that focus on the financial distress issues in developing economies especially in Ethiopia. Hence, the factors identified may not be applicable and consistent with the Ethiopian economy.

According to Ufo, A (2011) there are three huge incidents, which lead to the phenomenon of financial difficulties in Ethiopian manufacturing companies occurred. In 2008, 2009 and 2010, the reason was global financial crisis, raw material price shock and Ethiopian currency devaluation respectively. These three different cases expose firms to financial distress of the manufacturing companies in Ethiopia. In 2009, when Ethiopian government reduced subsidy for raw material price locally and increased tax burden, this made cost of production increased and squeezes profitability. This made many companies in an effect of a big losses and shortage of cash. The huge increment of non-performing loan (NPL) in commercial and development bank considered as a first indication. The same phenomena had been occurred in 2008. Thus, manufacturing companies are very sensitive to the external factors.

Pronowo (2010) reveals that the current ratio, efficiency and equity have positive and significant effect on debt service coverage as a proxy of financial distress. However, leverage has negative and significant relationship with debt service coverage with different perspectives, Profitability Good corporate governance and macroeconomic variables have no significant relationship with DSC. However, Ufo A. (2011) concluded that Profitability, liquidity and efficiency have positive and significant influence to debt service coverage as a proxy of financial distress. Whereas, according to Yohannes(2014) efficiency and profitability have a positive coefficient sign however statistically insignificant.

Foremost, this paper had the intension to oversee financial distress of manufacturing companies in Ethiopia over the last decades and to investigate the determinants of financial distress that are not only the problem faced by small and medium enterprises, but also large firms are not

protected from financial distress. Based on data and evidence from the past 25 years, in-depth analysis of the structure and performance of the Ethiopian manufacturing sector and further explores the reasons behind the ‘paradox’ of the slow growth of manufacturing outputs (especially manufactured exports) and unimpressive performance of manufacturing despite determined efforts through industrial policy (Oqubay 2015).

What makes this study unique is that it was used two dependent variables as a proxy of financial distress which is long term debt to total equity ratio and short-term debt to total equity ratio. According to Upneja and Dalbor (2001), debt should not be thought as a homogeneous. Total debt should analyze as short term and long-term debt. However, most researchers including Yohannes (2014) and Ufo, A (2011) used only Debt service coverage as a proxy of financial distress. A relatively low overall explanatory power of adjusted (R^2) in studies reveals that there might be imperfect representation of theories in using proxies or the existence of other factors affecting the firm’s financial decisions than those hypothesized by those studies. And this study was tried to incorporate basic macroeconomic variables like inflation and economic growth which measured by GDP. Moreover, this study was introduced new variables to analyses financial and non-financial issues of the firms like growth, size and age of the firm and by using relatively large number of observations the researcher was try to make this empirical work to be more consistent and possible to generalize. Obviously financial health is a primary issue to survive as a firm and to contribute for the economic development of once country, especially in developing countries like Ethiopia financial distress and bankruptcy comes with multiple social and economic crises. Hence, the importance of exploring factors that determine the financial distress of these firms is doubtless and this inspire the researcher to put his contribution on this area.

1.3 Research Questions

1. What is the relationship between firm specific factors and financial distress in Manufacturing Companies?
2. What is the relationship between Macroeconomic Factors and financial distress in Manufacturing Companies?
3. What is the level of financial distress in selected manufacturing Companies?

1.4 Objective of the Study

1.4.1 General Objective

The general objective of the study is to investigate the determinants of financial distress evidence from selected manufacturing companies in Ethiopia.

1.4.2 Specific Objectives

1. To investigate the relationship of firm specific factors and financial distress in manufacturing Companies.
2. To identify the relationship of macroeconomic factors and financial distress in selected manufacturing Companies.
3. To describe the level of financial distress in selected manufacturing Companies.

1.5 Significance of the Study

As the increase of the manufacturing industry mainly the food and beverage sector there is not that much comprehensive and enough studies are not done in the area of financial distress that create a knowledge gap. Thus, this study has a significant role to play in filling the gap in understanding of the determinants of financial distress of manufacturing companies in Ethiopia, such understanding is important because the findings and recommendations will enable regulators, supervisors, and managers know about the cause of financial distress so that they can manage and take corrective actions on those factors while playing their role in the manufacturing Industries. It also contributes a lot to investors and lenders to analyze the financial health of the companies before they invest or grant credit.

1.6 Scope and Limitation of the study

The scope of the study is entirely focused on the determinants of financial distress on selected large tax payers' food and beverage manufacturing companies, particularly in Addis Ababa City. The study period was also limited to only twelve years covering from 2011 to 2022, due to unavailability of organized data for years prior to 2011 and subsequent to 2022. This study had also several limitations. One limitation on this regard was that, there were a total of 28 large tax payer food and beverage manufacturing companies in Ethiopia but due to the criteria employed to generate sample units, some companies with missing values were excluded from the

considerations. Hence, they might have been with some meanings, though omitted due to the balanced panel data observation strategy.

1.7. Organization of the Study

The thesis had been structured in to five chapters as follows; following introduction in the first chapter, Chapter two contains a review of the literature including; the theoretical review first section; this is followed, by the review of the previous studies related to the area and conclusion and knowledge gap finally. The research design and methodology are presented in chapter 3. Specifically, this chapter shows the research sampling method followed by data collection and all are outlined. In chapter four, the results and findings of the study are also discussed. Finally, the last Chapter is enclosing the summary of findings, conclusions drawn and recommendations and areas where further research may be productive.

CHAPTER TWO: REVIEW OF RELATED LITERATURES

This chapter discusses the literature concerning the financial distress determinants. This review of literature establishes framework for the study and highlights the previous studies, which in turn, helps in clearly identifying the gap in the literature. The discussion of the literature on financial distress determinants has four sections; the first section considers meaning and concept of financial distress. This is followed by the general theory of financial distress. The third section a review of the empirical studies on the determinants of financial distress choice. Finally, conclusions on the literature review and knowledge gaps are presented in section four.

2.1. Review of Theoretical Literatures

2.1.1. The concept of Financial Distress

Financial distress is a situation where a company does not have capacity to fulfill its liabilities to the third parties (Andrade & Kaplan, 1998). In this case, a company is unable to fulfill its debt obligations to third parties, which leads to either restructuring or bankruptcy. Financial distress can be described in many ways. It can mean liquidation, deferment of payment to short term creditors, deferment of payment to interest or principal on bonds or the omission of a preferred dividend. One of the problems experienced in examining the literature on forecasting financial distress is that different authors use different criteria to indicate distress (Jamshed, 2012). According to Pandey (2005) financial distress occurs when a firm is not able to meet its obligations. Adeyemi (2011) defines financial distress as a situation in which an institution is having operational, managerial and financial difficulties. In this study the working definition is adopted from Jahur and Quadir (2012) who defines financial distress as the inability of a firm to pay its current obligations on the dates they are due.

According to Jahur and Quadir (2012), the common causes of financial distress and business failure are often a complicated mix of problems and symptoms. The most significant causes of financial distress in young companies are capital inadequacy where the business did not start with enough capital and has struggled from day one. Capital in any business serves as a mean by which losses may be absorbed. It provides a cushion to withstand abnormal losses not covered in the current earning pattern (Adeyemi, 2012).

Where other companies have undertaken management succession planning for key roles and identified high potentials in their company's employee's, usually firms in financial distress do not prepare at all for top management succession (Malik, 2013). This could lead to recruiting unbalanced management team which lack essential skills to steer the company ahead. Any wrong investment decision made may plunge the company to financial distress since some of the decisions involve huge cash outlay and irreversible. The importance of innovation to a firm's future has been documented extensively, though the level of risk associated with innovation has been examined to a small degree (Chao, Lipson & Loutskina, 2012). The probability that innovation will drive a firm to financial distress is high especially where the competitors introduce innovative and competitive products which reduces the attractiveness of the company's products and services (Jahur & Quadir, 2012). Therefore, innovation can either give a firm a competitive edge to its rivals or will see its demise equally. While most companies rely on their financial performances as the key barometer of financial health, it is important not to ignore managerial and operational signals (Palinko, 2016). Many profitable businesses have found themselves in trouble due to rapid expansion like Aeropostal or the introduction of a formidable competitor (Cheluget, 2014). In each of these instances, the companies were successful before an operational event or unheeded signal led to financial problem and in some cases the subsequent failure of the company. In other countries, the business that were able to recognize earlier warning signs such as Zellers, Canadians Tire and The Bay have survived by differentiating themselves or changing and improving their business model (Hamid, 2014).

Financial Distress as a phenomenon has been a focal point of study in corporate finance since the notable corporate failure of Penn Central and railroad industry in 1970 (Altman, 1971). The terms 'financial distress' and 'bankruptcy', have commonly been often used synonymously; however, the two situations differ substantially in terms of the fundamental variables related to firm's financial health as well as in the sequence of events. Bankruptcy or insolvency or liquidation is the situation, preceded by financial distress.

Platt & Platt (2002) emphasized that financial distress is the late stage of firm decline, which can be followed by the major events such as bankruptcy, liquidation or insolvency.

Developing a theory of financial distress, Gordon (1971) suggested that the decrease in the earnings capacity of the firm can result in the possibility of inability of the firm to repay the principal or interest component of debt. Such a state represents the distressed financial condition of the firm.

Wruck (1990) also explained “financial distress as a situation, where cash flows are insufficient to cover the current obligations”. Researchers have attempted to unravel the causes and impact of financial troubles, bankruptcy, debt restructuring along with the efforts to predict the distressed conditions of the firms. Although, the financial distress has always been perceived in a negative light, it is the phenomenon results into costs as well as certain benefits to the corporations (Opler & Titman, 1994; Wruck, 1990). Out of pocket or the direct costs (such as legal, administrative, advisory fees), indirect or the opportunity costs (such as additional covenants, decrease in product demand, increase in the cost of production, management’s effort in distress resolution) are the major costs incurred by the firms experiencing the distressed condition.

2.2 Theories related to financial distress

Wrecker’s Theory of Financial Distress

After developing a reduced form default risk indicator, Campbell, Hilscher and Szilagyi (2005) present hypothesis that stocks of distressed firms perform in a manner which is vastly inferior to stocks of financially healthy firms. The wreckers’ theory of financial distress seeks to explain the benefits that may step out of financial distress to stakeholders. It is not necessary to attribute the negative excess returns of distressed firms to inefficient or irrational markets. Such negative excess returns can be shown to be the equilibrium outcome under efficiency in an environment where a subset of participants is able to draw returns (in kind) from distressed companies. For firms close to bankruptcy, non-cash returns to ownership may be the dominant form of payout. If markets are efficient, those returns must show up in stock valuation. This may be labeled the ‘wreckers’ theory’ of financial distress. It explains the entire pattern of results very well. They proceed to show how to test this hypothesis directly against the alternative of inefficient markets using the theory of convenience yields.

It is hard to believe that financial market participants as a group can be that irrational or inefficient.

Therefore, Campbell, Hilscher and Szilagi (2005), take one step back and try to tell the story of “profiting from a ship wreckage” from a completely different perspective. They paint an illusion of a firm being hit by a series of negative shocks, making losses and approaching a state of financial distress. With higher leverage, volatility of share prices increases with respect to private information; the ultimate fate of the firm depends on issues unknown to the general public. With information asymmetry becoming more important, uninformed investors widows and orphans will leave, as, from their perspective; it is a market for lemons. Two groups come to mind: managers themselves, and competing firms. A third possibility might be private equity or funds, working on a restructuring. (Campbel, Hilscher, & Szilagyi, 2005)

According to Opler and Titman (1994) show that financially distressed (highly leveraged) firms lose significant market share to their healthy competitors during industry downturns.

Liquid Asset Theory

The theory behind the model can best be explained within the framework of a cash-flow. Beaver (1966) wrote: The firm is viewed as a reservoir of liquid assets, which is supplied by inflows and drained by outflows. The reservoir serves as a cushion or buffer against variations in the flows. The solvency of the firm can be defined in terms of the probability that the reservoir will be exhausted at which point the firm will be unable to pay its obligations as they mature and may result in failure). It was argued that firms with positive cash flow are able to raise their capital and borrow from the capital market, while firms with negative or insufficient cash inflow are unable to borrow and therefore face the risk of default.

According to this argument, a firm is assumed to go bankrupt (default) whenever the current year profit or cash flow is negative or less than the debt obligations or whenever the sum of its current year profit and the expected value of equity (without current income) is negative (less than zero) (Scott, 1981).

Liquidity and Profitability Theory

According to Hashi (1997), when the firm ‘s indicators (liquidity and profitability) are good it is perceived as healthy, but it is perceived as unhealthy and at risk of bankruptcy if the indicators are poor. Two major categories of these indicators: liquidity and profitability. A positive and

high measurement of these two implies a lower risk of bankruptcy. The obvious weakness of this theory is its generality. On the flip side, however, this —weakness‖ ensures that the theory does not conflict with, and is inclusive of other more prescriptive theories. However, entrance or exit of a company does not always mean physical inclusion in or exclusion from an industry. Entrance or exit can be observed as increase or decrease in operations, resource raise or shortage, or change in field of activity.

Gambler’s Ruin Theory

The basic idea of this theory relates with the game of a gambler, who plays with an arbitrary sum of money. Gambler would play with some probabilities of gain and loss. Game would continue until the gambler loses all his money (Espen, 1999). Theory would also talk about gambler ‘s ultimate ruin and expected duration of the game. In context of the firm ‘s failure, firm would take the place of a gambler. Firm would continue to operate until its net worth goes to zero, point where it would go bankrupt (Espen, 1999). The theory assumes that a firm has got some given amount of capital in cash, which would keep entering or exiting the firm on random basis depending on firm ‘s operations. In any given period, the firm would experience either positive or negative cash flow. Over a number of periods, there is one possible composite probability that cash flow will be always negative. Such a situation would lead the firm to declare bankruptcy, as it has gone out of cash (Aziz & Dar, 2006). Hence, under this approach, the firm remains solvent as long as its net worth is greater than zero. This net worth is calculated from the liquidation value of stockholders ‘equity (Espen, 1999).

Keynesians Theory

Keynesian theory is an economic theory proposed by Maynard Keynes (1936). According to Keynes (1936), liquidity preference is the main reason why firms hold cash during tough economic times. The multiplier effect causes a small decrease in consumption or investment which in return causes a decline throughout the economy.

This theory brought about structural inadequacies such as unemployment which causes imbalance in demand leading to contraction in the economy. Most businesses under go business cycle process. The cycle is influenced by macroeconomic factors majorly systematic risks. Most firms experiencing systematic risk embark on hedging in order to mitigate this problem. In

circumstances where hedging is not done, inflation causes an increase in prices of goods and services and cost of production concurrently (Duda and Schmidt (2010).

Cash Management Theory

Cash management theory is concerned with the managing of cash flows into and out of the firm; cash flows within the firm and cash balances held by the firm at a point of time by financing deficit or investment surplus cash. Short-term management of corporate cash balances is a major concern of every firm. This is so because it is difficult to predict cash flows accurately, particularly the inflows, and there is no perfect coincidence between cash outflows and inflows (Aziz & Dar, 2006). During some periods cash outflows will exceed cash inflows because payments for taxes, dividends or seasonal inventory will build up. At other times, cash inflow will be more than cash sales and debtors may realize in large amounts promptly (Pandey, 2005). An imbalance between cash inflows and outflows would mean failure of cash management function of the firm. Persistence of such an imbalance may cause financial distress to the firm and, hence, business failure (Aziz & Dar, 2006).

Trade off Theory

The trade-off theory says that firms have optimal debt-equity ratios, which they determine by trading off the benefits of debt with the costs. In traditional trade-off models, the chief benefit of debt is the tax advantage of interest deductibility (Modigliani and Miller, 1963). The primary costs are those associated with financial distress and the personal tax expense bondholders incur when they receive interest income (Miller 1977).

The goal is to maximize the firm value for that reason debt and equity are used as substitutes. According to this theory, higher profitability decreases the expected costs of distress and let firms increase their tax benefits by raising leverage; therefore, firms should prefer debt financing because of the tax benefit.

As per this theory firms can borrow up to the point where the tax benefit from an extra dollar in debt is exactly equal to the cost that comes from the increased probability of financial distress (Ross, 2002)

2.3 Costs of Financial Distress

To the extent that financial distress and bankruptcy are costly, and if these costs are inevitable, then virtually all corporate financial decisions will be affected by such costs. Thus, the magnitude of the financial distress and bankruptcy costs is an important empirical question.

Direct costs

Direct bankruptcy costs are the legal, administrative and advisory fees that the firm bears as a result of entering the formal bankruptcy process. Warner (1977) estimates the direct cost to be around 4% of the firm's pre-bankruptcy value, using a sample of railroad bankruptcies during 1933 and 1955. Weiss (1990) uses a sample of 37 bankrupt firms in the period 1980-1986, and estimates the direct costs to be around 3% of the pre-bankruptcy firm value. Lubomir (2002) uses a sample of 22 firms from 1994 and calculates that the cost of legal counsel bankruptcy is on average about 1.8% of the distressed firm's total assets, and can be as high as 5%. Altman and Hotchkiss (2006) provide a nice summary of the estimates of the direct bankruptcy costs in the literature. The findings in all these studies suggest that direct bankruptcy costs are unlikely to represent a significant determinant of the firm's capital structure decision. The robustness of this conclusion, though, to "mega" bankruptcies is an open question.

In theory, direct bankruptcy costs should not be confounded with liquidation costs. The former is the cost associated with using the legal mechanism to resolve financial distress, and the magnitude of this cost is important to assess the impact of bankruptcy on corporate financial policies. The latter is the cost incurred in selling off a firm's assets and closing up the firm's operations.

Indirect Costs

Potentially more significant and substantial are the indirect costs of financial distress and bankruptcy.

These costs can be viewed as opportunity costs, in that they collectively represent the outcome of suboptimal actions by corporate stakeholders when the firm becomes financially distressed. Thus, costs that arise because of inter- or intra-group conflicts of interest, asymmetric

information, holdout problems, lost sales and competitive positions, higher operating costs, and ineffective use of management's time all potentially represent the indirect costs of bankruptcy.

Given that the estimated magnitudes of direct bankruptcy costs are small, the empirical magnitude of the indirect costs is central to the consequence corporate bankruptcy. A common sentiment is that the indirect costs are substantially larger than the direct costs. However, these costs are difficult to observe and measure.

Another major challenge is how to empirically distinguish the costs of financial distress from the costs that would have arisen with pure business dislocation and economic distress. As a result, the interpretation and comparison of the estimated magnitudes of indirect bankruptcy costs are often not straightforward.

2.4 Financial Distress and Bankruptcy Models

2.4.1 Financial ratio-based models of distress and bankruptcy prediction

Beaver (1966) verified the predictive ability of financial ratios in the event of corporate failure based on the 30 individual ratios or univariate analysis and suggested that ratios have the ability to detect the illness of firms much before the corporate failure. Altman (1968) presented a bankruptcy prediction model based on multiple discriminant analysis. The model based upon ratio analysis to predict the financial health of the enterprise considers multivariate view along with the interaction of the various independent variables instead of the earlier univariate analysis. The predictive accuracy of the model is reported as 95%. The model suggested in the paper based on the validation tests on the initial as well as secondary samples found that the model's predictive ability is highest up to two years prior to the bankruptcy and the prediction power decreases as the lead time increases.

The ratios used in the model were found to be considerably higher for the non-bankrupt firms, hence leading to a higher Z score.

Higher the Z score, lower is the probability of bankruptcy for the firm. With the evolution of the bankruptcy prediction models, emphasis shifted on the virtues of conditional logit analysis from multiple discriminant analysis (MDA), Ohlson (1980), used the conditional logit analysis to predict the bankruptcy among 105 bankrupt firms with non-bankrupt firms as a control sample.

2.4.2 Price based model of distress and bankruptcy prediction

Building upon the informational efficient capital markets, the price-based model takes into account the market related data such as stock prices and equity returns. The major advantage of market data-based models is the timeliness of the information (Keasey & Watson, 1991).

The market-based models are derived from Black & Scholes (1973) and Merton (1974) model of contingent claims. The model considers firms' equity as a call option on the underlying assets of the firm having a strike price equal to face value of the firm's debt or liability. Market based models thus calculate the distress risk, which is the probability of face value of the underlying assets of the firm decreasing to a value below the face value of the firm's liability or debt at the end of the forecasting horizon thus known as Merton's distance-to-default model. In order to assess the predictive accuracy of Merton's distance-to-default model with unrealistic assumptions, Bharath & Shumway (2008), refined the Merton's structural model.

Reisz & Perlich (2007) have suggested that accounting ratio-based measures have better predictive accuracy in shorter time horizons such as 1 year ahead bankruptcy prediction. The accounting-based approaches are also suggested to be robust and economically beneficial than the market approach (Agarwal & Taffler, 2008).

2.4.3 Artificial neural network-based distress and bankruptcy prediction models

In an effort to improve the classification & prediction accuracy, the mathematical & computational techniques such as artificial intelligence approaches, data mining techniques, neural networks, data envelopment analysis (DEA), expert systems and genetic algorithms have been widely used in the prediction of corporate failure (Xu & Wang, 2009).

The advantages of such techniques over the classical statistical techniques are the absence of conformity to the assumptions of normality, linearity and absence of multicollinearity.

The artificial neural network techniques generally involve dividing the data into two categories: Training sample (in sample) and test sample (out sample). Randomly dividing the data into such categories introduces biases in the model (Palinko,2016)

2.5 Determinants of Financial Distress

Wrecker's theory, provide an opportunity to classify the determinant of financial distress as firm specific and external factors. Firm specific factors include profitability, liquidity, solvability, efficiency, firm growth, firm size and firm age. External factors include Inflation and GDP.

2.5.1 Firm Specific Factors

Due to the difference on the sensitivity of firm characteristics for financial distress, firm related factors can be classified as financial and non-financial factors. Financial factors include; profitability, liquidity, solvability and efficiency. firm growth, firm size and firm age considered as non-financial factors.

Liquidity

Liquidity is a measure of the extent to which a person or organization has cash to fulfill immediate and short-term obligations, or assets that can be quickly converted to do this. The financial liquidity ratios are the tools that are commonly used to measure financial performance (Chan, 2011). It is one of the popular determinants of financial distress that's why different studies have used for instance; Paranowo (2010), Salehi & Abedini (2009) Baimwera (2006), Sulaiman and Sanda (2001), Mohammed (1997), Theodossiou, (1996), Kiragu (1993), Keige (1991), Altman (1968), Ufo A.(2011) and Altman, Haldeman, & Narayanan (1977) . Their study provides some evidence on the usefulness of accounting information specifically the financial ratio as an indicator of present, past and future performance. In general, financial analysts and investors used financial ratios to evaluate or to identify the financial distress or bankruptcy.

The study of Altman, Haldeman, and Narayanan (1977) find that liquidity is the most significant indicator for financial distress. Their study uses a matched sample consists of 53 bankrupt companies and 58 non- bankrupt entities between the years 1969 to 1975.

The model adopted by them is multiple discriminant analysis. The finding suggests that companies should retain sufficient liquidity to prevent the insolvency problems.

Paranowo (2010) uses debt service coverage ratio as a proxy for liquidity and find liquidity as a significant variable. The sample consists of public listed non-financial companies in Indonesia for the period from 2004 to 2008. (Hafizah, 2015).

Profitability

Profitability will reflect the ability of the company to turn sales revenue into different types of income such as gross profit, net profit, operating profit, and expressed as a portion of each dollar of sales.

Profitability ratio is among the standard variable use in the study on the relationship between the financial distressed and firm specific factor. Prior study which discusses bankruptcy using profitability as the variable are Altman (1968), Altman, Haldeman, and Narayanan (1977), Kiragu (1993), Nyamboga, Omwario, Muriuki, Gongera, (2014), and Paranowo (2010), Li (2007), Outecheva (2007).

Salehi and Abedini (2009) investigate the relationship between profitability and financial distress prediction of listed companies on Tehran Stock Exchange (TES). For this reason, they use the multiple regressions as the model. Valuation models made using the data from the two groups. The first group consists of 30 companies which do not have any financial difficulties, and for the second group, likewise, contain of 30 companies facing the financial difficulties. Their study find that profitability has negative significant relationship with financial distressed, which is contradictory with Altman's conclusion.

Altman (1968) using Z-Score model concludes that profitability has a positive relationship with distress and it is the most significant ratio in predicting failure. Opler & Titman (1994) also indicates that profitability is the most important ratio.

But other researchers conclude in different ways for instance; Paranowo (2010) study revealed that profitability do not has an impact on the status of corporate financial problems. This leads to the conclusion that high profits is not a guarantee that companies can live to satisfy its liability.

However, financially distressed firms with above average profitability may be appealing acquisition targets to firms that have the income and know how to improve their financial distress problems. This result is based on Indonesian companies.

Firm Efficiency

Efficiency measured by earning before tax, depreciation and amortization to Total assets (EBITDA/TA). This indicates productivities of company's assets to generate income. For companies which have a negative profit, cash availability only be contributed by depreciation and amortization.

Firm's Efficiency or turnover ratios measure how productively the firm is using its assets Brealey (2000). The firm efficiency is measured in terms of its asset turnover, average collection period and average payment period. These components indicate the firm's viability as well as speed of turning over its assets within the year, which determines the firm's financial distress.

According to (Brealey 2000) other determinant of financial distress is the firm's efficiencies, which limits the firm's ability of increasing its EBITD and reducing the wastage of effort or increasing the ability of firm's asset utilization to increase its sales. The researcher uses the ratio of earnings before interest tax and depreciation to total assets as a firm-level proxy for efficiency. The possible cause of financial distress is efficiency or turnover, the higher a firm's total asset turnover; the more efficiently its assets have been used. This measure is probably of greatest interest to management, because it indicates whether the firm's operations have been financially efficient.

Solvability

According to Hotchkiss (1995) Solvability is the condition of being solvent; ability to pay all just debts. In other way is defined as whether something can be resolved and the degree of ease with which it can be resolved. The researcher used equity to total assets in order to see the sensitive to the probability of financial distress.

Firm Size

From economics and strategic management perspectives as firms become large in size, they would be more profitable because of the economies of scale scenario. Thus, larger firms are more profitable than the small ones. But, from corporate finance point of view, larger firms could also be problematic than their small counter parties.

This problem could be justified by the existence of agency problem in the larger ones because of the agent principal relationships. While small companies are mostly owner managed and there would not be agency problem.

Previous literature confirms the significance of company firm size in explaining corporate failure; however, the results are mixed. On the one hand, it is expected that a small company is more likely to fail because of inadequate experience in the market, limited connections and limited financial resources compared to a larger company (Mohammed, 1997; Honjo, 2000).

Pronowo (2010) looked at firm size from four different perspectives, namely, turnover base, number of employees, assets base and the firm 's age in terms of the number of years in existence. In this study Firm size will determined by log of total asset.

Firm Age

We define company age as the number of the year since incorporation date. A company with a long history can establish an important effect on corporate governance. For example, among Chinese listed companies, the agency costs, such as the entrenchment problem, are expected to vary with company age (Chan, 2011). It is expected that company age is negatively related to the probability of financial distress.

According to Whitaker (1999) that company age has a positive effect on the likelihood of financial distress. Older companies could increase the likelihood of falling into financial distress, however, younger companies have lower possibility to enter financial crisis.

Firm Growth

This refers to the internal growth; the level of growth a firm can achieve without having to resort to additional borrowed funds or additional outside capital infusion.

Internal growth rate, in the context of this study, is measured by dividing Retained earnings by Total Assets. A high ratio indicates investment financed out of a high level of retained earnings as compared to external equity and debt.

Retained earnings and Total Assets data is obtained from the balance sheet of the firms. Internal growth succeeds the plowing back of earnings and the subsequent reinvestment of these earnings into profitable investments.

2.5.2 Macroeconomic Factors

Based on finance literatures there are different macro-economic factors that affect financial health of the firms. Inflation and GDP considered in this research.

Annual Inflation Rate

According to Kevin (2008), High inflation rate is associated with higher costs as well as higher income. If a manufacturing company income rises more rapidly than its costs, inflation is expected to exert a positive effect on financial distress. On the other hand, a negative coefficient is expected when its costs increase faster than its income.

Economic Growth (GDP)

According to Kevin (2008) this is measured by the real GDP growth rate and it is hypothesized to affect manufacturing company's financial distress in both said mean negatively or positively. This is because the default risk is lower in upturn than in downturn economy.

2.6 Empirical Literature

2.6.1. Overseas Studies

The first multivariate study was published by Altman, (1968). Altman used multivariate discriminant analysis (MDA) to develop a five-factor model to predict bankruptcy of manufacturing firms.

The 'Z-score', which is called, predicted bankruptcy of firms if the firm's score fell within a certain range. Altman's Z-score model had higher predictive ability for the initial sample one year before failure (95% accuracy).

Even though, the model's prognostic ability declined significantly from there with only 72 percent accuracy two years before failure, down to 48 percent, 29 percent, and 36 percent accuracy three, four, and five years before collapse, respectively. The model's prognostic ability when tested on a hold-out sample was 79%.

Since Altman's research, the complexity and number of bankruptcy prediction models have increased dramatically. There was also another researcher Daniel (1968) besides Beaver's and Altman's that was published in the late 1960's. The numbers climbed from there - 28 studies in the 1970's; 53 studies in the 1980's; 70 studies in the 1990's. There were 11 studies during the period 2000 to 2004 Cheluguet (2014).

Researches on the company's financial distress have been conducted many years in many countries. Fitzpatrick (2004) investigated dynamic of financial distress among US giant publicly-traded non-financial firms. He tried to develop and tested a parsimonious model that measures a firm's financial health. A firm's Financial Condition Score (FCS) is based on three variables: the leverage, firm's size and the standard deviation of the firm's assets.

Hamid & Nasil (2014) carried a study on Pakistanian manufacturing sector from July 2003 to June 2010. The study incorporated all listed manufacturing sectors on Karachi stock exchange. The study used Zmijewski model to test the distress level on these companies. The findings revealed that the probit model performed well on predicting financially distressed firms and non-distressed firms, based on; Net income, Shareholders equity and cash flows. The study however relied heavily on ratios ignoring other factors that lead to financial distress.

Warutere (2013) conducted a study on the applicability of logistic regression in financial distress prediction in Nairobi security exchange. The study was conducted on sixteen companies between the ranges 1997-2011. The findings revealed that Logit regression was successful in prediction of business failure one year before it occurred. The study relied on secondary data obtained from CMA and NSE.

The study used financial ratios in financial distress prediction. Moreover, the study did not factor in other factors that cause financial distress within the regression model so as to make it more reliable such as corporate governance.

Baklouuti (2016) study used financial ratios to predict financial distress. The independent variables used were; turn over ratios, activity ratios, profitability and leverage ratio.

The study revealed the ability of financial ratios in determining the firm going concern. The study used secondary data obtained from the banks' financial statements. The study used a discriminant model and incorporated all the above ratios.

The study revealed that, none of activity and turn over ratios was critical in predicting financial distress in commercial banks in Kenya.

However, the study differed with those of Altman (1968) who concluded that profitability and efficiency ratios were most crucial and that liquidity ratios were not significant. The study however relied on financial ratios only ignoring other factors.

Odipo and Sitati (2010) conducted a study using Altman's model in bankruptcy prediction at the Nairobi securities exchange. The study used twenty firms listed between 1989 and 2008. The study used Altman's model which incorporated, total assets, retained earnings, earnings before interest and taxes, book value of equity, and sales as independent variables. The findings of the study revealed that Altman's model was found to be applicable with 80% successful prediction. The study relied on secondary data from NSE and CMA. However, this study was only limited to financial ratios in bankruptcy prediction.

Gruszczynski (2004), study focused on financial distress of companies in Poland. The following were found to play a critical role in determining financial distress in companies in Poland. Financial distress is determined mainly by the degree of liquidity, profitability and by the size of debt. According to the findings from this study, the best predictors of financial distress of Polish companies in the second half of nineties were: the loss of liquidity (liquidity ratio), diminishing profitability (return on assets), increasing debt (debt ratio), and decreasing turnover of liabilities. The study focused on Liquidity, profitability and size of debt (leverage) as determinants of financial distress in Poland companies.

Karels & Plakash (1987) divided all possible causes of financial distress arising out of decline in profitability into two groups: internal risk factors and external shocks. Poor management also occurs due to internal risk factors. Potential forms of the appearance of bad management are the absence of a sense of a need for change, inadequate communication, overexpansion, unintentionally improper handling of projects, or fraud. Exogenous shocks are independent of managerial skills.

Bhunias, Khan and Mukhuti (2011) use companies listed on Indian Stock Exchange as a sample. The data is collected from the Company's Annual Report. A matched sample design method is applied in their analysis. Each bankrupt firm has a non-bankrupt "partner" in the sample. Paired samples of failed and non-failed firms from year of 2001 to 2010 are utilized in their analysis.

Li (2007) uses a rough set (RS) model to study the financial distress prediction for Chinese listed companies. The sample consists of 212 financial distressed firms and 212 healthy firms from the years 1998 to 2005. The result from this study finds that profitability has strong effects on corporate financial distress.

Pranowo (2010) analyzed financial distress by mapping 220 non-financial companies which are listed in Indonesia Stock Exchange into the steps of integral financial distress. The result indicated that deterioration had the most effect on financial distress for Indonesia public companies and mapping into five different industrial sectors. The findings show that the number of deterioration companies and cash flow problem companies increased over the period of study. In general, every time number of good companies going down, companies in the status of deterioration increased.

To identify troubled companies, Opler and Titman (1994) study use sales growth as a variable. Then, they find a negative growth in sales is related to the companies that have problems in their daily business. Both indicators are particularly important during a recession because they reflect not only the structure of the effective operations of the company, but it shows that it is also dependent on investor sentiment, the state of competition and also to the general condition of the industry.

Kiragu (1993) conducted a study of corporate failure prediction using accounting data of price adjusted. He uses a matched sample of 10 bankrupt firms and the 10 healthy firms. Financial ratios are calculated from financial statistics adjusted price level. Discriminant model developed shows that of the ratios have the ability to predict corporate failure. He finds that liquidity is the most important ratio and has negative relationship with financial distressed. This conclusion is in line with previous findings. Firms need to maintain sufficient liquidity to prevent the problem of insolvency.

Ang (1992) argued that the relationship between leverage and firm size is complex, and enough reasons can be found to justify both lower and higher leverage in small firms when compared with larger firms. Indeed, empirical evidence does not provide support for a clear and monotone relationship between size and leverage, although small firms generally show higher leverage ratios and make greater use of short-term financing than the larger firms.

Whited (1992) found that firms with high leverage display a higher sensitivity of investment to cash flow. John (1993) presented evidence for firm-level determinants of cash holdings, indicating that firms with higher costs of financial distress and higher cash flow volatility hold significantly more cash, while firms with higher leverage, higher growth rates, a longer cash conversion cycle, and more tangible assets hold less cash. Raad and Wu (1994) found that stockholders of mergers financed with stocks suffer significant losses.

2.6.2 Studies in Ethiopian context

As far as the knowledge of the researcher there are only two studies were conducted in the manufacturing sector. Ufo, A (2011) conducted a study on determinants of financial distress on beverage and metal industry and he revealed profitability, firm age, liquidity and efficiency (Eff) have positive and significant relation with Debt Service Coverage (DSC) which is a proxy of financial distress. Contrary, leverage (Lev) has a negative and significant effect on debt service coverage. Other variables such as operational viability and good corporate governance have no significant impact on the status of firm's financial distress. Additionally, the analysis indicated that operationally viable firms in specific period of time should not be a guarantee that the firms going concern to settle its liabilities. Liquidity of firms which can be a prominent point can be recognized by evaluating cash flow issues.

And he tried to support his empirical conclusion through interview with managers and he revealed that liquidity, leverage, profitability, efficiency; firm size and low debt service coverage are the main causes of financial distress at highest degree. Operational viability also causes firm's financial distress at higher level. Contrary, the variable such as, industrial relations, good corporate governance implementation problems and firm age causes financial distress at lower level. However, this study didn't incorporate basic macroeconomic variables such as annual Inflation rate and Economic Growth.

Yohannes (2014) on his research identify factors affecting financial distress of Manufacturing firms in Ethiopia by using quantitative research approach using balanced panel data set of 60 observations from 12 Share companies in Addis Ababa city over the period 2009-2013. And his study revealed that solvability (SOL), firm size (FSIZE), economic growth (EG) and liquidity (LI) have positive and significant influences to Debt Service Coverage (DSC) as a proxy of financial distress.

On the other hand, leverage (Lev) has a negative and significant relation with DSC. Other variables such as profitability, efficiency and inflation have no significant impact on the status of firm's financial distress in manufacturing share companies in Addis Ababa-Ethiopia.

This study was better and inclusive than the previous one but it is difficult to conclude about the factors based on small observations it makes different to generalize. For instance, in most studies' profitability has positive and significant effect on DSC but here declared that no significant impact on the status of firm's financial distress. Moreover, this study didn't incorporate non-financial variables. Inconsistent of conclusions also motivated the researchers to precise this confusion by taking more sample.

2.7 Conclusion and Knowledge Gap

Scholars have provided many theoretical explanations and much of empirical studies associated with determinants of financial distress of manufacturing industry. This study has identified the following knowledge gaps:

Though, since recent years the topic what factors determine the financial distress of manufacturing firms has gained considerable researchers' attention, still there is no clear-cut explanation what determinant positively or negatively affecting their financial performance.

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 manufacturing of small size operates 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 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 all developing nations, research on the determinants of financial distress in Ethiopia, is a recent phenomenon and only scanty of recent studies are available on the database evidencing from Ethiopian Manufacturing industry.

Moreover, most studies on manufacturing companies globally and locally focus more on predicting models, financial and operational sustainability and limited up-to-date. Given the passage of time and limitations of case studies as far as generalization of results to the population is concerned, there is need for the present study to be conducted. Therefore, this study tried to fill the stated research gaps in our country's context and also add body of literature to the existing stock of knowledge on determinants of financial distress of manufacturing firms in Ethiopia.

Table 2.1 Summary of major literatures

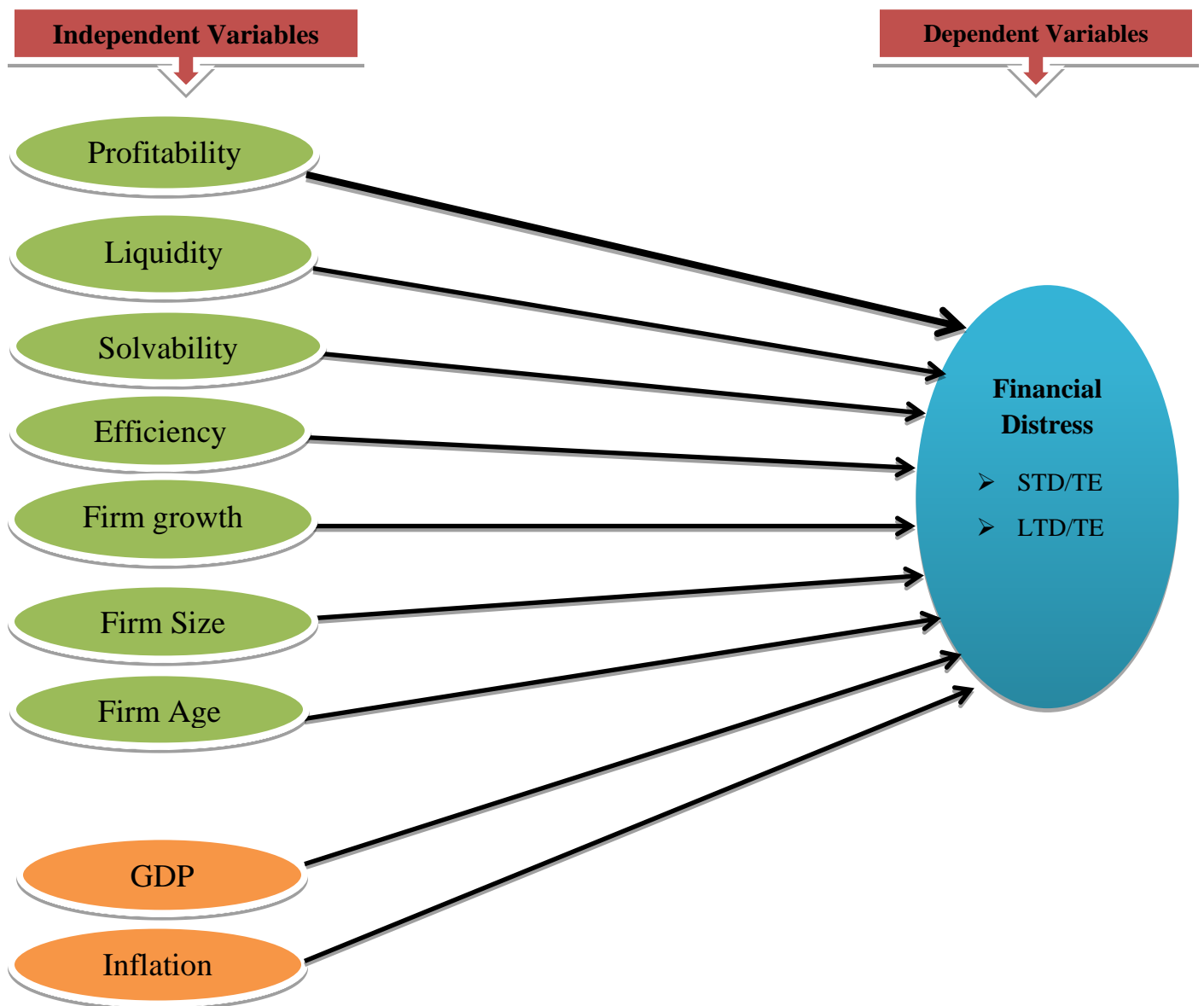
Research ers	Research Title	Research Variables	Research Results	Selected Variables
Tadesse Yirgu (2017)	The Determinants of Financial Distress: Empirical Evidence from Banks in Ethiopia	Accounting variables- Capital adequacy ratio, loan loss provision, cost to income, earning ability, Liquidity risk, bank's size, GDP, inflation and saving interest rate.	Capital adequacy, management efficiency, earning ability, GDP and bank size have negative effect on banking financial distress and except size all of them appeared significant; whereas asset quality and liquidity appeared as having positive effect, but liquidity was only significant.	GDP
Palinko (2016)	Main Causes and Process of Financial Distress An Empirical Analysis of Hungarian Firms	Operational efficiency, Financial leverage and Liquidity.	Operational efficiency, Financial leverage and Liquidity have significant and negative relation with financial distress	Efficiency and liquidity
Cheluget (2014)	Determinants of financial distress in insurance companies in Kenya	Profitability, Liquidity, Efficiency, Leverage, Firm Size and Firm Age.	Profitability, Liquidity, Firm Size and Firm Age have significant and negative relation with financial distress and Efficiency and Leverage have insignificant relationship.	Profitability, liquidity, firm size and firm age
Hamid &	Financial	Accounting	Earnings Before Interest Tax	Retained

Nasil (2014)	Distress in Pakistan manufacturing firms	variables including Earnings Before Interest Tax to sales return of equity return of assets interest coverage ratio and retained earnings to total asset.	(EBIT) to sales, return of equity, return of assets and retained earnings to total asset has significant negative effect on financial distress and interest coverage ratio has insignificant positive relationship.	Earnings/total asset= Solvability
Yohannes (2014)	The Determinants of Financial Distress in the Case of Manufacturing Share Companies in Addis Ababa-Ethiopia	Liquidity, leverage, profitability, solvability, size of the firm, efficiency, inflation and GDP	Solvability, firm size, economic Growth and liquidity have negative and significant influences to Financial distress. On the other hand, leverage has a positive and significant relation. Profitability, efficiency and inflation have no significant impact on firm's financial distress in Manufacturing Share Companies	GDP, Liquidity, Profitability, Solvability, Firm size, and Efficiency
Ufo,A (2011)	Financial distress & its determinants in selected beverage & metal Manufacturing firms in Ethiopia	Liquidity, Profitability, Leverage, Efficiency, Firm size and operational viability.	profitability, liquidity and efficiency have Negative and significant influences to financial distress. Leverage has a positive and significant relation with financial distress and operational viability has no significant relation.	profitability, liquidity and efficiency
Hafizah binti (2011)	Determinants of financial distress among Manufacturing companies in Malaysia	liquidity, leverage, profitability, Firm's growth, Market Value and cash flows.	Liquidity, leverage, profitability and firm's growth has significant and negative relationship with financial distress. The remaining variables have insignificant relationship.	liquidity, profitability and firm's growth

Source: Author owns design based on Literature (2023)

2.8. Conceptual Framework of this 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 variables in this study are financial distress, which is measured by Short term debt/Total Equity and Long-term debt /Total equity while the independent variables in this study are categorized in to two group microeconomic and macroeconomic determinants.



Source: Author owns design based on Literature (2023)

CHAPTER THREE: RESEARCH METHODOLOGY

This section presents the methodology part of the research. It includes the research design, data type, data source, sample design, data analysis technique and model specification.

3.1. Research Design

Researches of such types that involve in examining cause and effect relationships of two or more variables are explanatory in nature and, therefore, the type of design to be used in this study was explanatory research design. To examine this nature of relationship quantitative data is required and panel data of selected Manufacturing firms for 12 years of operation covering from 2011 to 2022 was used.

3.2 Research Approach

The quantitative research relies on the measurement and analysis of statistical data to produce quantifiable conclusions. Creswell (2009), states that it is one means to test objective theories by examining the relationship among variables. Generally, the problem is best addressed using quantitative research through understanding the variables influence on the outcome since it is made using scientific methods, which include: the generation of models, theories & hypotheses, the development of instruments and methods for measurement, manipulation of variables, collection of empirical data and modeling, and analysis of data. Therefore, for this study quantitative research approach was used to see the relationship between financial distress and firm specific and macroeconomic factors.

3.3. Sampling Design

Sampling design signifies for the definite plan designed to obtain a sample unit 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).

First the population was defined as the manufacturing companies categorized as large tax payer's foods and beverage manufacturing companies spread across Addis Ababa.

Second 28 companies identified as population units which were registered in Addis Ababa city revenue office ,Ministry of Revenue and Ethiopian Investment Agency. Finally, 11 companies were selected (with 12 year's financial information).

3.3.1. Target Population and Sample Size

The population of this study is all licensed large tax payer's foods and beverages manufacturing companies in Addis Ababa-Ethiopia. The total population in terms of large tax payer's food and beverage manufacturing companies are 28 in number. These firms differ in size, age, manufacturing products and many other measures. Based on the stated year of service eleven food and beverage companies with financial data over the period of 2011-2022 were collected from Ministry of Revenue, National Bank of Ethiopia, World Bank and IMF Data. Therefore, one hundred thirty-two (12*11) observations were used to empirically analyze the determinants of financial distress in large tax payer's food and beverage companies in Ethiopian context. According to Mugenda & Mugenda (2003) a sample of 10-30% of the total population is adequate if the sample is properly selected. The sample of manufacturing firms included in the study 32% of the total population which is adequate enough to represent the population. Some firms exclude from the sample because of lacks organized data with lot of missing values in their consolidated financial statements.

3.3.2 Sampling Techniques

Purposive sampling technique was used and the criteria for choosing among the food and beverage manufacturing firms LTP (large tax payers) in Addis Ababa, based on the availability of necessary full balanced panel data for the time period of 12 years (2011-2022).

3.4 Data Type and Data Sources

The required data to analyze the determinants of financial distress of manufacturing firms is quantitative in nature and secondary data were collect from Ministry of Revenue, National Bank of Ethiopia and others online source like world bank and IMF data.

3.5 Data Analysis Techniques

Once the required data was obtained, data computations and entries has made with the help of Microsoft Excel. Then, having entered and computed the values of the variables, data was processed by using STATA 14 software program for meaningful analysis. Analysis of data was

undertaken to show important relationships of the selected variables in the study. Mixes of both descriptive statistics and quantitative analysis was employed to address the research objective.

Descriptive analysis was used to describe patterns of behavior or relevant aspects of the data values and detailed information about the variables selected.

This analysis shows the average, minimum and maximum values of the variables and standard deviation of the different variables of interest in the study.

Under quantitative analysis to examine the determining factors of financial distress of large tax payer's food and beverage manufacturing firms and to test the research hypotheses this study was used panel data regression analysis, because the data have both time series and cross-sectional dimensions. Panel data represent a nexus of time series and cross-section data. Because of several major advantages over conventional cross-sectional or time series data sets, panel data analysis is widely used in economic studies. Panel data usually gives a researcher a large number of data points, therefore improves the efficiency of econometric estimates. More importantly, it allows a researcher to analyze a number of important economic questions that cannot be addressed using cross-sectional or time series data sets. Besides, panel data is advantageous to construct and test more complicated behavioral models than purely cross-sectional or time series data Brook (2008). From the ongoing explanation, it is apparent that panel data regression analysis was used. For this reason, diagnostic tests of classical linear regression model assumptions were run prior to the regression analysis.

3.6 Model Specifications

The type of data used in this study enables the researcher to use panel data model, which is deemed to have advantages over time series and cross section data methodology. Panel data involves the pooling of observations on a cross-section of units over several time periods. This type of data approach is more useful than either cross-section or time-series data separately.

As Brook (2008) stated the advantages of using the panel data set; first and perhaps most importantly, it can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time-series or pure cross-sectional data alone.

Model 1: Short term debt/total equity

$$\text{Model 1: (STD/TE)} = \beta_0 + \beta_1 \text{pro, } t + \beta_2 \text{liq, } t + \beta_3 \text{sol, } t + \beta_4 \text{eff, } t + \beta_5 \text{fgr, } t + \beta_6 \text{gdp, } t + \beta_7 \text{inf, } t + \beta_8 \text{fsi, } t + \beta_9 \text{fag, } t + \mu_{i,t}$$

Model 2 Long term debt/total equity

$$\text{Model 2: (LTD/TE)} = \beta_0 + \beta_1 \text{pro, } t + \beta_2 \text{liq, } t + \beta_3 \text{sol, } t + \beta_4 \text{eff, } t + \beta_5 \text{fgr, } t + \beta_6 \text{gdp, } t + \beta_7 \text{inf, } t + \beta_8 \text{fsi, } t + \beta_9 \text{fag, } t + \mu_{i,t}$$

The research considers nine determinants of financial distress as independent variables of financial distress. They are Profitability (PRO), Liquidity (LIQ), Solvability (SOL), Efficiency (EFF), Firm's Growth (FGR), Gross Domestic Product (GDP), Inflation (IFN), Firm Size (FSI) and Firm's Age (FAG).

A. Dependent Variables

Short term debt to total equity: Short-term debt is an account shown in the current liabilities portion of a company's balance sheet. This account is generalizing any debt incurred by a company that is mature less than one year. The debt in this liabilities account is usually made up of short-term bank loans taken out by a company, among other types Short-term debt, also known as short-term liabilities, refers to any financial obligation that is either mature within one-year period or due within the current fiscal year. The value of the short-term debt account is very vital when determining a firm's performance and financial health of the firm, if the account is larger than the firm's cash and cash equivalents; this suggests that the firm may be in poor financial health.

Long term debt to total equity: The second proxy for financial distress is the ratio which is calculated by taking the firm's long-term debt and dividing it by the book value of common equity the higher a firm's leverage, the greater the ratio.

Generally, firms with higher ratios are thought to be riskier. A high ratio usually indicates a higher degree of business risk because the company must meet principal and interest on its obligations. Potential creditors are reluctant to finance firms with a high debt position. However, the magnitude of debt depends on the type of business. For instance, a financial institution like

banks and micro finances may have a high debt ratio but its assets are generally liquid. A utility can afford a higher ratio than a manufacturer because its earnings are more stable.

B. Independent variables and respective hypotheses

Profitability

The firms Profitability ratios are used to measure the firm's return on its investments Brealey (2000). The research conducted on financially distressed firm suggests staking actions of adjusting the business to increase profitability (Chang-e 2006). There were some researchers such as Hotchkiss (1995) who explored the achievement of bankrupt reorganization firms in US of America and focus on profitability. Financial distress plays a significant role in a firm's operation and profitability through the influence of cost implications, such as administrative and legal costs associated with the bankruptcy process (i.e., direct financial distress costs) or increased costs of debt i.e., indirect financial distress costs for example, (Betker1997) and (Beaver 1966).

Companies with poor profitability are associated with potentially bankrupt firm. Previous researchers find that profitability has a positive significant relationship with firms' financial distress level (Altman, Haldeman, & Narayanan, 1977; Altman, 1968; Nyamboga, Omwario, Muriuki, Gongera, 2014; Malik, 2013; Bhunia, 2011; Baimwera and Muriuki, 2014; Theodossiou, 1996; Parker, Peters and Turetsky, 2002; Li and Liu, 2009; Altman, 1968, 1991 & 2000; Purnanandam, 2005; Smith & Graves(2005); Hamid, 2014; Beaver, 1966; and Hafizah, 2015).

However, some studies find that profitability does not lead to the distress (Kiragu, 1993; Paranowo, 2010; Ohlson, 1980; and Shirata, 1998). *Hence, hypothesized as, there is a negative significant relationship between profitability and financial distress.*

Liquidity

Liquidity measures the company's ability to fulfil its current obligations. Failure to have enough liquidity will lead to poor creditworthiness as the company cannot fulfill their financial obligations. This will lead to loss of creditors' confidence.

Previous studies which found positive relationship between liquidity and financial distress are Suleiman (2001), Altman (1968), Platt and Platt (2002), Smith and Graves (2005), Taffler (1983), Ameer (2010), and Abdullah (2008).

However, negative relationship can occur when the higher the liquidity, the lower would be the probability of bankruptcy. Studies that find negative relationship between liquidity and distress are Shim (1998), Begley (1996) and Deakin (1972). Nevertheless, Shirata (1998) find that liquidity is not an important factor. Begley (1990) and Deakin (1972) show that working capital ratio to total assets is an important factor. Hence hypothesized as, ***there is a negative significant relationship between liquidity and financial distress.***

Solvability

Solvability is the ability of a company to meet its long-term financial obligations. Solvency is vital to staying in business as it asserts a firm's ability to continue operations into the foreseeable future. While a company also needs liquidity to thrive, liquidity should not be confused with solvency. A company that is insolvent must often enter bankruptcy.

Interest coverage ratio = Operating income (or EBIT) / Interest expense. This ratio measures the firm's ability to settle the expense for interest payment on its debt with its operating income, which is equivalent to its earnings before interest and taxes (EBIT). The higher the ratio, the better the company's ability to cover its interest expense hence, ***hypothesized as; there is a negative significant relationship between solvability and financial distress.***

Efficiency

Firm's efficiency or turnover ratios measure how productively the firm is using its assets and FD affects the productive capacity significantly (Brealey, 2000). The firm efficiency is measured in terms of its EBITD/TA (Altman 1983). This parameter indicates the firm's viability and speed of turning over its assets within the year, which determines the firm's FD.

Besides, the increase in efficiency resulting from increase in EBITD/TA ratio increases the firm's productivity, thus increasing debt coverage service. In addition to these effects, low EBITD/TA ratios also grant a firm with near to the ground the probability of FD, which is

designate firms in the track of FD. Hence, *hypothesized as; there is a negative significant relationship between Efficiency and financial distress.*

Firm Growth

Plat and Platt (2008) find that sales growth is negatively significant with distress; where the larger the growth in sales, the lower is the possibility of financial difficulties. Their study confirms the earlier studies by Altman (1984), Griffin (2002), Opler and Titman (1994), and Plat, Platt, and Chan (2011). Hence, *hypothesized as; there is a negative significant relationship between firm growth and financial distress.*

Economic Growth (GDP)

Altman (1971), have considered Gross National Product (GNP) as a strong indicator of the state of a country's economic health. However, he also declared that it is not necessary to follow this. A possible alternative may be Gross Domestic Product (GDP), as used by Taffler and Abassi (1984), Taffler (1999), Li (2007), and Lin (1999) as a measure of total economic activity of a nation and the found negative relationship with financial distress. Its advantage over the GNP is that profits made in foreign countries are not included. Hence *hypothesized as, there is a negative significant relationship between economic growth and financial distress.*

Inflation

According to Kevin 2000, High inflation rate is associated with higher costs as well as higher income. If a manufacturing company income rises more rapidly than its costs, inflation is expected to exert a positive effect on financial distress.

Contrary, a negative coefficient is expected when its increment in cost faster than its income increment. Hence *hypothesized as, there is a positive significant relationship between Inflation and financial distress.*

Firm Size

Measured by the firms' total assets this variable, as is the case with the others, was adjusted for financial reporting changes. No doubt, the capitalization of leasehold rights has added to the average asset size of both the bankrupt and non-bankrupt groups. We have also transformed the

size variable to help normalize the distribution of the variable due to outlier observations. Again, a logarithmic transformation was applied Altman, (2005).

According to Smith and Graves (2005), size is linked with borrowing capacity, the use of assets rather than sales or the number of employees is considered a more appropriate base for capturing borrowing capacity. The size of the firms based on the definition of National Small Business Amendments Act (2003), using combinations of assets. Company size effect of the company, this variable is taken as a natural logarithm of total assets in billions. Company size has an important effect on the likelihood of corporate failure, the complicated ownership problems in larger companies cannot be ignored, because the difficulty in monitoring and agency problem leads into financial distress. Company size is thus expected to increase when the company in question is unprofitable, is highly leveraged and it has liquidity problems. Hence *hypothesized as, there is a negative significant relationship between firm size financial distresses.*

Firm Age

According to Xu & Wang, (2009) A company with a long history and experience can establish an important effect on corporate governance and financial condition of firms. For example, among Chinese listed companies, the agency costs, such as the entrenchment problem, are expected to vary with company age. Hence *hypothesized as, there is a negative significant relationship between firm age and financial distress.*

Table 3.1 Variable description

Variables	Measures	Symbol	Expected Sign with Financial distress
Short term debt/ Total equity	Short term debt/ Total equity	STD/TE	
Long term debt/ Total equity	Long term debt/ Total equity	LTD/TE	
Profitability	Net profit/Total Sales	PRO	-
Liquidity	Current Ratio=Current Asset/Current Liability	LIQ	-
Solvability	Operating income / Interest expense	SOL	-
Efficiency	Earnings Before Income Taxes Depreciation and Amortization /Total Asset	EFF	-
Firm Growth	Earnings Growth Ratio	GRO	-
GDP	Gross Domestic Product growth rate	GDP	-
Inflation	Annual Inflation Rate	IFN	+
Size	Log of total asset	FSIZ	-
Age	Number of years since incorporated	AGE	-

Source: From Literature base (2023)

CHAPTER FOUR: DATA PRESENTATION AND DISCUSSION

This chapter deals with data analysis and interpretation. It has four sections. The first is about descriptive statistics the second section is about on correlation analysis among the determinants of financial distress. The third section is panel data random effect model regression analysis. Lastly, discussion is made.

INTRODUCTION

To analyze the collected data, the researcher first used descriptive statistics and then correlation to make sure about the relationship between independent variables (liquidity, firm growth, and size of the firm, profitability, solvability, efficiency, age of the firm, inflation and GDP.) Finally, after applying various tests on the data, multiple regression analysis was employed. Multiple regressions were conducted in order to know the contribution of predictor variables in explaining the dependent/regressed variables (STD/TE & LTD/TE). The outputs of correlation and regression analyses were evaluated using 5 percent significance levels of confidence interval, and finally the results were presented by using the appropriate tables.

4.1 Descriptive Statistics

The distribution of data set for dependent and independent variables used in the study is explained by descriptive statistics. The central idea of descriptive statistics for a given study is measurement of location and variability. The central value of the variables denoted by location is measured mean whereas the spread of the data from mean denoted by variability is measured by standard deviation.

Illustrated below in table 4.1 is the summary of descriptive statistics for the study.

Table 4.1: Descriptive statistics of all variables

Variables	Observation	Mean	Sta. Deviation	Minimum	Maximum
STD/TE	132	0.0169	0.05538	-0.1100	0.2300
LTD/TE	132	0.0725	0.1934	-0.5080	1.4300
PRO	132	0.0379	0.0403	0.0000	0.2380
LIQ	132	0.2494	0.0328	0.1985	0.2925
SOL	132	0.1077	0.0745	0.0188	0.418
EFF	132	0.7448	0.1187	0.23	0.94
FGR	132	-0.0331	0.1663	-0.4	0.486
GDP	132	10.8433	1.0168	8.7	12.6
IFN	132	15.4833	10.6318	2.8	36.4
FSI	132	8.0941	0.8892	6.394372	9.9274
FAG	132	13.2272	4.3783	4	24

Source: STATA output results for sampled firms from 2011-2022

Note: Short term debt to total equity (STD/TE), Long term debt to total equity (LTD/TE), Profitability (PRO), Liquidity (LIQ), Solvability (SOL), Efficiency (EFF), Firm's Growth (FGR), Gross Domestic Product (GDP), Inflation (IFN), Firm Size (FSI) and Firm's Age (FAG).

Table 4.1 above provides a summary of the descriptive statistics of the dependent and explanatory variables for 132 observations and it indicates the results over the period from 2011 to 2022 in food and beverage manufacturing firms (large tax payers) in Addis Ababa. This shows the average indicators of variables computed from the financial statements.

As shown in table 4.1, the dependent variables, short term debt to total equity and long term debt to total equity that are proxy of financial distress for one hundred thirty two observations shows a mean of 0.016928 and 0.072478 in the study period it expresses that the food and beverage companies has covered their current obligation by 0.016 and 0.072 their long term obligation that indicates the level of the financial distress of the firms which is relatively a little in food and beverage manufacturing firms (large tax payer), a higher value of STD/TE and LTD/TE indicates the firms higher probability of falling to financial distress and the reverse is true for lower value, With a maximum value of 0.23 and 1.43 respectively and a minimum value of -0.11 and -0.508.

The standard deviation of short-term debt to total equity is 5.5 percent and that of long-term debt to total equity is 19.33 percent it shows that the value of STD /TE and LTD/TE can vary both sides by 5.5 and 19.33 percent respectively from the mean. The maximum values and the standard deviation imply that the firms experience financial distress unlike the mean values. Regarding the independent variables the table above shows a descriptive summary statistic of different ratios. The average profitability as measured by net income to total sales for Ethiopian food and beverage sector during the study period is about 3.78 percent and the value of the standard deviation is 0.04 which implies the presence of moderate variations among the values of profitability across the companies. It means that, Ethiopian large tax payer's food and beverage manufacturing companies generate on average 3.78 percent from their total sales employed. The higher the value of return on sales indicated that firms are effective in generating profit from its sales and the reverse is true for lower the value in return on sales. Besides, on average, this Ethiopian large tax payer's food and beverage manufacturing companies the liquidity ratio of 0.2493731, which is very low this implies relatively riskier liquidity position which can leads to serious financial distress. Maximum and minimum values were 0.292517 and 0.198556 with standard deviation of 0.0328149. Let alone the mean value the maximum values imply very risky liquidity position. The higher the value of the liquidity ratio indicated that the firm can settle its mature debt easily hence the probability of falling into financial distress is less.

The firm solvability shows a mean of 10.77136 percent with a maximum of 41.8 percent and a minimum of 1.88 percent. The standard deviation is 7.4481 percent indicating greater deviation or variability in the firm's financial distress in the Ethiopian large tax payer's manufacturing companies during the period of investigation. The higher the mean value of solvability of the firm indicates, the better the firm's ability to cover its interest expense hence it implies the lower probability of falling into financial distress.

The mean value of Efficiency is 74.4833 percent Therefore, with regard to efficiency as shown in the table above the increase in efficiency resulting from increase in EBITD/TA ratio increases the firm's productivity, thus most probably increase the firm's leverage in return decrease the probability of facing financial distress, there exists significant variation across the sample large tax payer's food and beverage companies for the reason that the value of the standard deviation is 11.87396 percent.

Hence the highly varied among food and beverage companies may have significant impact on STD and LTD in food and beverage manufacturing companies that we are going to see in the regression results.

The firm growth shows a mean of -3.312 percent with a maximum of 0.486 and minimum of -0.4. The standard deviation 16.63036 percent indicating existence of significant deviation or variability in the firm's financial distress in the food and beverage manufacturing companies during the period. Where the lower the growth in earning, the higher is the possibility of financial difficulties, the deviation also indicates the firms highly varied in terms of earning growth. Generally, the gradual decline earnings growth of food and beverage manufacturing companies leads to financial difficulties that we are going to see in the regression results.

As it is presented in the above table 4.1 the mean value of firm size which is measured by log of total asset 8.094149, whereas the minimum and maximum values is 6.394372 and 9.927381 respectively. The standard deviation from the mean is 0.8892833. This implies the greater variation on firm's size hence its impact on financial distress is highly varied among firms. Similarly, the mean value of firm's age is 12.22727 with 4 and 24 minimum and maximum values respectively, the variation from the mean also greater which is 4.378279. A company with a long history can establish an important effect on corporate governance and it improves the firm's health. Ethiopian food and beverage firms are above the infant stage this helps to escape from difficulties that may face in infant stage of the business this situation decrease the probability of getting financial difficulties.

As far as the macroeconomic factors are concerned, the Ethiopian economy continued to grow and the overall economic performance reflected rapid expansion of the country. Among the expected macroeconomic factors that could affect the firm's financial distress/health GDP was growing by 10.84333 percent on average for the last twelve years. During the sample period, the maximum growth rate of the economy was recorded in the year 2007 (i.e., 12.6%) and the minimum was in the year 2014 (i.e., 8.7%). Except in the year 2014 and 2015, the country has been recording double digit economic growth rate which implies humble opportunities for firms in terms of market and other aspects in turn, this leads to decrease the probability of financially distressed.

Due to the expansionary monetary policy, the country's economy had been experiencing an average of 15.48333 inflationary effects. The rate of inflation was ranges from a minimum of 2.8 percent to a maximum of 36.4 percent with dispersion towards its mean of 10.63184 percent. The implication of high rate of inflation is better to observe in two scenarios, if the firm's price increment exceeds the cost increment of the raw materials and other factor of productions perhaps considered as a good opportunity for the firms, otherwise the high inflation rate leads to higher financial distress possibility.

4.2 Correlation Analysis

It is common in most studies making correlation analysis among variables before going to do detail regression analysis. Correlation analysis is used to identify the direction of relationship between two variables and to measure the degree of association between them. 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; whereas a correlation coefficient of zero indicates that the variables are uncorrelated. Correlation analysis is conducted in this section in order to analyze and examine the relationship between variables.

Table 4.2 correlation matrix between variables included in the study

	STD/TE	LTD/TE	PRO	LIQ	SOL	EFF	FGR	GDP	IFN	FSI	FAG
STD/TE	1										
LTD/TE	0.7082* ¹	1									
PRO	-0.1745*	-0.2029*	1								
LIQ	-0.5736*	-0.5353*	-0.0023	1							
SOL	-0.3947*	-0.2784*	0.1095	0.2215*	1						
EFF	0.5131*	0.2519*	0.1183	-0.2194*	-0.3860*	1					
FGR	-0.1989*	-0.1781*	-0.1298	0.2271*	0.3469*	-0.0961	1				
GDP	-0.5309*	-0.4514*	-0.1103	0.6674*	0.2300*	-0.3123*	0.2040*	1.0000			
IFN	0.1863*	0.1119	0.0189	-0.0363	-0.1605	0.2967*	-0.0100	-0.5169*	1		
FSI	0.4229*	0.3385*	-0.2307*	-0.4561*	-0.7694*	0.1197	-0.3572*	-0.3587*	0.0941	1	
FAG	0.4397*	0.4273*	0.0164	-0.7634*	-0.1801*	0.1470	-0.2044*	-0.5666*	0.0713	0.3926*	1

Source: STATA output results for sampled firms from 2011-2022

The result of correlation analysis in the above table 4.2 shows that there is negative relation between profitability and STDTE. It means that, the better firm profitability associated with a

¹ * significant at 5% level

decrease in STDTE. The reason for this may be as the profitability of the firm's increase that leads an increase in equity investment than debt investment and leads to decrease in STDTE. Similarly, there is negative relation between profitability and LTDTE. The reason for this may be as the profitability of the firm increases the ability to pay its LTDTE increases and leads a decrease in LTDTE.

Correlation analysis also carried out between liquidity and STDTE and LTDTE and the result shows that there is negative relation between liquidity and STDTE and LTDTE. The larger the liquidity the lower will be STDTE and LTDTE.

The correlation coefficient indicates that, there is also a negative relationship between firm's growth rate and GDP with STDTE and LTDTE on the other side there is positive relation between firm size with STDTE and LTDTE. The reason behind this is, when the size of the firm increases investment will increase which in turn will increase STDTE and LTDTE.

Similarly, there is positive correlation between firm age and STDTE and LTDTE which implies more aged firms increase the ability of getting more loans and leads increase in STDTE and LTDTE. Surprisingly, the correlation coefficient indicates that a positive relationship between efficiency and STDTE and LTDTE this is may be due to the increase of trustworthiness of the firm's leads to higher access to debt finance in turn increase in STDTE and LTDTE.

There is also negative relationship between solvability and STDTE and LTDTE and positive correlation between inflation and STDTE and LTDTE.

4.3 Diagnostic tests of the CLRM

4.3.1 Normality Test

Table 4.3: Normality test for Short term debt to Total equity

Shapiro-wilk W test for normal data

Variable	Obs	W	V	Z	Prob>z
Resid	132	0.98578	1.483	0.888	0.18727

Source: STATA output results for sampled firms from 2011-2022

A normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. A distribution said to be normal when it is symmetric about its mean and also called mesokurtic, while a skewed distribution is not symmetric to its mean, it may be skewed to the left or right side of its mean.

To check the problem of normality tests has been conducted for both regression models using the most popular test of normality, Shapiro-Wilk W test for normal data. Based on this test of Normality, if the P value is more than 0.05 ($P \geq 0.05$) there is no normality problem. Therefore, the normality tests for this study as shown in table below, the Shapiro-Wilk W test for normal data has a P-value of 0.18727 for the first model and p-value of 0.41481 for the second model implies that the p-value of the Shapiro-Wilk W test for normal data for both models is greater than 0.05 which indicates that the errors are normally distributed.

Table 4.4: Normality test for Long term debt to Total equity

Shapiro-wilk W test for normal data

Variable	Obs	W	V	Z	Prob>z
RESID	132	0.98945	1.100	0.215	0.41481

Source: STATA output results for sampled firms from 2011-2022

4.3.2 Heteroscedasticity Test

Homoskedastic error term is one of the classical assumptions required for the OLS estimator to be efficient. The homoskedastic assumption fulfilled when the variance of disturbance term is constant and the same for all observation. If the disturbance terms do not have a constant variance across all observations the assumption of homoskedastic will be violated. The violation of this assumption said to be heteroscedasticity. If the problem heteroscedasticity exists in the

model, the least squares estimators are still unbiased(consistent) however the Gauss- Markov theorem was violated in other words confidence interval will be unnecessary larger. As result, the t-test and f-test gives in accurate result because of overestimation of variance the t-test will be smaller and statistically insignificant which leads to wrong conclusion (Gujarati, 2004). There are several tests present to detect the violation of this assumption. This study used Breusch-pagan test in order to check the presence of the problem of heteroscedasticity for both models.

H0: Homoskedastic error term

H1: Heteroskedasticity error term

Table 4.5: Heteroskedasticity test for Short term debt to Total equity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: fitted values of stdte	
chi2 (1)	0.74
Prob > chi2	0.3889

Source: STATA output results for sampled firms from 2011-2022

Table 4.6: Heteroskedasticity test for Long term debt to Total equity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: fitted values of ltdte	
chi2 (1)	7.90
Prob > chi2	0.0049

Source: STATA output results for sampled firms from 2011-2022

As it is indicated above the result of hetroscedsticity test shows that p- value of statistic is 0.3889 which is more than 5 percent of significance level for the first model. Therefore, the null hypothesis of homoskedasticity is failed to reject at 5 percent level of significant. This implies that, there is no tangible evidence for the existence of hetroscedasticity in the first model. But in the second model there is hetroscedasticity problem. Having detected the presence of heteroscedasticity 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 unweight 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 heteroscedasticity. In line with this view, this study has used the robust standard errors of the regression coefficients for the second model.

4.3.3 Autocorrelation Test

Another assumption of the classical linear regression model is that the covariance between the error terms over the time or cross-sectionally is zero. In other terms, it is assumed that the errors are uncorrelated with one another. In this regard Durbin-Watson (DW) provides a test for first order autocorrelation (Brooks, 2008).

Accordingly, if the d computed nearest to 2 in application, it is assumed that there is no autocorrelation problem.

Thus, as shown in Table 4.7 the computed “ d ” in this study on model one and model two respectively was 1.298909 and 1.572288 which are nearest to 2 implying the absence of autocorrelation problem. Thus, this implies that error terms are not correlated with one another for different observation in this study.

Table 4.7 Autocorrelation test

Model-1 Durbin-Watson d-statistic (10, 132) = 1.298909

Model-2 Durbin-Watson d-statistic (10, 132) = 1.572288

Source: STATA output results for sampled firms from 2011-2022

4.3.4 Multi-collinearity test

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 role how much correlation causes multicollinearity. Malik (2013) argue that correlation coefficient below 0.9 may not cause serious multicollinearity problem.

According to Brook (2008), if the correlation between independent variables exceeds 0.8 then it would be a problem of multicollinearity. Here, the above correlation results are showing correlation much below it. So, there is no presence of multicollinearity among the variables. Additionally, VIF test was made and shows there were no multicollinearity as shown below.

Table 4.8 Multi-collinearity test

Variable	VIF	1/VIF
FSI	4.10	0.243638
LIQ	3.85	0.260013
SOL	3.70	0.269912
GDP	3.39	0.294843
FAG	2.46	0.405999
IFN	1.90	0.527438
EFF	1.58	0.632011
FGR	1.24	0.805450
PRO	1.19	0.838802
Mean VIF	2.60	

Source: STATA output results for sampled firms from 2011-2022

As it presented in the above **table 4.8** multi-collinearity test, there is no VIF greater than ten and less than one over VIF of zero point one which indicated that the absence of multi-collinearity problem in the model.

4.3.5 Test for Model Specification: Ramsey RESET Tests

A multiple regression model suffers from functional form misspecification when it does not properly develop for the relationship between the dependent and the observed independent variables (Wooldridge, 2013). If the study missed one or more explanatory variables from the equation, the model is going to face a problem of model misspecification; as a result, cannot be able to make unbiased estimation. That means the estimated coefficients of the independent variable may not be appropriate. According to Brooks (2008), and Wooldridge (2013), whether the model functional form is correctly specified or not can be formally tested using Ramsey's (1969) RESET test, which is a general test for misspecification of functional form. The null hypothesis of the RESET test is, the model is correctly specified, and the alternative is not correctly specified. If the F- test p-value is greater than 5 %, the decision is, does not reject the null (i.e. the model is correctly specified).

In this case, as shown in the following table 4.9 the RESET F-statistics is 1.87 for Model 1 and 1.24 for Model 2, with p-value is 0.1381 and 0.2986 respectively, so failed to reject the null at

5% significant level. Therefore, it can infer that these models are correctly specified and the estimated coefficients are appropriate to explain the financial distress.

Table 4.9 Ramsey RESET Tests

Model-1

Ramsey RESET test using powers of the fitted values of stdte Ho: model has no omitted variables	
F(3,119)	1.87
Prob > F	0.1381

Model-2

Ramsey RESET test using powers of the fitted values of ltdte Ho: model has no omitted variables	
F(3,119)	1.24
Prob > F	0.2986

Source: STATA output results for sampled firms from 2011-2022

4.3.6 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. As has been described in the methodology part, the study used two models. The first model takes STD/TE as dependent variable while the second model takes LTD/TE as dependent variable.

Therefore, the researcher made Hausman test for these models to check whether to use fixed effects or random effects model. For both models' random effects model is found to be appropriate. Based on the **appendices (8)** of Hausman specification test, the P- value of the models is 0.9158 and 0.1674 respectively which are more than 5% level of significance. This showed that the null hypothesis of the model which is Random effect model is appropriate do not rejected at 5 percent of significant level. Therefore, Random effect model is appropriate for this study and regression analysis will be made based on random effect estimates.

After running the Hausman test, it is better to test Breusch and Pagan Lagrange multiplier for random effects versus pooled ordinary least square method. The LM test (Lagrange Multiplier

test) is used to decide between a random effect's regression and simple OLS regression. The null hypothesis is that there is no significant different across cross-sectional unites (i.e. no panel effect) implying that random effects model is inappropriate. Based on the following table (4.10) The LM test statistics is 15.02 for the Model-1 and 17.15 for Model-2 with the p-value of 0.0001 and 0.0000 respectively, which is less than 5 percent, it is significant and the null hypothesis in favor of OLS is rejected. Thus, the Random effects model is chosen against the pooled ordinary least square.

Table 4.10 Breusch and Pagan Lagrange multiplier test for random effects

Model-1

Test: Var (u) = 0	
chibar2(01)	15.02
Prob > chibar2	0.0001

Model-2

Test: Var (u) = 0	
chibar2(01)	17.15
Prob > chibar2	0.0000

Source: STATA output results for sampled firms from 2011-2022

4.4 Regression analysis

As working on determinants of financial distress of selected Ethiopian manufacturing firms the researcher uses two regression models.

Model I take STD/TE as dependent variable while model II LTD/TE as dependent variable. Both models consider the above diagnosis test results before the estimation technique is chosen.

The Hausman test shows that random effects model is appropriate for both regression models. However, because of heteroscedasticity problem in the second model the researcher uses appropriate regression model that produces robust standard error estimators. So, the study has used the robust standard errors of the regression coefficients for the second model.

Table 4.11: Regression result of STDTE (Model 1)

STDTE	Coef.	Std. Err.	Z	p> z 	(95% Conf. Interval)	
PRO	-0.2381038	0.0969049	-2.46	0.014** ²	-0.4280338	-0.0481738
LIQ	-0.6340141	0.2452972	-2.58	0.010*	-1.114788	-0.1532404
SOL	-0.1486303	0.0944183	-1.57	0.115	-0.333686	0.0364261
EFF	0.1418098	0.0357866	3.96	0.000*	0.0716694	0.2119502
FGR	-0.0010437	0.253331	-0.04	0.967	-0.0506957	0.0486083
GDP	-0.0137516	0.0054736	-2.51	0.012*	-0.0244796	-0.0030237
IFN	-0.000356	0.0003841	-0.93	0.354	-0.0011089	0.0003968
FSI	-0.0014265	0.0107131	-0.13	0.894	-0.0224237	0.0195707
FAG	-0.001143	0.0021616	-0.53	0.597	-0.0053797	0.0030937
Constant	0.2756905	0.1542509	1.79	0.074	-0.0266358	0.5780168
Obs=132						
R-sq: overall =0.5587						
F (9,122) = 18.17						
Prob> chi2 = 0.0000						

Source: STATA output results for sampled firms from 2011-2022

² *Significant at 1%, **Significant at 5% and *** significant at 10%

The result of regression on the above tables shows, the models adjusted R^2 is 55.8%. This implies that 55.8% of the variations in the STDTE of the firms are explained by the independent variables of Profitability (pro), liquidity (liq), solvability (sol), efficiency(eff), firm size (fsi), firm Growth (fgr), firm age(fag), inflation(ifn) and GDP (gdp) included the model.

Overall, F-statistic 18.17 which is highly significant at 1% with p-value 0.0000 indicates that the regression model is feasible.

C is the coefficient of the intercept of the model and it represents the average value of STDTE when all explanatory variables took a value of zero. This means that without these components, sample firms still survive due to some other factors which are not the focus of this research. The average value of STDTE is 2.756905 if all explanatory variables took zero, it is statistically significant.

The random effect regression result in table 4.11 indicates that the coefficient of **profitability** is -0.2381038 and its p-value is 0.014. This means that, keeping other variables constant a percent increase in profitability result in a decrease of STDTE of sampled firm by 23.81 percent, and statistically significant at 5%.

The result of the regression analysis for **liquidity** shows that, the coefficient of liquidity is negative with -0.6340141 and p-value of 0.010. This implies that, keeping other variables constant a percentage increase in liquidity results in decrease of STDTE by 63.40 %, and is statistically significant at 5% level.

The regression output for **solvency** indicates that the coefficient is -0.1486303 and its p-value is 0.115. This implies that, keeping other variables constant a percent increase on solvency associated negatively with a decrease in STDTE of sampled firms by 14.86 percent and statistically insignificant.

The result of panel data random effect regression model indicates that **Efficiency** (eff) variable indicates has a positive relationship with STDTE by coefficient 0.1418098 and p-values 0.000. This means, keeping other variables constant a percentage increase in efficiency will increase STDTE by 14.18 percent and is statistically significant at 5% level.

The result of the regression analysis for **firm growth** on table 4.11 shows that, the coefficient of firm growth is negative with -0.0010437 and p-value of 0.967. This implies that, keeping other

variables constant a percentage increase in firm growth results in decrease in STDTE by 0.104%, but is statistically insignificant.

The results of the regression analysis for **firm size**, the coefficient of **firm size** is negative with 0.0014265 and p-value of 0.894.

This implies that, keeping other variables constant a dollar increases in the asset results in a decrease of STDTE by 0.142 percent and statistically insignificant.

The random effect regression result in table 4.11 indicates that the coefficient of **firm age** is -0.001143 and its p-value is 0.597. This means that, keeping other variables constant a percent an increase in firm age result in a decrease of STDTE of sampled firm by 0.11 percent, and statistically insignificant.

Similarly, the coefficient of **inflation** is -0.000356 and its p-value is 0.354. This means that, keeping other variables constant a percent an increase in inflation result in a decrease of STDTE of sampled firm by 0.0356 percent, and statistically insignificant.

Finally, as indicated in the above table the coefficient of **GDP** is -0.0137516 and its p-value is 0.012. This means that, keeping other variables constant a percent an increase in GDP result in a decrease of STDTE of sampled firm by 1.37 percent, and statistically significant.

Table 4.12: regression result of LTDTE (Model 2)

LTDTE	Coef.	Robust Std. Err.	Z	p> z	(95% Conf. Interval)	
PRO	-1.062686	0.3138034	-3.39	0.001* ³	-1.67773	-0.4476429
LIQ	-2.173352	0.6067973	-3.38	0.000*	-3.362653	-0.9840511
SOL	-1.212864	0.5316528	-2.28	0.023**	-2.254885	-0.1708437
EFF	0.064221	0.4179935	0.02	0.988	-0.8256742	0.81283
FGR	-0.0809502	0.0787301	-1.03	0.304	-0.2352583	0.0733579
GDP	-0.0402284	0.0134502	-2.99	0.003*	-0.0665904	-0.0138665
IFN	-0.0009422	0.0010331	-0.91	0.362	-0.0029671	0.0010827
FSI	-0.088334	0.0825275	-1.07	0.284	-0.250085	-0.0734169
FAG	-0.0054734	0.0123405	0.44	0.657	-0.0187135	0.0296603
Constant	1.88082	1.007439	1.87	0.062	0.0937243	3.855365
Obs=132						
R-sq: overall =0.3582						
F (9,122) = 8.52						
Prob> chi2 = 0.0000						

Source: STATA output results for sampled firms from 2011-2022

The result of regression on the above tables shows, the models adjusted R^2 is 35.82 %. This implies that 35.82 % of the variations in the LTDTE of the firms are explained by the independent variables of Profitability (pro), liquidity (liq), solvability (sol), efficiency (eff), firm size (fsi), firm Growth (fgr), firm age (fag), inflation (ifn) and GDP (gdp) included the model. Overall, F-statistic 8.52 which is highly significant at 1% with p-value 0.0000 indicates that the regression model is feasible.

C is the coefficient of the intercept of the model and it represents the average value of LTDTE when all explanatory variables took a value of zero. This means that without these components, sample firms still survive due to some other factors which are not the focus of this research. The average value of LTDTE is 1.88082 if all explanatory variables took zero, it is statistically significant.

The random effect regression result in table 4.12 indicates that the coefficient of **profitability (pro)** is -1.062686 and its p-value is 0.001. This means that, keeping other variables constant a

³ *Significant at 1%, **Significant at 5% and *** significant at 10%

percent an increase in profitability result in an decrease of LTDTE of sampled firm by 106.26 percent, and statistically significant at 1%.

The result of the regression analysis for liquidity shows that, the coefficient of **liquidity (liq)** is negative with -2.173352 and p-value of 0.000. This implies that, keeping other variables constant a percentage increase in liquidity results in decrease of LTDTE by 217.33%, and is statistically significant at 1% level.

The regression output for **solvency (sol)** indicates that the coefficient is -1.212864 and its p-value is 0.023. This implies that, keeping other variables constant a percent increase on solvency associated negatively with a decrease in LTDTE of sampled firms by 121.28 percent and statistically significant at 5%.

The result of panel data random effect regression model indicates that **Efficiency (eff)** variable indicates has a positive relationship with LTDTE by coefficient 0.0064221 and p-values 0.988. This means, keeping other variables constant a percentage increase in efficiency will increase LTDTE by 0.64 percent and is statistically insignificant.

The result of the regression analysis for **firm growth (fgr)** on table 4.12 shows that, the coefficient of firm growth is negative with -0.0809502 and p-value of 0.304.

This implies that, keeping other variables constant a percentage increase in firm growth results in decrease in LTDTE by 8.09%, but is statistically insignificant.

The results of the regression analysis for **firm size (fsi)** the coefficient is negative with -0.088334 and p-value of 0.284.

This implies that, keeping other variables constant a dollar increases in the asset results in a decrease of LTDTE by 8.83 percent and statistically insignificant.

The random effect regression result in table 4.12 indicates that the coefficient of **firm age (fag)** is -0.0054734 and its p-value is 0.657. This means that, keeping other variables constant a percent an increase in firm age result in an decrease of LTDTE of sampled firm by 0.054 percent, and statistically insignificant. Similarly, the coefficient of **inflation (inf)** is -0.000942 and its p-value is 0.362. This means that, keeping other variables constant a percent an increase in inflation result in an decrease of LTDTE of sampled firm by 0.094 percent, and statistically insignificant.

Finally, as indicated in the above table the coefficient of **GDP (gdp)** is -0.040228 and its p-value is 0.003. This means that, keeping other variables constant a percent an increase in GDP result in an decrease of LTDTE of sampled firm by 4.02 percent, and statistically significant at 1%.

4.5. Discussion of the Regression Result

This section presents the discussion of the detail analyses of the results of regression for each of explanatory variable and their influence on the financial distress of firms. In addition, the discussion includes the comparison with prior empirical evidence in relation to financial distress and its determinants and the finding of this study in comparison with prior empirical finding and hypothesis of the study.

4.5.1. Relationship between Profitability and financial distress

The result of the regression shows that there is negative and significant relationship between profitability and STDTE which is one of the proxy measures of financial distress of sampled large tax payer's food and beverage companies. This indicates that, there is a decrease of STDTE by 23.81 percent when profitability increases by one unit. When the higher the Profitability, the lower would be the probability of distressed/bankruptcy.

This finding is similar to Salehi & Abedini (2009), Campbell (2010) Begley (1996), Ufo, A (2011) and Deakin (1972). Nevertheless, Suleiman (2001), Altman (1968), Platt and Platt (2002), Smith and Graves (2005), Taffler (1983), Ameer (2010), and Abdullah (2008) found positive relationship between liquidity and financial distress. Similarly, profitability has negative and significant relationship with LTDTE which is the second proxy of financial distress.

The first hypothesis of this study was significant negative relation between profitability and financial distress. In line with this, the result of the regression analyses matched with the hypothesis which states that there is negative and significant relation between profitability and financial distress. Thus, the hypothesis of significant negative relation between profitability and financial distress is accepted.

4.5.2. Relationship between liquidity and financial distress

The result of panel data random effect regression model as presented in Table 4.11 and 4.12 indicates that liquidity has a negative and significant relation with both LTDTE and STDTE. Liquidity is measured by current ratio or current asset to current liability. This finding is similar

with Chan (2011), John (1993), Ufo, A (2011) and Paranowo (2010) uses debt service coverage ratio as a proxy for liquidity and find liquidity as a significant variable. However, it is contradicting with Altman (1968), Baimwera (2006), Lubomír (2002) and Tadesse (2017).

The second hypothesis of this study was significant negative relation between liquidity and financial distress. However, the result of regression analyses is consistent with the hypothesis which states that there is negative and significant relation between liquidity and financial distress. Thus, the hypothesis of significant negative relation between liquidity and financial distress is failed to reject.

4.5.3. Relationship between solvency and financial distress

Acceptable solvency ratios vary from industry to industry. However, as a general rule of thumb, a solvency ratio higher than 20% is considered to be financially sound. Generally, a lower solvency ratio of a firm indicates a greater probability of the firm being on default with its debt obligations.

Interest coverage ratio can be used to measure the severity of financial distress (Kahl, 2001). It shows the capability of the firm to pay interest on borrowed money and the value 1 should be the minimum value for interest coverage ratio (Khan and Jain, 2004). Harris and Raviv (1990) suggest that leverage is inversely related to interest coverage ratio and they argue that an increase in debt will cause a higher default probability. Therefore, a high interest coverage ratio suggests a low probability of financial distress as default probability has a positive relation with the probability of financial distress.

The result of the regression indicates that solvency has negative and insignificant relationship between STDTE. On the other hand, solvency has negative and significant relationship with LTDTE. Thus, the hypothesis of significant negative relation between solvency and financial distress is failed to reject.

4.5.4. Relationship between efficiency and financial distress

It is well known that the appreciation of the Earnings before Interest Tax and Depreciation to total asset (EBITD/TA) increases efficiency (Altman 1983) hence, a positive link between the increases of EBITD to TA and efficiency is expected. In other words, appreciation of EBITD to TA ratio increases the efficiency of the firms.

The positive coefficient of EBITD to TA for the regression output implies that the increase of the Earnings before Interest Tax and Depreciation to total asset will lead to increase in STDTE and LTDTE. Converse, the decrease of EBITD to TA reduces the efficiency of firms.

The result of the regression indicates that efficiency has positive and significant relationship with STDTE. On the other hand, efficiency has negative and insignificant relationship with LTDTE. This is not in line with both theoretical reasoning in corporate finance and findings of previous empirical studies. Thus, the hypothesis of significant negative relation between efficiency and financial distress is failed to accept.

4.5.5. Relationship between firm growth and financial distress

Result reveals that firm growth is negatively related with STDTE in insignificant manner. This means there is a decrease in STDTE in 0.10 percent when firm growth is increase by one unit. On the same manner, firm growth is negatively and insignificantly related with LTDTE. This means that there is a decrease in LTDTE in 8.09 percent when firm growth increase by one unit, high growth firms will face lower level of financial distress as they employ less debt financing.

Assuming that firms are particular about the future as well as with current financing problems, there is high chance that firms with great expected growth opportunities will maintain a low risk debt capacity to avoid financing future investment with equity offerings or passing the investment. This finding is similar with (Morri and Cristanziani, 2009) Yosha (1995), Chan (2011).

The fifth hypothesis of this study was significant negative relation between firm growth and financial distress. However, the result of regression analyses is consistent with hypothesis there is negative and insignificant relation between firm growth and financial distress. Thus, the hypothesis of significant negative relation between firm growth and financial distress is failed to reject.

4.5.6. Relationship between firm size and financial distress

Firm size is the natural logarithm of total asset; this indicates how large the company in terms of its asset size in order to generate return to cover its debt services. TA is the current asset plus fixed assets of the firm. The regression shows that there is negative and insignificant relationship between firm size and STDTE and LTDTE. This means if one-unit size increase will make

STDTE decrease by 0.014 percent and LTDTE decrease by 8.83 percent. The more size, STDTE and LTDTE will be less. The eighth hypothesis of this study was significant negative relation between firm size and financial distress. However, the result of regression analyses is consistent with hypothesis there is negative and insignificant relation between firm size and financial distress. Thus, the hypothesis of significant negative relation between firm size and financial distress is failed to reject.

4.5.7. Relationship between firm Age and financial distress

The age of the firm refers to the period that firms have been in operation since its initial inception. Previously, in hypothesis no. nine indicated that age of the firm has a negative relationship with financial distress. However, the result of the regression analyses reveals that firm age is negatively related with STDTE in insignificant manner. This means there is a decrease in STDTE in 0.11 percent when firm age is increase by one unit/year. On the other hand, firm age is positively and insignificantly related with LTDTE.

This means that there is an increase in LTDTE in 0.54 percent when firm age is increase by one unit/year. Thus, the hypothesis of significant negative relation between firm age and financial distress is failed to accept.

4.5.8 Macroeconomic Determinants of Financial Distress

4.5.8.1 Gross Domestic Product and Financial Distress

The negative and statistically significant effect of economic growth (GDP) on financial distress is consistent with the sixth hypothesis (H6). That means, among the macroeconomic indicators used in this research, GDP had significantly negative effect on financial distress with p-value 0.012 for STDTE and 0.003 for LTDTE. This finding is consistent with what was reported by Goldstein (2000) and Betz (2013). Baklouti (2016) is explained this relationship: when the economic growth becomes weaker it is more likely that businesses and households will reduce their inflows, which result in higher level of financial distress. On the other hand, Konstandina (2006) and others were not found statistically significant relationship between financial distress and macroeconomic factors, including GDP. Thus, the hypothesis of significant negative relation between GDP and financial distress is failed to reject at 5% level of significance and 1% level of significance respectively.

4.5.8.2 Inflation and Financial Distress

Inflation (inf) has a negative relation with financial distress, with coefficient -0.0356 and p-value 0.354 for STDTE and -0.09422 coefficient and 0.362 p-value for LTDTE. Inflation is measured by consumer price index (CPI) in national level. The result shows inflation negative and insignificant in stated level of confidence interval.

This is may be due to company income rises more rapidly than its costs; inflation is expected to exert a positive effect. Thus, the hypothesis of significant positive relation between inflation and financial distress is failed to accept.

Table 4.13 shows Results summary of relationship between financial distress as proxy of STDTE and LTDTE and independent variables.

Table 4.13 Variables Summary

Independent Variables	Hypothesis	Expected	Actual Result	Conclusion
Profitability	H-1	-	-	Accept
Liquidity	H-2	-	-	Accept
Solvability	H-3	-	-	Accept
Efficiency	H-4	-	+	Reject
Firm Growth	H-5	-	-	Accept
Gross Domestic Product	H-6	-	-	Accept
Inflation	H-7	+	-	Reject
Firm Size	H-8	-	-	Accept
Firm Age**	H-9	-	+	Reject

Source: STATA output results for sampled firms from 2011-2022

CHAPTER FIVE

SUMMARY OF FINDING, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents summary of finding, conclusion, recommendation and recommendation made for further researchers.

5.1 Summary of Findings

The finding of the descriptive statistics analysis, correlation analysis, and regression analysis are summarized in the following sentences.

The average values for the dependent variables, short-term debt to total equity and long-term debt to total equity, are 0.016928 and 0.072478, respectively. The results show that, for food and beverage manufacturing companies (major tax payers), the level of financial difficulty is rather low. Because The probability of the company experiencing financial difficulties increases with a larger STD/TE and LTD/TE amount, and the opposite is also true.

The average value for the independent variable Profitability is 3.79 percent, It means that, Ethiopian large tax payer's food and beverage manufacturing companies generate on average 3.78 percent from their total sales employed. The higher the value of return on sales indicated that firms are effective in generating profit from its sales, the probability of falling into financial distress is less.

The average independent liquidity ratio value is 2493731, which indicates that the large tax-paying Ethiopian food and beverage manufacturing enterprises have a very low liquidity ratio. This suggests a considerably riskier liquidity position, which can result in significant financial difficulties.

The firm's solvability shows a mean of 10.77136 percent; the higher this number, the better the firm's ability to pay its interest costs, and the less likely it is that the firm would experience financial distress.

Efficiency has a mean value of 74.4833 percent for both STDTE and LTDTE. The EBITD/TA ratio and the firm's productivity both rise as a result of increased efficiency, which also most

likely raises the firm's leverage in return. The sampled Ethiopian food and beverage companies not fall to financial distress.

The macroeconomic factors affecting the firm's financial distress, which are the two independent macroeconomic variables GDP and inflation, the average value of 10.84333 percent and 15.48333 percent, respectively. It implies the Ethiopian economy continued to grow, and the higher the country's GDP, the lower the probability of firms facing financial distress and vice versa. The implication of a high rate of inflation is better observed in two scenarios: If the firm's price increase exceeds the cost increase of the raw materials and other production factors, this may be considered a good opportunity for the firm; otherwise, the high inflation rate increases the likelihood of financial distress.

The study's Correlation analysis coefficient result is between +1 and -1, which implies the relationship of two variables are strongly correlated.

The result of regression on the model 1 adjusted R² is 55.8%, and the model 2 adjusted R² is 35.82%. This implies that 55.8% of the variations in the STDTE and 35.82% of the variations in the LTDTE of the firms are explained by the independent variables of Profitability, liquidity, solvability, efficiency, firm size, firm Growth, firm age, inflation, and GDP.

C is the coefficient of the intercept of the model and it represents the average value of STDTE and LTDTE when all explanatory variables took a value of zero. The average value of STDTE and LTDTE is 2.756905 and 1.88082 respectively. both are statistically significant.

The coefficient of **profitability** of STDTE and LTDTE is -0.2381038 and -1.062686 respectively. This means that, keeping other variables constant a percent an increase in profitability result in a decrease of STDTE and LTDTE of sampled firm by 23.81 percent and 106.26 percent, and statistically significant at 5%.

The result of the regression analysis for **liquidity** shows that, the coefficient of liquidity STDTE and LTDTE is negative -0.6340141 and -2.173352 respectively. This implies that, keeping other variables constant a percentage increase in liquidity results in decrease of STDTE and LTDTE by 63.40 % and 217.33 %, and is statistically significant at 5% level.

The regression result of **solvency** shows that the coefficient STDTE is -0.1486303 and LTDTE is -1.212864 respectively. This implies that, keeping other variables constant a percent increase on

solvency associated negatively with a decrease in STDTE and LTDTE of sampled firms by 63.40 % and 217.33 %, and is statistically significant at 5% level of LTDTE and statistically insignificant for STDTE.

The result of regression model **Efficiency** variable indicates that a positive relationship with STDTE by coefficient 0.1418098 and LTDTE by the coefficient of 0.0064221. This means, keeping other variables constant a percentage increase in efficiency will increase STDTE by 14.18 percent and LTDTE by 0.64 percent and is statistically significant at 5% level of STDTE and statically insignificant for LTDTE.

The result of the regression analysis shows that the coefficient of **firm growth** has a negative relationship with STDTE by -0.0010437 and LTDTE by -0.0809502. This implies that, keeping other variables constant, a percentage increase in firm growth results in a decrease in STDTE by 0.104% and LTDTE by 8.09% but is statistically insignificant.

The results of the regression analysis show that the coefficient of **firm size** has a negative relationship with STDTE by -0.0014265 and LTDTE by -0.088334. This implies that, keeping other variables constant, a dollar increase in the asset results in a decrease in STDTE of 0.142 percent and 8.83 percent in LTDTE, both of which are statistically insignificant.

In the random effect regression result, the coefficient of **firm age** for STDTE is -0.001143 and -0.0054734 for LTDTE. This means that, keeping other variables constant, an increase in firm age results in a decrease in STDTE of the sampled firm by 0.11 percent and a decrease in LTDTE by 0.0054 percent, both of which are statistically insignificant.

The coefficients of **inflation** of STDTE and LTDTE are -0.000356 and -0.000942, respectively. This means that, keeping other variables constant by a percent, an increase in inflation results in a decrease in STDTE and LTDTE of the sampled firm by 0.0356 percent and 0.094 percent, respectively, and both of which are statistically insignificant.

The coefficients of **GDP** of STDTE and LTDTE are -0.0137516 and -0.040228 respectively. This means that, keeping other variables constant, an increase in GDP results in a decrease in STDTE and LTDTE of the sampled firm by 1.37 percent and 4.02 percent, and both are statistically significant.

The total hypothesis testing revealed is H9. Out of this hypothesis testing, H1, H2, H3, H5, H6, and H8 were accepted, and the remaining H4, H7, and H9 were rejected.

5.2 Discussion of the Result Implications

5.2.1 STDTE and LTDTE with Financial Distresses

The adjusted value of R square (0.5587) indicates that 55.87% of the model 1 dependent variable is explained by the independent variables. On the other side, the adjusted value of R Square (0.3582) indicates that 35.82% of the model 2 dependent variable is explained by the independent variables. Therefore, it implies that internal factors and external factors are important determinants of financial distress in food and beverage manufacturing companies in Addis Ababa-Ethiopia to the extent on average 55.87% and 35.82% for model 1 and model 2 respectively.

5.2.2 Profitability and Financial Distress

Negative coefficient of variable profitability specifies the negative relationship between financial distress and profitability and statistically significant. The higher the firm's profit, the higher the ability of the firms is covering its short and long term debts and the lower the probability of the firm to go for financial distress. As the findings shows that profitability and do have negative impact on financial distress.

The finding is similar to Salehi & Abedini (2009), Campbell (2010) Begley (1996), Ufo, A (2011) and Deakin (1972). Nevertheless, Suleiman (2001), Altman (1968), Platt and Platt (2002), Smith and Graves (2005), Taffler (1983), Ameer (2010), and Abdullah (2008) found positive relationship between liquidity and financial distress. Similarly, profitability has negative and significant relationship with LTDTE which is the second proxy of financial distress.

5.2.3 liquidity and Financial Distress

Negative coefficient of variable liquidity specifies the negative relationship between financial distress and liquidity and statistically significant. The higher the firm's liquid asset, the higher the ability of the firms is covering its short and long term debts and the lower the probability of the firm to go for financial distress.

The finding is similar with Chan (2011), John (1993), Ufo, A (2011) and Paranowo (2010) uses debt service coverage ratio as a proxy for liquidity and find liquidity as a significant variable. However, it is contradicting with Altman (1968), Baimwera (2006), Lubomír (2002) and Tadesse (2017).

5.2.4 Solvability and Financial Distress

The negative and significant relationship between solvability and financial distress of selected manufacturing companies in Addis Ababa- Ethiopia implies that a sound capital position is able to ability to pay all just debts and has more time and flexibility to deal with problems arising from unexpected losses, thus achieving increased solvability. Hence indicates that well capitalized manufacturing companies face lower costs of going bankrupt.

Harris and Raviv (1990) suggest that leverage is inversely related to interest coverage ratio and they argue that an increase in debt will cause a higher default probability. Therefore, a high interest coverage ratio suggests a low probability of financial distress as default probability has a positive relation with the probability of financial distress.

5.2.5 Efficiency and Financial Distress

Surprisingly, efficiency has positive and significant relationship with financial distress. This is may be because of easily access to finance due to “efficiency” leads to increase short term and long term debts and if it is not well managed it goes on distress.

It is well known that the appreciation of the Earnings before Interest Tax and Depreciation to total asset (EBITD/TA) increases efficiency (Altman 1983) hence, a positive link between the increases of EBITD to TA and efficiency is expected. In other words, appreciation of EBITD to TA ratio increases the efficiency of the firms.

5.2.6 GDP and Financial Distress

The negative and statistical significant relation between economic growth and financial distress of manufacturing companies in Addis Ababa-Ethiopia implies that manufacturing companies which operates with high rate of economic growth in terms of GDP are also in a better position of being less probability of financial distress.

The finding is consistent with what was reported by Goldstein (2000) and Betz (2013). Baklouti (2016) is explained this relationship: when the economic growth becomes weaker it is more likely that businesses and households will reduce their inflows, which result in higher level of financial distress. On the other hand, Konstandina (2006) and others were not found statistically significant relationship between financial distress and macroeconomic factors, including GDP

5.2.7 Firm Size, Firm Age, Firm Growth and Inflation with Financial Distress

The other explanatory variables firm size, firm age, firm growth and Inflation negatively related with financial distress. However statistically insignificant with the large p-values hence, not considered as powerful explanatory variables to define the determinants of financial distress

5.3 Conclusions

The main objective of the study was to examine the determinants of financial distress of large tax payer's food and beverage firms in Ethiopia. The panel data were used for the sample of eleven firms for the period of twelve years (2011 to 2022). Based on the descriptive statistics and regression analysis the study reached on the following conclusions and implications of the results.

To achieve the intended objective, the study used random effect panel regression model for nine independent variables and two dependent variables of the study. Concerning the data of this study; audited financial statements were collected from the Ministry of Revenue of sampled food and beverage companies and macroeconomic data collected from National Bank, World bank and IMF. Data was analyzed by using both descriptive statistic and inferential statistics/multiple regression model, in doing so Hausman specification test was made for choosing of random effect panel data model and employed to measure estimators. And then test for CLRM were made and all the data fitted the assumptions, finally the random effect regression results were presented and analyzed.

The results of the regression analysis revealed that Profitability, Liquidity, Solvability, Efficiency and Gross Domestic Product were most important and significant determinants of financial distress in food and beverage manufacturing companies in Addis Ababa-Ethiopia whereas firm size, firm age, firm growth and inflation has statistically insignificant relationship with STDTE and LTDTE.

Each of the hypothesis's has been tested for its validity. accordingly, H1, H2, H3, H5, H6, and H8 were accepted, and the remaining H4, H7, and H9 were rejected.

Generally based on the descriptive statistics and regression analysis result most of the Ethiopian food and beverage manufacturing firms (large tax payers) experienced a little level of financial distress. Almost categorized in safe zone but there is no guarantee for sustaining this situation because the result shows a very low level of liquidity, profitability, solvability and firm growth recorded.

5.4. Recommendations

This study was intended to investigate the financial distress and its determinants in selected food and beverage companies; and hence on the basis of the findings of the study, the following recommendations were forwarded:

Increasing the firm's profitability by increase the firm's efficiency; Maintaining and improving liquidity by improving cash collection. The failure of cash collection leads for unbalanced asset structure and financial distress. Similarly, managers have to give major emphasis for solvability and the country's general economic situation. Thus, this can be served as indicator for managers to monitor their financial position in their corporations. It's better to corporate managers to realize the importance of early detections to avoid facing distressed and total lost in corporate values of their firms.

Manufacturing firms recommended to be adequately liquid, consider to current and future needs and availability of assets readily convertible to cash without undue loss. The fund management practices should ensure that the firm is able to maintain a level of liquidity sufficient to meet its financial obligations in a timely manner; and capable of quickly liquidating assets with minimal loss.

The firms recommend ensuring that their efficiency is maintained and updated regularly, the firms also need to have in place policies to help guide the firm to overcome dynamic changes in the sector.

When investors and lenders also analysis the financial health of the companies before they invest or grant credit gives attention for the profitability, liquidity, solvability, efficiency and the general economic condition via GDP is a wise decision before they lost their investment.

Finally, The following important policy and operational directions are proposed in light of the study's findings: The board of directors should take into account the aforementioned significant determinants of financial distress when making financial decisions and developing financial policies and strategies because they may serve as an early warning sign for corporate financial distress. To ensure seamless operation and the organization's ongoing survival, corporate managers must also establish and maintain the proper amount of liquidity, leverage, profitability, and revenue growth. In order to lessen the probability of financial crisis in the sector, the government must also give particular attention to the manufacturing industry by fostering a supportive environment and providing adequate infrastructure.

5.5 Suggestions for Further Research

This study raised the following points for further research towards determinants of financial distress of large tax payer's food and beverage manufacturing companies. First, the study conducted on 11 companies in Addis Ababa-Ethiopia for the period of 12 years. Further researchers should increase the sample size and increase the number of years for more validity. Second, some results of this study deviate from what other studies have found. Therefore, other researchers are welcomed to the same issue but with different data set and diversified financial distress measures.

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Appendices

Appendix 1- Descriptive Statistics

```
. summarize stdte ltdte pro liq sol eff fgr gdp ifn fsi fag
```

Variable	Obs	Mean	Std. Dev.	Min	Max
stdte	132	.016928	.0553829	-.11	.23
ltdte	132	.072478	.1933872	-.508	1.43
pro	132	.0378606	.0402831	0	.238
liq	132	.2493731	.0328149	.198556	.292517
sol	132	.1077136	.074481	.0188	.418
eff	132	.7448333	.1187396	.23	.94
fgr	132	-.0331288	.1663036	-.4	.486
gdp	132	10.84333	1.016811	8.7	12.6
ifn	132	15.48333	10.63184	2.8	36.4
fsi	132	8.094149	.8892833	6.394372	9.927381
fag	132	13.22727	4.378279	4	24

Appendix 2- Correlation Matrixes


```

. pwcorr stdte ltdte pro liq sol eff fgr gdp ifn fsi fag

```

	stdte	ltdte	pro	liq	sol	eff	fgr
stdte	1.0000						
ltdte	0.7052	1.0000					
pro	-0.1745	-0.2029	1.0000				
liq	-0.5736	-0.5353	-0.0023	1.0000			
sol	-0.3947	-0.2784	0.1095	0.2215	1.0000		
eff	0.5131	0.2519	0.1183	-0.2194	-0.3860	1.0000	
fgr	-0.1989	-0.1781	-0.1298	0.2271	0.3469	-0.0961	1.0000
gdp	-0.5309	-0.4514	-0.1103	0.6674	0.2300	-0.3123	0.2040
ifn	0.1863	0.1119	0.0189	-0.0363	-0.1605	0.2967	-0.0100
fsi	0.4229	0.3385	-0.2307	-0.4561	-0.7694	0.1197	-0.3572
fag	0.4397	0.4273	0.0164	-0.7634	-0.1801	0.1470	-0.2044

	gdp	ifn	fsi	fag
gdp	1.0000			
ifn	-0.5169	1.0000		
fsi	-0.3587	0.0941	1.0000	
fag	-0.5666	0.0713	0.3926	1.0000

Appendix 3- Heteroscedacity Test

A. For STDTE

```

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of stdte

chi2(1)      =      0.74
Prob > chi2  =      0.3889

```

B. For LTDTE

```
. hettest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of ltdte

chi2(1) = 7.90

Prob > chi2 = 0.0049

Appendix 4 -Autocorrelation Test

A. For STDTE

```
. dwstat
```

Durbin-Watson d-statistic(10, 132) = 1.298909

```
.
```

B. For LTDTE

```
. dwstat
```

Durbin-Watson d-statistic(10, 132) = 1.572288

```
.
```

Appendix 5- Multi-Collinearity Test

```
. vif
```

Variable	VIF	1/VIF
fsi	4.10	0.243638
liq	3.85	0.260013
sol	3.70	0.269912
gdp	3.39	0.294843
fag	2.46	0.405999
ifn	1.90	0.527438
eff	1.58	0.632011
fgr	1.24	0.805450
pro	1.19	0.838802
Mean VIF	2.60	

Appendix 6- Normality Test

A. For STDTE

```
. swilk resid
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
resid	132	0.98578	1.483	0.888	0.18727

.

B. For LTDTE

```
. swilk RESID
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
RESID	132	0.98945	1.100	0.215	0.41481

.

Appendix 7- Ramsey RESET Tests

A. For STDTE

```
. ovtest
```

Ramsey RESET test using powers of the fitted values of stdte

Ho: model has no omitted variables

F(3, 119) = 1.87

Prob > F = 0.1381

B. For LTDTE

```
. ovtest
```

```
Ramsey RESET test using powers of the fitted values of ltdte
```

```
Ho: model has no omitted variables
```

```
F(3, 119) = 1.24
```

```
Prob > F = 0.2986
```

Appendix 8 -Hausman Test

A. For STDTE

. hausman fixed random

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
pro	-.2099804	-.2381038	.0281234	.0383788
liq	-.8867589	-.6340141	-.2527448	.2541404
sol	-.1869997	-.1486303	-.0383694	.0363143
eff	.1155538	.1418098	-.026256	.020657
fgr	.0036269	-.0010437	.0046706	.0113247
gdp	-.0152237	-.0137516	-.0014721	.0017522
ifn	-.0003939	-.000356	-.0000378	.000071
fsi	.0122226	-.0014265	.0136491	.0192241
fag	-.0055081	-.001143	-.0043651	.0038566

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(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 3.93
 Prob>chi2 = 0.9158

B. For LTDTE

```
. hausman fixed random
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
pro	-.9462635	-1.108471	.1622071	.1684464
liq	-.9356793	-2.029016	1.093337	1.125712
sol	-1.775622	-1.036743	-.7388792	.1677534
eff	.0499358	.0634701	-.0135343	.0824709
fgr	-.0916805	-.0730989	-.0185815	.0542393
gdp	-.0247452	-.0355366	.0107914	.
ifn	-.000443	-.0008052	.0003621	.
fsi	-.2756373	-.0958853	-.179752	.080906
fag	.0391249	.0081833	.0309416	.0165677

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(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 12.90
Prob>chi2 = 0.1674
(V_b-V_B is not positive definite)
```

Appendix 9- Breusch and Pagan Lagrange multiplier test for random effects

A. For STDTE

```
. xttest0
```

Breusch and Pagan Lagrangian multiplier test for random effects

```
stdte[id,t] = Xb + u[id] + e[id,t]
```

Estimated results:

	Var	sd = sqrt(Var)
stdte	.0030673	.0553829
e	.0011436	.0338169
u	.0004644	.0215507

Test: Var(u) = 0

```
chibar2(01) = 15.02
Prob > chibar2 = 0.0001
```

B. For LTDTE

```

. xttest0
Breusch and Pagan Lagrangian multiplier test for random effects

ltdte[id,t] = Xb + u[id] + e[id,t]

Estimated results:

```

	Var	sd = sqrt(Var)
ltdte	.0373986	.1933872
e	.0181406	.1346872
u	.0038208	.0618123

```

Test: Var(u) = 0
      chibar2(01) = 17.15
      Prob > chibar2 = 0.0000

```

Appendix 10 –Regression Results

A. For STDTE

```

. xtreg stdte pro liq sol eff fgr gdp ifn fsi fag, re

Random-effects GLS regression           Number of obs   =       132
Group variable: id                     Number of groups =        11

R-sq:                                  Obs per group:
    within = 0.5954                      min =           12
    between = 0.4172                     avg =          12.0
    overall = 0.5587                     max =           12

Wald chi2(9) = 174.04
corr(u_i, X) = 0 (assumed)              Prob > chi2     = 0.0000

```

stdte	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
pro	-.2381038	.0969049	-2.46	0.014	-.4280338	-.0481738
liq	-.6340141	.2452972	-2.58	0.010	-1.114788	-.1532404
sol	-.1486303	.0944183	-1.57	0.115	-.3336867	.0364261
eff	.1418098	.0357866	3.96	0.000	.0716694	.2119502
fgr	-.0010437	.0253331	-0.04	0.967	-.0506957	.0486083
gdp	-.0137516	.0054736	-2.51	0.012	-.0244796	-.0030237
ifn	-.000356	.0003841	-0.93	0.354	-.0011089	.0003968
fsi	-.0014265	.0107131	-0.13	0.894	-.0224237	.0195707
fag	-.001143	.0021616	-0.53	0.597	-.0053797	.0030937
_cons	.2756905	.1542509	1.79	0.074	-.0266358	.5780168
sigma_u	.02155072					
sigma_e	.0338169					
rho	.28882402	(fraction of variance due to u_i)				

B. For LTDTE


```
. xtreg ltdte pro liq sol eff fgr gdp ifn fsi fag, re robust
```

```
Random-effects GLS regression      Number of obs   =       132
Group variable: id                 Number of groups =       11
```

```
R-sq:                               Obs per group:
    within = 0.4787                    min =       12
    between = 0.0007                    avg  =      12.0
    overall = 0.3582                    max  =       12
```

```
Wald chi2(9)      =      476.38
Prob > chi2       =      0.0000
corr(u_i, X)     = 0 (assumed)
```

(Std. Err. adjusted for 11 clusters in id)

ltdte	Robust				
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
pro	-1.062686	.3138034	-3.39	0.001	-1.67773 - .4476429
liq	-2.173352	.6067973	-3.58	0.000	-3.362653 - .9840511
sol	-1.212864	.5316528	-2.28	0.023	-2.254885 - .1708437
eff	-.0064221	.4179935	-0.02	0.988	-.8256742 .81283
fgr	-.0809502	.0787301	-1.03	0.304	-.2352583 .0733579
gdp	-.0402284	.0134502	-2.99	0.003	-.0665904 - .0138665
ifn	-.0009422	.0010331	-0.91	0.362	-.0029671 .0010827
fsi	-.088334	.0825275	-1.07	0.284	-.250085 .0734169
fag	.0054734	.0123405	0.44	0.657	-.0187135 .0296603
_cons	1.88082	1.007439	1.87	0.062	-.0937243 3.855365
sigma_u	.06181228				
sigma_e	.13468718				
rho	.1739761	(fraction of variance due to u_i)			

Appendix 11 -The raw data

ID	YEAR	STD/TE	LTD/TE	PRO	LIQ	SOL	EFF	FGR	GDP	IFN	FSI	FAG
101	2011	0.038	0.118	0.017	0.28798	0.076	0.713	0	11.7	7.3	8.46246	5

101	2012	0.048	0.137	0.005	0.29252	0.062	0.674	-0.065	12.6	6.1	8.661249	6
101	2013	0.043	0.132	0.011	0.29028	0.062	0.748	-0.076	11.5	10.6	8.772789	7
101	2014	0.045	0.146	0.008	0.26583	0.05	0.809	-0.1	11.8	15.8	8.925866	8
101	2015	0.041	0.145	0.005	0.27417	0.046	0.79	-0.13	11.2	25.3	9.106247	9
101	2016	0.08	0.25	0.02	0.25413	0.03	0.79	-0.09	10	36.4	9.294153	10
101	2017	0.06	0.24	0.04	0.25126	0.04	0.71	-0.14	10.57	2.8	9.368846	11
101	2018	0.04	0.13	0.035	0.23138	0.02	0.7	-0.12	11.4	18.1	9.403673	12
101	2019	0.066	0.235	0.0146	0.23396	0.048	0.59	-0.12	8.7	34.1	9.515767	13
101	2020	0.071	0.254	0.01	0.20326	0.039	0.69	-0.12	9.9	13.5	9.641672	14
101	2021	0.06	0.23	0.0073	0.19856	0.04	0.73	-0.13	10.35	8.1	9.769025	15
101	2022	0.06	0.23	0.006	0.20916	0.04	0.627	-0.16	10.4	7.7	9.927381	16
102	2011	-0.078	-0.095	0.078	0.28798	0.143	0.507	0	11.7	7.3	7.236262	7
102	2012	-0.059	-0.068	0.025	0.29252	0.079	0.679	0.486	12.6	6.1	7.780814	8
102	2013	-0.005	0.007	0.009	0.29028	0.041	0.812	0.3	11.5	10.6	8.151553	9
102	2014	-0.065	-0.092	0.035	0.26583	0.041	0.69	0.307	11.8	15.8	8.370727	10
102	2015	-0.081	-0.119	0	0.27417	0.047	0.73	0.269	11.2	25.3	8.242234	11
102	2016	0.04	0.06	0.03	0.25413	0.04	0.84	0.3	10	36.4	8.465449	12
102	2017	0.03	0.04	0.04	0.25126	0.03	0.83	0.32	10.57	2.8	8.585466	13
102	2018	0.04	0.06	0.026	0.23138	0.03	0.8	0.25	11.4	18.1	8.724389	14
102	2019	0.031	0.063	0.0378	0.23396	0.034	0.74	0.09	8.7	34.1	8.882626	15
102	2020	0.034	0.078	0.025	0.20326	0.045	0.54	-0.01	9.9	13.5	9.083503	16
102	2021	0.03	0.07	0.0298	0.19856	0.04	0.63	0.01	10.35	8.1	9.183116	17
102	2022	0.08	0.32	0.0294	0.20916	0.032	0.741	-0.15	10.4	7.7	9.340286	18
103	2011	-0.046	-0.053	0.058	0.28798	0.4	0.577	0	11.7	7.3	6.568119	10
103	2012	-0.051	-0.064	0.039	0.29252	0.418	0.335	0.368	12.6	6.1	6.800228	11
103	2013	-0.085	-0.121	0.004	0.29028	0.304	0.76	0.262	11.5	10.6	7.011894	12
103	2014	-0.013	-0.02	0.012	0.26583	0.233	0.669	0.266	11.8	15.8	7.182172	13

103	2015	-0.08	-0.016	0.013	0.27417	0.252	0.69	0.035	11.2	25.3	7.45821	14
103	2016	0.07	0.16	0.02	0.25413	0.18	0.73	0.04	10	36.4	7.635457	15
103	2017	0.07	0.15	0.02	0.25126	0.15	0.81	0.09	10.57	2.8	7.779146	16
103	2018	0.07	0.15	0.016	0.23138	0.16	0.81	0.09	11.4	18.1	7.779146	17
103	2019	0.141	0.268	0.068	0.23396	0.126	0.92	0.13	8.7	34.1	7.922216	18
103	2020	0.23	0.494	0.006	0.20326	0.159	0.88	0.06	9.9	13.5	8.093422	19
103	2021	0.07	0.17	0.0044	0.19856	0.11	0.84	-0.01	10.35	8.1	8.281039	20
103	2022	0.012	1.43	0.008	0.20916	0.139	0.466	-0.12	10.4	7.7	7.538669	21
104	2011	-0.005	-0.011	0.063	0.28798	0.061	0.628	0	11.7	7.3	8.471657	11
104	2012	0.021	0.055	0.023	0.29252	0.038	0.762	-0.064	12.6	6.1	8.695466	12
104	2013	0.034	0.126	0.022	0.29028	0.028	0.753	-0.167	11.5	10.6	8.955147	13
104	2014	0.019	0.085	0.01	0.26583	0.025	0.703	-0.188	11.8	15.8	9.017604	14
104	2015	-0.003	-0.016	0.005	0.27417	0.029	0.683	-0.197	11.2	25.3	9.198141	15
104	2016	0.02	0.1	0.02	0.25413	0.03	0.79	-0.21	10	36.4	9.266974	16
104	2017	0.03	0.008	0.05	0.25126	0.03	0.65	-0.02	10.57	2.8	9.318761	17
104	2018	0	0	0.067	0.23138	0.02	0.71	-0.16	11.4	18.1	9.329857	18
104	2019	0.019	0.078	0.0216	0.23396	0.019	0.68	-0.16	8.7	34.1	9.432035	19
104	2020	0.025	0.103	0.045	0.20326	0.044	0.68	-0.15	9.9	13.5	9.475816	20
104	2021	0.0155	0.0701	0.0588	0.19856	0.05	0.67	-0.18	10.35	8.1	9.551978	21
104	2022	0.03	0.12	0.0082	0.20916	0.047	0.671	-0.185	10.4	7.7	9.623094	22
105	2011	-0.065	-0.094	0.078	0.28798	0.108	0.738	0	11.7	7.3	7.934227	6
105	2012	-0.007	-0.012	0.05	0.29252	0.09	0.763	0.14	12.6	6.1	8.061607	7
105	2013	0.011	0.021	0.053	0.29028	0.075	0.738	0.113	11.5	10.6	8.265985	8
105	2014	0.004	0.009	0.002	0.26583	0.064	0.846	0.038	11.8	15.8	8.408491	9
105	2015	0.007	0.02	0.015	0.27417	0.06	0.778	-0.114	11.2	25.3	8.706947	10
105	2016	0.04	0.17	0.03	0.25413	0.04	0.9	-0.18	10	36.4	8.893442	11
105	2017	0.03	0.14	0.07	0.25126	0.05	0.82	-0.15	10.57	2.8	8.954794	12

105	2018	0.03	0.14	0.046	0.23138	0.05	0.75	-0.16	11.4	18.1	9.142436	13
105	2019	0.054	0.207	0.0352	0.23396	0.05	0.79	-0.14	8.7	34.1	9.22814	14
105	2020	0.065	0.225	0.032	0.20326	0.045	0.78	-0.11	9.9	13.5	9.344196	15
105	2021	0.04	0.18	0.0277	0.19856	0.05	0.86	-0.16	10.35	8.1	9.462682	16
105	2022	0.04	0.2	0.0349	0.20916	0.059	0.779	-0.204	10.4	7.7	9.659582	17
106	2011	-0.109	-0.508	0.014	0.28798	0.14	0.529	0	11.7	7.3	7.655846	9
106	2012	-0.061	-0.395	0.055	0.29252	0.164	0.498	-0.257	12.6	6.1	7.791695	10
106	2013	-0.02	-0.179	0.012	0.29028	0.103	0.572	-0.308	11.5	10.6	8.074388	11
106	2014	-0.005	-0.049	0.029	0.26583	0.083	0.724	-0.301	11.8	15.8	8.14547	12
106	2015	-0.013	-0.11	0.02	0.27417	0.086	0.724	-0.277	11.2	25.3	8.394748	13
106	2016	0.02	0.23	0.05	0.25413	0.04	0.89	-0.31	10	36.4	8.670329	14
106	2017	0.02	0.17	0.07	0.25126	0.02	0.9	-0.3	10.57	2.8	8.70846	15
106	2018	0	0.01	0.066	0.23138	0.05	0.85	-0.13	11.4	18.1	8.80151	16
106	2019	0.014	0.059	0.1516	0.23396	0.051	0.92	-0.16	8.7	34.1	8.867523	17
106	2020	0.026	0.144	0.094	0.20326	0.082	0.7	-0.22	9.9	13.5	9.122216	18
106	2021	0.03	0.17	0.0173	0.19856	0.07	0.69	-0.24	10.35	8.1	9.288773	19
106	2022	0.02	0.17	0.009	0.20916	0.079	0.752	-0.254	10.4	7.7	9.433063	20
108	2011	-0.067	-0.145	0.097	0.28798	0.174	0.742	0	11.7	7.3	6.394372	8
108	2012	-0.087	-0.459	0.177	0.29252	0.153	0.695	-0.24	12.6	6.1	6.564636	9
108	2013	-0.042	-0.27	0.07	0.29028	0.174	0.66	-0.248	11.5	10.6	6.713233	10
108	2014	0.076	0.275	0.029	0.26583	0.155	0.818	-0.063	11.8	15.8	7.005791	11
108	2015	0.024	0.075	0.024	0.27417	0.121	0.88	-0.111	11.2	25.3	7.206513	12
108	2016	0.03	0.12	0.04	0.25413	0.09	0.94	-0.12	10	36.4	7.285829	13
108	2017	0	0	0.16	0.25126	0.1	0.93	-0.13	10.57	2.8	7.346666	14
108	2018	-0.02	-0.07	0.238	0.23138	0.11	0.93	-0.17	11.4	18.1	7.393541	15
108	2019	0.065	0.236	0.2133	0.23396	0.107	0.94	-0.12	8.7	34.1	7.441878	16
108	2020	0.095	0.283	0.102	0.20326	0.132	0.9	-0.06	9.9	13.5	7.50515	17

108	2021	0.1	0.28	0.0739	0.19856	0.13	0.84	-0.06	10.35	8.1	7.650934	18
108	2022	0.09	0.23	0.0595	0.20916	0.133	0.886	-0.002	10.4	7.7	7.723544	19
109	2011	-0.04	-0.068	0.009	0.28798	0.185	0.653	0	11.7	7.3	7.053497	13
109	2012	-0.033	-0.065	0.015	0.29252	0.158	0.699	0.096	12.6	6.1	7.151144	14
109	2013	-0.034	-0.065	0.043	0.29028	0.135	0.72	0.147	11.5	10.6	7.267172	15
109	2014	-0.027	-0.051	0.031	0.26583	0.127	0.796	0.124	11.8	15.8	7.412794	16
109	2015	-0.093	-0.232	0.018	0.27417	0.125	0.784	-0.093	11.2	25.3	7.52637	17
109	2016	0.03	0.06	0.04	0.25413	0.12	0.75	0.06	10	36.4	7.634492	18
109	2017	0.01	0.03	0.03	0.25126	0.16	0.63	0.03	10.57	2.8	7.729191	19
109	2018	0.07	0.15	0.032	0.23138	0.07	0.7	0.05	11.4	18.1	7.787862	20
109	2019	0.068	0.147	0.0599	0.23396	0.131	0.73	0.06	8.7	34.1	7.84438	21
109	2020	0.076	0.178	0.027	0.20326	0.122	0.79	0.03	9.9	13.5	7.968483	22
109	2021	0.08	0.21	0.0193	0.19856	0.09	0.89	-0.04	10.35	8.1	8.149171	23
109	2022	0.08	0.2	0.0106	0.20916	0.093	0.906	-0.015	10.4	7.7	8.215762	24
110	2011	0.017	0.024	0.059	0.28798	0.169	0.667	0	11.7	7.3	6.528172	7
110	2012	0.034	0.059	0.001	0.29252	0.179	0.649	0.122	12.6	6.1	6.914347	8
110	2013	-0.051	-0.103	0.076	0.29028	0.165	0.562	0.076	11.5	10.6	7.127924	9
110	2014	-0.016	-0.034	0.009	0.26583	0.151	0.708	0.066	11.8	15.8	7.416982	10
110	2015	0.003	0.007	0.017	0.27417	0.113	0.735	0.058	11.2	25.3	7.582469	11
110	2016	0.06	0.19	0.02	0.25413	0.08	0.82	-0.4	10	36.4	7.726221	12
110	2017	0.08	0.25	0.01	0.25126	0.06	0.76	-0.08	10.57	2.8	7.926554	13
110	2018	0.03	0.1	0.041	0.23138	0.04	0.88	-0.09	11.4	18.1	7.978466	14
110	2019	0.064	0.185	0.0225	0.23396	0.071	0.89	-0.05	8.7	34.1	8.106045	15
110	2020	0.075	0.231	0.013	0.20326	0.077	0.78	-0.08	9.9	13.5	8.283301	16
110	2021	0.06	0.18	0.0052	0.19856	0.09	0.85	-0.08	10.35	8.1	8.378071	17
110	2022	0.05	0.15	0.0071	0.20916	0.094	0.83	-0.103	10.4	7.7	8.490424	18
111	2011	-0.053	-0.127	0.002	0.28798	0.206	0.67	0	11.7	7.3	6.889269	4

111	2012	0.034	0.079	0.001	0.29252	0.175	0.68	0.043	12.6	6.1	7.054066	5
111	2013	-0.03	-0.088	0.001	0.29028	0.121	0.811	-0.121	11.5	10.6	7.287438	6
111	2014	0.059	0.215	0.007	0.26583	0.081	0.927	-0.131	11.8	15.8	7.467415	7
111	2015	0.052	0.177	0.005	0.27417	0.075	0.866	-0.085	11.2	25.3	7.567615	8
111	2016	0.07	0.2	0	0.25413	0.08	0.89	-0.07	10	36.4	7.642305	9
111	2017	0.02	0.07	0.06	0.25126	0.05	0.87	-0.4	10.57	2.8	7.691458	10
111	2018	0.07	0.18	0.004	0.23138	0.11	0.8	-0.06	11.4	18.1	7.723983	11
111	2019	0.093	0.212	0.0034	0.23396	0.118	0.91	0.04	8.7	34.1	7.754852	12
111	2020	0.065	0.144	0.001	0.20326	0.137	0.81	0.05	9.9	13.5	7.80618	13
111	2021	0.04	0.09	0.0014	0.19856	0.12	0.88	0.04	10.35	8.1	7.923252	14
111	2022	0.05	0.12	0.0013	0.20916	0.126	0.857	0.036	10.4	7.7	7.983141	15
112	2011	-0.094	-0.152	0.116	0.28798	0.21	0.779	0	11.7	7.3	6.455277	5
112	2012	-0.101	-0.164	0.023	0.29252	0.185	0.624	0.238	12.6	6.1	6.673391	6
112	2013	-0.08	-0.127	0.033	0.29028	0.147	0.734	0.222	11.5	10.6	6.900647	7
112	2014	-0.078	-0.128	0.043	0.26583	0.151	0.582	0.198	11.8	15.8	7.073521	8
112	2015	-0.057	-0.093	0.054	0.27417	0.18	0.63	0.216	11.2	25.3	7.164549	9
112	2016	0.01	0.01	0.1	0.25413	0.14	0.67	0.22	10	36.4	7.219681	10
112	2017	0.03	0.03	0.09	0.25126	0.18	0.64	-0.39	10.57	2.8	7.242277	11
112	2018	-0.02	-0.03	0.036	0.23138	0.27	0.76	0.16	11.4	18.1	7.297255	12
112	2019	-0.018	-0.032	0.0739	0.23396	0.268	0.76	0.16	8.7	34.1	7.297255	13
112	2020	0.032	0.058	0.095	0.20326	0.222	0.75	0.15	9.9	13.5	7.322219	14
112	2021	-0.02	-0.04	0.0437	0.19856	0.28	0.58	0.04	10.35	8.1	7.401276	15
112	2022	-0.11	-0.08	0.036	0.20916	0.287	0.23	-0.26	10.4	7.7	6.859591	16