DETERMINANTS OF CAPITAL STRUCTURE: EVIDENCE FROM MANUFACTURING FIRMS IN ETHIOPIA

DEGREE OF MASTER OF SCIENCE IN

ACCOUNTING AND FINANCE

BY: JIMMAWORK G/MESKEL

(ID NO: BEGE012/12)

WOLKITE UNIVERSITY

COLLEGE OF BUSINESS & ECONOMICS

MASTER OF SCIENCE IN ACCOUNTING AND FINANCE

NOVEMBER, 2022

WOLKITE, ETHIOPIA

THESIS SUBMITTED TO WOLKITE UNIVERSITY DEPARTMENT OF ACCOUNTING AND FINANCE, COLLEGE OF BUSINESS AND ECONOMICS, SCHOOL OF GRADUATE STUDIES, WOLKITE UNIVERSIT,

IN PARTIAL FULFILMENT OF THE

REQUIREMENTS FOR THE

DGREE OF MASTER OF SCIENCE IN ACCOUNTING AND FINANCE.

DGREE OF MASTER OF SCIENCE SPECIALIZATION IN ACCOUNTING AND FINANCE

NOVEMBER, 2022

WOLKITE, ETHIOPIA

Declaration

I hereby, declare that this work entitled ***"Determinants of Capital Structure: Evidence from manufacturing firms in Ethiopia"*** is my own original work and has not been presented for a degree in any other university, and that all sources of materials used for this thesis have been duly acknowledged.

Jimmawork G/meskel _____ _____

Researcher's Name Signature Date

This research paper has been submitted for examination with my approval as a thesis advisor

_____ _____ _____

Advisor's Name Signature Date

Place and Date of Submission: _____

SCHOOL OF GRADUATE STUDIES

WOLKITE UNIVERSITY

ADVISORS' APPROVAL SHEET

This is to certify that the thesis entitled ***"Determinants of Capital Structure: Evidence from manufacturing firms in Ethiopia"*** submitted in partial fulfillment of the requirements for the degree of Master's with specialization in Accounting and finance, the Graduate Program of the Department of accounting and finance, school of graduate studies and has been carried out by **Jimmawork G/meskel Id. No BEGE 012/12**, under my supervision. Therefore I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the department.

_____	_____	_____
Name of major advisor	Signature	Date

SCHOOL OF GRADUATE STUDIES

WOLKITE UNIVERSITY

EXAMINERS' APPROVAL SHEET

As members of the Board of Examiners of the final Master's degree open defense, we certify that we have read and evaluated the thesis prepared by Jimmawork G/meskel under the title ***"Determinants of Capital Structure: Evidence from manufacturing firms in Ethiopia",*** and recommend that it be accepted as fulfilling the thesis requirement for the degree of Master of Science in Accounting and Finance with Specialization in Accounting and Finance.

_____	_____	_____
Name of the Chairperson	Signature	Date
_____	_____	_____
Name of Internal Examiner	Signature	Date
_____	_____	_____
Name of External Examiner	Signature	Date

Final approval and acceptance of the thesis is contingent upon the submission of the final copy of the thesis to the SGS through the DGC/SGC of the candidate's department/School.

Thesis approved by

_____	_____	_____
DGC/SGC	Signature	Date

Acknowledgement

Above all, my dearest gratefulness and adoration goes to the Almighty God for giving me the ability and all those exertions to complete this study. Next, I would like to extend my deep indebtedness to my advisor Mitiku Melese (Asst. Prof) for his heart full support from the very beginning up to the final writing of report. He sacrificed his precious time, forwarded positive criticism, suggestions, valuable guidance and comments, my debts are innumerable.

Furthermore, I would like to address my sincere gratitude to the person of my heart Wondye for his moral support and prayers, encourage me throughout the course of my life. Without his unconditional love and support in everything, I could have been never accomplished it. I really admire his full interest and effort towards my success. Finally, I would like to express my deepest gratitude and appreciation to all those who participated either directly or indirectly contributed to the successful preparation of this study.

Acronyms

ROA	Return on asset
LTY	Liquidity
FG	Firm growth
FS	Firm size
AT	Asset tangibility
NDTS	Non-debt tax shield
GDP	Gross domestic product
IFN	Inflation
VFEX	Volatility in foreign exchange
OLS	Ordinary least square
IMF	International monetary fund
NBE	National bank of Ethiopia
CLRM	Classical linear regression model
TDR	Total debt ratio
FEM	Fixed effects models
REM	Random effect models
GCC	Gulf Cooperation Council
MM	Modigliani and Miller

Abstract

The overall objective of the study was to investigate determinant factors affecting the capital structure of manufacturing firms in Ethiopia. The study employed explanatory research design and quantitative research approach. Secondary data were collected from 81 manufacturing firms' financial statement (2015 to 2020) to achieve the objective of the study. The study was targeted on manufacturing firms in Ethiopia. However, for the accessibility of data the author specifically focused on large tax paying manufacturing firms and simple random sampling technique was used to select sample of 81 large tax paying manufacturing firms among the total population of 102. Finally, after collecting the relevant data, descriptive statistics, correlation analysis and OLS model were used to analyze the data. The study found that profitability, firm size, firm growth, liquidity and volatility in foreign exchange are found very important in determining the variation in capital structure of manufacturing firms in Ethiopia during the study period under consideration. Specifically, from the firm specific factors; firm growth, asset tangibility, and firm size were found positively affecting the capital structure in the manufacturing industry during the study period while profitability and liquidity found negatively influencing capital structure. In other side among the macro economic variables, volatility in foreign exchange were found positively affecting the capital structure. The researcher recommends that it is better to manufacturing firms to increase debt capacity in proportion to tangible asset because the tangible asset is used as collateral and provides security to lender in occurrence of financial stress. Furthermore, the researcher recommends that it is advisable to take in to account the suggestions of pecking order theory and static trade of theory since these theories are more pertinent to the capital structure decision of Ethiopian manufacturing firms.

Key terms:

Manufacturing firms; liquidity; capital structure; Ethiopia; Profitability

Contents

List of tables

List of figures

CHAPTER ONE

INTRODUCTION

The issue of capital structure is the researchable topic that has got attention from different scholars across the world. In this part the study background, problem statement, research objectives, research question, significant of the study and the scope of the study is discussed in detail.

1.1. Background of Study

In finance it is believed that financially leverage firms` value supposed to be better than those of unleveraged firms. In this case leverage shows the firms` ability of using long-term debt financing in combination to equity financing. Similarly, the composition of debt to equity financing is known as capital structure. The decision of capital structure is one of the sensitive roles of the financial manager in corporate management. But attaining the optimum proportion of debt to equity ratio is the most difficult decision for managers. As different authors like Van-Horn (1989), Brealey and Myers (1991) and Pandey (2005) defined capital structure, it can be expressed using different terms the essences of their definition is a choice of firms between debt and equity. Accordingly, as mentioned above it is the composition of debt and equity used to finance a firm's missions. Usually, corporations raise funds through borrowing and selling shares. However, maintaining rational proportion of debt to equity needs due attention of the financial manager. The issue of capital structure decision and its` effect on corporate performance is still a hot researchable agenda among scholars (Papadimitri, Pasiouras & Tasiousince, 2021) since the birth of modern capital structure theories (Modigliani and Miller, 1958).

Modigliani and Miller (1958) are praised for launching a base for the birth of modern capital structure theories. Accordingly, they argued that the decision of capital structure is not affecting firms` value, which is irrelevant. However, their theory was based on unrealistic assumptions like; no tax duty, no information asymmetry between managers and shareholder, corporations can borrow at equal borrowing rate with individual investors. Modigliani and Miller were later on changed their view and claimed that capital structure is relevant but in favor of debt financing than equity financing due to its` tax saving advantage (Modigliani and

Miller, 1963). Similar to Modigliani and Miller (1958), many scholars like Alchian and Kessal (1959), Durand (1959), Donaldson (1961) and Namalathasan (2010) made an endogenous endeavor to the development of capital structure theories. The capital structure theories are divided in to net income, net operating income, traditional and Modigliani- Miller approach. According to the net income approach, a firm can increase its value by lowering the cost of capital through increasing the quantity of debt in the capital structure. Secondly, according to net operating income approach, at constant weighted average cost of capital the market value of the firm is not affected by the variation of capital structure. Thirdly, the traditionalist approach are explained us the value of a firm can be maximized and the cost of capital can be minimized by the carful mix of debt and equity capital.

The modern capital structure theories contributed to new theories such as trade-off theory (Kraus and Litzenberger, 1973), agency costs theory (Jensen and Meckling, 1976), pecking order theory (Myers, 1984), market timing theory and shareholder theory are used till know in investigating factors that affects the capital structure (Vergas, 2015), bargaining theory (Chu and Wang, 2017). First, according to the trade-off theory, an optimal capital structure can be maintained when the benefits of tax from using debt contrary to the costs associated with debt, like bankruptcy or financial distress are equal (Kraus and Litzenberger,1973). Second, agency theory stated financial debt can be used to increase the performance of the firm by solving the conflict of interests between the manager and stockholders (Jensen and Meckling, 1976). Third, a pecking order theory is company incline to finance its operations by using internally existing funds and external funds being their latter option (Myers, 1984). Fourthly, market timing theory described as decision on capital structure of the firm depends on market circumstances, means firms use an alternative in choosing equity or debt during financial distress or stock prices are over-evaluated respectively (Baker and Wurgler, 2002). Recently new theories like behavioral consistency theory (Cronqvistet al., 2012), norm theory (Lamet al., 2013), and bargaining theory (Chu and Wang, 2017) are emerging and the issue of capital structure is not yet conclusive.

Since the birth of modern capital structure many authors studied about the determinants of capital structure (Qiu & La, 2010; Nguyen and Tran, 2020; Nguyen et al., 2020). Previous authors categorized factors affecting capital structure as firm specific and macroeconomic

factors (Sbeti & Imad Moosa, 2012; M'ng, Rahman & Sannacy, 2017; Koralun-Bereźnick, 2018; Zafar, Wongsurawat & Camino, 2019; Nguyen and Tran, 2020). From the standing points of those theories and literatures the focal aim of the study was to investigate the factors that affected capital structure among manufacturing firms in Ethiopia, by manipulating six firm specific variables such as; profitability, firm growth, firm size, tangibility of assets, liquidity and non-debt tax shield and three macro variables; volatility in foreign exchange, inflation, and GDP.

1.2. Problem Statement

Optimal financing decision believed that it would positively contribute for firms` profitability. As it was mentioned in the background section above, the modern theory suggests that borrowed firms can leverage their firms` value than those non-borrowed firms. For example, according to Modigliani & Miller (1963) firms should use as much debt as possible due to tax-deductible interest payment. As it was proved in their study, the value of levered firms exceeds that of un levered firm by an amount equal to the present value of the tax savings from the use of debt. Then, various scholars with hundreds of articles on the theory of capital structure have been carried out in order to find out under what condition capital structure does matter. Similarly, Miller (1977) suggested the effective personal tax rate on equity income usually less than a regular personal tax rate on interest income and this reduces the advantage of debt financing. Besides, companies also have ways other than the interest on debt to shelter income such as depreciation, investment tax credit or tax loss carry forward whereby firms with large non-debt tax shields relative to their expected cash flow include less debt in their capital structure (DeAngelo & Masulis, 1980). Therefore, it can be generalized that effective capital structure management would significantly contribute for the success of firms.

Since the birth of modern capital structure theories many researchers conducted national and global studies particularly on the issue of capital structure determinants (M'ng, Rahman & Sannacy, 2017; Koralun-Bereźnick, 2018; Zafar, Wongsurawat & Camino, 2019; Nguyen and Tran, 2020). For example, the study conducted by Khaki and Akin (2020) in Gulf Cooperation Council (GCC) countries revealed the determinants of capital structure particularly in non-financial companies. Accordingly, the study reported that size, tangibility, and growth opportunities have positive impact on leverage. On the other hand, profitability,

age, financial constraints, liquidity, and government ownership affect the leverage negatively in GCC countries. Similar study was conducted in Turkish non-financial firms and found that profitability, growth, industry median leverage and tangibility were effective in explaining the capital structure of Turkish firms (Basti and Bayyur, 2019). Mardones and Cuneo (2020) studied the relationship of capital structure and corporate performance in Latin American countries and their study revealed there was a positive relationship between financial performance, growth, and size of the company. However, the study was reported there were mixed results for short- and long-term financial leverage, as well as for company liquidity. A study in Vietnams listed construction companies on Hanoi Stock Exchange reported that growth and firm size positively affect the capital structure while the profitability has the opposite effect on capital structure (Nguyen and Tran, 2020). In the same country another study revealed that financial leverage (FL) has a negative relationship with some factors such as asset structure (AS), liquidity (LQ), growth opportunities (GRW), profitability (ROA), and firm age (AGE) in the fixed effect regression (Nguyen et al., 2020).

In developing countries the study of capital structure determinants has got researchers attention seriously. A study in Malaysia, Singapore, and Thailand profitability has a significant negative influence on capital structure for Malaysia and Singapore but insignificant for Thailand. While, firm size has a significant positive influence on capital structure for all countries. Similarly, the study disclosed that tangibility of assets has a significant positive influence on capital structure for Malaysia and Singapore while insignificant for Thailand (M'ng, Rahman & Sannacy, 2017). Studies in Africa also shows scholars are still eager to know the effect of different factors on capital structure. In this regard a study conducted in Sub-Saharan Africa supported trade-off and pecking order theories (Kh´emiri and Noubbigh, 2018). Accordingly, there was a positive relationship between profitability and long-term debt, which was in favor of trade-off theory. Generally, profitability, growth opportunity, collateral, corporate tax, non-debt tax shield, liquidity, and earning volatility were found affecting the capital structure in Sub-Saharan Africa countries. Another similar studied was conducted in 13 African countries and reported that asset tangibility, financial distress cost, profitability and Non debt tax shield are strong firm specific determinants of capital structure. This study also found that corporate tax rate, banking sector development, GDP growth rate, and lending interest rate are the most important country

specific determinants of capital structure (Demis and Wang, 2018). This study was also confirmed that pecking-order and trade-off theory were powerfully explaining the capital structure decision in African non-financial companies. Many other studies were also reported in different countries like Nigeria (Ajao and Ema, 2012); Dar es Selaam (Kapaya, Ngatuni, Katunzi, 2018) SSA (Chipeta, Deressa, 2016; Munisi, 2017) in Zimbabwe (Strike Mbulawa, 2019).

Studies in Ethiopia also revealed the determinants of capital structure in different sectors. For example Usman Muhammed (2013) studied the determinants of capital structure among large tax payers and reported that size, age, tangibility, liquidity position and non-debt tax shield of a company are positively correlated with leverage, whereas profitability, earnings volatility and dividend payout ratio are negatively associated with leverage. The author was also claimed Agency cost theory provide more robust result than other theories. Recently, Abdu Mohammed (2020) also studied the capital structure determinants in private banks in Ethiopia. His study reported that there was a significant positive relationship between earning volatility, size of banks, and taxation with leverage while profitability and asset tangibility were found have a significant negative effect on the banks' leverage decision. In conformity with the aforementioned studies, the author revealed that static trade-off and pecking order, were essentially explaining the capital structure decision of Ethiopian private commercial banks. Similar studies were conducted in the banking industry in Ethiopia and reported both firm specific and macro-economic factors were affecting the capital structure decision like profitability, age, tax shield and size, growth, asset tangibility and liquidity (Mohammed Getahun, 2014; Tesfa Bizuayehu, 2016; Tesfaye Asefa, 2017; Tamiru Anley, 2020; Kanbiro Orkaido, 2021; Mekonnen Yitayaw, 2021; Zemenu Amare, 2021).

Majority of previous studies in Ethiopia were given special attention to the financial sector than the manufacturing sector (Tesfaye Asefa, 2017; Tamiru Anley, 2020; Kanbiro Orkaido, 2021; Mekonnen Yitayaw, 2021; Zemenu Amare, 2021). However, the manufacturing sector in Ethiopia is given less attention by concerned bodies and researchers too. Ethiopia's manufacturing sector is still far from being an engine of growth and structural change. The manufacturing sector plays a marginal role in employment generation, exports, output, and inter-sectorial linkages. In some ways, the structure and performance of the Ethiopian

manufacturing sector mirrors the wider sub-Saharan African experience (Lawrence 2005). The annual rate of growth of industrial output doubled to nearly 20 percent by 2015–17, while manufacturing output grew by 10 percent a year from 2005 to 2010 and by 17.9 percent in 2015–17. Despite this acceleration, however, the level of industrialization remained low.

As one of the practical challenges of Ethiopia, value added in manufacturing had only reached 6.4 percent of GDP by 2017, though value added in the wider industrial sector was by then up to more than 25 percent (NBE, 2018). During the same period, the annual growth rate of the industrial sector almost doubled from 10.1 to 19.8. Nonetheless, in 2016/17 the net contribution of the manufacturing and industrial sectors to the 10.9 percent annual GDP growth rate rose to 1.1 and 4.4 percent respectively. Similar to those trends, the recent performance of the manufacturing sector contribution to GDP also shows that it declined from 7.187 % in 2017 to 5.302 in 20192020. Even its` GDP contribution never back to recover the 1997 highest ratio, which was 7.301% according to the world bank`s statistics. Generally, the current economic status shows that the Ethiopia's economy experienced strong, broad-based growth averaging 9.4% a year from 2010/11 to 2019/20. Similarly, the Ethiopia's real gross domestic product (GDP) growth slowed down to 6.1% in 2019/20 due to COVID-19 (coronavirus pandemic). It was believed that the industry, mainly construction, and services accounted for most of the growth. However, it was blamed that the manufacturing sector is less growing and needs profound reform for attaining the structural shift of the economy. Among the challenges of manufacturing sector, financing problem is one of the others. It is known that the manufacturing firms` projects are capital intensive by nature, which demands huge source of finance. Having the access to finance limitations, it demands rational decision of managers to attain the optimal capital structure composition. Unless it may adversely affects the firms` success.

In this regard previous researchers mainly focused on capital structure determinants of financial institutions and very few researchers tried to investigate capital structure determinants among manufacturing firms. For example Workneh Amanuel (2015**)** identified variables like tangibility, non-debt tax shields, earning volatility, profitability, and size of the firm variables are the significant determinants of capital structure of Addis Ababa manufacturing firms. Similarly, Veni, Shewit Kinfe (2018) studied on the determinants of

capital structure among private manufacturing firms in Ethiopia. But, in the above studies and others too the authors failed to consider the macro economic variables like inflation, GDP, and volatility in foreign exchange. Similarly, previous studies focused only limited group of manufacturing sectors like only food manufacturing or steel productions. However, in this study the author included from all manufacturing sectors in sample. Moreover, this study was considered both the firm specific factors like; profitability, firm growth, firm size, tangibility of assets, liquidity and non- debt tax shield and three macroeconomic variables; volatility in foreign exchange, inflation, and GDP. Therefore, the aim of this study was to investigate the determinants of capital structure among manufacturing firms.

1.3. Objectives of the Study

The general objective of this study was to investigate the determinants of capital structure among manufacturing firms. Specifically it was aimed to achieve the following objectives:

1. To study the effect of firm specific variables (profitability, firm growth, firm size, tangibility of assets, liquidity and non-debt tax shield) on capital structure.
2. To study the effect of macroeconomic variables (volatility in foreign exchange, inflation and GDP) on capital structure.

1.4. Research Questions

This study would answer the following research questions:-

1. What are the firm specific factors that affect capital structure decision in manufacturing sector in Ethiopia?
2. What are the macro-economic factors affecting capital structure decision in manufacturing sector in Ethiopia?

1.5. Significance of the Study

It is obvious that manufacturing firms playing significant role for the national economic growth and employability opportunity. In this context, this research work studied the effect of firm specific and macro-economic factors that determine capital structure decision of companies that enable them achieve their objectives of supporting the economy in general, the specific needs of its stakeholders in particular. The study also

analyzed whether the trade-off theory, pecking order theory or other capital structure theory can explain the financing pattern of the manufacturing firms in Ethiopia. As the result the findings of this research would add value to the existing knowledge on the area of corporate finance. Such analysis can help managers manufacturing firms to improve financial resource generating thereby they can improve sector performance, and become more competitive.

1.6. Scope of the study

This study is limited to analyze the determinants of capital structure of 81 selected manufacturing firms in Ethiopia. The secondary data about 81 manufacturing firms was limited from the years 2015 to 2020. More specifically this study was aimed to test the effect of firm specific (profitability, growth opportunity, firm size, asset tangibility, liquidity and non-debt tax shield) and macro-economic variables (volatility in foreign exchange, GDP growth and inflation) on capital structure.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

In this part different sources of literature reviewed both theoretically and empirically. Therefore, the following section focuses on theoretical review and empirical review of literature.

2.1. Theories of Capital Structure

Capital structure has been an important focus point in the literature since Modigliani and Miller started publishing their research about it in 1958. Capital structure is a remarkable topic because it has researched in both academic level and corporate level since the financing decisions of a firm are of vital importance for its operating and investing activities. Therefore, there are many theories, which discuss it in many different ways. It is referred how a firm mixes debt and equity in order to finance itself or in other words, it concerns about combination of funds, in the form of debt and equity.

Capital structure theory, as known today, originates from the work of Modigliani and Miller, hereafter named M&M, who published their famous article in 1958. Many, if not all business and finance academics have heard and know about M&M‘s capital structure irrelevance proposition and several textbooks within corporate finance begin their explanations of capital structure and cost of capital with the work of M&M. In addition M&M Myers (2002) indicates that the capital structure theories and empirical evidences focus mainly on financing strategy as well as the selection of an optimal debt ratio for a certain type of firm that operates in a distinct institutional environment. According to Myers (2002), these theories are credible not because they do a perfect job highlighting the differences in total debt ratios, but because the costs and benefits that drive the theories at work in financing strategies can be observed. While there is no universal theory of capital structure, there are however, some relevant conditional theories and these theories can be distinguished in their relative focus on the factors that could significantly impact the right mix of debt and equity.

These factors comprise taxes, agency costs, and differences in information, institutional or regulatory constraints and a whole lot more (Myers, 2002). The same author stressed that each of these factors could be very significant for some firms and for other firms they could be highly unimportant. The leading theories are given below. Majority of these theories overlap and a blend of these theories help in explaining capital structure.

2.1.1. The Modigliani-Miller Theorem

As previously mentioned, the irrelevance theory of capital structure, which has been introduced by Merton Miller and Franco Modigliani (1958)-denoted by M&M throughout the researcher paper-was the first break through in relation to the subject of capital structure and its effects on financial performance. They first hypothesized that if markets are perfectly competitive, firm performance will not be related to capital structure, there by suggesting no significant relationship between a firm‘s capital structure and its performance. The value of the firm is similarly unaffected by its financial structure. Their assumptions of a perfectly competitive market exclude the impacts tax, inflation and transaction costs associated with raising money or going bankrupt. In addition they also assume that disclosure of all information is credible, thus there is no information asymmetry (Hamada, 1969 and Hatfield et.al, 1994). There were various criticisms, which encouraged M&M to issue an alteration to their first theory, which refers to as MM2. In their revised proposition they incorporated tax benefits as determinants of capital structure. The vital characteristic of taxation is the acknowledgement of the interest as tax deductible expenditure.

2.1.2. Trade-Off Theory

The tradeoff theory model originated from the debate over the M&M‘s theorem. When corporate tax was added to the original irrelevance proposition of M&M, a benefit for debt is observed that serves to shield earnings from taxes. This theory states that the optimal capital structure is the trade-off between the benefits of debt (i. e., the interest tax shields) and the costs of debt (i. e., the financial distress and agency costs) (Brigham and Houston, 2004).

2.1.3. Models based on trade-off theory

According to Frank et al, (2011) the trade-off theory of capital structure is the idea that a company chooses how much debt and how much equity finance to use by balancing the costs and benefits. An important purpose of the trade off-theory is to explain the fact that corporations usually are financed partly with debt and partly with equity. This theory assumes that "there are benefits and costs associated with the use of debt as against equity and firms thus chose an optimal capital structure that trades off the marginal benefits and costs of debt". In the beginning, the theory was limited to the tradeoff between the tax advantages of debt against the bankruptcy costs. Then it was extended to include benefits and costs associated with the use of debt in mitigating the conflicts among the agent groups associated firm such as managers, equity-holders and debt holders.

2.1.3.1. Static Trade-off Theory

This theory came as a reaction on the MM theory, presenting the benefits of debt financing through debt related tax shields. Debates were raised over the fact that there was no offsetting cost to debt. Therefore, a discussion followed saying that the optimal leverage should be found where a trade-off between tax shield benefits of debt and costs of financial distress was found (Shyam-Sunder and Myers, 1999). Debt enables the possibility to deduct interest charges raising incentive for higher leverage in order to maximize the tax shield. By doing this the firm value increases with the value of the tax shield (Graham, 2000). Damodaran (2001) stretches the increased financial discipline for managers as a consequence of higher debt levels. However there have been raised concerns on increasing risks of bankruptcy with increasing debt levels and likelihood of raising agency costs occurring between owners and managers. An underlying reason for this is a conflict of interests generated by debt (Myers, 1984). Therefore, according to the trade-off theory, an optimal debt level which maximizes the value of the firm does exist, when attaining a trade off as balancing the benefits of debt against the cost of financial distress. The trade-off model assumes that companies have an optimal capital structure and they aim to attain this through a target debt level. This is the reason why the "Trade-off Theory is often referred to as the 'Static Trade-off Theory'" in the literature.

2.1.4 Pecking Order Theory

Pecking order theory (Myers & Majluf, 1984) is applicable by financial managers in comparison to the trade-off theory. The theory underlying assumption is that there exists asymmetric information among the managers of the firm and outsiders. It is assumed that managers who work on behalf of the company's stakeholders have better information than the company's stakeholder and other investors. According to this theory, manager's first choice is to use internal financing or retained earnings. "Internal financing indicates that there is no need to issue debt or equity and the firm can inject its own money to finance a project. If the firm does not possess enough internal resources, the second option will be external financing". The external financing is divided into issuing debt and equity, and there is a preference with the issuance of debt and equity. The first choice in external finance is issuing debt. "Debt is a safer security and less risky than equity". The pecking order allows issuing equity when the capacity of debt is fully used (Myers and Majluf, 1984). The pecking order theory focuses on asymmetrical information costs. This approach assumes that companies prioritize their financing strategy based on the path of least resistance. Internal financing is the first preferred method, followed by debt and external equity financing as a last resort

2.2 Determinants of capital structure

Growth

Empirical evidence seems inconclusive regarding the impact of firm growth and capital structure. According to Dang et al., (2019), there was positive relationship between the sales growth and the administrative financial leverage, it is suggested that companies with a higher sales growth can use the debt financial leverage to financing ratio for financing through more funds or financial leverage, it is suggested that companies with a higher asset growth use more leverages for their financing. On the same way, Tchuigoua,, (2015)., Mohammed (2014), Bas et al. (2009), Michaelaset al. (1999), Hutchinson (2003), Cassar and Holmes (2003) Hallet al. (2004), Nguyen and Ramachandran (2006), Saeed (2007) and Smith (2010) suggest positive relationship between growth and leverage, i.e., support the pecking order theory concluded growth being positively related to long-term debt ratio, while negatively related to short-term debt ratio, and Smith (2010) suggest positive relationship between

growth and leverage, i.e., support the pecking order theory found growth being positively related to long-term debt ratio, while negatively related to short-term debt ratio.

Profitability

Different studies such as Degryse et al, (2012), Smith (2010); Tchuigoua (2015), Lislevand (2012), Asefa (2017), Mohammed (2014), Dang et al., (2019), suggest negative relationship between growth and leverage, i.e., support the pecking order theory. Because, accordingly, the pecking order model predicts a negative relationship between book leverage and profitability. The pecking order theory predicts that firms with a lot of profits and few investments have little debt. Since the market value increases with profitability, the negative relationship between book leverage and profitability also holds for market leverage. The pecking order theory predicts that firms with a lot of profits and few investments have little debt. Since the market value increases with profitability, the negative relationship between book leverage and profitability also holds for market leverage as it was discussed in the theoretical review.

Firm Size

The effect of size on debt ratios is ambiguous from the theoretical point of view; money authors encountered a positive relation between firm size and leverage. Empirical studies like Ebru (2011); Tchuigoua, (2015); Mohammed (2014), Dang et al., (2019), suggest positive relationship between growth and leverage. It is also argued that larger firms with less volatile benefits also have a greater likelihood of being able to fully use tax shields from interest payments, increasing the expected tax benefits of debt. For small firms, the conflicts between creditors and shareholders are more severe because the managers of such firms tend to be large shareholders and are better able to switch from one investment project to another. According to this point of view, most empirical studies in fact report a positive sign for the relationship between size and leverage.

Liquidity

Liquidity indicates the ability of a firm to meet its short term obligations as they come due by using its liquid or short-term assets. As measured by the ratio of current assets to current

liabilities, liquidity factor employed by numerous researchers as one factor to affect financial structure decision made by firms. According to majority of such empirical studies (Basti & Bayyurt, 2019; Bei & Wijewardana, 2012; Khaki & Akin, 2020; Kumar, 2008) pertaining to capital structure determinants, liquidity appeared to have negative association with leverage. Since most of prior empirical studies have found the negative relationship (Basti & Bayyurt, 2019; Bei & Wijewardana, 2012; Khaki & Akin, 2020; Kumar, 2008).

Asset tangibility

Tangibility of Asset and Capital of firms from a pecking order theory perspective, firms with few tangible assets are more sensitive to informational asymmetries. These firms will thus issue debt rather than equity when they need external financing (Harris and Raviv, 1991), leading to an expected negative relation between the importance of intangible assets and leverage. According to trade-off hypothesis, tangible assets act as collateral and provide security to lenders in the event of financial distress. Hence, the tradeoff theory predicts a positive relationship between measures of leverage and the proportion of tangible assets. On the relationship between tangibility and capital structure, theories generally state that tangibility is positively related to leverage. Tangibility is almost always positively correlated with leverage.

Non-debt tax-shield

Tax-shield is believed to be important determinant that affects the amount of debt that a firm has to have in its capital structure (Barclay and Smith, 1999, as cited by Kibrom, 2010). The more financially profitable a firm is, the more is the amount of tax it would have to pay on its interest payments. To avoid paying more tax, manufacturing firms might prefer to take more debt because interest payments reduce the profits of the firm and consequently they pay less tax on their profits. Therefore, by having more debt in their capital structure, firms benefit from the 'interest tax-shield'. This benefit of debt is promoted mainly by the Static trade-off theory which predicts that "the more the tax amount a firm has to pay, the greater is the debt it will have in its capital structure".

Volatility of Foreign Exchange Rate

Shim, Kalemi-Ozcan & Liu (2020) quantified the effect of exchange rate fluctuations on firm capital structure. When home currency appreciates, firms who hold foreign currency debt and local currency assets observe higher net worth as appreciation lowers the value of their foreign currency debt. These firms can borrow more as a result and increase their leverage. When home currency depreciates, the reverse happens as firms have to deliver with a negative shock to their balance sheets.

Gross Domestic Product (GDP)

GDP growth factor as measured by annual real gross domestic product growth rate reflects how much a country's overall economy is growing as compared to its own one year lagged value. As noted in Frank and Goyal (2004), Trade off theory predicts a positive impact of GDP growth rate of a country on leverage of firms operate within that country. This positive prediction implies that firms will have more debt level in the period of higher economic growth than did in lower economic growth. Results of empirical studies including Cekrezi (2013) and Bas et al. (2009), confirmed positive relationship of GDP growth rate and capital structure.

Inflation

Gulati (1997) developed a general case model to identify the effect of inflation on capital structure. In his study, the inflation was represented by the percentage increase in product prices and production costs and was "adjusted" accordingly to get the effect of inflation. The result indicated that inflation is significantly affecting leverage. In another study, Frank and Goyal (2004), confirmed such a positive relation of inflation rate and debt level. Empirical studies made in Ethiopia by Tesfaye and Minga (2012) ascertained also that there was a positive relation of inflation rate and debt level.

2.3 Empirical Review of Literature

There were many empirical researches undertaken by scholars on capital structure choices in the developed nations. Relatively little research work on firms' financing decision has been

done in developing countries as compared to developed nations that saw the applicability of the theories of capital structure generated from them, Shah & Khan (2007). The main difference between developing and developed world is that in developed world firms finance their leverage with long term debt and short term debt is mainly contributing in leverage of firms in developing world (Booth et al 2001). Mayer (1990), Singh (1995), Cherian (1996), Cobham and Subramaniam (1998) were among the scholars who have studied the capital structure issue in the developing nations.

For instance, Singh (1995) observes that developing countries' firms finance themselves differently, mainly due to a different financial environment. He examined financing patterns of 100 top corporations in ten developing countries .The basic conclusions were that, first, in developing countries, there is an inverse pecking order as corporations rely heavily on external financing, especially stock issues and short-term finance. Second, top corporations in developing countries rely more heavily on equity issues than their counterparts in developed countries. While in the UK and the US, large issues of stock by large corporations are likely in the periods of high takeover activity; developing countries corporations use the proceeds to finance their regular investments, which is a major difference in motivation to issue shares. In contrast to Singh (1995), Booth et al (2001) has carried out a research on ten developing countries data to review whether capital structure theory is convenient across countries with different institutional structures. According to their finding, the decisions on capital structure choice of the firms of those developing countries are affected by the same variables as in developed countries.

The study by Demis & Wang (2018) investigated the determinant factor of financing decision of firms operating in 13 African countries with different financial, institutional, legal and economic environments. The study employed categorical analysis so as to investigate the factors that influence the financing decision of firms operating in countries with underdeveloped and developed stock and banking sector. The study tried to test the pecking order and trade off theory is more statistically powerful in explaining firms' financing decision of those African countries and the result confirms both pecking order and trade off theory. The study found that asset tangibility, financial distress cost, profitability and Non debt tax shield are strong firm specific determinants of capital structure. The study also found

that corporate tax rate, banking sector development, GDP growth rate, and lending interest rate are the most important country specific determinants of capital structure. Finally, the study found that rule of law is found to be strong determinants of capital structure of African firms.

There were only very few recently done studies on capital structure available in Ethiopia. Kindie (2011) has attempted to examine the role of firm specific factors s in determining a firm's capital structure. He made an empirical assessment on nine Insurance Companies operating in Ethiopia that covers the period from 2004 to 2010. The intention of the study was to search the specific factors that determine capital structure in the case of insurance industry in Ethiopia. Panel data model with OLS regression analysis technique were used. The study has shown that growth, profitability, business risk and age of the firms are significant variables in explaining the capital structure pattern of those insurance companies included in the sample.

Another study by Shibru (2012) in case of Ethiopian banking sector examined the impact of firm specific factors of profitability, liquidity, growth, tangibility, risk, and size on leverage as measured by total debt ratio by using twelve years data from 2000-2011. His findings showed that profitability, firm size, asset tangibility, and liquidity were important determinants of capital structure for Ethiopian banks suggesting pecking order theory as a pertinent theory for the sector. However, growth opportunity and business risk variables were found to have no influence on capital structure of banks in Ethiopia. Specifically, Shibru (2012) also revealed that profitability, liquidity, and tangibility appeared a significant negative relationship with leverage while only firm size positively and significantly related with the dependent variable. Solomon (2012) on his study in case of Ethiopian insurance sector, took firm specific factors of profitability, size, liquidity, growth, non-debt tax shield, dividend payout, age, size, and tangibility as independent variables and regressed them against the dependent variable of leverage as measured by total debt ratio over the period of eight years from 2003-2010 . The results of his study implied size, growth, business risk, and non-debt tax shield to have a significant direct impact on leverage of insurance companies in Ethiopia. On the other hand, his study revealed

that factors of profitability, liquidity, tangibility, firm age, and dividend payout had no any significant relationship with capital structure of firms in Ethiopian insurance sector.

According to Sendeku (2016) determinants of capital structure in Ethiopian insurance sector revealed that asset tangibility, growth, liquidity and size of the firm were found to be significant in relation to leverage as firm specific factors and GDP and inflation were positively related with leverage as macro variables. Similarly, in the insurance sector capital structure determinants were reported as size, tangibility and business risk were significant impact on performance of Ethiopian insurance companies. While firm growth and liquidity were not clear and statistical proved relationship are obtained from the regression analysis. In the same study the author reported that there was strong evidence in support of the pecking order theory of capital structure which asserts that leverage was a significant determinant of firms' performance. A significant negative relationship is established between leverage and performance (Getahun, 2014).

Assfaw (2020) studied the determinants of capital structure in the banking industry and the study reveals that there is a significant positive relationship between earning volatility, size of banks, and taxation with leverage while profitability and asset tangibility are found to have a significant negative effect on the banks' leverage decision. The empirical findings of the study claimed that the two capital structure theories, static trade-off and pecking order, are essentially explaining the capital structure decision of Ethiopian private commercial banks. Another author result revealed that profitability, age, tax shield and size had significant effect on leverage.

Tamiru (2020) conducted study on the title determinants of capital structure; evidence from private commercial banks in Ethiopia. Fourteen private commercial banks, which had minimum of seven years of operation, were selected for the study. The regression result revealed that profitability, age, tax shield and size had significant impact on leverage. However, capital structure determinants growth, asset tangibility and liquidity had statistically insignificant effect on capital structure of Ethiopian private commercial bank. In addition, trade-off theory and the pecking order theory explained the capital structure behavior of banking industry in Ethiopia. However, among the hypothesized capital structure

determinants growth, asset tangibility and liquidity had insignificant effect on capital structure of Ethiopian private commercial bank.

After the birth of modern capital structure theories many researchers conducted national and global studies particularly on the issue of capital structure determinants. For example, the study conducted by Khaki and Akin (2020) in Gulf Cooperation Council (GCC) countries revealed the determinants of capital structure particularly in non-financial companies. Accordingly, the study reported that size, tangibility, and growth opportunities have positive impact on leverage. On the other hand, profitability, age, financial constraints, liquidity, and government ownership affect the leverage negatively in GCC countries. Similar study was conducted in Turkish non-financial firms and found that profitability, growth, industry median leverage and tangibility were effective in explaining the capital structure of Turkish firms (Basti and Bayyur, 2019). Mardones and Cuneo (2020) studied the relationship of capital structure and corporate performance in Latin American countries and their study revealed there was a positive relationship between financial performance, growth, and size of the company. However, the study was reported there were mixed results for short- and long-term financial leverage, as well as for company liquidity. A study in Vietnams listed construction companies on Hanoi Stock Exchange reported that growth and firm size positively affect the capital structure while the profitability has the opposite effect on capital structure (Nguyen and Tran, 2020). In the same country another study revealed that financial leverage (FL) has a negative relationship with some factors such as asset structure (AS), liquidity (LQ), growth opportunities (GRW), profitability (ROA), and firm age (AGE) in the fixed effect regression (Nguyen et al., 2020). Many other studies tried to investigate the determinants of capital structure (M'ng, Rahman & Sannacy, 2017; Koralun-Bereźnick, 2018; Zafar, Wongsurawat & Camino, 2019; Nguyen and Tran, 2020).

In developing countries the study of capital structure determinants has got researchers attention seriously. A study in Malaysia, Singapore, and Thailand profitability has a significant negative influence on capital structure for Malaysia and Singapore but insignificant for Thailand. While, firm size has a significant positive influence on capital structure for all countries. Similarly, the study disclosed that tangibility of assets has a significant positive influence on capital structure for Malaysia and Singapore while

insignificant for Thailand (M'ng, Rahman & Sannacy, 2017). Studies in Africa also shows scholars are still eager to know the effect of different factors on capital structure. In this regard a study conducted in Sub-Saharan Africa supported trade-off and pecking order theories (Kh´emiri and Noubbigh, 2018). Accordingly, there was a positive relationship between profitability and long-term debt, which was in favor of trade-off theory. Generally, profitability, growth opportunity, collateral, corporate tax, non-debt tax shield, liquidity, and earning volatility were found affecting the capital structure in Sub-Saharan Africa countries. Another similar studied was conducted in 13 African countries and reported that asset tangibility, financial distress cost, profitability and Non debt tax shield are strong firm specific determinants of capital structure. This study also found that corporate tax rate, banking sector development, GDP growth rate, and lending interest rate are the most important country specific determinants of capital structure (Demis and Wang, 2018). This study was also confirmed that pecking-order and trade-off theory were powerfully explaining the capital structure decision in African non-financial companies. Many other studies were also reported in different countries like Nigeria (Ajao and Ema, 2012); Dar es Selaam (Kapaya, Ngatuni, Katunzi, 2018) SSA (Chipeta, Deressa, 2016; Munisi, 2017) in Zimbabwe (Strike Mbulawa, 2019).

Prior studies exist also in Ethiopia regarding the determinants of capital structure. However, majority of previous studies in Ethiopia were given special attention to the financial sector (banks, insurances and small and micro enterprises) than the manufacturing sector (Tesfaye Asefa, 2017; Tamiru Anley, 2020; Kanbiro Orkaido, 2021; Mekonnen Yitayaw, 2021; Zemenu Amare, 2021). However, the manufacturing sector in Ethiopia is given less attention by concerned bodies and researchers too. Ethiopia's manufacturing sector is still far from being an engine of growth and structural change. In some ways, the structure and performance of the Ethiopian manufacturing sector mirrors the wider sub-Saharan African experience (Lawrence 2005). Since the manufacturing sector plays a marginal role in employment generation, exports, output, and inter-sectorial linkages, it is advisable to determine the capital structure of them. Thus, this study tries to fill this gap by investigating the determinants of capital structure of manufacturing firms in Ethiopia.

2.4. Conceptual Framework

In this study variables are extracted from different empirical literature that proved by previous authors. As majority of previous researches were conducted in Ethiopia especially in financial industry. But there are very limited attention has been given to the manufacturing industry. Therefore, in this study six firm specific variables (profitability, liquidity, firm growth, firm size, asset tangibility, non-debt tax shield) and three macro-economic variables such as Volatility in foreign exchange, GDP and inflation were constructed with the dependent variable, leverage.

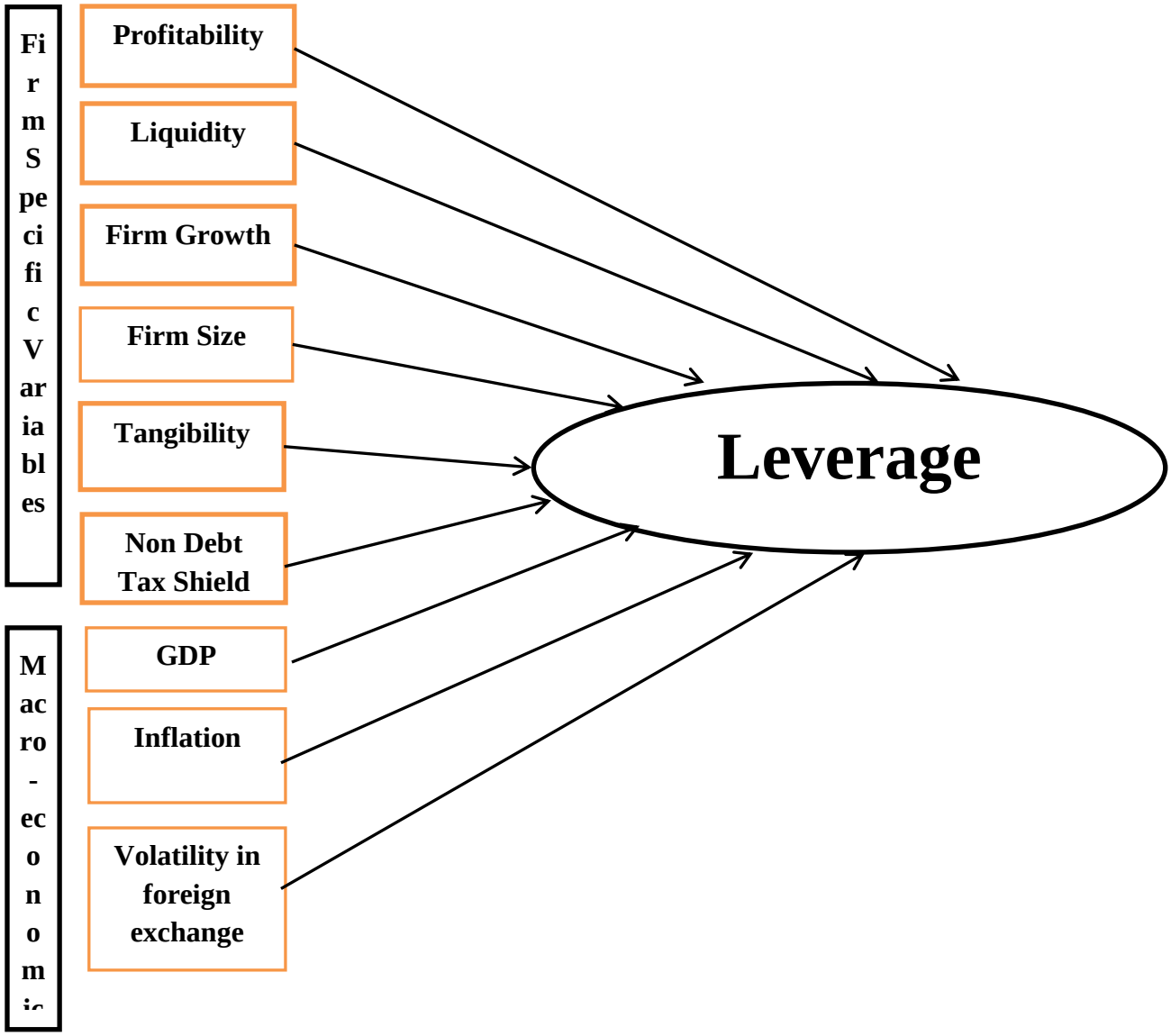

Figure 2.1 Conceptual framework

CHAPTER THREE

RESEARCH METHODOLOGY

In this part methodology used to conduct the study was discussed. Accordingly, in the preceding part title like research design, research approach, data source, population and sampling techniques, hypothesis development, method of data analysis and model specification is discussed in detail.

3.1 Research Design

The main objective of this study was to investigate the determinants of capital structure in manufacturing sector in Ethiopia. The researcher tested the firm specific and macro-economic factors that affect the capital structure decision of firms particularly in the manufacturing sector. Therefore, the study was an explanatory nature and hypothesis of variables were tested using econometric model. Thus, the research design employed in this study was explanatory research design.

3.2 Research Approach

Research approach is an important phase that the researcher has to decide before collecting data in conducting research. It describes the type of data the researcher going to use in his or her study for further analysis. As research methodology book authors explains the common type of the research approach includes quantitative approach and qualitative approach (Kothari, 2004). According to Creswell (2003), research approaches classified in to three such as quantitative, qualitative and mixed approaches.

As Kothari (2004) defined quantitative approach "involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion". The author also farther classified this approach in to inferential, experimental and simulation approaches (Kothari, 2004). However, quantitative approach also defined as "is one in which the investigator primarily uses post positivist claims for developing knowledge (i.e., cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiments and surveys, and collects data on predetermined

instruments that yield statistical data' (Creswell, 2003). Therefore, the quantitative approach is relied on numerical data that helpful in inferential studies. It can be explained as a planned mechanism of collecting data to predict the social phenomena in social science studies. The quantitative approach adopts the pre-planned technique of data collection that helps to study the cause and effect of social attitude in business and marketing studies. The "post positivism," refers to the thinking after positivism, challenging the traditional notion of the absolute truth of knowledge (Phillips & Burbules, 2000 as it was cited by (Creswell, 2003)). This implies that there is cause and effect relationship in dependent and independent variables. Generally, the quantitative approach uses questionnaires, which are easily quantifiable to use the data. Qualitative approaches used in descriptive, experimental and causal studies (Williams, 2007).

The qualitative research approach defined as the subjective assessment of attitudes, opinion and behavior (Kothari, 2004). Accordingly, the researcher collects non-quantitative data for farther analysis. To get such data researcher uses depth interviews and focus group discussions. It also defined as "one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives" (Creswell, 2003). This approach is recommendable in case study, narratives, phenomenology, ethnography and grounded theory studies (Williams, 2007); (Creswell, 2003). However, the mixed approach was using both quantitative and qualitative data. Therefore, the researcher uses questionnaires for numerical data and interviews, focus group discussion for text data (Creswell, 2003). As Creswell suggest the mixed approach to research is more parsimony to collect data based on the research objective.

Based on the research type of this study, the researcher used quantitative approach. Hypotheses testing studies defined as "studies that engage in hypotheses testing usually explain the nature of certain relationships, or establish the differences among groups or the independence of two or more factors in a situation" (Sekaran, 2003). Since this study was hypotheses testing research, which was based on quantitative data that can be used for inferring to total population, the quantitative approach is a recommendable approach.

3.3 Data Sources

Since this study needs quantitative data for testing the hypothesis, secondary source of data was used. Secondary data about each variable was collected from the financial statement of each manufacturing firms and the macroeconomic variable data was collected from NBE, World Bank, IMF sources.

3.4 Population and Sampling Technique

In this study the population emphasized the entire large manufacturing firms in Ethiopia. As it was reported by chamber of commerce, in Ethiopia currently more than 2000 manufacturing firms registered. However, due to the broad nature of addressing all manufacturing firms across the country, purposively this study collected data from manufacturing firms identified as large tax payers in Ethiopia. As data gathered from Ethiopian large tax payers` office (LTO), in Ethiopia there are 138 large tax payer manufacturing firms. However, currently 102 of them are actively operating in the industry and have more than five years data recently.

Manufacturing firms' scale in many countries can be defined in various ways. Like the other countries in abroad, in Ethiopia to provide working definition for micro, small, medium and large firms number of permanent employees engaged in the firms and capital invested are the two basic variables. Based on the above criteria currently there are 102 large tax paying manufacturing firms in Ethiopia operating actively. This entire population was considered as a unit of analysis. According to Yemane's (1967) formula put the following to determine the sample size. Therefore, secondary data was collected from 81 large tax paying manufacturing firms in Ethiopia for the period of 5 years (2015 – 2020), which makes 405 observations.

$$n = \frac{N}{1+N(e^2)}$$

Where (n) stands for sample size, (N) is total population and (e) is precision level. Based on the level of confidence assumed 95% and the precision level 5%, sample size for this study was 81. It was determined in the following way:

$$n = \frac{102}{1+102(0.05^2)} = 81$$

Table 3.1: Sample based on the sector

No.	Sector	Population	Proportion	Sample
1.	Food and beverage producer	17	17/102	14
2.	Educational material and printing enterprises	12	12/102	9
3.	Chemical and Pharmaceutical manufacturing	9	9/102	7
4.	Tire, Plastic and Glass producer	15	15/102	12
5.	Textile and leather	21	21/102	17
6.	Furniture manufacturer	9	9/102	7
7.	Construction and Metal engineering	19	19/102	15
	Total	**102**		**81**

Source: Researcher

3.5 Variables Definition, Measurement and Hypothesis Development

this study would consider both the firm specific factors like; profitability, growth, firm size, tangibility of assets, asset structure, liquidity, non-debt tax shield, and three macroeconomic variables; inflation, GDP and volatility of foreign exchange rate.

Dependent Variable

There are three ratios namely long term debt, total debt (total leverage), and debt to equity ratios are the most widely used ratios to represent book value leverage, in majority of empirical researches in relation with capital structure determinant. Previous research work that include Najjar and Petrov (2011), Solomon (2012), Woldemikael (2012), Mohamed and Mahmoud (2013), and Tornyeva (2013) employed total debt ratio (also known as total leverage) calculated as total debt divided by total assets to measure leverage of firms. For this study, the researcher adopted the same measurement called total debt ratio, which measured by using total debt/total asset.

Independent Variables

This study was consider both the firm specific factors like; profitability, growth, firm size, tangibility of assets, asset structure, liquidity and three macroeconomic variables; volatility of exchange rate, inflation, and GDP.

Profitability

Profitability is one of the popular firm specific factor that authors used to test its` effect on capital structure/leverage decisions. According to the trade-off it was predicted has a positive relationship between profitability and leverage of a firm. On the other hand, pecking order theory argues a negative relation of profitability and leverage, implying that more profitable firms will become less levered through time due to utilization of internally generated cash flows for financing their operation. Similarly, various authors used different tools to measure firm profitability such as ratio of operating income over sales and operating income over total assets (Titman and Wessel (1988), the return on total assets, which is calculated as the ratio of EBIT to total assets (Rajan & Zingals (1995), Ozkan (2001), Gaud et al (2005) were used as a measure of profitability. However, in this study profitability was measured as a ratio of Net Income (NI) to total Asset and it was hypothesized as follows:

H1: There is negative significant relationship between profitability and capital structure in manufacturing firms.

Firm Size

Large number of empirical studies reported including Amanuel (2011), Woldemikael (2012), and Cekrezi (2013) that there is a robust positive association of firm size (measured by natural logarithm of total assets) and leverage. As a result, in line with trade off theory and empirical evidences, size represented by natural logarithm of total assets was expected to have a positive relationship with firms` leverage in this study.

H2: There is a significant positive relationship between the firm size and capital structure in manufacturing firms.

Liquidity

Liquidity indicates the ability of a firm to meet its short term obligations as they come due by using its liquid or short-term assets. As measured by the ratio of current assets to current liabilities, liquidity factor employed by numerous researchers as one factor to affect financial structure decision made by firms. According to majority of such empirical studies (Basti & Bayyurt, 2019; Bei & Wijewardana, 2012; Khaki & Akin, 2020; Kumar, 2008) pertaining to capital structure determinants, liquidity appeared to have negative association with leverage. Since most of prior empirical studies have found the negative relationship (Basti & Bayyurt, 2019; Bei & Wijewardana, 2012; Khaki & Akin, 2020; Kumar, 2008), in this study it is expected that there is a negative relationship between liquidity and leverage. Liquidity was measured as a ratio of total current asset to short term liability. Thus, this study was established the research hypothesis as follows:

H3: There is negative relationship between liquidity and capital structure of manufacturing firms.

Firm Growth

The trade-off theory predicts a negative relation between leverage and growth emphasizing that growth firms lose more of their value when they go into distress thereby they will be less leveraged .In contrast. Pecking order theory predicts a positive association of firm's growth with its debt level, implying that firms with more growth opportunity should become more leveraged through time. Frank and Goyal (2005) stated that growth of a firm is one of among the major firm specific factors that can influence funding choice. For this study, in line with pecking order theory, the researcher hypothesized that there is a positive relationship between growth opportunity of the firm and its debt ratio. Growth opportunity of the firm was measured by the annual growth rate of total assets.

H4: There is a positive significant relationship between firm growth and capital structure in manufacturing firms.

Asset Tangibility

There are two contradictory views on the relationship between asset structure and firm's capital structure. The first point of view is that firms with large tangible assets can access loans more easily than firms with high intangible assets without collateral because of their own assets. The second viewpoint exists that an inverse relationship exists between asset structure and capital structure. Moreover, banks often prefer short-term loans over long-term loans with many risks, which cause businesses to mobilize long-term loans instead of short-term loans. The trade-off theory, states that higher levels of collateral contribute to the firm tending more to debt. In relation to this, Scott (1977) stated that, companies with higher levels of collateral find it easier to access debt, given that companies' fixed assets contribute to reduced information asymmetry. Most of the empirical studies evidenced a positive influence of asset tangibility on leverage. Booth et al. (2001) state: "The more tangible the firm's assets, the greater its ability to issue secured debt and the less information revealed about future profits." Thus, a positive relation between tangibility and leverage is predicted. For this study the ratio of total fixed assets to total assets was used as a proxy for tangibility of Asset.

H5: A firm with higher percentage of fixed assets will have higher debt ratio in manufacturing firms.

Non-Debts Tax Shields

In the context of trade-off theory, firms could reduce tax payments by using more debt rather than equity in financing their activities but in the presence of high non-debt tax shields firms could decrease their debt financing because non-debt tax shields provide alternative to interest tax shield. According to DeAngelo and Masulis, (1980), non-debt tax shields can be substitutes for the tax benefit of debt financing and a firm with large non-debt tax shields is expected to use less debt. Furthermore, Antoniou et al., (2008) suggest that firm with high amount of non-debt tax shields tends to have lower amount of debt proportion. Thus, trade off theory predicts that non-debt tax shield have a negative impact on leverage.

H6: There is negative significant relationship between Non-debt tax shields and capital structure in manufacturing firms.

Macroeconomic variables

Volatility in Foreign Exchange

Shim, Kalemi-Ozcan & Liu (2020) quantified the effect of exchange rate fluctuations on firm capital structure. When home currency appreciates, firms who hold foreign currency debt and local currency assets observe higher net worth as appreciation lowers the value of their foreign currency debt. These firms can borrow more as a result and increase their leverage. When home currency depreciates, the reverse happens as firms have to deliver with a negative shock to their balance sheets. Accordingly, it is hypothesized in this study as the following:

H7: There is significant positive relationship between volatility in foreign exchange and capital structure in manufacturing firms.

Gross Domestic Product (GDP)

GDP growth factor as measured by annual real gross domestic product growth rate reflects how much a country's overall economy is growing as compared to its own one year lagged value. As noted in Frank and Goyal (2004), Trade off theory predicts a positive impact of GDP growth rate of a country on leverage of firms operate within that country. This positive prediction implies that firms will have more debt level in the period of higher economic growth than did in lower economic growth. Results of empirical studies including Cekrezi (2013) and Bas et al. (2009),

confirmed positive relationship of GDP growth rate and leverage. In this study GDP or gross domestic product considered to have a significant positive effect on corporate leverage of firms.

H8: GDP has a positive significant effect on capital structure of manufacturing firms.

Inflation

Gulati (1997) developed a general case model to identify the effect of inflation on capital structure. In his study, the inflation was represented by the percentage increase in product prices and production costs and was "adjusted" accordingly to get the effect of inflation. The result indicated that inflation is significantly affecting leverage. In another study, Frank and Goyal (2004), confirmed such a positive relation of inflation rate and debt level. Empirical studies made in Ethiopia by Tesfaye and Minga (2012) ascertained also that

there was a positive relation of inflation rate and debt level. Inflation rate is measured by annual general inflation rate in Ethiopia.

H9: There is a positive significant relationship between inflation rate and capital structure in manufacturing firms.

Table 3.2 Variables, measurement and expected signs

Variables	Measurement	Expected Sign
Total debt Ratios	Total Debt divided by Total Assets	
Independent Variable Profitability (ROA)	Net Income/ total assets	-
Firm Size	Natural logarithm of Total Assets	+
Asset Tangibility	Net fixed asset/ total assets	+
Growth	Sales Growth/ total assets growth	+
Liquidity	Current assets/current liabilities.	-
Non-Debt Tax Shield	Depreciation/total asset	-
Volatility in foreign exchange	Period to period change of foreign exchange	+
GDP	GDP growth rate	+
Inflation	Inflation rate	+

Source: Researcher

3.6 Model Specification

In order to achieve the objectives of this research study, the panel data regression model was used to identify the relationship between the capital structure of manufacturing firms and explanatory variables like profitability, liquidity, firm size, tangibility of asset, firm growth, non-debt tax shield, volatility of foreign exchange, inflation and growth rate of GDP. Prior studies like Gatsi and Gatzo (2013) used this model to identify the determinant of insurance companies' capital structure. After collecting data, it was analyzed using descriptive statistics, correlations, multiple linear regression analysis and inferential

statistics. Mean values and standard deviations was used to analyze the general trends of the data from 2015 – 2020 based on the sector sample of 81 large tax payer manufacturing firms and a correlation matrix was also used to examine the relationship between the dependent variable and explanatory variables. The ordinary least square (OLS) estimation was conducted using STATA 14 software to determine the most significant explanatory variables affecting the capital structure of the manufacturing firms in Ethiopia.

The equation that account for individual explanatory variables which are specified for this particular study is given as follows.

$$LEV_{it} = \beta_0 + \beta_1 ROA_{i,t} + \beta_2 LQ_{i,t} + \beta_3 G_{i,t} + \beta_4 SZ_{i,t} + \beta_5 TANG_{i,t} + \beta_6 NDTS_{i,t} + \beta_7 VFEX_{i,t} + \beta_8 GDP_{i,t} + \beta_9 INF_{i,t} + \varepsilon_{it}$$

Where

LEV= the dependent variable which is Leverage;

ROA = Return on asset;

LQ = Liquidity;

SZ = Size of the Company;

G = Firm Growth;

TANG = Tangibility of asset of the company;

NDTS = Non- debt tax shield of firm;

VOFEX=Volatility in foreign exchange

GDP = Gross Domestic Product

INF = Inflation

β_0 = Intercept

$\beta_1 - \beta_9$ = Coefficients of the explanatory variable respectively

ε_{it} = Error term that vary across entities and times

3.7 Data Analysis Technique

After collecting the panel data, it was analyzed and interpreted by using descriptive statistic, correlation analysis and multiple regression estimation method. To enhance the robustness of the models and to control the cross section effects of the intercepts, the researcher was tested the best estimating technique among fixed effect and random effect regression techniques. In an OLS panel data analysis, there are broadly two classes of panel estimator approaches that can be employed in financial research: fixed effects models (FEM) and random effects models (REM) (Brooks, 2008). Similarly, the author checked whether the proposed empirical model is free from autocorrelation, multicollinearity, heteroskedasticity and normality.

If any one of those phenomenon turns out to be present, this would be a violation of a key assumption of OLS regression. The results of all assumptions tests and robustness checks were ensured that they are not violated. To conduct this study, the researcher used STATA 14 software due to its ability to help researchers to analyze research easily and efficiently.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents the analysis and the results of the study. The analysis was based on the data collected by reviewing audited financial reports of manufacturing firms in Ethiopia. The first part presents descriptive analysis of variables (both dependent and explanatory), then second section provides correlation analysis, thirdly the result of the fulfillment of the classical linear regression model (CLRM) assumptions, and the fourth and last section presents the results and discussions of regression analysis of the study.

4.2 Descriptive Statistics

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

Table 4.1 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
TDR	405	.3592754	.1199484	.10227	.736446
ROA	405	.0308106	.0336705	.001119	.319589
FS	405	8.233457	.6641163	6.37	10.78
AT	405	.2565582	.1712082	.002005	.931486
GR	405	.0945372	.0286941	.01372	.328806
LTY	405	.1966875	.2821804	.012052	1.926313
NDTS	405	.2129228	.1514416	.003054	.745072
GDP	405	.0893487	.0127981	.063925	.125505
IFN	405	.1082103	.0317793	.066281	.15833
VFEX	405	.1186108	.0761083	.0150275	.337071

Source: Stata output 2022

According to table 4.1, the dependent variable which is total debt ratio (TDR) which is taken a proxy of total leverage measured as total debt divided by the total asset of manufacturing firms in Ethiopia shows a mean value of 0.3592754 with standard deviation of 0.1199484 during the sample period 2015 to 2020 of manufacturing firms in Ethiopia. This indicates that on average, manufacturing firms in Ethiopia has tied about 36% by debt of their total asset with 12 % ups and downs from the mean value for the period covering from year 2015 to 2020. The maximum TDR was 73 percent (Max=0.736446) and the minimum value was 10.23 percent (Min=0.1227). The maximum and minimum value indicates that the most leveraged manufacturing firms financed about 73 percent of their assets by borrowing and the least leveraged firms financed only 10.23 percent by borrowing or debt during the study period the study period. The standard deviation was 12 percent which shows that almost moderate variation was observed in the capital structure of the sampled manufacturing firms from the mean value of 36 percent as its coefficient of variation is less than 1.

As presented in table 4.1, the average value of the profitability ratios measured using ROA, sample manufacturing firms in Ethiopia is 3.1 percent (0.0308106), and this implies sample Ethiopian manufacturing firms on average earned a net income of 3.1 percent of total asset with a maximum and minimum value of 0.319589 and 0.001119 The standard deviation is 3.4 percent from the average value, which reflects the presence of moderate variation among across the sampled manufacturing firms in Ethiopia. As it is shown in table 4.1 above, the average size of the sample manufacturing firms was 8.233457 with the maximum and a minimum value of 10.78 and 6.37 respectively. The standard deviation indicates that for the sample of Ethiopian manufacturing firms is 0.664113 suggests that there is moderate dispersion in the mean value of sample manufacturing firms during the sample period.

Based on table 4.1, the mean and standard deviation of tangibility of asset of manufacturing firms were 0.2565582 and 0.1712082 respectively. This indicates that out of the total assets owned by manufacturing firms, 25.7% is categorized as tangible or fixed assets. Growth rate, which is measured by the sales growth divided total assets growth, shows a mean value of 0.0945372, indicating that the annual revenue of manufacturing firms is increased by 9.5% annually, with 2.9 percent deviation from the mean value. The minimum and maximum value of growth rate during the sample period of the study was 1.4 percent (0.01372) and 33 percent

(0.328806). The mean value of liquidity is 0.1966875, which indicate on average the manufacturing firms have current assets (liquid assets) that are 0.2 times greater than their short term liabilities with maximum and minimum value 1.926313 and 0.012052 respectively. It deviates by 28.2 percent (0.2821804) from the mean value of the sample of across Ethiopian manufacturing firms. The mean of non-debt tax shield is 0.2129228, indicating that 21.3 percent of total assets is depreciating during the sample period. The minimum and maximum value of non-debt tax shield during the sample period of the study was 0.3 percent (0.003054) and 74 percent (0.745072), with ups and downs of 15 percent.

Regarding macroeconomic factors included in this study, volatility in foreign exchange and inflation with mean value of 11.7% and 1.9% had a moderate standard deviation of 7.6% and 3.2% respectively. Moreover, the standard deviation of real GDP which was 1.3% over the past eleven years, and implies that the economic growth in Ethiopia during the sample period remained stable as compared to the inflation rate and volatility in foreign exchange.

4.2 Correlation Analysis

This part of the study presents the correlation analysis between explained and explanatory variables. To show the relationship between capital structure of manufacturing firms and explanatory variables (profitability, firm size, asset tangibility, firm growth rate, liquidity, non-debt tax shield, GDP, inflation and volatility in foreign exchange), correlation coefficients were used. The correlation coefficient values always were between -1 and +1. A correlation coefficient of -1 implies that the two variables have a perfect negative relationship, whereas, a correlation coefficient of +1 indicates that the two variables have a perfect positive relationship with each other (Gujarati, 2004), and it is useful to check the correlation test between dependent and independent variable prior to conducting regression analysis. The primary objective of correlation analysis is to measure the strength or degree of linear association among variables. According to the correlation analysis (see table 4.2 here under), return on asset, liquidity and inflation are negatively associated with capital structure of manufacturing firms for the study period under consideration. This implies that the increase in these factors results in decrease in the total debt ratio whereas decline in the value of these factors leads to the increase in total debt ratio of manufacturing firms in Ethiopia during the

study period. Whereas, firm size, asset tangibility, sales growth rate, non-tax shield, GDP and volatility in foreign exchange) are positively related with capital structure of manufacturing firms in Ethiopia. This indicates that the increase in value of these factors results in increase in total debt ratio and in contrast the decrease in these factors leads to the decline in total debt ratio of manufacturing firms in Ethiopia during the study period under consideration.

Table 4.2 Correlation table

	TDR	ROA	FS	AT	GR	LTY	NDTS	GDP	IFN	vfrx
TDR	1.0000									
ROA	-0.2464	1.0000								
FS	0.3305	-0.1093	1.0000							
AT	0.2286	-0.1163	0.0609	1.0000						
GR	0.2898	-0.0834	0.2800	0.1798	1.0000					
LTY	-0.1682	0.1519	-0.0031	-0.1151	-0.0229	1.0000				
NDTS	0.0592	0.0057	-0.0858	0.2146	-0.0378	-0.0694	1.0000			
GDP	0.0216	0.0306	0.0247	-0.0512	-0.0047	-0.0566	-0.0653	1.0000		
IFN	-0.0382	0.0342	0.0729	-0.0188	0.0746	0.0188	-0.0076	0.0151	1.0000	
Vfrx	0.1616	-0.0845	0.0937	0.0621	0.0754	-0.0062	-0.0097	0.0623	0.0307	1.0000

Source: Stata output, 2022

4.3 Diagnostic Tests of the Classical Leaner Regression Model (CLRM)

This sub section of the chapter discusses the test results of the diagnostic tests that warrant whether or not the data fits the basic assumptions of classical linear regression model. Here under, the assumption surrounding the classical linear regression model is presented.

4.3.1 Test for zero average value of error term

The primary assumption required is that the mean value of the errors is zero (ε (ut) = 0). Of course, if a constant term is comprised in the regression equation, this assumption will never be violated (Brooks, 2014). Therefore, since the constant term was included in the regression equation, the average value of the error term in this study was expected to be zero.

4.3.2 Test for Heteroscedasticity

In the classical linear regression model, one of the basic assumptions is Homoscedasticity. This means that the variance of errors is the same for all values of the explanatory variables. However, if the disturbance terms do not have the same variance, this condition of non-homogeneity of the variance is known as Heteroscedasticity (Brooks, 2008). If the problem heteroscedasticity appears in the model, the least squares estimators may still unbiased (consistent), however the Gauss- Markov theorem was violated and this violation leads 38 confidence interval to be unnecessarily larger. As a result, the t-test and f-test gives inaccurate result, and because of overestimation of variance, the t-test will be smaller and statistically insignificant which leads to wrong conclusion (Gujarati, 2004). In order to detect the presence of Heteroscedasticity, a Breusch-Pagan or Cook- Weisberg test was utilized in this study. The Breusch-Pagan test of the null hypothesis is that the error variances are all equal; homoscedastic, versus the alternative that the error variance is a multiplicative function of one or more variables. In this study, when the researcher test heteroscedasticity, the researcher found that the data was hetroscedastic and the researcher was obliged to take the remedial action as the problem is series in panel data. According to Adeleye (2019), one of the remedial actions to be taken if hetroscedasticity problem occurs is performing robust regression. After conducting robust regression, it is not appropriate to test hetroscedasticity, as the robust regression fixes the problem. Thus, on this study, the researcher conducted robust regression in order to resolve the problem and hence the problem is fixed and now the data is homoscedastic (see Appendix 1.1).

4.3.3 Test for Model Specification

Multiple regression model suffer from functional form misspecification if it does not properly develop to identify the relationship between the dependent and the explanatory variables (Wooldridge, 2014). In addition, according to Stock and Watson (2003), if we are missing variables in the model and the omitted variable is a determinant of the dependent variable, then the regression coefficients are inconsistent. Thus, testing for omitted variable bias is helpful for the model to check the appropriateness of the model. To do so in Stata, linktest command which is commonly employed was used to test for omitted-variable bias in this study. The thing to look in case is the significance of _hatsq. The null hypothesis was that

there is no specification error. If the p-value of _hatsq is not significant, then we fail to reject the null hypothesis and conclude that the model is correctly specified.

Ho: There is no specification error

Ha: There is specification error

Table 4.3 Model specification test

TDR	Coef.	Std. Err.	t	P>t	95%	Conf. Interval
_hat	.0956787	.5296587	0.18	0.857	-.9455683	1.136926
_hatsq	1.239069	.7159405	1.73	**0.084**	-.1683865	2.646524
_cons	.1605625	.0979947	1.64	0.102	-.0320836	.3532086

Source: Stata output, 2022

The p-value of _hatsq is not significant (**0.084**) and therefore the null hypothesis is not rejected, means the model is correctly specified.

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 (errors are linearly independent of one another). In other terms, it is assumed that the errors are uncorrelated with one another. In this regard Durbin-Watson (DW) is used to test autocorrelation (Brooks, 2014). There may be positive or negative autocorrelation, and in case of both, the OLS estimators may not be efficient (may not achieve the smallest variance). Furthermore, the estimated standard errors of the coefficients are biased, that results in undependable hypothesis tests (t-statistics). Nevertheless, the OLS estimates remain unbiased (Guajarati, 2004).

Table 4.4 Autocorrelation test result

Durbin-Watson Statistic (transformed)= 1.800261

Source: output of STATA 14

Thus, as shown in Table 4.4, the computed "d" in this study was 1.800261 which is approximately nearest to 2 and implying the absence of autocorrelation problem. Thus, this implies that error terms are not correlated with one another for different observation in this study.

4.3.5 Test for Normality of the Data

Normality refers to the shape of data distribution for an individual metric variable. Normality can be tested using graphical and statistical tests. This study employed the most popular test of normality i.e. Shapirowilk test to see normality of the data for the study period and the hypothesis is developed as follow:

H0: Errors follow a normal distribution

Ha: Errors not follow a normal distribution

In this study the normality test result shows the P-value is greater than 0.05 levels, which is insignificant as indicated in table 4.5 below leading not to reject the null hypothesis. Therefore, the result indicates that errors are normally distributed (follow a normal distribution).

Table 4.5 Normality test

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
r	405	0.99625	1.045	0.104	0.45866

Source: Stata output

4.3.6 Test for Multi-collinearity

The last assumption of the ordinary least squares is that there is no correlation between the independent variables. Such a problem occurs when the independent variables are highly correlated with each other (Brook, 2014). Practically, however, the concern is not in the nature rather in the degree of their relationship. The reason behind this concern to the degree of high correlation is that a serious difficulty arises when the relationship between the explanatory variables is highly strong (problem of perfect multicollinearity) (Brooks, 2014). Even there is no clearly defined level of correlation that can cause the occurrence of multicollinearity problem, Malik (2013) and (Hair et al., 2006) argue that correlation coefficient below 0.90 may not cause serious multi-collinearity problem. In case of this study, the correlation results are showing correlation approximately less than 90. So, there is no presence of multicollinearity problem among the variables as it can be seen in the correlation

table 4.2 matrix among variables. Additionally, VIF test was made to test multicollinearity and shows there was no multi-collinearity problem as shown in table 4.6 below.

Table 4.6 Variance inflation factor test for Multi-collinearity

Variable	VIF	1/VIF
GR	1.13	0.886301
AT	1.11	0.896921
FS	1.11	0.900459
NDTS	1.07	0.935514
ROA	1.06	0.946571
LTY	1.04	0.959455
VFRX	1.02	0.976597
GDP	1.02	0.983541
IFN	1.01	0.987658
Mean VIF	1.06	

Source: Stata output

According to table 4.6 multi-collinearity test, there is no VIF greater than ten and less than one which indicated that there was no multi-collinearity problem in the model.

4.4 Model Selection

4.4.1 Selecting between Random effects and Fixed effects

Since the study used panel data to analyze the effect of selected explanatory variables on the capital structures which is measured by using return on asset of private commercial banks in Ethiopia, it is obvious to choose a model that gives consistent estimates for this study to show the cause and effect relationship between explained and explanatory variables. To do so, the Hausman specification test is conducted and the hypothesis is developed as follows:

Ho: Random effect model is appropriate

Ha: Fixed effect model is appropriate

The Hausman specification test employed shows the p-value of 0.8454 which is more than 5% level of significance. Thus, there is no reason to reject the null hypothesis, which supports that random effect model is appropriate. However, again it needs to check whether to use random effect model or pooled OLS method.

4.4.2 Selecting between Random effects and Pooled OLS model

After running the Hausman test, it is helpful to employ 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 regression and pooled OLS regression. The null hypothesis is that there is no significant difference across cross-sectional unites (i.e. no panel effect) implying that pooled OLS is appropriate.

Ho: Pooled OLS is appropriate

Ha: Random effect is appropriate

Table 4.7 Breusch and Pagan Lagrangian multiplier test result

Breusch and Pagan Lagrangian multiplier test for random effects
chibar2(01) = 0.00
Prob > chibar2 = 1.0000

Source: Stata output

The Hausman specification and Lagrange Multiplier test shows p-value of 1.0000, which is greater than 5% significance level. Therefore, the null hypothesis in favor of Pooled OLS is failed to be rejected. Thus, Pooled OLS model is chosen against Random effect and the result is analyzed based on Pooled OLS model.

4.5 Analysis of Regression Result

Here under is the regression analysis made by using STATA 14, to show the relationship between dependent and independent variables. All the above tests of basic CLRM assumptions for OLS prove that the results obtained from the regression model in this study is consistent, free from bias and efficient (BLUE), since the assumption holds. Table 4.9 presents the regression result of total debt ratio as dependent variable and explanatory variables (profitability, firm size, asset tangibility, sales growth rate, liquidity, non-debt tax shield, GDP, inflation and volatility in foreign exchange) for the manufacturing firms during the study period under consideration.

Table 4.8 Regression result

Pooled OLS regression			Number of obs = 405 **F(9, 395) = 17.69** **Prob > F = 0.0000** **R-squared = 0.2474** **Root MSE = 0.10523**			
TDR	**Coef.**	**Robust Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
ROA	-.5728801	.1065535	-5.38	0.000*	-.7823631	-.3633971
FS	.0458476	.0087909	5.22	0.000*	.0285648	.0631303
AT	.0915918	.033617	2.72	0.007*	.0255011	.1576825
GR	.744585	.2050431	3.63	0.000*	.3414729	1.147697
LTY	-.0498225	.0157135	-3.17	0.002*	-.0807152	-.0189299
NDTS	.0429311	.0366569	1.17	0.242	-.0291359	.1149982
GDP	.180278	.397372	0.45	0.650	-.6009505	.9615066
IFN	.2373713	.1596716	1.49	0.138	-.5512836	.0765411
VFRX	.1626526	.0727165	2.24	0.026**	.0196928	.3056123
_cons	.1035028	.077116	-1.34	0.180	-.255112	.0481064

N.B: - * and ** indicates that significant at 1% and 5% significance level respectively.

Source: Stata output

As shown in the table 4.8 above, the R^2 of the model is 24.74%, suggesting that almost 24.74% of variations in capital structure of manufacturing firms during the study period are explained by the aforementioned explanatory variables. The overall model is a good fit and highly significant at 1% and that all the independent and control variables are overall or jointly significant in causing variation in capital structure.

The intercept coefficient (constant) of the Pooled OLS regression represents the average value of capital structure even all aforementioned explanatory variables took a value of zero. This means that without these components, manufacturing firms can still be leveraged due to some other factors which are not discussed in this study. The average value of the total debt ratio will be 0.1035 if all explanatory variables given zero and it is statistically insignificant at 5%.

As it has presented in the table 4.8, from the explanatory variables profitability, firm size, asset tangibility, sales growth rate, liquidity and volatility in foreign exchange were statistically significant factors affecting the capital structure of manufacturing firms in Ethiopia during the study period under consideration at 5% significance level. This indicates that these variables are the most important factors in explaining the variations in the capital structure of the manufacturing firms. However, non –debt tax shield, GDP and Inflation had statistically insignificant impact on the capital structure of manufacturing firms during the study period 2015 to 2020.

4.6 Discussion of the Regression Result

This sub section of the study deals with the discussion of the results of the regression analysis for each of the dependent and control variable one by one and their impact on the financial performance of the private commercial banks in Ethiopia. Subsequently, the discussion includes the comparison of the results with prior empirical evidences.

4.6.1 Relationship between Profitability and Capital Structure

As presented in the regression table 4.8, there is statistically significant (at 5%) and indirect relation between return on asset and total debt ratio, which is proxy of the capital structure of manufacturing firms in Ethiopia. It has found that the relationship between return on asset and total debt ratio of manufacturing firms has negative relation. The coefficient of return on asset is -0.5728801 with p-value of 0.000. This implies that a one percent increase in return on asset results in 57 percent decrease in the total debt ratio while holding other explanatory constant in manufacturing firms in Ethiopia. Thus, the researcher failed to reject the nail hypothesis which supports the significant and indirect effect of profitability on the total leverage of manufacturing firms in Ethiopia. The result is in line with the suggestion of pecking order theory. However, the result is contrary with trade-off theory. The pecking order theory predicts that firms with a lot of profits and few investments have little debt. Since the market value increases with good financial performance, the negative relationship between leverage and profitability also holds for leverage. Hence, based on the above findings and idea of pecking order theory, the researcher can conclude that profitability negatively and significantly affects the leverage of manufacturing firms in Ethiopia.

4.6.2 Relationship between Firm Size and Capital Structure

According to the regression result in table 4.8, there exist direct and significant relationship between firm size and total leverage of manufacturing firms in Ethiopia. The coefficient of firm size is 0.0458476 with a p-value of 0.000. This implies that, holding other explanatory variables constant, a percentage increase in firm size result in an increase of total debt ratio of manufacturing firms by 4.6%, and that was statistically significant at 5% level of significance. Thus, it has positive and significant effect on the total debt ratio of manufacturing firms during the study period. Therefore, the researcher fails to reject the null hypothesis which was in favor of positive and significant relationship between firm size and total debt ratio of manufacturing firms in Ethiopia. The result is consistence with the findings of Amanuel (2011), Woldemikael (2012) and Cekrezi (2013). These studies also suggested that there is robust positive association between firm size and leverage of firms.

4.6.3 Relationship between Asset Tangibility and Capital Structure

As presented in table 4.8, asset tangibility is positively related to and significantly affects total leverage of manufacturing firms in Ethiopia during the study period. It has coefficient of 0.915918 with p-value of 0.007 which shows that it is significant at 5% significance level. The coefficient indicates that on average, keeping other factors unchanged, a percentage change in asset tangibility results in 9.16 percent increase in total debt ratio of manufacturing firms in Ethiopia during the study period under consideration. Therefore, the researcher fails to reject the null hypothesis which was in favor of positive and significant relationship between asset tangibility and total debt ratio of manufacturing firms in Ethiopia. The finding of this study is consistent with the findings of Booth et al. (2001). They suggested that asset tangibility has a positive impact on the leverage of the firms. In addition, the finding of this study is in line with suggestions of pecking order theory. According to this theory, if fixed assets large in size, firms can borrow more as these assets are used as collateral. On the relationship between tangibility and capital structure, theories generally state that tangibility is positively related to leverage. Hence, it can be concluded that there is a positive relationship between measures of leverage and the proportion of tangible assets.

4.6.4 Relationship between Firm Growth and Capital Structure

As presented in table 4.8, firm growth rate is directly related to and significantly affects total leverage ratio of manufacturing firms in Ethiopia during the study period under consideration. It has coefficient of 0.744585with p-value of 0.000 which shows that it is significant at 5% significance level. The coefficient of 0.744585 indicates that on average, keeping other factors constant, a percentage change in firm growth rate results in 74.5 percent increase in firm growth rate in Ethiopia during the study period under consideration. The finding is the same as expected so far and thus, the researcher fails to reject the null hypothesis which was in favor of statistically significant and positive impact of firm growth rate of manufacturing firm in Ethiopia. The finding of the study is in line with pecking order theory and Frank & Goyal (2005) and Smith (2010) who suggest positive relationship between growth and leverage. Hence it can be said that firm growth is one of the important firm specific factor affecting the leverage of manufacturing firms positively.

4.6.5 Relationship between Liquidity and Capital Structure

The regression output presented in table 4.8 above show that there exists a negative and significant relationship between liquidity and total debt ratio in Ethiopia. Its coefficient is -0.0498225 with p-value of 0.002 which is significant at even 1% level, and indicating that total debt ratio decreases by 5% for a one unit increase in in liquidity. This suggests that the higher the liquidity ratio the lower would be the total debt ratio. The finding is as expected so far, and thus the researcher fails to reject the null hypothesis which supports the negative and statistically significant effect between liquidity and total debt ratio of manufacturing firms. The finding is consistent with the findings of Basti & Bayyurt, 2019; Bei & Wijewardana, 2012; Khaki & Akin, 2020; Kumar, 2008).

4.6.6 Relationship between Non-debt Tax Shield and Capital Structure

As presented in table 4.8, non-debt tax shield is positively related to and insignificantly affects total debt ratio of manufacturing firms in Ethiopia during the study under consideration. It has coefficient of 0.0429311 with p-value of 0.242 which shows that it is insignificant even at 10% significance level. The coefficient indicates that on average, keeping other factors unchanged, a percentage change in non-debt tax shield results in 4.3 percent increase in total debt ratio of manufacturing firms in Ethiopia during the study period

under consideration. Accordingly, the researcher rejects the null hypothesis which expects that non-debt tax shield as an explanatory variable has a significant and positive effect on the total debt ratio of manufacturing firms in Ethiopia. According to DeAngelo and Masulis, (1980), non-debt tax shields can be substitutes for the tax benefit of debt financing and a firm with large non-debt tax shields is expected to use less debt. However, surprisingly in this study it is found that it has positive impact on the leverage of manufacturing firms in Ethiopia. This implies that, by having more debt in their capital structure, manufacturing firms benefit from the 'interest tax-shield'. This positive association is promoted mainly by the Static trade-off theory which predicts that "the more the tax amount a firm has to pay, the greater is the debt it will have in its capital structure".

4.6.7 Relationship between real GDP and Capital Structure

Another factor regarding macroeconomic environment is real GDP, and it has not found to be important in explaining the variations in capital structure. As the regression table 4.8 shows, it has a coefficient of 0.180278 with p-value of 0.650. This indicates that, keeping other explanatory variables constant, a percentage change in real GDP growth rate results in increase of approximately 18% of total debt ratio of manufacturing firms in Ethiopian during the study period. Therefore, the study rejects the null hypothesis which was in support of positive and significant relationship between real GDP and total debt ratio in Ethiopian manufacturing firms during the period 2015 to 2019/20. The result of the study is consistent with the results of Cekrezi (2013) and Bas et al. (2009) who confirmed positive relationship of GDP growth rate and leverage in the their empirical investigation.

4.6.8 Relationship between Inflation and Capital Structure

As the regression table 4.8 presents, inflation is negatively related with total debt ratio and its coefficient is 0-.2373713 with a P-value of 0.138 which indicates that inflation is statistically insignificant in explaining the variation in total debt ratio. The coefficient of 0-.2373713 implies that on average, keeping other repressors constant, averagely a one percent increase in inflation rate decreases the total debt ratio by approximately 23.74%. The study rejects the null hypothesis which was developed as inflation has positive and significant effect on the capital structure in manufacturing firms in Ethiopia during the study period. Because there is no sufficient evidence that support the significant effect of annual inflation on the

diversification of income sources. The result is contrary to the findings of Tesfaye and Minga (2012) who ascertained that there was a positive relation of inflation rate and debt level.

4.6.9 Relationship between Volatility in Foreign Exchange and Capital Structure

The foreign exchange rate volatility measures the degree to which the exchange rate changes over time, here in this case year to year. It is said to be more volatile if there are more frequent variations or less volatile if there are lesser variations in it over a period of time (Sabri, 2011). In Ethiopian case, it can be said that the volatility of exchange rate is material from period to period, and it became important to investigate its effect on capital structure. As presented in table 4.8, foreign exchange volatility is directly related to and significantly affect total debt ratio of manufacturing in Ethiopia during the study period covering 2015 to 2020. It has coefficient of 0.1626526 with p-value of 0.026 which shows that it is significant at 5% significance level. The coefficient of 0.1626526 indicates that on average, keeping other factors unchanged, a percentage change in volatility in foreign exchange results in 16.3% increase in total debt ratio in manufacturing firms in Ethiopia during the study period under consideration. Therefore, the study failed to reject the null hypothesis which was in favor of positive and significant effect of volatility in foreign exchange on capital structure of manufacturing firms of Ethiopia during the study period covering 2015 to 2020. The result is in line with (Panda, 2015; Shim, Kalemi-Ozcan & Liu, 2020). They stated that when home currency appreciates, firms who hold foreign currency debt and local currency assets observe higher net worth as appreciation lowers the value of their foreign currency debt; these firms can borrow more as a result and increase their leverage. On the other hand, when home currency depreciates, the reverse happens as firms have to de-lever with a negative shock to their balance sheets.

To sum up, as seen from the regression output table 4.8 above and discussions made accordingly; explanatory variables except non-debt tax shield, GDP and inflation, were found to be statistically significant in explaining the variation in the capital structure of manufacturing firms in Ethiopia during the study period under consideration. Macro-economic variables except Volatility in foreign exchange found not significant in explaining variation in the level of leverage of manufacturing firms in Ethiopia during the study period under consideration.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter in its first part presents conclusions based on the finding of the study. The chapter subsequently, makes recommendations arising from the conclusions of the study. Finally, the chapter makes suggestions for further research in connection with certain specific areas of this study.

5.2 Conclusion

This study aimed at conducting an empirical investigation to examine the determinants of capital structure decisions of manufacturing firms in Ethiopia. The study was made using data computed from the financial statements of manufacturing firms in Ethiopia during the study period under consideration using descriptive statistics, correlation analysis and multiple regressions. The sample taken for the study was 81 (eighty one) in Ethiopia. Pooled OLS model was applied to estimate the regression equation.

In this study, both firm specific and macroeconomic explanatory variables were considered in the study. Firm specific variables consisted in the study were profitability, firm size, liquidity, firm growth, tangibility of assets and non-debt tax shield. Macro-economic variables considered in this study were volatility in foreign exchange, inflation and GDP. The empirical findings on the determinants of capital structure of the manufacturing firms in Ethiopia as the following:

- Profitability of the manufacturing firms affects their leverage ratio negatively significantly, which is consistent with the pecking order theory and the hypothesis formulated for the study. Thus, it can be concluded that highly profitable manufacturing firms are more likely relied on internally generated funds other than debt and equity capital than borrowed capital as the source of financing.
- Firm size had significant positive relationship with leverage, which was in line with trade- off theory. This result indicates that large sized manufacturing firms need more debt financing than small sized manufacturing firms. Big size manufacturing firms can

more easily attract more risk transfers from individuals and business firms thereby increasing the leverage.

- Regarding to the effect of asset tangibility on the capital structure of manufacturing firms in this study, the regression result of asset tangibility was positive and statistically significant at 5% level of significance. Therefore, tangibility is one of the major predictors of the leverage of manufacturing in Ethiopia, and regarding the impact, when this variable increases, the leverage level of manufacturing firms increase.
- Firm growth and leverage ratio of the manufacturing firms found positive and statistically significant at 5% level of significance. Manufacturing firms with relatively high growth rate needs more debt financing than less for growing firms. Because internal fund is not sufficient to meet their requirement, and therefore they go for external financing in to meet this requirements.
- Besides, the impact of liquidity on the level of leverage ratio, it is found in this study that is related negatively and found statistically significant at 5% level of significance. The negative relationship shows that more liquid manufacturing firms will tend to use less debt in their capital structure. Liquid manufacturing firms are in possession of more internal funds. Therefore, it can be concluded that more liquid firms are far less leveraged than less liquid firms.
- Regarding the impact of volatility in foreign exchange, this study found that, there is significant positive association between volatility in foreign exchange and the leverage ratio of manufacturing firms in Ethiopia during the study period under consideration. Based on the study result, it can be concluded that volatility in foreign exchange is one of the predictors of variation in capital structure decision in manufacturing firms in Ethiopia.
- **To sum up**, the finding of the study revealed that, profitability, firm size, asset tangibility, firm growth rate, liquidity and volatility in foreign exchange were important factors that influence manufacturing firm's capital structure. The overall results also indicate that pecking order theory was more pertinent theory in Ethiopian manufacturing industry than trade-off theory.

5.3 Recommendations

Base on the findings of the study, the researcher has drawn the following recommendations.

- ✓ The analyses indicated that the independent firm specific factors like profitability, size, asset tangibility, growth and liquidity and volatility in foreign exchange from macro-economic factors were significantly related to leverage of manufacturing firms in Ethiopia. Therefore, managers and other concerning bodies of the manufacturing firms should consider the impact of these significant factors in determining capital structure decisions so as to maximize the value of the firms
- ✓ Based on the findings related to asset tangibility, it is found that asset tangibility has positive and statistically significant impact on capital structure of manufacturing firms in Ethiopia. Thus, manufacturing firms have to increase debt capacity in proportion to tangible asset because the tangible asset is used as collateral and provides security to lender in occurrence of financial stress.
- ✓ The regression result of the variables applied in this study indicated that the pecking order theory exceedingly appears to exert influence on the manufacturing firm's capital structure. It is, therefore, important for managers of industry to formulate a policy that is consistent with the suggestions of the theory that can promote the need to enhance the equity capital and the internal growth and to use for future financing needs of the company

5.4. Directions for Further Study

This study focused on limited firm specific and macroeconomic determinants of capital structure. Other factors affecting the manufacturing firm's financing decision like return volatility may further be considered and those hypothesized by this study might be more analyzed using other forms of research framework. In addition, this study sample five year as sample period, and thus future researcher may investigate the determinants of capital structure decisions by increasing the sample period and thereby observations.

References

Abor (2008). Determinants of the Capital Structure of Ghanaian Firms. African Economic

Alebachew, T. A. (2020). Determinates of Capital Structure in Case of Private Commercial Banks in Ethiopia. Journal of Finance and Accounting, 8(5), 221–229. https://doi.org/10.11648/j.jfa.20200805.13

Alebachew, T. A. (2020). Determinates of Capital Structure in Case of Private Commercial Banks in Ethiopia. Journal of Finance and Accounting, 8(5), 221–229. https://doi.org/10.11648/j.jfa.20200805.13

Amidu (2007). Determinants of capital structure of banks in Ghana. Journal of Management, 2, 67-79.

Ashenafi (2005). Determinants of Capital Structure in Medium Enterprises in Ethiopia.

Assfaw, A. M. (2020). The Determinants of Capital structure in Ethiopian Private Commercial Banks : A Panel Data Approach. Journal of Economics, Business, and Accountancy Ventura, 23(1), 108–124.

Assfaw, A. M. (2020). The Determinants of Capital structure in Ethiopian Private Commercial Banks : A Panel Data Approach. Journal of Economics, Business, and Accountancy Ventura, 23(1), 108–124.

Basti, E., & Bayyurt, N. (2019). Factors Affecting Capital Structure Choice : New Evidence From Turkish Non-Financial Listed Companies, 8, 53–70.

Basti, E., & Bayyurt, N. (2019). Factors Affecting Capital Structure Choice : New Evidence From Turkish Non-Financial Listed Companies, 8, 53–70.

Bei, Z., & Wijewardana, W. P. (2012). Financial leverage , firm growth and financial strength in the listed companies in Sri Lanka. Procedia - Social and Behavioral Sciences, 40, 709–715.

Bei, Z., & Wijewardana, W. P. (2012). Financial leverage , firm growth and financial strength in the listed companies in Sri Lanka. Procedia - Social and Behavioral Sciences, 40, 709–715.

Chen, J.J. (2004). Determinants of capital structure of Chinese-listed firms, Journal of Business Research, Vol. 57 No. 12, pp. 1341-1351 costs and ownership structure. Journal of Financial Economics, 3, 305–360.

De-Angelo & Masulis (1980). Optimal capital structures under corporate and personal taxation. The Journal of Financial Economics.3-29.

DeAngelo, H., & Masulis, R. (1980). Optimal capital structure under corporate and personal taxation. Journal of Financial Economics.

DeAngelo, H., & Masulis, R. (1980). Optimal capital structure under corporate and personal taxation. Journal of Financial Economics.

Degryse, Goeij, &Kappert (2010). The impact of firm and industry characteristics on small firms‘ capital structure. Small Business Economics, 38, 431-447.

Demis & Wang. 2018. Determinants of Capital Structure of African Firms: A Categorical Analysis. European Journal of Business and Management www.iiste.org

Donaldson, (1963). Financial Vs Goals: Management Vs Stockholders, Harvard Business Review, May – June: 116-129

Durand (1959). American Economic Association the Cost of Capital, Corporation Finance, and the Theory of Investment: Comment the Cost of Capital, Corporation Finance, and the. The American Economic Review, 49(4), 639–655.

Getahun, M. (2014). Determinants Of Capital Structure And Its Impact On The Performance Of Ethiopian Insurance Industry.

Getahun, M. (2014). Determinants Of Capital Structure And Its Impact On The Performance Of Ethiopian Insurance Industry. American Economic Review, 48, 261– 275. ISSN 2222-1905 (Paper)

Jensen & Meckling (1976). Theory of the firms: Managerial behavior, agency

Juan Gallegos Mardones & Gonzalo Ruiz Cuneo (2020) Capital structure and performance in Latin American companies, Economic Research-Ekonomska Istraživanja, 33:1, 2171-2188, DOI: 10.1080/1331677X.2019.1697720

Kanbiro (2021). Determinants of capital structure in financial institutions: Evidence from selected micro finance institutions of Ethiopia. MSc thesis, Dilla

Kanbiro (2021). Determinants of capital structure in financial institutions: Evidence from selected micro finance institutions of Ethiopia. MSc thesis, Dilla

Khaki, A. R., & Akin, A. (2020). Factors affecting the capital structure : New evidence from GCC countries, 13, 9–27. https://doi.org/10.14254/2071-8330.2020/13-1/1

Khaki, A. R., & Akin, A. (2020). Factors affecting the capital structure : New evidence from GCC countries, 13, 9–27. https://doi.org/10.14254/2071-8330.2020/13-1/1

Kibrom (2010). The determinants of capital structure: evidence from commercial banks in Ethiopia, MSc thesis, Mekelle

Kibrom (2010). The determinants of capital structure: evidence from commercial banks in Ethiopia, MSc thesis, Mekelle

Kumar, R. (2008). Determinants of Firm ' s Financial Leverage : A Critical Review. Journal of Contemporary Research in Management, (March), 57–86.

Kumar, R. (2008). Determinants of Firm ' s Financial Leverage : A Critical Review. Journal of Contemporary Research in Management, (March), 57–86.

Modigliani, F. & Miller, M. (1958). The cost of capital, corporation finance and the theory of

Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. The American Economic Review, 53(3), 433–443.

Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. The American Economic Review, 53(3), 433–443.

Mohammed, A. (2008). Capital Structure in Saudi Arabian Listed and Unlisted Companies. Research paper, Submitted to University of Stirling, Scotland.

Myers & Majluf (1984). Corporate financing and investment decisions when firms have information that investors do not have, Journal of Financial Economics, 13, 187–221.

Myers & Steward . (1984).The Capital Structure Puzzle, Journal of Finance.

Panda (2015). Capital structure and exchange rate risk, an empirical analysis of indian non-financial firms

Panda (20150. Capital structure and exchange rate risk, an empirical analysis of indian non-financial firms. Research Consortium, Nairobi, 176, 1-34.

Research paper, Submitted to Addis Ababa University, School of Graduates, Ethiopia.

Sendeku, T. B. (2016). Determinants Of Capital Structure In Ethiopian Insurance Companies. Thesis.

Sendeku, T. B. (2016). Determinants of Capital Structure In Ethiopian Insurance Companies. Thesis.

Tesfa (2016). Determinants of capital structure in Ethiopian Insurance Campanies, MSc thesis, Addis Ababa

Tesfa (2016). Determinants of capital structure in Ethiopian Insurance Campanies, MSc thesis, Addis Ababa

Appendixes

Appendix 1.1 Pooled OLS regression (robusted)

```
. reg TDR ROA FS AT GR LTY NDTS GDP IFN vfrx, robust

Linear regression                               Number of obs     =        405
                                                F(9, 395)         =      17.69
                                                Prob > F          =     0.0000
                                                R-squared         =     0.2474
                                                Root MSE          =     .10523
```

TDR	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ROA	-.5728801	.1065535	-5.38	0.000	-.7823631	-.3633971
FS	.0458476	.0087909	5.22	0.000	.0285648	.0631303
AT	.0915918	.033617	2.72	0.007	.0255011	.1576825
GR	.744585	.2050431	3.63	0.000	.3414729	1.147697
LTY	-.0498225	.0157135	-3.17	0.002	-.0807152	-.0189299
NDTS	.0429311	.0366569	1.17	0.242	-.0291359	.1149982
GDP	.180278	.397372	0.45	0.650	-.6009505	.9615066
IFN	-.2373713	.1596716	-1.49	0.138	-.5512836	.0765411
vfrx	.1626526	.0727165	2.24	0.026	.0196928	.3056123
_cons	-.1035028	.077116	-1.34	0.180	-.255112	.0481064

Appendix 1.2 Correlation between dependent and independent variables

```
. corr TDR ROA FS AT GR LTY NDTS GDP IFN vfrx
(obs=405)
```

	TDR	ROA	FS	AT	GR	LTY	NDTS	GDP	IFN	vfrx
TDR	1.0000									
ROA	-0.2464	1.0000								
FS	0.3305	-0.1093	1.0000							
AT	0.2286	-0.1163	0.0609	1.0000						
GR	0.2898	-0.0834	0.2800	0.1798	1.0000					
LTY	-0.1682	0.1519	-0.0031	-0.1151	-0.0229	1.0000				
NDTS	0.0592	0.0057	-0.0858	0.2146	-0.0378	-0.0694	1.0000			
GDP	0.0216	0.0306	0.0247	-0.0512	-0.0047	-0.0566	-0.0653	1.0000		
IFN	-0.0382	0.0342	0.0729	-0.0188	0.0746	0.0188	-0.0076	0.0151	1.0000	
vfrx	0.1616	-0.0845	0.0937	0.0621	0.0754	-0.0062	-0.0097	0.0623	0.0307	1.0000

Appendix 1.3 Test for model specification

```
. linktest
```

Source	SS	df	MS	Number of obs	=	405
				F(2, 402)	=	68.08
Model	1.47066071	2	.735330355	Prob > F	=	0.0000
Residual	4.34193441	402	.010800832	R-squared	=	0.2530
				Adj R-squared	=	0.2493
Total	5.81259512	404	.014387612	Root MSE	=	.10393

TDR	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	.0956787	.5296587	0.18	0.857	-.9455683	1.136926
_hatsq	1.239069	.7159405	1.73	0.084	-.1683865	2.646524
_cons	.1605625	.0979947	1.64	0.102	-.0320836	.3532086

Appendix 1.4 Test for Autocorrelation

```
. prais TDR ROA FS AT GR LTY NDTS GDP IFN vfrx, corc

Iteration 0:  rho = 0.0000
Iteration 1:  rho = 0.4428
Iteration 2:  rho = 0.4650
Iteration 3:  rho = 0.4656
Iteration 4:  rho = 0.4656
Iteration 5:  rho = 0.4656

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

      Source |       SS           df       MS      Number of obs   =       404
-------------+----------------------------------   F(9, 394)       =     15.08
       Model |  1.18899131         9  .132110145   Prob > F        =    0.0000
    Residual |  3.45225022       394  .008762056   R-squared       =    0.2562
-------------+----------------------------------   Adj R-squared   =    0.2392
       Total |  4.64124152       403  .011516728   Root MSE        =    .09361

------------------------------------------------------------------------------
         TDR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ROA |  -.4536932   .1269444    -3.57   0.000    -.7032662   -.2041201
          FS |    .035509   .0070296     5.05   0.000     .0216888    .0493292
          AT |    .067538   .0282626     2.39   0.017     .0119736    .1231024
          GR |   .8358652   .1638665     5.10   0.000     .5137033    1.158027
         LTY |    -.03368   .0168981    -1.99   0.047    -.0669016   -.0004584
        NDTS |   .0439305   .0317619     1.38   0.167    -.0185135    .1063745
         GDP |  -.0054827   .3392119    -0.02   0.987    -.6723744    .6614091
         IFN |   -.285011   .1444826    -1.97   0.049    -.5690643   -.0009577
        vfrx |   .1933037   .0683968     2.83   0.005     .0588354    .3277721
       _cons |  -.0087324   .0655616    -0.13   0.894    -.1376266    .1201619
-------------+----------------------------------------------------------------
         rho |   .4656311
------------------------------------------------------------------------------

Durbin-Watson statistic (original)    1.110404
Durbin-Watson statistic (transformed) 1.800261
```

Appendix 1.5 Test for Normality

```
. swilk r
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
r	405	0.99625	1.045	0.104	0.45866

Appendix 1.6 Correlation among variables

```
. vif
```

Variable	VIF	1/VIF
GR	1.13	0.886301
AT	1.11	0.896921
FS	1.11	0.900459
NDTS	1.07	0.935514
ROA	1.06	0.946571
LTY	1.04	0.959455
vfrx	1.02	0.976597
GDP	1.02	0.983541
IFN	1.01	0.987658
Mean VIF	1.06	

Appendix 1.7 Random effect regression

```
. xtreg TDR ROA FS AT GR LTY NDTS GDP IFN vfrx, re

Random-effects GLS regression                   Number of obs     =       405
Group variable: Year                            Number of groups  =         5

R-sq:                                           Obs per group:
     within  = 0.2483                                         min =        81
     between = 0.0206                                         avg =      81.0
     overall = 0.2474                                         max =        81

                                                Wald chi2(9)      =    129.88
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0000
```

TDR	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ROA	-.5728801	.1598227	-3.58	0.000	-.8861269	-.2596333
FS	.0458476	.0083078	5.52	0.000	.0295645	.0621306
AT	.0915918	.0322896	2.84	0.005	.0283053	.1548783
GR	.744585	.193812	3.84	0.000	.3647206	1.124449
LTY	-.0498225	.018942	-2.63	0.009	-.0869481	-.0126969
NDTS	.0429311	.0357432	1.20	0.230	-.0271243	.1129866
GDP	.180278	.4124988	0.44	0.662	-.6282047	.9887608
IFN	-.2373713	.1657744	-1.43	0.152	-.5622831	.0875406
vfrx	.1626526	.0696105	2.34	0.019	.0262185	.2990866
_cons	-.1035028	.0775167	-1.34	0.182	-.2554327	.0484272
sigma_u	0					
sigma_e	.10558399					
rho	0	(fraction of variance due to u_i)				

Appendix 1.8 Fixed effect regression

```
. xtreg TDR ROA FS AT GR LTY NDTS GDP IFN vfrx, fe

Fixed-effects (within) regression               Number of obs      =       405
Group variable: Year                            Number of groups   =         5

R-sq:                                           Obs per group:
     within  = 0.2484                                         min =        81
     between = 0.0402                                         avg =      81.0
     overall = 0.2474                                         max =        81

                                                F(9,391)           =     14.36
corr(u_i, Xb)  = -0.0110                        Prob > F           =     0.0000
```

TDR	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ROA	-.5848179	.1614248	-3.62	0.000	-.902187	-.2674488
FS	.0463974	.0083844	5.53	0.000	.0299132	.0628815
AT	.0896213	.0326411	2.75	0.006	.0254473	.1537954
GR	.7335549	.1961257	3.74	0.000	.3479621	1.119148
LTY	-.0500907	.0190182	-2.63	0.009	-.0874814	-.0126999
NDTS	.0448669	.0360489	1.24	0.214	-.026007	.1157408
GDP	.1795005	.4139426	0.43	0.665	-.6343312	.9933322
IFN	-.2383522	.1664151	-1.43	0.153	-.5655326	.0888282
vfrx	.1583769	.0700099	2.26	0.024	.020734	.2960198
_cons	-.1057902	.0779758	-1.36	0.176	-.2590944	.047514
sigma_u	.00695272					
sigma_e	.10558399					
rho	.00431752	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(4, 391) = 0.35                     Prob > F = 0.8468
```

Appendix 1.9 Housman test

```
. hausman fe_all re_all, sigmamore

Note: the rank of the differenced variance matrix (4) does not equal the number of coefficients being tested (9); be sure this
        is what you expect, or there may be problems computing the test.  Examine the output of your estimators for anything
        unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.
```

	Coefficients			
	(b) fe_all	(B) re_all	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ROA	-.5848179	-.5728801	-.0119378	.0184948
FS	.0463974	.0458476	.0005498	.0009013
AT	.0896213	.0915918	-.0019705	.0039708
GR	.7335549	.744585	-.0110301	.025445
LTY	-.0500907	-.0498225	-.0002682	.0007058
NDTS	.0448669	.0429311	.0019358	.0036518
GDP	.1795005	.180278	-.0007776	.0076386
IFN	-.2383522	-.2373713	-.0009809	.0054232
vfrx	.1583769	.1626526	-.0042757	.0048272

```
                    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(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =       1.39
            Prob>chi2 =      0.8454
            (V_b-V_B is not positive definite)

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

       TDR[Year,t] = Xb + u[Year] + e[Year,t]

       Estimated results:
                        |       Var     sd = sqrt(Var)
                --------+------------------------------
                    TDR |    .0143876       .1199484
                      e |     .011148        .105584
                      u |           0              0

       Test:   Var(u) = 0
                           chibar2(01) =     0.00
                         Prob > chibar2 =   1.0000
```