ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ACCOUNTING AND FINANCE
GRADUATE STUDIES

The Effect of Capital Structure on Financial Sustainability of Microfinance Institutions in Ethiopia: A Panel Data Approach

By

Berhanu Shanco Wubeno

A Thesis Submitted to the Department of Accounting and Finance in Partial Fulfillment of the Requirements for the Degree of Master of Science (MSc) in Accounting and Finance

November 2022
Addis Ababa, Ethiopia

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Supervisor: Alem Hagos (PhD)

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Statement of Declaration

I, the undersigned, declare that this thesis, entitled **"The Effect of Capital Structure on Financial Sustainability of Microfinance Institutions in Ethiopia: A Panel Data Approach,"** is my original work and has not previously been submitted for a degree in any other University, and that all the sources of materials used for the thesis have been duly acknowledged.

Berhanu Shanco

Signature: _____

November 2022

Letter of Certification

This is to certify that **Berhanu Shanco Wubeno**'s thesis, **"The Effect of Capital Structure on Financial Sustainability of Microfinance Institutions in Ethiopia: A Panel Data Approach,"** which was submitted in partial fulfillment of the requirements for the award of Master of Science in Accounting and Finance, complies with the regulations of the University and meets the accepted standards with respect to quality and originality.

Alem Hagos (PhD), Supervisor

_____ _____

Signature **Date**

Approval

Addis Ababa University
College of Business and Economics
Department of Accounting and Finance

This is to certify that the thesis prepared by **Berhanu Shanco Wubeno**, entitled **''The Effect of Capital Structure on Financial Sustainability of Microfinance Institutions in Ethiopia: A Panel Data Approach''** submitted in partial fulfilment of the requirements for the Degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to quality and originality.

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List of Acronyms

AEMFI=Association of Ethiopian Microfinance Institutions

CAR=Capital to asset ratio

DAR= Deposits to total assets ratio

DER= Debt to equity ratio

DLR= Deposits to Loans ratio

FSS= Financial self-sufficiency

MFIs=Microfinance Institutions

OLS= Ordinary Least Squares

OSS=Operational self-sufficiency

PAR= Gross loan portfolio to total assets ratio

PAR > 30 days= Portfolio at Risk >30 days

PAR > 90 days= Portfolio at Risk >90 days

ROA = Return on assets

ROE =Return on equity

VIF= Variance inflating factor

Glossary of Terms

Capital structure: Capital structure is the mix of debt and equity that a company deems appropriate to strengthen its business. (Islam & Nasreen, 2018)

Financial sustainability: Financial sustainability is defined as MFI's ability to meet operational costs or continue operations in the absence of grants and subsidies. In other words, it is the company's ability to cover its operational expenses while also creating a profit margin that may be used to support future expansion (Rahman & Mazlan, 2014; and Bowman, 2011).

Microfinance: Microfinance refers to all kinds of economic intermediation offerings including savings, credit funds transfer, pension remittances, insurance, provided to low-incomes individuals or groups and undertakings in both urban and rural areas, which includes employees within the private and the public and the self-employed. (Robinson, 2003).

Microfinance institutions: Microfinance institutions are institutions that provide financial services to the low-income individuals or groups who otherwise would have no other access to financial services. (Naz et al., 2019)

Abstract

This study examined the effect of capital structure on the financial sustainability of microfinance institutions (MFIs) in Ethiopia. The study was conducted using panel fixed effect multiple regression model during the 2011-2020 period. Due to data availability, out of a total of 49 MFIs in Ethiopia, only 20 MFI panels are included to examine the MFIs' capital structure on financial sustainability. The purposive non-probability sampling was used to select samples based on the availability of financial data and the duration of the microfinance institutions' existence. The data analysis included both descriptive and inferential statistics. The confidence levels p<.01, p<.05, p<.1 were used to test the hypotheses. The study used operational self-sufficiency (OSS) as a measure of financial sustainability as dependent variable and four capital structure measures including capital-to assets (CAR), debt-to-equity ratio (DER), deposit-to-loan ratio (DLR) and deposit-to-assets ratio (DAR) as independent variable. Other factors affecting financial sustainability are considered as control variables including size of the MFIs, age of the MFIs and risk (measured by portfolio at risk). The study discovered that financial sustainability is positively correlated with capital-to-assets ratio (CAR) and deposit-to-loan ratio (DLR), at a 5% level, this association is statistically significant. On the other hand, the ratios of debt to equity (DER) and deposits to total assets (DAR) have very little bearing on OSS. According to the findings, operational self-sufficiency (OSS) for MFIs will typically rise by 2.8% for every percentage increase in DER while falling by 5.7% for every percentage increase in DAR. MFIs in Ethiopia must take prudence while building portfolios because the choice of a portfolio had a negative effect on sustainability. From the findings, it is strongly recommended that microfinance institutions in Ethiopia should also work to increase their repayment rates. The broad market access, information sharing, and portfolio quality monitoring that have a positive impact on long-term financial sustainability may be crucial for this purpose.

Key words: *Capital structure, financial sustainability.*

CHAPTER ONE

1. INTRODUCTION

1.1 Introduction

This study looked at how capital structure affected the financial sustainability of microfinance institutions in Ethiopia. To respond to the research questions and meet the research objectives, the relationship between the independent variable and dependent variables is investigated in this study. This first chapter, hence, discuss about the contextual of the research, research objectives and questions, the significance of the study, the scope of the study, the limitations of the study, and the organization of the study.

1.2 Background of the Study

Microfinance institutions (MFIs) have emerged as important drivers of financial inclusion and socioeconomic development. MFIs will fund small businesses and rural households that are considered high-risk via conventional banking institutions. Therefore, MFIs function as vital tool in reducing poverty and boosting entrepreneurial activity through providing unsecured financial services to the poor (Khachatryan and Avetisyan, 2017). Unlike banks, MFIs use innovative lending practices which include group lending and progressive lending to provide modest, unsecured loans (Sangwan and Nayak, 2020)

MFIs has a long history of operating using donor funds, and the business is now about 40 years old. There is a heated debate about whether MFIs should continue to be supported by donors or be free of them and stand on their own. There is one school of thought that believes MFs should be able to survive on donor funds (welfarists), and another that believes MFs should create enough revenue to cover their own expenditures because donor monies are unreliable (institutionalists) (Brau &Woller, 2004). As a result, the topic of developing a sustainable MF industry that can operate without donor money is being investigated empirically.

Capital structure decisions by firms are critical and important because they are geared toward maximizing shareholder profit while also improving the financial performance of the organizations (Awais et al., 2016). The type of sources of funding that should be considered are

equity, short-term debt, long-term debt, or a combination of sources of funding that improve the firm's financial performance (Khanam et al., 2014). According to Qayyum & Noreen (2019), a proper debt and equity arrangement is critical for any firm because it has a direct impact on its performance. For example, if equity and debt are kept in a sensible balance, the organization's performance will improve. Otherwise, the unreasonable debt-to-equity ratio would lead to the organization's bankruptcy. As a result, an organization with an optimal capital structure can reduce costs and hence increase profitability (Zeitun & Tian, 2007), allowing it to attain competitive advantage (Riaz, 2015).

Kinsman and Newman (1999) argue that analyzing the relationship between capital structure and company performance is critical for a variety of reasons. First, firm debt levels have risen significantly in recent years, necessitating an understanding of the influence of debt levels on business performance to make acceptable debt level decisions in each firm. Second, because managers and investors may place differing emphasis on several aspects of debt, the relative intensities of any distinct debt-related consequences on a firm's performance must be established. Finally, the most essential reason for analyzing debt levels and business performance is to investigate the relationship between debt levels and shareholder wealth, because maximization of shareholder value is a fundamental goal of firm management.

The composition of the capital structure is crucial for MFIs financial sustainability (Bogan, 2007). This is because superior capital structure choices made by MFIs would lower risk, maximize financial flexibility, and promote the long-term solvency necessary to provide affordable financial services to the underprivileged (CGAP, 2007). Client trust is predicated on a MFIs' potential for long-term survival based on the composition of its capital (Sekabira, 2013). A strong sustainable capital basis makes MFIs more competitive, which benefits their clients more (Wright and Rippey, 2003). Therefore, it was crucial to evaluate how capital structure affected the financial sustainability of MFIs. This study considers the capital structure of Ethiopian microfinance institutions and will examine how it affects the financial sustainability of these institutions.

Financial sustainability is a critical component of microfinance institutions' long-term viability. (Rai, 2012). There are different financial sustainability indicators to consider. Traditional

financial measures like as return on assets (ROA) and return on equity (ROE) are inadequate to assess the financial viability of a microfinance institution. This is because these metrices are based on adjusted accounting information for subsidy (Yaron and Manos, 2007). The MFI's ROE and ROA are measures of how effectively it uses its equity capital and total assets to generate profits. Financial self-sufficiency and operational self-sufficiency were developed to measure financial sustainability to identify inadequate traditional unadjusted financial indicators (idid). Kinde (2012) also argues that there are two forms of financial sustainability measures to search for: operational self-sustainability (OSS) and self-financing sustainability (FSS). Barrels (2006), however, asserts that the standard concept of financial sustainability can be easily tied to operating self-sufficiency rather than financial self-sufficiency. He further argued that OSS made it possible to obtain a subjective and comprehensive picture of the institutions' financial sustainability. So, in this study, OSS was used to gauge financial sustainability. This measure of financial sustainability is popular and has been used in numerous recent studies, including those by Bogan, 2012; Chauhan, 2022; Kipesha and Zhang, 2013; Mwongeli and Ariemba, 2018 Quayes, 2012; Sekabira, 2013; and Tehulu, 2013. By excluding all grants, subsidies, and contributions, OSS measure how well MFI revenues cover all expenses (operating expenses, loan loss provisions, and financial costs). By removing the cost of capital but considering actual financing costs, OSS demonstrated if the MFI generated enough revenue to cover its direct costs. (Nyamsogoro,2010).

1.3 Statement of the Problem

MFIs serve low-income, economically active borrowers seeking relatively small amounts to finance their enterprises, manage emergencies, acquire assets, or smooth consumption. Due to a lack of credit history, collateral, or both, many borrowers are unable to obtain funding from traditional commercial banks. As a result, MFIs are perceived as aiding in the establishment of economic opportunities and the alleviation of poverty (CGAP, 2003). MFIs must be able to provide long-term financial services to achieve their primary goal of poverty alleviation. In order to be sustainable, MFIs must earn enough revenue to cover their financial costs, administrative costs, and loan loss reserves. Except for the clients it serves, an MFI aiming toward sustainability on market principles is like a traditional bank. As a result, it will face a struggle like that faced by a conventional bank in attaining its goals (Hartungi, 2007).

At present, the most important challenge any MFI is to become sustainable while expanding its outreach. MFIs are under a lot of pressure to reduce their reliance on external financial sources of funds, such as subsidized funding, grants, and so on, due to a variety of unavoidable conditions. The transactions costs of rendering microfinance service to clients are high in the informal financial sector. Many MFIs are currently financially unsustainable and rely on external financial sources of funds like as grants, donations and loans to stay afloat. Because the primary goal of any MFI is to alleviate poverty, it must be financially sustainable. Financial self-sufficiency ("the extent to which operating profits cover MFI costs") and operational self-sufficiency should be priorities for MFI management. (Khan et al., 2017).

Obo (2009) indicated that the majority of MFIs in Ethiopia are not yet financially and operationally sustainable. In particular, he concluded that MFIs controlled by the government perform better than MFIs sponsored by NGOs in terms of their financial and operational sustainability. Ethiopian MFIs backed by NGOs can only reach out to the project areas where they carry out their development efforts. Lack of rural microfinance institutions, which provide financial services to the poor, is one of the factors limiting productivity in many developing nations. Poor farmers have little access to financial markets. Microfinance institutions have been founded and are now operating in Ethiopia with the ultimate objective of reducing poverty (Pius, 2005).

Previous research in the field of microfinance has focused more on the sustainability of microfinance and tried to evaluate the link between capital structure and the sustainability of microfinance institutions. The majority of them have been undertaken in nations with more advanced or established financial and capital markets (Abeywardhana, 2015; Bogan, 2008; Gill et al., 2011; Khachatryan and Avetisyan, 2017; Lislevan, 2012; Tailab, 2014; and Tchuigoua, 2015) Companies in these nations have the option to quickly generate new capital through the issuance of new shares and/or new debt securities from the market, which can be used to modify their capital structure. However, business organizations found it difficult to raise new capital other than from restricted lines of credit extended by depository institutions in less developed or nonexistent capital markets, such as Ethiopia. This makes it difficult for managers to maintain their capital structure, and Ethiopia has few studies in this area that have primarily focused on the factors that determine capital structure. (Asfaw, 2020; Daniel ,2011; Deneke and Gujral,

2021; Feyisa, 2017; Mohammed, 2014; Tadesse, 2021; and Weldemikael, 2012). Even though those local studies who examined the effect of capital structure on financial performance are dominated by studies on banks, insurance and manufacturing companies (Abdi and Bayu, 2011; Admassu, 2016; Birru, 2016; Kedir, 2017; Mekonnen, 2021; Mengesha, 2015; Negasa, 2016; Netsanet, 2013; and Weldehana,2013) and those who investigated this relation in the case of MFIs took ROE and ROA as dependent variables. (Getaneh, 2017). Traditional financial measures like as return on assets (ROA) and return on equity (ROE) are inadequate to assess the financial viability of a microfinance institution. (Yaron and Manos, 2007). This study, however, seeks to measure the impact of the capital structure on MFI financial sustainability as measured by operational self-sufficiency. Operational self-sufficiency was developed to measure financial sustainability to identify inadequate traditional unadjusted financial indicators. (ibid).

1.4 Objectives of the Study

1.4.1 General Objective

The general objective of this study is to investigate the effect of capital structure on the financial sustainability of MIFs in Ethiopia.

1.4.2 Specific of Objectives

The specific objectives of the study are:

- To examine the effect of capital-to-asset ratio (CAR) on financial sustainability of selected MFIs in Ethiopia.
- To investigate the effect of debt-to-equity ratio (DER) on financial sustainability of selected MFIs.
- To evaluate the effect of deposits-to-loans portfolio ratio (DLR) on financial sustainability of selected MFIs.
- To explore the effect of deposits-to-total assets (DAR) on financial sustainability of selected MFIs.
- To examine the effect of the age of the selected MFIs on financial sustainability.
- To explore the effect of the size of the selected MFIs on financial sustainability.
- To investigate the effect of risk on the financial sustainability of MFI.

1.5 Research questions

The following research questions were specifically addressed in this study:

- What is the effect of capital to asset ratio, debt to equity ratio, deposit to loan portfolio ratio and deposits to total assets on financial sustainability of Microfinance Institutions in Ethiopia?
- What is the influence of the age of the firm on financial sustainability of Microfinance Institutions in Ethiopia?
- To what extent the size of the firm affects the financial sustainability of MFIs in Ethiopia?
- What is the impact of risk on financial sustainability of Microfinance Institutions in Ethiopia?

1.6 Hypothesis Development

The primary goal of this study, as stated before, was to examine the effect of capital structure on the financial sustainability of microfinance institutions in Ethiopia and to carefully examine the relationship between capital structure variables and measures of financial sustainability. The study investigated how capital structure (using proxies like capital-to-assets ratio, debt-to-equity ratio, deposits-to-loans ratio, deposits-to-assets ratio and portfolio-to-assets ratio) affect Ethiopia's MFI financial sustainability. To conduct the study, the following hypotheses were developed:

Capital to Assets Ratio (CAR)

The capital adequacy ratio (also known as capital to assets ratio or equity-to-asset ratio) is calculated by comparing a MFI's total equity to its total assets for the same period. The minimum capital adequacy ratios set by national banks is essential to ensure that MFIs have adequate cushion to sustain an acceptable amount of losses before they become insolvent and lose depositors' funds. (AEMFI, 2021). Put another way, this ratio ensures the efficiency and stability of a financial system by lowering the risk of MFIs becoming insolvent. Generally, an MFI with high capital adequacy ratio is considered safe and likely to meet its financial obligations. (ibid).

Mugun (2019) in his study claimed that lagged portfolio to assets ratio had a positive significant relationship with financial performance. As a result, the following hypothesis can be made:

Hypothesis 1: There is a significant positive association between capital to asset ratio and financial sustainability of MFIs in Ethiopia.

Hossain and Khan (2016), to the contrary, claims that MFIs' financial sustainability has a statistically significant negative association with their capital-to-asset ratio. This suggests that obtaining capital from a variety of sources does not improve their financial sustainability.

Debt to Equity Ratio (DER)

The debt-to-equity (D/E) ratio is a leverage ratio that shows how much a company's financing comes from debt or equity. A higher D/E ratio means that more of a company's financing is from debt versus issuing shares of equity. Banks tend to have higher D/E ratios because they borrow capital to lend to customers.

Watson and Wilson (2002) define debt-to-equity as a capital a business raises by taking out loan. Because debt capital suppliers are essentially creditors rather than owners of the business, they differ from equity capital in that they often receive a contractually predetermined yearly percentage return on their loan, known as a coupon rate. The debt- to-equity Ratio, also known as the Leverage Ratio or the Debt/Equity Ratio) is a widely used indicator of the capital strength or sufficiency of an MFI at a specific period. Hoque and Chishty (2011) studied the impact of MFI commercialization on mission drift, financial sustainability, and MFI funding structures. A panel data regression analysis shows that the use of debt reduces outreach depth while retaining financial sustainability. This finding is further confirmed by Coleman's (2007) research, which showed that highly leveraged MFIs perform better because they have larger economies of scale, which enables them to manage moral hazards. In addition, a study by Abor, 2005; Abu-Rub, 2012; Berger and Patti, 2006; Dinh and Pham, 2020; Negasa, 2016; and Zerah, 2011; also revelated that there is a positive correlation between financial sustainability or profitability performance measures and leverage.

Hypothesis 2: There is a significant positive association between debt-to-equity ratio and financial sustainability of MFIs in Ethiopia.

A study was conducted in Kenya on the impact of capital structures on deposit-taking microfinance institutions' financial performance (Kiiru, 2013). The study included information from annual supervision reports from Central Banks for the years 2011 and 2012. Contrary to earlier research, this study found that debt or borrowing has a negative impact on the financial performance of the institutions (as measured by ROA). Additionally, it was discovered that MFIs preferred customer deposits to debts and were less likely to take on debt or borrow money because doing so would negatively affect their financial performance. Also, research conducted by Zeitun and Tian (2007) on the impact that capital structure has on corporate performance in Jordan, and their findings revealed that a firm's overall debt ratio significantly and negatively impacted both its accounting and market-based performance indicators.

Deposits to Loans Portfolio Ratio (DLR)

The deposit to loan ratio is an important measure for MFIs that mobilize deposits. The ratio of deposits to loans indicates the percentage of the MFI's portfolio that is funded by deposits. The MFI's ability to finance its loan portfolio from deposits increases with the higher deposits to loans ratio. A higher ratio lowers funding costs and increases the MFI's reliance on internal finance. (AEMFI, 2020). The sustainability of MFIs is positively and statistically significantly impacted by deposit availability and deposit capacity. The following are the two justifications: First, a few variables, such as the overall level of economic activity, economic development, and financial system trust, affect a country's ability to offer deposit services. All these elements could have a favorable and significant impact on how profitable MFIs are. In this regard, deposit availability might be viewed as a sign of the general macroeconomic circumstances that might favorably affect the performance of MFIs. Second, as more people have access to deposit services and deposit capacity, fewer formal moneylenders are giving poor people loans, leaving MFIs with a greater customer to serve. The demand for MFI loans rises as a result of increased deposit access, which may drive away prospective borrowers from informal moneylenders and improve MFI performance. (Ahlin etal., 2010 as cited in AEMFI, 2020). As a result, it can be hypothesized as expressed below:

Hypothesis 3: Deposits to loans ratio (DLR) is significantly positively related to the MFIs financial sustainability.

Sara (2011) investigated the implications of financial sustainability in the microfinance industry. In this study, the total deposits of the MFIs are divided by the total outstanding loan balance to determine the extent of deposits among the various MFIs. The results indicate that compared to their non-sustainable counterparts, the self sustainable MFIs in the study have a much greater level of savings in comparison to loans (12.59%). The use of deposits is remarkable because many prominent microfinance researchers emphasize how crucial it is for MFIs to encourage saving. (Campion, 2002; and Morduch, 1999)

Deposits to Total Assets Ratio (DAR)

Muriu (2016) found that there is a strong positive correlation between the sustainability of MFIs and the ratio of deposits to assets. He explained these results by stating that, if the deposits program is cost-effective, a correspondingly increased deposit base will frequently result in a lower total cost of capital for the MFIs, with the accompanying improvement in profitability and consequently stronger financial sustainability. His findings corroborated those of Cull et al. (2011), who recommended that MFIs should increase the number of deposits they accept through their services. This is important since it would make it easier for MFIs to grant credit. MFIs, according to Kinde (2012), strengthen their sustainability through mobilizing savings. His findings also suggested that savings may be used to increase loan portfolios, lower interest rates, and move closer to meeting demand. Deposit attraction has a significant impact on financial sustainability, as observed by Iezza & La Cour, 2010; Khani, 2004; and Kiiru, 2013; and as a result, it has become the favored MFI financing choice. These results, however, are contrary with those of Bogan (2008), who found a link between the ratio of deposits to assets and financial sustainability that was negative. As a result, based on the findings discussed above, the researcher developed a preliminary hypothesis that will be substantiated by regression analysis. Here is the statement:

Hypothesis 4: There is a positive significant relationship between deposit to asset ratio and financial sustainability of MFIs in Ethiopia.

Portfolio to Total Assets Ratios (PAR)

Portfolio to total assets is determined by diving the MFIs gross loan portfolio by its total assets. (AEMFI, 2020). Mugun (2019) studied the impact of the portfolio to assets ratio on the financial performance of MFIs in Kenya. The preferred model random effect results from the ARDL model on the portfolio to assets ratio showed there was a positive correlation between portfolio to asset ratio and financial performance, but it was not statistically significant. Muriu (2016) investigated the effect of capital structure on the performance of microfinance institutions. In this study, data was collected from 210 MFIs operating in 31 nations throughout Asia, the Middle East, Latin America, and Africa were considered between 1997 and 2008. According to the findings, microfinance institutions with high debt in their capital structures were more successful. Additionally, it was discovered that, depending on the institution's age, MFIs with larger portfolio to assets ratios were more profitable. The study concluded that in order to increase microfinance profitability, MFIs should have policies that are focused on having access to long-term debt. Thus, the hypothesis set forth below has been developed:

Hypothesis 5: There is a positive insignificant relationship between portfolio-to-total assets and financial sustainability of MFIs in Ethiopia.

Age of the MFIs

Besides capital structure, a microfinance institution's age can be considered as an important factor that can affect its financial sustainability. The agency and trade-off theory of capital structure proposes that companies balance the costs and advantages of debt and equity financing to determine how much debt and equity financing to use. According to these theories, age has a positive impact on capital structure decisions since enterprises with a longer age have a higher credit worthiness for borrowing from different companies. Adams and Tewari (2016); Dang et al., 2019; Degryse et al., 2012; Ezeoha and Botha, 2012; Mohammed, 2014; Tchuigoua, 2015; and Smith, 2010; found that the age of the MFIs had positive impact on their capital structure. The researcher, therefore, devised a tentative hypothesis set forth below:

Hypothesis 6: The age of the firm has a statistically significant positive effect on the capital structure of MFIs in Ethiopia.

Size of the MFIs

Another factor that can affect the financial performance of an MFI is its size. The size of an MFI is measured by the value of its assets (Hermes et al., 2008). Several research (Bogan, 2008; Cull et al, 2007; Mersland & Storm, 2007; and Tehulu, 2013) found a strong positive correlation between an MFI's financial performance and size. Similarly, another study discovered and investigated a substantial positive relationship between MFI size and financial sustainability (Burki, 2017). Cull et al., (2007) found that large MFIs have low outreach because they are tempted by higher profit spreads. As a result, rather than focusing on the disadvantaged, the attention is mostly on the wealthy clients. MFIs with a larger size have better financial stability, making it easier to reach a large group of people.

Bogan (2012) also investigated the impact of capital structure on sustainability and found that the size of MFIs' assets and its capital structure are related to performance. It was discovered that MFI asset size has an impact on sustainability, and that outreach and grants as a percentage of assets are large and negatively associated to sustainability, but positively related to MFI cost per borrower. He also discovered causal evidence to support the claim that large MFIs' growing reliance of grants reduces operational self-sufficiency. It highlights that the idea of using long-term grants could be linked to inefficient operations because of a lack of competitive constraints connected with seeking market funding. As a result, grants may hindrance for the growth of MFIs into sustainable, competitive and efficient operations

Moreover, empirical studies such as Dang et al., 2019; Smith, 2010; and Tchuigoua, 2015; revealed that size of the firm and leverage have a positive association. It is also believed that larger businesses with less fluctuating benefits are more likely to be able to fully utilize interest payment tax shields, hence boosting the predicted tax benefits of debt. In the case of small businesses, conflicts between creditors and shareholders are more severe because their managers are typically major shareholders who are better able to transfer from one investment project to another. Therefore, it is safe to hypothesize as follows:

Hypothesis 7: The size of the firm positively and significantly impacts financial sustainability of MFIs in Ethiopia.

Default Risk

Another factor that could affect the financial sustainability of MFIs is portfolio at risk (PAR). Portfolio at Risk is important because it indicates the potential for future losses based on current performance of the loan portfolio. The number of days must be specified clearly because the ratio is frequently used to gauge loans affected by arrears of greater than 30, 60, 90, 120 and180 days (for example PAR 30). (MicroSave, 2008). The PAR ratios (PAR are > 30 days and > 90 days) are the two most widely accepted measure of loan performance in the microfinance industry. This study considered the Portfolio at Risk at 90 days as a proxy of risk, whereby payments overdue by more than 90 days period out of the total gross loan portfolio of MFIs are considered. (MicroRate & Inter-American Development Bank, 2003). The portfolio at risk gauges how efficient are MFI's effectiveness in generating collections. The greater the PAR, the lower the likelihood of payback and, thus, the financial sustainability. This negative correlation between PAR and financial sustainability is supported by various studies. Lafourcade et al., 2005; Nyamsogoro, 2010; and Parvin et al., 2020; also argued that MFIs risk has a significant negative impact on MFI on both operational efficiency and profitability.

Hypothesis 8: MFIs risk has a statistically significant negative effect on the capital structure of MFIs in Ethiopia.

1.7 Significance of the Study

This study will benefit many groups, including MFI managers, who might use it to gain insight into the effect of capital structure on MFI's financial sustainability. This might in turn offer them a capital structure which brings more advantage to the shareholders. For financial consultants, it will enable them to render prudent service to their clients in terms of the best capital structure in which financing is solid and the company stays financially sound.

The study will also benefit the National Bank of Ethiopia, which is tasked with overseeing and regulating financial institutions in Ethiopia. By providing information on how MFI chooses its capital structure National Bank will be better able to issue regulations that guide the microfinance industry. National Bank also protect microfinance clients from the high interest rates that microfinance institutions may charge. Regulation also protects clients' deposit by specifying how the institution should handle their deposits.

Moreover, this study is also very important for investors interested in investing in Ethiopian microfinance institutions. Investors will be confident to invest in these institutions if they have knowledge of MFI's capital structure and how capital structure affects the MFI's financial sustainability. Donors will be willing to extend grants to MFI when they know that their funds will be used for a purpose in an efficient and effective way.

Finally, this study is relevant to researchers who want to know more about the capital structure of microfinance institutions and how this affects their performance. This is especially helpful for those exploring with MFI's capital structure to gain more insight into the various problems faced by microfinance institutions in choosing a capital structure and to find better solutions.

1.8 Scope of the Study

This study is confined only to examine the effect of capital structure on the financial sustainability of Ethiopian MFIs for the period between 2011-2020. The data is secured from the financial analysis report of Association of Ethiopian Microfinance Institutions. There are 49 MFIs, however only 20 MFIs are found to have complete data to the conduct the analysis for the period of study.

The researcher also restricts the scope to the 10 years of available secondary data and the analysis only goes up to the year 2020. This is also because the microfinance institutions and service are relatively new in Ethiopia. The time period selected helped the researcher to include more time series and cross-sectional data.

1.9 Limitation of the Study

This research will rely solely on secondary quantitative data to examine the effect of capital structure on MFI sustainability in Ethiopia. The study, in the researcher's opinion, would be stronger if it included qualitative variables that have an impact on the sustainability of microfinance institutions.

The time frame employed in this study can be seen as a limitation of the study. Consequently, the generalizability of the results may be questionable due to the short time period used for the

analysis in the study, which spans from 2011 to 2020. Moreover, the findings are only related to the chosen sample microfinance institutions but are used to generalize on all MFIs in Ethiopia.

1.10 Organization of the Study

This research paper consists of five chapters. The first chapter presented a brief introduction to the background of the study, general and specific objectives, problem statement and justification of the study, research questions, and significance of the study, scope and limitations of the study. Chapter two deals with literature review that comprised of the empirical literature review, the theoretical literature review, research gap and conceptual framework of the study. The next chapter presents the research methodologies used in the study. These encompasses the research design and approach, target population, sample size, sampling techniques, data collection methods, data analysis and ethical consideration. Results and discussions are presented in the fourth chapter. The last chapter, chapter five deals with findings, conclusions and recommendations depending on the results discussed under the four chapter.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Introduction

This chapter is aimed to provide the theoretical literature review that has been done by various researchers on the concepts of capital structure, capital structure theories and the sustainability of microfinance institutions. The empirical literature and conceptual framework of the study (the relationship between the variables) concludes this chapter.

2.2 Microfinance Institutions in Ethiopia: History and Development

Historically, there were numerous important causes for the initial introduction of microfinance. according to Robinson, about 90% of individuals in poor nations lack access to institutional financial services, (Robinson, 2001). Because of this, the poor get poorer every day even when they're willing to work hard for a better life (Thurman, 2007). Most poor and low-income households still rely on informal forms of microfinance because they lack access to institutional sources of funding (ADB, 2000). These sources, however, restrict their capacity to actively engage in and gain from the development process. Microfinance thereby provides financial services to those who aren't addressed by the conventional financial sector. Microfinance is currently one of the most crucial tools for aiding and resolving this issue of the poor in developing countries (Guntz, 2011). Microfinance has rapidly changed and grown over the past few decades, moving from the relatively small field of micro enterprise credit to a more comprehensive concept that includes a variety of financial services, savings, money transfers, and insurance for the poor, as well as the enormous challenge of creating inclusive financial systems (Dokulilova et al., 2009).

In Ethiopian context, following the terrible drought and famine of 1984/85, numerous NGOs began to offer microcredit as part of their relief efforts, albeit on a small scale and not on a consistent basis (Alemayehu, 2008). However, Ethiopia's micro-credit sector has been rigorously controlled since 1996. Following an evaluation of revolving funds managed in the context of NGO development projects, a piece of legislation was circulated with the goal of professionalizing the sector by decreasing risky lending practices, lax financial discipline, and

interest rate distortions (Sisay, 2016). In Ethiopia, formal microfinance began in 1994/5. The government's Proclamation on Microfinance Institution Licensing and Supervision, issued in 1996(proclamation 40/96), aided the expansion of microfinance institutions in both rural and urban areas.

Even though microfinance institutions in Ethiopia were only established recently, the industry has had significant growth in terms of outreach, notably in terms of the number of clients. Forty-three microfinance institutions (MFIs) have been officially registered by the National Bank of Ethiopia (NBE) as of June 2021 since the issuance of Proclamation 40/1996, which allows for the formation of microfinance institutions.

In a country with a population of more than 100 million people, Ethiopian microfinance has made extraordinary success over the last decade, reaching about two million clients. Limited outreach, high transaction costs for clients, a generally weak institutional base, inadequate governance, and a notional ownership structure, as well as reliance on government and maternal NGOs, continue to characterize financial services for the low-income population, impoverished farmers, and MSMEs" (Pfister et al., 2008). Similarly, Amha (2008) found that 27 MFIs only meet around 20% of the demand for financial services among the active poor. This shows that there is a considerable demand for microfinance services that is not being met.

2.3 Theoretical Literature Review

2.3.1 The Concept of Microfinance

Microfinance institutions have emerged as a viable financial option for low-income people who do not have access to the formal financial institutions' credit. Its goals include reducing poverty by encouraging small-scale enterprise through easy access to credit. It sets itself apart from traditional credit by disbursing small loans to the poor through a variety of innovative non-traditional loan structures, including loans without collateral, group lending, progressive loan structures, immediate repayment arrangements, regular repayment schedules, and collateral substitutes (Quayes, 2012).

There are two approaches to poverty reduction taken by microfinance institutions. Microfinance institutions are considered a tool for poverty alleviation by enhancing access to finance and financial services, as mentioned previously. Improved access to banking and financial services provides income-generating capability, allowing the poor to access all development needs to escape poverty's varied dimensions and minimize their vulnerability to unforeseen events. Microfinance's contribution to this objective has thus been measured using a process called as microfinance outreach. That is, an MFI's ability to reach out to the poorest of the economically active poor.

In terms of poverty alleviation, there are two contrasting viewpoints on whether aim of microfinance should be given higher emphasis. These approaches- intuitionists (also known as financial system) and welfarists (poverty lending) approaches are described below (Arun, 2005; and Brau & Woller,2004).

2.3.1.1 Welfarists' Approach

The welfarists place a strong emphasis on poverty lending as measured by the depth of their outreach. That is, not only reaching a huge number of clients (broad outreach), but also a large number of impoverished clients (depth of outreach) (Brau and Woller, 2004). As a result, welfarists see microfinance as a tool for poverty reduction, with the goal of empowering the poorest of the economically active poor, and hence the depth of outreaches should be prioritized. Microfinance institutions should, to the extent practicable, be able to service as many impoverished clients as possible, even if it appears to be unprofitable. Donor and government funding, as well as social investors, should be used to cover the gap in operations (Woller et al, 1999).

Taking the welfarists' point of view, many groups, particularly NGOs, argue that there is a trade-off between sustainability (profitability) and reaching out to the poor (outreach) because the poorest are the most cost-ineffective to reach when profit is considered, and thus donor support (to support MFIs) is required to achieve this goal (Paxton, 2003). Their premise is that reaching the lowest people necessitates modest, laser-focused programs that cannot be sustained without ongoing donor financing (Morduch, 1999).

The Welfarist approach assesses MFIs' sustainability based on their contribution to the poor community's social welfare. MFIs can attain sustainability without gaining self-sufficiency, according to the thesis. MFIs, according to welfarists, are sustainable when they can continue to operate, reaching the poorest of the poor and therefore contributing to poverty reduction, whether through subsidization or not. Their focus is on how MFIs can have a social influence on their disadvantaged consumers. They back up their case by seeing any subsidy or financial injection into MFIs as equity contributed by social investors who aren't necessary looking to earn a profit, but rather to have a positive social impact (Brau and Woller, 2004; Morduch, 2000; and Woller et al, 1999) when it comes to the welfarists.

2.3.1.2 Intuitionists Approach

Institutionalists, on the other hand, are primarily concerned with microfinance institutions' financial viability. The intuitionists, according to Woller et al (1999), see financial deepening as the primary goal of microfinance institutions. Financial deepening is the process of establishing long-term financial intermediation for the poor. Financial sustainability, as defined by financial self-sufficiency (profitability), should be given increased attention by all MFIs, according to institutionalists (Brau and Woller, 2004). Their point is that donor dependence is in most circumstances uncertain, and that until an MFI can support itself financially, it will be unable to serve the needy in the long run.

In contrast to fostering financial self-sufficiency, there is a risk that a focus on financial self-sufficiency will drive an MFI to abandon its poverty-reduction mission (Drake and Rhyne, 2002; and Stack and Thys, 2000). This is referred to as mission drift (Aubert et al., 2009; and Copestake, 2007).

A detailed review of the arguments forwarded by intuitionists and welfarists reveals that the problem is one of money. On the one hand, institutionalists want MFIs to cover all of their costs with self-generated funds, including the prospect of profit (without using any external funds). This is what they refer to as a long-term MFI. Welfarists, on the other hand, are unconcerned about the source of cash. MFIs have achieved sustainability if they can continue to operate and so satisfy their social objectives. Rather than scalability (breadth of outreach) or financial self-

sufficiency, their focus is on targeted depth of outreach (Brau and Woller, 2004). As Woller et al (1999) stated, what matters is how subsidies are distributed.

2.3.2 Sources of MFIs Financing

The major funding sources for profit-motivated microfinance institutions are donations/grants, debt, equity, and savings/deposits (Bayai & Ikhide, 2016; and Bogan, 2012).

Donations

Donations continued to be favored by new MFIs despite being ignored by institutionalists. Even though donors offer donations at reduced rates, there are still conditions that must be met by MFIs before donors may extend loans. During their initial stages of development, MFIs rely more on government grants and funding from NGOs. (Bayai and Ikhide, 2016). These sources begin to undermine the financial sustainability of MFIs as they develop and widen their reach, though. Subsidies and FS thus have a favorable relationship up to a certain point in their development, after which donations start to undermine sustainability. Bogan (2012) asserts that subsidizing MFIs with subsidies and grants is advantageous, particularly for start-up businesses without access to commercial financing. The difficulty, though, is that easy money does not promote efficiency. This gave rise to the concept of "smart subsidies," wherein subsidies are utilized to encourage innovation and the funding of setup costs while aiming to reduce distortions and inefficiencies. Although donations are beneficial for beginning MFIs (de Aghion and Morduch, 2005), they are blamed for stunting the expansion of MFIs due to their association with inefficiency, unreliability, corruption, abuse, and a smaller scope of operations (Kapper ,2007; and Yaron and Manos, 2007). This explains the Industry Perspective paradigm's call for NGOs to commercialize MFI finance (Campion and White, 1999).

Debt

CGAP (2004) notes that debt is supplied by private investors (non-commercial investors), commercial banks and other multilateral organizations. Debt can be from both local banks and foreign banks. However, debt comes with the obligation of servicing it, regardless of whether MFI operations are profitable or not. The agency theory is framed on the usage of debt in spurring MFI efficiency in the deployment of resources and ensuring financial sustainability.

This resource remains expensive in most African markets (Tehulu, 2013) given financial underdevelopment, illiquid markets, and the information opacity of the microfinance sector in most countries.

Equity

In contrast to debt, equity free MFIs from periodic contractual obligations. Owners (for profit driven MFIs) or national and international donor organizations (NGOs) and development banks offer equity finance. Retained earnings are a cheaper form of equity than issuing shares. Dividends (although no legal requirements necessitate the payment of the dividend - Tehulu 2013) and administrative charges (placement fees) associated with obtaining capital through the stock markets are expenses related to equity (Kapper 2007). Since few MFIs are listed on the stock exchange, equity has remained a limited resource. There aren't many cases, particularly in Latin America, when MFIs have successfully listed on stock exchanges. But it only affects primarily established organizations or licensed financial institutions (Bayai & Ikhide, 2016; Bogan, 2012). Although it is encouraged, equity funding for MFIs is still rare and limited. Other research has demonstrated that the level of equity that MFIs assume can be explained by financial sustainability. The efficiency-risk theory contended that equity financing has a negative association with financial sustainability, whereas the franchise-value hypothesis claimed that there is a positive relationship between equity financing and financial sustainability.

According to the franchise-value concept, MFIs want a high amount of equity funding to protect themselves from potential losses in economic rent or franchise value. On the other hand, the efficiency-risk theory explains that MFIs use less equity and more debt-based financing when the likelihood of liquidation is low. Like this, Marwa and Aziakpono (2015) assert that research has shown that MFIs should keep higher levels of equity in their capital structure to achieve longevity and sustainability.

Deposits/Savings

Deposits are a major source of funding for microfinance institutions worldwide, particularly in Africa, where deposits have increased faster than MFI lending portfolios (Bayai & Ikhide, 2016). Therefore, savings are a source of loan growth and a means of enhancing sustainability. A high mobilization of savings suggests the capacity for self-finance, leading to independence and

permanence. It is more significant since deposits can be drawn in at a cheaper cost, boosting MFIs' profitability. The problem, though, is that only institutions subject to regulation are permitted to accept deposits (Bogan, 2012). Due to capital provision requirements and licensing fees, the fact that majority of MFIs that are permitted to accept deposits are regulated puts additional costs on them. Meeting capital reserve requirements is a tax on MFIs, and as a result, MFIs may prefer to provide larger loans, leading to mission drift (Cull et al., 2009). Although the influence of deposits on financial sustainability is apparent in the short term, attracting the necessary level of deposits takes a lot of time in comparison to these costs (Mwangi et al., 2015).

2.3.3 The Concept of Capital Structure

The capital structure of an organization is the combination of debt and equity used to fund its operations. (Correia et al., 2015) Financing is the process of raising capital to invest in and operate a business, and it can include both internal and external funding sources. Internal funds are money generated within the organization, such as retained earnings, whereas external funds come from stocks and debts. (Gitman and Zutter, 2014) As a result, these funds are divided into three categories: retained earnings (internal finance), debt (external finance), and equity (external finance). (Frank and Goyal, 2003).

The optimal capital structure is the debt-to-capital ratio that minimizes the company's weighted average cost of capital and maximizes shareholder value. Debt financing poses a higher risk, but paying interest is a legal requirement that, if not met, can result in the organization's liquidation, which is less costly. Equity financing, on the other hand, is more expensive but less risky because shareholders are not legally compelled to receive dividends if the company performs poorly. The higher the leverage ratio, the higher the debt level, the higher the interest payments, and the more negative the attribution to shareholders effects. (Ross et al., 2012).

2.3.4 Theories of Capital Structure

One of the most arguable issues in finance is capital structure; as a result, when a manager decides to fund a new project, they should be aware of the aspects that may impact their decision (Bilgehan, 2014). Debt and equity make up the majority of the capital structure. Debt financing refers to the use of short-term or long-term debt to fund new initiatives. The debt might take the

form of notes payable, bank loans, bonds, or debentures (Margaritis & Psillaki, 2010). The decision makers picked debt capital because it is less expensive than equity capital and has some advantages; the cost of capital in debt is lower than that required by shareholders because the risk in equity is greater than that of the lenders. The cost of debt interest might be rather high.

Equity, on the other hand, is required by law. It is made up of common and preferred shares. The cost of equity is higher than the cost of debt, thus managers must choose between equity and debt financing while also considering the maximizing of firm value and the minimization of capital costs (Atrill, 2006; and Watson & Head, 2007). Different theories of capital structure have been discussed in relation to how decision-makers might finance a new project.

The capital structure theories are explained here below.

2.3.4.1 Modigliani-Miller Theory

Modigliani and Miller released their capital structure irrelevance theory in 1958, which is referred to as M&M throughout this work. Modigliani and Miller were two professors who studied capital structure theory and collaborated to develop the capital-structure irrelevance proposition. They created the contemporary theory of capital structure in an article published in The American Economic Review. Some assumptions underpin M&M theory, including (no taxes, no transaction, and bankruptcy costs.) M&M dealt with two ideas without levying any taxes. All external and internal users of the firm will have access to the same information (information symmetry); the cost of debt is the same as the cost of equity, and debt financing has no impact on the company's EBIT. Based on the assumptions indicated above, proposal I without tax stated that the capital structure has no effect on the company's market value. (Modigliani and Miller, 1958)

Following that, they established their argument, claiming that when debt grows, the equity shareholder perceives a bigger risk. As a result, the equity requires a high return in proportion to the risk. Modigliani and Miller (1963) announced a change to their M&M I, dubbed M&M II, in response to different critiques. They consider the benefits of the tax as determinants of the capital structure in their hypothesis. The benefit of taxes is that it offsets interest, which is referred to as tax shields, allowing the corporation to pay a reduced tax. In other words, M&M demonstrates

that growing leverage will allow the organization to boost firm value and performance by allowing for tax deductions from the interest payment. (ibid)

2.3.4.2 Trade off Theory

The Trade-off Theory, introduced by Kraus and Litzenberger in 1973, states that firms choose their target capital structure by balancing the tax-shield advantage and the cost of bankruptcy. The cost-benefit analysis of debt financing is factored into the theory (Tsoy & Heshmati, 2017). As a result, according to Trade-off Theory, every company has the best capital structure at the point where marginal costs and marginal benefits of debt are equal, (Ross et al., 2008). One of the advantages of debt is that it provides a tax shield, lowering capital costs. The cost of debt is made up of the costs of bankruptcy and the costs of debt collection agencies. The cost of bankruptcy arises from the company's heavy reliance on debt and its incapacity to repay it. Conflicts of interest between management and shareholders, as well as between shareholders and lenders, result in agency costs. As a result, the benefit of using debt reduces as the cost of bankruptcy and agency rises, according to trade-off theory (Tsoy & Heshmati, 2017). As a result, the trade-off theory acknowledges that leverage has a detrimental impact on company performance (Hassan et al., 2016). As a result, businesses should be aware of the costs and benefits associated with debt and equity and strive to have the best capital structure possible (Qayyum & Noreen, 2019). The trade-off hypothesis is depicted in Figure 2.1. The ideal capital structure can be achieved by striking a logical balance between the debt advantage of tax-shield and debt expense (Hassan et al., 2016).

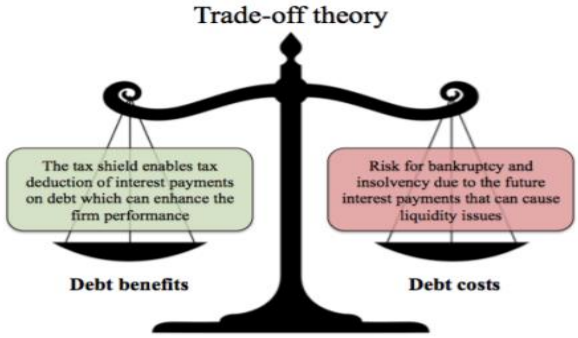

Figure 2.1 The Trade-off Theory

Source: (Hassan et al., 2016)

2.3.4.3 Pecking Order Theory

In 1984, Myers and Majluf created the pecking order theory. The Pecking Order Theory highlights the importance of asymmetric information in capital structure decisions, referring to the fact that managers know more about their companies than investors. The theory states that firms should look for internal ways to fund their operations before turning to external sources, which are riskier and have a negative impact on the firm's value. The hypothesis assumes that a company's management would always prioritize the interests of its shareholders and will not attempt to manipulate current stock prices. Internal funding comes first, followed by debt, and finally equity in the financial hierarchy. If a company wishes to embark on a new project, it should use its own funds rather than relying on outside funding (Brealey et al., 2017; Nwaolisa & Chijindu, 2016; and Muritala, 2012). The Pecking Order Theory, according to La Rocca et al., (2011), is a useful tool for analyzing the financing behavior of firms throughout their life cycle.

The pecking order theory was popularized by Myers and Majluf (1984), who argued that equity is a less preferred type of capital raising because investors believe that when managers issue new equity, they believe the firm is overvalued and that managers are taking advantage of this overvaluation. As a result, investors will give the new share offering a lesser value.

The order of preferences displays the relative costs of the diverse financing options. In connection with this theory Myers (2001) mentioned that the theory of pecking order explains why the majority of external financing comes from debt. It additionally explains why most profitable firms borrow less: this is not due to the fact their target debt ratio is low. Less profitable businesses require outside funding and, as a result, accrue debt. However, many MFIs in Africa may represent an interesting scenario in terms of pecking order theory because retained earnings are zero and pecking order MFIs may choose for debt because many of them lack access to capital markets. If the evidence supports the pecking order idea, findings should point to a negative link between leverage and MFI sustainability. (Kirru, 2013).

The pecking order theory, on the other hand, has several limitations. It doesn't explain how taxes, agency costs, financial distress, security insurance costs, agency charges, or the range of investment options available to a company affect the capital structure of that company. It also overlooks the issues that can occur when a company's executives accumulate enough financial

slack to become resistant to market discipline. In such a circumstance, a company's management would be able to avoid ever being penalized by a low security price and, if combined with non-financial takeover defense, would be immune to being removed in a hostile acquisition. As a result, pecking order theory is recommended as an addition to, rather than a replacement for, the traditional trade-off model. As a result, while the traditional trade-off model is good for understanding corporate debt levels, pecking order theory outperforms it when it comes to describing capital structure changes (Myers, 1984).

2.3.4.4 The Market Timing Theory

According to market timing theory, the choice of the financing method can be influenced by opportunities on the capital market, which arise as a result of information skewness. It was also highlighted that business organization decision-makers should be aware of the times when their own future expectations are higher than those of investors, as well as the times when those expectations are lower. According to the confidential information, the theory suggests that decision-makers ought to recognize instances in which an organization's shares are currently under or undervalued. As a result, corporations use this information to decide whether to issue new shares or contemplate share repurchases when they believe that the stock price is high. Gearing level is influenced by profiting from market opportunities to issue new securities or buy back existing assets (Ater, 2017). Essentially, the idea contends that most of the time, opportunities in the market and market timing influenced businesses' financing decisions and that they did not have an optimal gearing level target (Abeywardhana, 2017).

2.3.4.5 Agency Theory

During the last two decades, a large amount of study has been devoted to models in which capital structure is influenced by agency costs, including costs owing to conflicts of interest (Harris and Raviv, 1991). For starters, there exist conflicts of interest between shareholders and managers because managers are not entitled to 100% of the remaining claims. As a result, the managers do not take home the entire profit from profit-enhancing initiatives, but they do accept the full costs of these actions

According to agency theory, a compromise between several funding choices (equity, loans, and hybrid securities) that provide the resolution of conflicts of interest between the capital suppliers (shareholders and creditors) and managers yields the ideal financial structure of the capital. According to the agency theory, the best capital structure is determined by settling conflicts of interest between managers and capital providers (stockholders and debt suppliers) and other funding options, such as equity, debt, and other securities. (Alnasser and Muhammed, 2017).

2.3.5 Financial Sustainability of Microfinance Institutions

Sustainability of a microfinance institution refers to the long-run viability of its program subsequent the project activities have been completed. It results in the establishment of appropriate systems and processes that will enable microfinance services to be accessible on a continual basis and that clients will continue to benefit from the services on a regular basis. This would also imply that the package would be able to address the needs of the members using resources either from within the group or from outside sources (Guntz, 2011).

Financial sustainability of microfinance institutions is most likely the most important aspect of microfinance viability. It refers to a microfinance institution's ability to survive in the long run based on its own income-generating activities, without relying on donations. According to Myers (2001), the MFI's financial sustainability is important since the poor benefit the most if they have access to financial services over time rather than obtaining a single future loan but being deprived of future loans because the MFI has gone out. The ability of microfinance institutions to operate sustainably and cover operational and financial costs is defined by financial sustainability (Brau & Woller, 2004). Financial sustainability may be examined at two levels: operational self-sustainability and financial self-sustainability. The term "operational self-sustainability" refers to the ability of operating income to cover running costs. Financial self-sufficiency refers to the MFI's ability to cover the costs of funding and other forms of assistance. (ibid)

2.3.6 The Link between Capital Structure and Financial Sustainability

Naz et al., (2019) studied determinants of financial stability of microfinance institutions in Pakistan. And makes use of a panel of unbalanced data made up of 29 MFIs for the years 2008

through 2014 that was received from MIX Market. The study employs fixed effect and random effect, with endogeneity later being accounted for using instrumental variables (2SLS and 3SLS). The results show that the primary variables affecting the financial performance of MFIs in Pakistan are size, cost effectiveness, portfolio at risk, average loan size, and yield on loan portfolio. No evidence of mission drift has been discovered; rather, helping the less fortunate is thought to improve financial results.

A study by Perera (2021) entitled "Determinants of Financial Sustainability of the Microfinance Institutions in Sri Lanka", twenty different independent variables were utilized to assess the sustainability determining factors, with financial self-sufficiency as the dependent variable. The yield on the gross loan portfolio, profit margin, MFI age, organization type, and loan officer productivity were found to be positively and statistically strongly significant at the 1% level. These elements have a significant impact on determining the financial sustainability of MFIs in Sri Lanka. Additionally, while measuring the financial viability of MFIs, the interest rate was positive with a 5% statistically significant level and active borrowers were positive with a 10% level. Operating expense ratio and capital structure were negatively impacted with a statistically significant level of 1%, and portfolio risk after 30 days was negatively impacted with a statistically significant level of 5% in assessing financial sustainability.

In his research on the financial sustainability of MFIs in Tanzania, Ganka (2010) found how the capital structure of a microfinance institution influenced the sustainability of the institution. Studies have also discovered equity financing to be a significant way to boost MFIs' sustainability. Sekabira (2013) discovered that MFIs with a stronger capital structure are more successful while researching the role of funds in the growth of MFIs in Uganda. In their investigation to confirm the impact of equity financing on profitability, Mesquita and Lara (2003) found evidence that there is little association between equity financing and firm's profitability using Return on Equity as a proxy.

Parvin et al., (2020) has conducted study on the relationship between capital structure, financial performance, and sustainability of microfinance institutions (MFIs)in Bangladesh. The association between the capital structure and performance of MFIs is determined using a dat aset of 187 MFIs. The random effect and fixed effect models have been employed in the study's

panel data regression analysis. As indicators of financial performance, return on assets (ROA) and net income to expenditure ratio (NIER) have been utilized. According to the research, the variables that affect NIER are size, risk, and the equity to asset ratio (EAR), as well as the debt to loan ratio (DTL). Furthermore, ROA is positively impacted by EAR, DTL, and risk while it is negatively impacted by risk. The results of this study will give MFIs the tools they need to set up their capital structures in a way that will enhance their financial performance and allow them to reach out to low-income clients who lack collateral.

To determine the profitability, Abrar and Javaid (2016) used the return on assets (ROA), operational self-sufficiency (OSS), and return on equity (ROE) performance measure as dependent variables, the deposit to asset, net deposits, and debt to equity ratio as independent variables. Approximately 70 nations from around the world's cross-sectional unbalanced panel data for the years 2004-2010 were examined in this study using the random effect model. They discovered that deposits are the most affordable form of funding for MIFs. Additionally, they discovered that highly leveraged MFIs are more profitable than less leveraged.

2.4 Empirical Literature Review

There have been debates on how the capital structure of corporate entities affects their performance, but empirical data from different scholars has produced contradictory and inconsistent results (Muriu, 2016). The author undertook an empirical investigation to ascertain whether an MFI's choice of financing affects its profitability. Between 1997 and 2008, Muriu has conducted his research on 210 MFIs operating in 31 nations throughout Asia, the Middle East, Latin America, and Africa were considered. Information was gathered from these organizations. According to the findings, microfinance organizations with greater debt in their capital structures were more profitable. Additionally, it was discovered that, depending on the institution's age, MFIs with larger portfolio to assets ratios were more profitable. The study concluded that to increase microfinance profitability, MFIs should have policies that are focused on having access to long-term debt.

Silva (2008) carried out a study on a dataset of 290 MFIs from 61 nations and ROA and ROE were utilized as performance indicators to examine the impact of capital structure on MFI performance in Kristiansand; the goal was to identify the impact of capital structure on MFI

performance. The overall debt and short-term debt ratios have a positive and significant impact on ROE, but a negative and significant impact on ROA, according to this study. The long-term debt ratio had a positive and significant impact on MFIs' ROE, but not on their ROA. This indicates that if MFIs use long-term debt to fund their operations, there may be no pressure on the MFI's management. This implies that profitable MFIs are more reliant on long-term debt financing.

Ebaid (2009) investigated how capital structure affected the performance of the companies listed on the Egyptian stock exchange. The researcher used a least square regression model to evaluate data from the years 1999 to 2005 on short term debt (STD), long term debt (LTD), and total debt (TD) in order to achieve its objectives. The independent variables were return on asset (ROA), return on equity (ROE), and gross profit margin (GPM). According to Ebaid's 2009 study, long-term debt and return on asset have no observable relationship, but short-term debt and total debt have a considerably negative influence or impact on financial performance as determined by return on asset. Additionally, he asserted that debt (STD, LTD, and TD) has no significant effect on financial performance as measured by return on equity (ROE) and gross profit margin (GPM) (ROE). Additionally, he said that the size of the business has no significant impact on its financial performance.

Kar (2012) used a panel dataset of 782 MFIs in his research. With the perspective of agency theory, the study tries to answer the question "Does funding structure have any significance with the performance of microfinance institutions?" The findings support the agency theoretic claim that increasing leverage increases profit efficiency.

According to a study based on data from 290 microfinance institutions (from 61 countries), the majority of microfinance enterprises incorporate more debt-financing into their frameworks (long term debt in particular). The data also suggest that debt financing allows MFIs to serve a larger number of consumers and achieve greater economies of scale, allowing them to better deal with moral hazards and difficult situations. The data also show that the ratio of total debt to short-term debt has a substantial negative impact on ROA while having a large positive impact on ROE, implying that profitable MFIs rely more on long-term debt financing (Coleman, 2007).

The study by Mbugua (2016) examined the effect of Kenyan deposit taking microfinance institutions'(DTMFIs') capital structure and their financial performance. The study, which spanned three years from 2013 to 2015, employed a descriptive design to describe the features of the six DTMFIs in Kenya as of December 31, 2015. The CBK, the Association of Microfinance institutions of Kenya (AMFI) and the annual reports from DTMFIs were used to gather secondary data. Capital structure was measured using the total long-term debt to equity ratio, and financial performance was assess using return on assets (ROA), which is determined by dividing net earnings after taxes by average assets. In addition, the ratios of shareholders' equity and long-term debt to total assets were included as controlled variables. The study used multiple regression analysis to evaluate the relationship between the variables being considered. The results indicated that the capital structure, measured in terms of the total long-term debt to equity ratio, had a positive impact on the financial performance of deposit-taking microfinance companies. Although the association between long-term debt to assets and ROA was not very strong, it was nevertheless positive.

Orua (2009) investigated relationship between capital structure and the financial performance of MFIs in Kenya. A survey of Nairobi based 36 MFIs was examined to explore the relationships between capital structure, outreach level, and default rate as of December 2008. Performance was tested in terms of Outreach and default rate in the different regression models that were applied. Short-term, long-term, and total debts as a percentage of total assets were the independent variables in the regression models, while firm size, risk level, and firm age were also employed as control factors to account for other exclusions. The results demonstrated that the majority of MFIs used high leverage. The typical level of overall debt was 76%. Furthermore, the findings indicated that MFIs relied significantly on long-term debt for their operations, as opposed to financing them with short-term loans. It was discovered that short-term debt has a positive impact on MFI outreach. Both short- and long-term debts showed expected results but were not significant, demonstrating that maturity may not always be of the utmost importance. Long term debt, however, showed a positive association with outreach but was not significant regarding default rates. Highly leveraged MFIs performed better by interacting with more clients. It was also shown that these MFIs benefited from economies of scale, which improved their capacity to manage risks by enabling them to deal with moral hazards and poor choices.

The study by Dinh and Pham (2020) investigated how capital structure affects the financial performance of pharmaceutical companies that are going public on the Vietnamese stock exchange. Self-financing, financial leverage, long-term assets, and debt to assets ratios are used as the study's four independent variables, with ROE acting as the dependent variable in the regression model. Additional factors utilized as controls are company size, fixed asset rate, and growth. The researchers gathered information on all 30 pharmaceutical companies that were listed on the Vietnamese stock market for the years 2015 through 2019. The relationship between the capital structure and the financial performance of the firms is examined using the least square regression (OLS). The findings demonstrated a positive association between firm performance and the financial leverage ratio (LR), long-term asset ratio (LAR), and debt-to-assets ratio (DR), but the self-financing has a negative impact on return on equity (ROE). Based on the results, the study recommend that the Vietnamese government concentrate on stabilizing the macro environment to establish a good business environment. Additionally, the pharmaceutical companies should create a more logical capital structure with a higher debt to equity ratio and a variety of loan mobilization methods, including the issuance of long-term bonds. The companies should also suitably scale up to maintain growth and their ability to pay debts.

Weldehana (2013) used audited financial statements from each of the ten sampled companies in Ethiopia's metal and engineering industry over a six-year period (2007 to 2012) to examine the effects of capital structure on financial performance. The study's multivariate OLS regression results show that capital structure, as measured by debt ratio, has a significant and positive impact on financial performance (as measured by return on equity) of the Metal and Engineering Industry companies; additionally, short term debt ratio has a significant impact while long term debt ratio has an insignificant but positive impact as the study examined whether different levels of debt maturity have different effects on financial performance. As a result, the study concluded that data from Ethiopia's metal and engineering industry enterprises corroborate trade off theories and that, despite their importance, levels of debt maturity had no noticeable effect on financial performance. In contrast, it was discovered that the controllable variable asset tangibility had a strong and negative correlation while asset turnover and firm size did not. The study's final recommendation was for companies in the metal and engineering industries to incorporate more debt into their capital structures. However, these companies should carefully consider the best level of debt utilization before doing so, as doing so could expose them to the risk of bankruptcy.

Gebremichael (2016) studied the impact of capital structure on profitability of core business operations of commercial bank of Ethiopia. The results showed that, whereas total debt to asset, a measure of capital structure, had a statistically significant negative influence on the profitability of commercial banks' main business activities, deposit to asset had a statistically significant positive impact. Additionally, there was a statistically significant and favorable association between profitability and the loan to deposit ratio, spread, and asset size. Growth was discovered to have no statistical impact on profitability, nevertheless. Therefore, when making financing decisions, the bank should take proper care to manage its debt effectively, mobilize deposits sufficiently, and enhance loan advances, spread, and size. In order to keep financing costs as low as possible and maximize profitability and the value of the bank, it is also advised to reduce non deposit debt financing and increase equity financing. In addition, the National Bank of Ethiopia, which sets policy, suggested re-evaluating the need to increase the minimum capital requirement for banks.

Mekonnen (2021) investigated how capital structure affected the financial performance of selected commercial banks in Ethiopia. The study used three capital structure measures- total debt ratio (TDR), loan to deposit ratio (LDPR), and deposit to asset ratio (DPA) as independent variables and one of the accounting-based measures of financial performance that is return on assets (ROA), as a dependent variable. Moreover, two control variables- bank size and growth, were included. According to the results, capital structure had a favorable link with profitability as assessed by ROA and was statistically significant at the 5% level. This relationship is indicated by total debt to total asset ratio. It had theoretical backing from trade-off theory. In addition, the loan to deposit ratio was statistically insignificant at even the 10% level of significance while having a positive association with profitability (ROA). The concept was also backed up by trade-off theory. In contrast, the association between deposit to asset and bank profitability was adverse, with the relationship being strongly statistically significant at the 1% level as evaluated by ROA. Pecking order theory supported it theoretically. Growth and asset size on the control variables revealed a statistically significant negative association with profitability. The results demonstrated that Ethiopian Commercial Banks have believe in total debt financing, which maximizes bank profitability, and that these banks should preserve their financing concentrate on deposits rather than turn to other sources.

In Ethiopia, empirical research on the microfinance industry have been undertaken, although the topics, scopes, comprehensiveness, and depth of the studies differ. Woldeyes (2012) investigated the determinants of MFI operational and financial self-sufficiency in Ethiopia, for example. As explanatory variables for the OSS, the study looked at yield, size, personnel productivity ratio, debt to equity ratio, cost per borrower, average loan per borrower, and MFI age. FSS of MFIs in Ethiopia is determined by yield, cost per borrower, liquidity ratio, number of active borrowers, operational expense ratio, and age. The study discovered that average loan balance per borrower, MFI size, cost per borrower, and yield on gross loan portfolio have a significant impact on Ethiopian MFIs' operational sustainability, while cost per borrower, number of active borrowers, and yield on gross loan portfolio have a significant impact on their financial sustainability.

In addition, Tehulu (2013) conducted research on the determinants of financial sustainability of Microfinance Institutions in East Africa, including Ethiopia, and found that loan portfolio, size, and management efficiency are important determining factors for financial sustainability of East African MFIs, including Ethiopia. More determining criteria for financial sustainability of MFIs in Ethiopia are clearly missing from this study. This study examined that leverage has a significant and negative impact on financial sustainability of MFIs. Financial sustainability is positively and significantly influenced by the gross loan portfolio to total asset and size of the firm whereas efficiency and credit risk have a negative and significant impact on financial sustainability of MFIs.

Feyisa (2017) investigated the factors affecting capital structure in the MFI sector in Ethiopia. The researcher used secondary data of 15 sample MFIs from the MIX market database for the years 2003 2009 that meet the requirements for data availability. The typical factors of capital structure are examined using a panel data model with Random Effect Multiple Regression. With two different model specifications, a sequential regression strategy was used. The study's findings revealed a substantial negative association between MFI profitability and leverage, as well as positive relationships between MFI size and tangibility. However, the data indicate conflicting findings on the effects of both age and growth rate on the leverage of Ethiopian MFIs. However, it was discovered that business risk had a negative but minor impact on leverage. The study's findings have provided some new information about the capital structure theory. In the period of greater commercialization of microfinance, rules could also be developed

to support and foster an atmosphere where MFIs can use debt as a viable source of funding to achieve their noble goal.

Getaneh (2017) carried out a study to examine how capital structure affected the financial performance of microfinance firms in Ethiopia using panel data analysis technique. The study was based on thirteen microfinance organizations that were operating in the microfinance sector between the years of 2010 and 2015. In this study ROE was used as a proxy for measuring financial performance and debt-to-asset, deposit-to-asset and interest coverage ratio were proxies for MFIs' capital structure The results revealed that the majority of the microfinance institutions had used excessive leverage. The average deposit to total asset ratio showed a mean value of 42.2%, and the average total debt ratio was around 63%. Except for firm size, all other factors are positively correlated with the financial performance of Ethiopian microfinance organizations. The study's final recommendation was that, to optimize their financial advantage, microfinance organizations in Ethiopia should incorporate more debt, at an optimal level, into their capital structure.

Kereta (2007) conducted another study on the industry's outreach and financial performance, which used descriptive analysis, graphs, and percentage growth rates to find that MFIs are operationally sustainable as measured by ROA and ROE, and that the industry's profit performance is improving over time. The use of these proxies (ROA and ROE) by Kereta (2007) and others for sustainability measurement contrasted with previous studies on MFI sustainability. Other similar studies, including as Alemayehu, 2008; Asnakew, 2012; and Yenesew, 2014; have been conducted on the performance of MFIs in Ethiopia at various times.

2.5 Research Gap and Justification

Microfinance institutions have proven to be critical to any country's economic development. Improved MFI performance promotes financial deepening in an economy, allowing them to contribute significantly to the development of that economy by providing key and basic financial services. Microfinance Institutions (MFIs) have moved to the forefront as critical development institutions. Microfinance has worked to develop sustainable firms and innovations since its inception in the 1970s. (Labie 2001; and Stauffenberg, 2001). Many entrepreneurs with limited assets have been able to develop small scale firms as a result of MFIs, resulting in the creation of

jobs and a significant contribution to economic growth. MFIs, according to Bogan (2008), have broadened institutional finance's horizons and brought the impoverished into the formal financial system.

The empirical findings on capital structure's impact on financial sustainability were mixed. Several studies have discovered that capital structure has a significant effect on financial sustainability (Bogan 2008; and Nyamsogoro 2010). Kinde (2012), on the other hand, claimed that capital structure had a minor impact on MFI financial sustainability. Coleman (2007) discovered that highly leveraged MFIs in Ghana performed better because they were able to reach out to more clients and benefit from economies of scale. Berger and Patti (2006) and Dinh and Pham (2020) also claimed that there is a positive correlation between financial sustainability or profitability performance measures and leverage. In contrary to this, there are findings that revealed negative correlation between financial sustainability or profitability and debt financing according to studies by Bhushan and Mohinder, 2016; Cassa and Holmes, 2003; Khan, 2012; and Oke and Afolabi, 2011. This is one of the justifications why this study seeks to investigate the effect of capital structure on the financial sustainability of in Ethiopia.

Moreover, many of the capital structure and performance research findings in Ethiopia context came from the banking, construction and manufacturing industries (Abdi and Bayu, 2021; Daniel, 2011; Gebremichael, 2016; Kedir, 2017; Mesele, 2017; and Tadesse and Tripti, 2021; Weldehana, 2013; and Zerah, 2011). Moreover, most research on MFIs concentrated on determinants of capital structure, financial performance analysis and outreach. (Abate et al., 2013; Alemayehu, 2008; Asnakew, 2012; Kereta, 2007; and Yenesew, 2014) For this reason, this study sought to investigate the impact of the capital structure on MFI financial sustainability as measured by operational self-sufficiency. The study explored how capital structure (using proxies like capital-to-assets ratio, debt-to-equity ratio, deposits-to-loans ratio, deposits-to-assets ratio and portfolio-to-assets ratio) affect Ethiopia's MFI financial sustainability.

2.6 Conceptual Framework

A conceptual framework helps a researcher in clarifying the proposed relationships between variables in a particular study. It is a diagram that shows how an independent variable, and a dependent variable are related. A conceptual framework shows a written or visual presentation

that illustrates the primary topics to be studied, the important concepts, components, or variables, and the assumed relationships between them in either graphical or narrative form. The interrelationship of these components completes the framework for specific expected results. (Miles and Huberman, 2014).

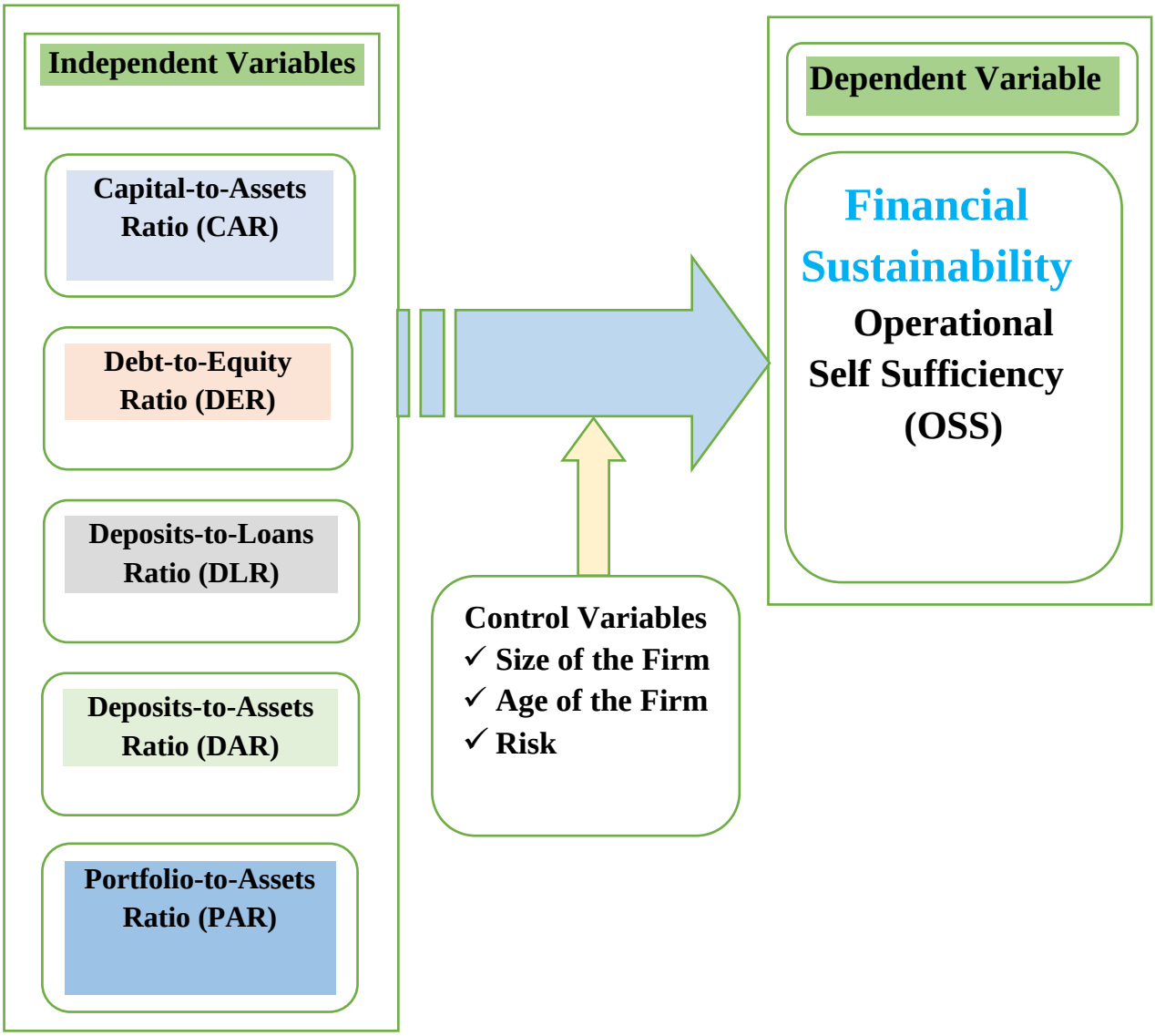

Figure 2.2 Relationship between Variables

Source: *Researcher's Compilation (2022)*

CHAPTER THREE

3. RESEARCH METHODOLOGY AND DESIGN

3.1 Introduction

This chapter presents the research design and methodology employed to conduct the study. Accordingly, the research design and approach, target population, sample size, sampling techniques are defined. Moreover, research instruments, data sources and method of data collection procedure, ethical consideration and data presentation and analysis used for the study are accommodated in this chapter.

3.2 Research Methodology

The research is mainly quantitative, with an econometric model being developed to detect and measure the impact of capital structure on financial sustainability of MFIs. Quantitative research examines the relationship between variables in order to test objective theories. (Creswell, 2009). To arrive at measurable findings, quantitative data research relies on the measurement and analysis of statistical data.

3.3 Research Design

A research design is a conceptual structure that depicts how all the major components of a research study fit together. The purpose of research design, according to Kothari (2004), is to create a blueprint for data collecting, measurement, and analysis. According to Leedy and Ormrod (2005), study design is a comprehensive plan that includes highlighting all other procedures used in data gathering and analysis.

This study used an explanatory research design to achieve the objectives of the study. This method was appropriate for this study because it describes the patterns of relationships between variables and shows how a change in one variable (the independent variable) affects another variable (the dependent variable). The study examined the relationship between independent variables and dependent variables and draw conclusions about the relationship. (Saunders et al. 2007).

3.4 Research Method

3.4.1 Data Type and Collection Method

This study used secondary data as compiled by Association of Ethiopian Microfinance Institutions (AEMFI) in its annual financial analysis report for the period covering 2011-2020. The annual financial analysis report was produced using audited financial statements acquired from member microfinance institutions Such audited financial statements are especially useful for assessing the financial performance of microfinance institution.

3.4.2 Population and Sampling Technique

Sampling is a method of selecting a representative sample for the purpose of ascertaining population parameters. The population is the collective of all the objects being considered in any subject of investigation. (Kothari, 2004). In this study, the target population included all 49 microfinance institutions in Ethiopia which provide financial services to low-income people in the country.

The study used a non-probability sampling technique called purposive sampling to choose samples depending on the availability of financial data and age of the microfinance institution institutions since their establishment. The research is done based on audited reports gathered from member microfinance institutions. Until 2021, the AEMFI has published 15 performance analysis reports (there are a single year financial analysis report may cover more than one year, for instance the 2018 report encompasses performance analysis of three years 2015-2017). Accordingly, from 49 microfinance institutions currently operating in Ethiopia, 20 microfinance institutions (out of the total 35 member MFIs) have been included as a sample in the study. These MFIs were in operation for more than ten years (2011-2020) and having complete data in the annual financial analysis report of AEMFI. The selected twenty MFIs are: Amhara Credit and Saving Institutions S.C (ACSI), Addis Credit and saving Institutions S.C (ADCSI), Aggar, Africa Vilage Financial services S.C (AVFS), Benishangul-Gumuz Micro Financing, Buusaa Gonofaa, Dedebit Credit and Saving Institutions S.C (DECSI), Dire, Dynamic, Eshet, Harbu, Letta, Meklit, Metemamen, Oromia Credit and saving S.C (OCSSCO), Omo, Poverty Eradication and Community Empowerment Microfinance Institutions S.c (PEACE), Specialized Financial and Promotional Institution S. Co.(SFPI), Sidama, and Wassa.

3.4.3 Data Analysis Techniques

Panel data from twenty microfinance institutions was collected over a ten-year period (2011 to 2020) to achieve the research objectives. Panel data has the advantage of providing more meaningful data because it combines cross-sectional data, which captures individual variability, with time-series data, which captures the data's dynamic aspect. As a result, increased variety, degrees of freedom, efficiency, and less collinearity among variables are ensured (Baltagi, 2008; and Gujarati, 2008).

The acquired panel data was analyzed using descriptive statistics and multiple regressions utilizing the statistical tool STATA Release 15 software. In addition, descriptive statistics such as mean, standard deviation, minimum, and maximum values were used to define the features of the variables under study. Furthermore, diagnostic test was conducted to verify the model validity based on the Classical Linear Regression Model assumptions. Heteroskedasticity Test, Autocorrelation Test, Multicollinearity and Normality Test are among the assumption tested. The Hausman specification test was also be utilized to pick between the random effect (RE) and fixed effect (FE) models for this investigation. Finally, the regression findings are presented in a tabular format with the necessary test statistics, followed by a description of each parameter based on the literature. The theoretical reviews and recommendations from the empirical evidence of well-known studies mentioned in this study serve as the foundation for the analytical models and variables taken into consideration in this investigation.

3.5 Ethical Considerations

Regarding the data collection and use, the study has adhered to ethical standards. All ideas and theories borrowed from other academics and used for the literature review were acknowledged. Additionally, the information gathered is only utilized for this research study and under no circumstances it will be given to a third party.

3.6 Econometric Model Specification

To analyze the effect of capital structure on financial sustainability of Ethiopian MFIs, fixed effect panel regression model was used. Based on the critical review of literature, this study estimates the following model:

$$OSS_{it} = \beta_{it} + \beta_1 CAR_{it} + \beta_2 DER_{it} + \beta_3 DLR_{it} + \beta_4 DAR_{it} + \beta_5 PAR_{it} + \beta_6 AGE_{it} + \beta_7 SIZE_{it} + \beta_8 RISK_{it} + \varepsilon_{it}$$

Where:

OSS_{it} = operational self-sufficiency of a MFI i at time t,

CAR_{it}= Capital-to-Assets Ratio (CAR) of a MFI i at time t,

DER_{it}= Debt-to-Equity Ratio (DER) of a MFI i at time t,

DLR_{it} = Deposits-to-Loans Ratio (DLR) ratio of a MFI i at time t,

DAR_{it} =Deposits- to- Assets Ratio (DAR) ratio of a MFI i at time t,

PAR_{it}=Portfolio- to- Assets Ratio (PAR) ratio of a MFI i at time t,

AGE_{it} = age of the MFI i at time t,

$SIZE_{it}$ = the size of the MFI and it is the natural log of asset base of MFI i at time t;

$RISK_{it}$ = default risk of MFI i at time t and it is measured by PAR> 90 days for MFI i at time t;

ε_{it} = error term,

β_{it}= constant term. β_{it} , i = 1, …, 20, is the unknown intercept for every MFI i at time t , t = 2011,...,2020. "i" denote the microfinance institutions to be studied and "t" represent the time-period.

β_1, β_2, β_3, β_4, β_5, β_6, β_7 and β_8, represent estimated coefficient for specific MFI i at time t.

Table 3.1 provides a summary of the variables and hypotheses.

3.7 Variable Specification and Measurement

The research framework in this study contains three main variables-independent variable, dependent variable, and control variable.

3.7.1 Independent Variables of the Study

The dependent variable in this study is the MFIs financial sustainability as measured by Operational self sufficiency.

Operational Self-Sufficiency (OSS)

Operational self-sufficiency is a ratio that indicates how well a financial institution can pay its operational costs with generated revenue. Administration costs, financing costs, impairments expenses labor, and other expenditures associated with MFI operations are included in the operational costs (Aveh et al., 2013; and Schafer & Fukasawa, 2011). The OSS ratio excludes donations and non-operating revenues. The ratio, however, includes financial expenses and impairments expenses with other operating costs. This ratio measures the extent to which the MFI can function independent of grants. As a result, the larger the ratio, the greater the MFI's operational self-sufficiency and financial sustainability.

If the OSS ratio is above 100%, this means that the MFI is sustainable and self-sufficient, and the 100% OSS ratio means that the MFI is break-even. And a rate of less than 100% implies that MFI cannot cover operating costs or provide credit to customers (Bogan, 2012; and Bayai & Ikhide, 2016).

$$\textbf{Operational Self-Sufficiency (OSS)} = \frac{\text{Financial Revenue}}{\text{FE} + \text{NLLPE} + \text{OE}}$$

Where FE= Financial Expense

NLLPE=Net Loan Loss Provision Expense

OE=Operating Expense

3.7.2 Dependent Variables of the Study

The independent variable is capital structures as measured by capital-to-assets ratio (CAR), debt-to-equity ratio (DER), deposits-to-loans ratio (DLR), and deposits-to-total assets ratio (DAR), and portfolio-to-total assets ratio (PAR). These five ratios are employed in the study as proxies for capital structure.

Capital-to-Assets Ratio (CAR)

The capital to asset ratio is a simple measure of the solvency of MFIs. It helps the MFI to assess its ability to meet its obligations and absorb unexpected losses. The determination of an acceptable CAR is generally based on MFI's assessment of its expected losses as well as its

financial strength and ability to absorb such losses. (AEMFI, 2020). It is calculated by the following formula

$$\textbf{Capital} - \textbf{to} - \textbf{Assets Ratio (CAR)} = \frac{\text{Adjusted Total Equity}}{\text{Adjusted Total Assets}}$$

Debt-to- Equity Ratio (DER)

The debt-to- equity ratio is a widely used measure to evaluate a company's leverage, or more specifically, how much of its funding comes from debt (Lislevand, et al., 2012). We can divide total liabilities by total equity to measure the extent of indebtedness for a firm. In the case of microfinance institutions, the overall debt includes all deposits, borrowings, account payables, and other liability accounts that are owed to third parties. The debt/equity ratio gauges the MFIs' entire leverage, making it the most straightforward and well-known indicator of capital adequacy (AEMFI, 2020).

$$\textbf{Debt} - \textbf{to} - \textbf{Equity Ratio (DER)} = \frac{\text{Adjusted Total Liabilities}}{\text{Adjusted Total Equity}}$$

Deposits-to-Loans Portfolio Ratio (DLR)

Deposits are the most cost-effective and easiest-to-get financing option. Clients, financial institutions, and local economies all benefit from deposit services. It offers consumers relatively secure deposit services that suit the ongoing needs of a significant number of underprivileged people. Deposit-taking may be the key to financial stability for financial organizations. This can be accomplished by providing a consistent source of funding for a rising loan portfolio, allowing MFIs to become less reliant on external sources of funding and, as a result, improving the institution's sustainability. (CGAP, 2005 and Elser et al., 1999)

MFIs' ability to save and mobilize funds is critical to their sustainability. For MFIs that mobilize deposits, the deposit-to-loan ratio is an essential metric. The deposit to loan ratio is a measure of how much of an MFI's portfolio is funded by deposits. The higher the percentage, the more capable the MFI is in funding its loan portfolio from its deposits, and the more commercialized the microfinance operation becomes. As a result, a greater ratio lowers the cost of funds and allows MFIs to rely on internal capital. Deposit mobilization is becoming increasingly crucial in Ethiopia, as commercial banks appear hesitant to fund MFIs' debt portfolios. Some commercial banks provided MFIs with loans backed by strong third-party guarantees (AEMFI, 2020). In

brief, the DETL ratio measures the members saving or deposit of the firm in relation to its loan and is calculated as:

$$\textbf{Deposits} - \textbf{to} - \textbf{Loans Ratio (DLR)} = \frac{\text{Voluntary Savings}}{\text{Adjusted Gross Loan Portfolio}}$$

The numerator in the above formula is voluntary saving. The amount of money that members of MFIs have put is referred to as the savings. Savings come in two flavors: voluntary savings and compulsory savings. When members of MFIs are financially stable enough to make some savings at interest rates set by the market and have the freedom to withdraw those savings whenever they want, those savings are referred to as voluntary savings. The term "compulsory savings" refers to a sum of money that borrowers must save with MFIs monthly to be eligible for a loan.

Deposits-to-Assets Ratio (DAR)

The deposit-to-assets ratio (DAR) is particularly essential for microfinance institutions that mobilize deposits. A smaller ratio enables MFIs to fund their assets directly from their deposit base, whereas a greater deposit collection (as a percentage of total assets) results in lower funding expenses, all while maintaining the deposit-operation program and financial cost-efficiencies. A higher ratio necessitates greater external investment, which is a costly source of capital. Deposits are used by microfinance institutions not just as a source of money, but also as a source of expenses for management, which can act as a motivation for improved management and hence increased profitability. (Hollis and Sweetman, 1998).

$$\textbf{Deposits-to-Assets Ratio (DAR)} = \frac{\text{Voluntary Savings}}{\text{Adjusted Total Assets}}$$

Portfolio-to-Assets Ratio (PAR)

Ratio of gross loan portfolio to total assets is portfolio-to-assets ratio (PAR). (AEMFI, 2020). Gross loan portfolio refers to the outstanding principal balance of all MFI's outstanding loans, including current, delinquent, and restructured loans, but not loans that have been written off. It does not include interest receivable. Although some regulated MFIs may be required to include the balance of interest accrued and receivable, the MFI should provide a note that gives a

breakdown between the sum of all principal payments outstanding, and the sum of all interest accrued.

$$\textbf{Portfolio-to-Assets Ratio (PAR)} = \frac{\text{Adjusted Gross Loan Portfolio/}}{\text{Adjusted Total Assets}}$$

3.7.3 Control Variables

There are various variables besides capital structure that will have impact on MFIs financial sustainability, this can be why control intervening variables are included within the model. The following control variables are used, age of the firm, size of the firm, and risk.

Size of MFIs

The natural log of total assets is used to calculate the size of the MFIs.

Age of MFIs

The age of an MFI determines how long it has been in operation. It is one of the most important factors to consider when analyzing the efficiency and growth of MFIs for outreach. (Cull, 2007; Gonzalez, 2007) found that institutions with at least six years of experience have 100 percent financial sustainability.

Default Risk

Portfolio at Risk is the microfinance sector's most popular measure of portfolio quality. Here in this study, portfolio at risk 90 Days (PAR90) measure the default credit risk for unpaid loans that are still outstanding and is thought to be detrimental to sustainability of MFIs. (MicroSave, 2008)

$$\textbf{Portfolio-at-risk (PAR) Ratio} = \frac{\text{Portfolio at Risk (X days)}}{\text{Gross Loan Portfolio}}$$

Table 3.1 Definition of Variables and their Specification

Variables		Notation	Description	Measurement	Expected Sign	Source of Data**
DEPENDENT VARIABLES	Financial Sustainability	OSS	Operational self-sufficiency	Financial Revenue/ (Financial Expense + Net Loan Loss Provision Expense* + Operating Expense)	N/A	AEMFI Report
INDEPENDENT VARIABLES	Capital structure	CAR	Capital to asset ratio	Adjusted Total Equity/ Adjusted Total Assets	+	AEMFI Report
		DER	Debt to equity ratio	Adjusted Total Liabilities/Adjusted Total Equity	+	AEMFI Report
		DLR	Deposits to Loans ratio	Voluntary Savings/Adjusted Gross Loan Portfolio	+	AEMFI Report
		DAR	Deposits to total assets ratio	Voluntary Savings/Adjusted Total Assets	+	AEMFI Report
		PAR	Gross loan portfolio to total assets ratio (PAR)	Adjusted Gross Loan Portfolio/Adjusted Total Assets	+	AEMFI Report
CONTROL VARIABLES		RISK	PAR > 90 days	Outstanding balance, loans overdue > 90 days/Adjusted Gross Loan Portfolio	-	AEMFI Report
		AGE	Age of the firm	Age of MFIs since their establishment	+	AEMFI Report
		SIZE	Size of the firm	Log of assets, adjusted for inflation and standardized loan portfolio provisions and write-offs.	+	AEMFI Report

* Net Loan Loss Provision Expense also called Impairment Expense

**The source for the measurements is the Association of Ethiopian Microfinance Institution's (AEMFI's) Annual Financial Analysis Report (2020).

CHAPTER FOUR

4. DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter attempts to present the data gathered from conducting the research and its subsequent analysis. The emphasis is on in-depth examination of the data and discussion of results that address the research questions and accomplish the research objectives listed in the first chapter with reference to theories and the empirically reviewed literature. Before interpreting the results, a diagnostic test was conducted for the regression model to determine whether the assumption for the regression model was violated or not. Moreover, the nature and the importance of the model specification tests were explained. In this chapter, the findings from the fixed effects regression model on the effect of capital structure on the financial sustainability from 2011 to 2020 are presented, analyzed and interpreted.

4.2 Descriptive Statistics

Table 4.1 shows the descriptive statistics for the dependent, explanatory, and control variables utilized in the subsequent analyses. Descriptive statistics use numerical and graphical techniques to organize, compile, analyze, and present data. The procedure looks for patterns in the dataset, summarizes the data in the record, and presents it in an acceptable format. Statistics used to describe data from STATA can summarize the information in the data by revealing the mean, standard deviation, minimum and maximum index for the variables used in the study. The summary of descriptive statistics of the variables used in the study is shown in Table 4.1 below. This will help us in locating some irregularities or abnormalities in our dataset prior to running the regression.

The descriptive statistics are displayed in Table 4.1. The findings show that the tested MFIs' average operating self-sufficiency (OSS) is around 134%. This indicate that, on average, the MFIs investigated covered all its costs through own operations and are not relying on contributions or subsidies from donors to survive. International practices also demonstrate that OSS must be greater than 120% to achieve the sustainable long-term operation. The lowest and the highest OSS are 21% and 278%, respectively. The variability in the data set of the MFIs is considerably high as the

value are not close to the mean. This is also validated by the standard deviation of 42% by the MFIs during the study period. The p50 value of OSS shows that 50% of the MFIs had registered more than the calculated 132%.

Table 4.1 Results of Descriptive Statistics Analysis

Variable	Obs	mean	sd	p50	min	max
oss	200	1.341	.419	1.325	.21	2.78
size	200	8.389	.936	8.255	5.97	10.53
age	200	16.8	4.512	17	3	24
risk	200	.0562	.0860	.03	0	.77
car	200	.380	.297	.33	.08	2.808
der	200	2.356	1.633	2.02	.03	11.88
dlr	200	.481	.209	.43	.14	1.3
dar	200	.375	.206	.32	.12	1.62
par	200	.825	.525	.77	.17	4.67

Source: Researcher's Computation (2022)

The CAR on average was 38%. This demonstrates that the MFIs, on average, had capitalization levels above the National Bank of Ethiopia statutory minimum requirement of 12% computed as a ratio of capital to total risk weighted assets (Directives No MFI/27/2015). This demonstrates how the MFIs' sufficient capital allows them to withstand adverse economic shocks. With a minimum CAR of 8% and a maximum CAR of 281%, the MFIs exhibit high overall fluctuation, as indicated by the standard deviation of 0.297. The p50 also revealed that 50% the Ethiopian MFIs under review had a capital adequacy of more that the calculated 33 %.

The average debt-to-equity ratio is 2.36, which shows that most MFIs are heavily leveraged and rely on debt financing. Ethiopian MFIs reviewed had an average DER of 2.36, which means that the microfinance institutions, on average, were able to obtain debt financing at amount equivalent to 2.36 of their equity. Put another way, the finding revealed that debt on average was used to finance MFIs at a rate that was around 236% times higher than equity. The debt-to-equity ratio ranges from 3% to 119% with a standard deviation of 163%, demonstrating the wide fluctuation in

leverage in the MFIs industry. Additionally, the p50 showed that 50% of the Ethiopian MFIs under examination had debt-to-equity ratio that were higher than the estimated 202%.

The summary of deposits to loans ratio (DLR) shows that the average DLR over the study period is 48%, the maximum is 130% and the minimum is 14%. The deposit to loan ratio is used to assess MFIs' liquidity by comparing their total deposits to their loans for the same period. The higher this ratio, the more it suggests that the institutions are mobilizing deposits to meet lending demand. The average value of this statistic (0.48) shows that MFIs in Ethiopia are mobilizing internal deposits. This means that a mobilized deposit can finance, on average, 48% of their gross loan portfolio. However, the minimum value of 14% demonstrates that only a few numbers of MFIs issue 14% loans from the mobilized savings. The maximum value for this variable, however, is 1.30, which shows that a few numbers of MFIs have a surplus deposit of 30% that is not used to finance loans. Less credit demand is to account for this. The study also showed a standard deviation of 21% and 50% the MFIs investigated were more than the calculated p50 of 43%.

The other independent variable, the deposits to assets ratio, which was calculated by dividing the total amount of customer deposits by the total assets of the sampled microfinance institutions during the study period, was 37.5 percent on average. The ratio of deposits to assets in the context of MFIs quantifies the proportion of the MFI's total assets that are funded by deposits. The DAR value, therefore, indicates that the average amount of deposits in Ethiopian microfinance institutions amounts to 37.5 percent of their total assets. A microfinance institution's highest deposit-to-asset ratio in during 2011-2020 was 162 percent, and its lowest ratio in that same period was 12 percent. The ratio of deposit value to asset value deviates by around 21% on either side from its mean. Moreover, the p50 value indicates that 50% of the MFIs are higher than the calculated 32%.

The fifth independent variable, portfolio to total assets, had a minimum and maximum value of 0.17 and 4.67, respectively. The mean value of portfolio to total assets is equal to 0.825 with a standard deviation of 0.525. This ratio determines how much MFIs devote to its primary business—lending—and, often, to its most lucrative undertaking loans. High results could point to insufficient liquidity levels, while low results could point to inefficient asset

utilization. In addition, the calculated value p50 shows that 50% the MFIs included in the study recorded an amount more than 0.77.

The size of the MFIs was indicated by the natural logarithm of the total assets. The maximum and minimum values for the sample MFIs over the study period were 5.97 and 10.53, respectively. Additionally, the MFI's size had a mean of 8.39 and 0.94 standard deviation. This demonstrates how the total assets of MFIs fluctuated during the study period. Moreover, according to the predicted value p50, 50% of the MFIs included in the study had a size of higher than 8.25.

Table 4.1 also indicates that the MFIs under study average age is 16.8, with the maximum MFI age of 24 and the minimum 3. The high standard deviation of 4.51 illustrates very high variances among the MFIs under investigation. Furthermore, according to the p50, 50% of the Ethiopian MFIs under investigation had age of the MFIs that were higher than the predicted value of 17.

The summary statistics for risk (as measured by PAR > 90 days) indicates that the MFIs under study had a minimum and maximum value of 0.00 and 0.77, respectively; with a mean value of 0.06. Additionally, the amount of the MFI's standard deviation was 0.09. Although the PAR ratio varies from region to region, a value of that goes beyond 8% should be a reason for worry. (MciroRates's, 2019 as cited AEMFI, 2021). Thus, the mean value of 6% implies that the value was not a cause for worry. Also, the p50 indicated that 50% of the reviewed MFIs had recorded more than the calculated amount, 3%.

4.3 Correlation Analysis

Correlation is a measure of how closely two or more variables are associated to one another. The Pearson product-movement coefficient, also known as the Pearson correlation and employed in this work, is the most used bi-variant correlation statistic. It assigns a value between − 1 and 1, where 0 is no correlation, +1 is a perfect positive association and -1 is perfect negative relationship. (Zikmund, 2013). The most important factor in determining whether the correlation coefficient is different from zero or statistically significant is sample size. A correlation value of about or above 0.20 is significant at the 5% level of significance when the sample size

approaches 100. (Meyers et al. 2006). The study's sample size was 10*20 matrixes, or 200 observations. Table 4.2 shows the correlation matrix for each variable in the regression model.

Table 4.2 Result of Correlation Analysis (n=200)

	oss	size	age	risk	car	der	dlr	dar	par
oss	**1.0000**								
size	**0.4619***	**1.0000**							
	(0.0000)								
age	**0.1842***	**0.6397***	**1.0000**						
	(0.0090)	(0.0000)							
risk	**-0.2401***	**-0.2447***	**-0.1737***	**1.0000**					
	(0.0006)	(0.0005)	(0.0139)						
car	**-0.0204**	**-0.2902***	**-0.1797***	**-0.0248**	**1.0000**				
	(0.7746)	(0.0000)	(0.0109)	(0.7273)					
der	**0.0061**	**0.5742***	**0.4520***	**-0.0475**	**-0.4008***	**1.0000**			
	(0.9316)	(0.0000)	(0.0000)	(0.5038)	(0.0000)				
dlr	**0.0617**	**0.4788***	**0.2459***	**0.1499***	**-0.2655***	**0.4772***	**1.0000**		
	(0.3855)	(0.0000)	(0.0004)	(0.0341)	(0.0001)	(0.0000)			
dar	**0.0855**	**0.2641***	**0.2344***	**-0.1322**	**0.4857***	**0.2317***	**0.4386***	**1.0000**	
	(0.2288)	(0.0002)	(0.0008)	(0.0621)	(0.0000)	(0.0010)	(0.0000)		
par	**0.0231**	**-0.1049**	**0.0421**	**-0.1603***	**0.7678***	**-0.1129**	**-0.2324***	**0.7467***	**1.0000**
	(0.7452)	(0.1392)	(0.5542)	(0.0234)	(0.0000)	(0.1115)	(0.0009)	(0.0000)	

**Pearson correlation is significant at the 0.05 level (2-tailed). P-values in parenthesis.*

Source: Researcher's Computation (2022)

The coefficients values revealed various levels of associations among the variables. For instance, operational self-sufficiency (OSS) exhibits a weak positive but insignificant association of 0.0061, 0.0617, 0.0855 and 0.0231 with debt-to-equity ratio (DER), deposits-to-loans ratio (DLR), deposits-to-assets ratio (DAR) and portfolio-to-assets ratio (PAR), respectively. Additionally, the correlation matrix demonstrates that OSS has a strong positive significant link with the size and age of MFIs, respectively, with values of 0.4619 and 0.1842. Finally, it was discovered that risk, as determined by PAR > 90 days, and OSS had a negative significant relationship of -0.2401 at 5% significance.

DER, DLR, DAR, PAR, size and age are positively correlated with the MFIs financial sustainability, as determined by OSS. There will be a multicollinearity issue in the model if the

degree of correlation between variables is large, that is, if the absolute value of the correlation coefficient is greater than 0.8. (Guajarati, 2008; Garson, 2012). The table above revealed a modest association among the explanatory variables, with the correlation coefficients absolute value less than 0.8 (a benchmark value) indicating that multicollinearity is not a concern. In the table correlation between the capital-to-assets ratio and the portfolio-to-assets ratio (PAR) has the highest positive significant coefficient value, 0.7678. Likewise, the next highest positive coefficient value of 0.7467 was between the portfolio-to-assets ratio (PAR) and the deposit-to-asset ratio (DAR), both of which had values below the required threshold value. Therefore, it is necessary to use a more reliable technique to determine the level of multicollinearity as indicated by these two high correlation values. Even though the literature frequently suggests different ways to measure the degree of multicollinearity, it is usually beneficial to employ multiple statistical measures because each statistical measure has its own constraints. (Thomas, 2007). The variance inflation factor (VIF) was employed to analyze the multicollinearity between the independent variables in the context of this paper.

4.4 Regression Model Diagnostic Tests

The correlation matrix presented above is not a reliable basis on which to draw conclusions about the association between the capital structure and financial sustainability of microfinance institutions. To examine these associations, the author first verified the reliability of the variables before running a regression analysis. (Dinh and Pham, 2020)

4.4.1 Tests for the Classical Linear Regression Model Assumptions

It is crucial to evaluate the time series features of panel data before analyzing the relationship that exist among the variables because the non-stationary panel data pose some issues in regression analysis. Regression results when employing non-stationary data produce erroneous estimates, as has been well proven in the literature. Thus, the diagnostic tests (i.e., normality, model specification test, endogeneity, multicollinearity and heteroscedasticity) that were carried out to determine if the data meets the basic assumptions of the classical linear regression model or not are discussed in the following sections.

Test for Normality

The notion of normality is the assumption that the residuals' distribution is normal. This assumption is crucial to hypothesis testing because its violation would compromise the reliability of the test (Brooks, 2019). If residuals do not follow a 'normal' pattern, then we should check for omitted variables and functional forms. In this study, the Kernel density (kdensity) command with the normal option displays a density graph of the residuals with normal distribution superimposed on the graph. The result shows that the residuals from the OSS equation seem to follow a normal distribution (See Figure 4.1).

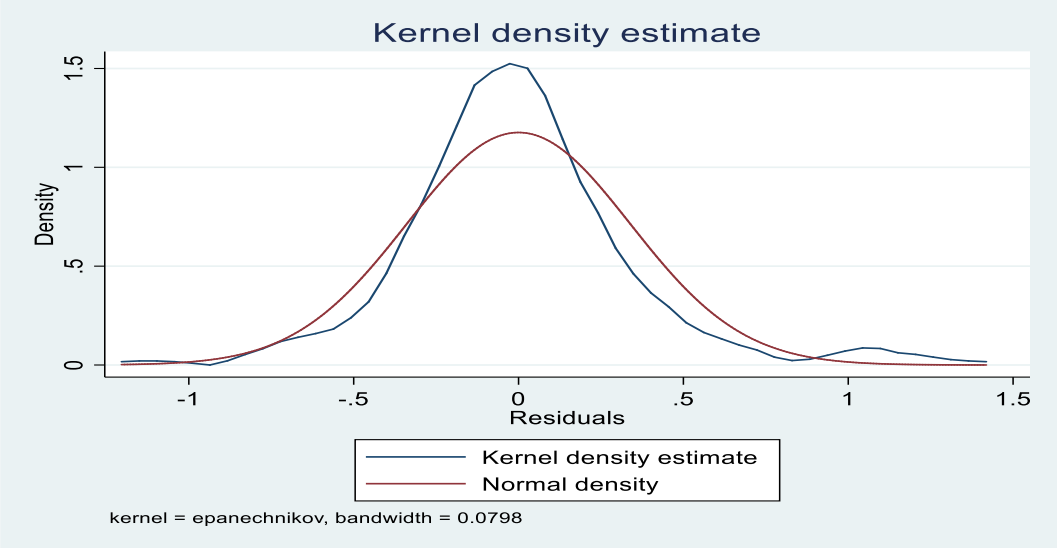

Figure 4.1 Test for Normality of Residual

Model Specification Test

Moreover, a model specification error can occur when one or more relevant variables are omitted from the model, or one or more irrelevant variables are included in the model. In this study, two tests were used-the Ramsey RESET (Ovtest) and Linktest model specification tests. In the Linktest if the model really is specified correctly, the prediction squared would have no explanatory power. The test result shows that the model is correctly specified. Ramsey (1969) also devised an omitted variable test (Ovtest)hat essentially employs the powers of the predicted values of the dependent variable. Th ovtest result also shows that the study fails to reject the null hypothesis that the model has no omitted variables (See Annex I & II).

Test for Endogeneity

Endogeneity occurs when the independent variable is correlated with the error term in the regression model or when there is simultaneity between dependent and independent variables. To test for existence of endogeneity, the correlation matrix between the predicted error term and the explanatory variables was utilized. The correlation coefficient is less than 0.5 which shows no threat of potential endogeneity problem in the model. (See Table 4.3).

Table 4.3 Test for Endogeneity

```
. corr r oss size age risk car der dlr dar
(obs=200)
```

	r	oss	size	age	risk	car	der	dlr	dar
r	1.0000								
oss	0.8098	1.0000							
size	0.0000	0.4619	1.0000						
age	-0.0000	0.1842	0.6397	1.0000					
risk	0.0000	-0.2401	-0.2447	-0.1737	1.0000				
car	0.0000	-0.0204	-0.2902	-0.1797	-0.0248	1.0000			
der	0.0000	0.0061	0.5742	0.4520	-0.0475	-0.4008	1.0000		
dlr	0.0000	0.0617	0.4788	0.2459	0.1499	-0.2655	0.4772	1.0000	
dar	0.0000	0.0855	0.2641	0.2344	-0.1322	0.4857	0.2317	0.4386	1.0000

Test for Multicollinearity

Multicollinearity suggests that there is a relationship between at least two explanatory factors (Baltagi, 2008). Variance Inflation Factors is a measure of degree of multicollinearity in regression analysis. It is calculated by

$$\textbf{Variance Inflation Factors (VIF)} = \frac{1}{1-R^2} = \frac{1}{Tolerance}$$

The tolerance is simply the VIF's inverse. The likelihood of multicollinearity among the variables increases with decreasing tolerance. When VIF = 1, it means that there is no correlation between the independent variables. The variables are said to be moderately correlated if the value of VIF is 1 to VIF 5. VIF's difficult range, which identifies highly correlated variables, is

between 5 and 10. Multicollinearity will exist among the predictors in the regression model if VIF is between 5 and 10; if VIF is greater than 10, the regression coefficients are only tentatively calculated in the presence of multicollinearity (Belsley,1991). Multicollinearity is also a concern for multiple regressions, not for its existence, but for its degree. For severe degree of multicollinearity, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients can get wildly inflated. This study used variance inflation factor (VIF) to analyze the potential level of multicollinearity among the explanatory variables, test the independence of the explanatory variables, and identify any multicollinearity issues in the regression model.

This study investigated the effects of capital structure on Ethiopian MFIs' financial sustainability from 2011 to 2020 using the panel data fixed effect estimation approach. In the estimation model, operational self-sufficiency (OSS), which measures the financial sustainability of MFIs, was used as the dependent variable, and the capital-to-assets ratio (CAR), debt-to-equity ratio (DER), deposits-to-loans ratio (DLR), deposits-to-assets ratio (DAR) and portfolio-to-assets ratio (DAR), which represents the capital structure, as the independent variables. However, as shown in Annex III, the first test for multicollinearity reveals that there is a problem with multicollinearity between the independent variables. As a result, the portfolio-to-assets ratio (PAR) was eliminated from the model and the MFI's capital structure was instead represented by the remaining four independent variables (CAR, DER, DLR and DAR).

Multicollinearity tests were conducted on these remaining independent variables after the correlated variable was eliminated. A variable with mean of VIF > 10 indicates trouble and may merit further investigation. The test result shows that mean VIF value is 2.29 < 10 which indicates there is no problem of multicollinearity in our model (see Table 4.4). Assuming homoscedastic disturbances, when heteroskedasticity is present, will still result inconsistent estimates of the regression coefficients, but these estimates will not be efficient.

Table 4.4 Multicollinearity Test

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
         dar |      3.14    0.318274
         car |      2.87    0.348983
        size |      2.50    0.400160
         dlr |      2.47    0.404781
         der |      1.95    0.511922
         age |      1.80    0.554064
        risk |      1.27    0.784638
-------------+----------------------
    Mean VIF |      2.29
```

4.4.2 Model Selection Test (Random Effect vs Fixed Effect)

There are two main categories of panel data estimator techniques that can be used in panel data estimation: the fixed effects and random effects estimators. (Brooks, 2019). The Hausman test was created to determine which model, out of the two types of panel data techniques, is appropriate before running the regression. As a result, the fixed effect model is appropriate if the p-value for the test is less than 5% or 0.05, but the random effect is recommended if the p-value for the test is greater than 5%. The test was designed to determine the appropriate model, which is random effect, or the fixed effect. (ibid)

In analyzing the panel data in this study, therefore, the Hausman test can help to choose between a fixed effects model and a random effects model when. The idea that the model does exhibit panel-level heteroscedascity would seem to be supported by the significance of the chi-square statistic in the test. Therefore, the cluster (id) option was employed in the estimation to make the model robust to hetroscedasticity (See Table 4.5).

H_0: Random effect model is appropriate

H_1: Fixed effect model is appropriate. $\alpha = 0.05$

Here, the decision rule in such test is to reject the null hypothesis (H0) if the p-value is lower than the significant level. Or else, don't reject H0. The Hausman test statistic was significant, and therefore the null hypothesis could be rejected. The table below shows that the p-value for OSS is less than 0.05. This implies that the fixed effects model is superior to the random effects model. As a result, the regression analysis is based on the fixed effects estimates.

Table 4.5 Hausman Test for Model Selection

	OSS
Chi2	60.04
Prob> Chi2	0.0000

Source: Researcher's Computations (2022)

4.5 Results of Multiple Regression Analysis

This study examined the effects of capital structure on Ethiopian MFIs financial sustainability from 2011 to 2020 using the panel data fixed effect estimation method. In the estimation model, operational self-sufficiency (OSS) was utilized as the dependent variable to measure financial sustainability of MFIs, and capital-to-assets ratio (CAR), debt-to-equity ratio (DER), deposits-to-loans ratio(DLR), and deposits-to-assets ratio(DAR) were used as the independent variables to represent the capital structure. This estimation method is preferred because it allows for a cross-sectional time series analysis, which typically allows for a larger number of data points and such models can also be used to account for heterogeneity and endogeneity problems. The panel data estimation permits the control of individual-specific effects, which are typically unobservable and may be correlated with other explanatory variables included in the specification of the relationship between dependent and explanatory variables. (Hausman and Taylor, 1981).

The regression analysis result (Annex VI display a lower adjusted R-square of 37%) indicates that the relationship between capital structure and financial sustainability as shown by OSS. According to the outcome, the variables in the model (capital-to-assets ratio, debt-to-equity ratio, deposits-to-loans ratio, deposits-to-assets ratio, age of the MFIs, size of the MFIs and risk) account for 37% of the variability in the dependent variable. The F-statistics is, however, statistically significant at the 5% level, indicating that the model is fit. This is also a test to determine whether all the model's coefficients are not equal to zero. In panel data analysis, a value of R^2 greater than 20% is appropriate for the reliability of decisions. (Nyamsogoro,2010).

The regression results in the table below demonstrate that CAR, DLR, age, size and risk were statistically significant factors in affecting the MFIs financial sustainability as measured by OSS,

whereas the remaining explanatory variables (DER and DAR) are identified as having insignificant impact on financial sustainability. Among all the independent variables, CAR and DLR are most important because they have more impact on OSS. The control variables risk and firm-age are identified as having significantly negative impact on financial sustainability, whereas size has positive impact on this measure of financial sustainability.

Table 4.6 Fixed Effect Regression Results

loss	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lrisk	-.037	.019	-1.95	.067	-.078	.003	*
size	.282	.067	4.23	0	.142	.421	***
lage	-.417	.128	-3.27	.004	-.684	-.150	***
lcar	.173	.039	4.39	0	.091	.256	***
lder	.028	.022	1.30	.208	-.017	.074	
ldlr	.208	.079	2.62	.017	.042	.374	**
ldar	-.057	.048	-1.19	.247	-.158	.043	
Constant	-.821	.386	-2.13	.047	-1.629	-.014	
F-test		22.148					
Number of observations		182					

*Note: *, **, *** indicate significance at the 10%, 5% and 1% levels of significance, respectively.*

Source: Researcher's Computation (2022)

4.6 Discussions of Multiple Regression Analysis

The findings of the key study variables are discussed below.

4.6.1 Capital-to-Asset Ratio (CAR) and Operational Self-Sufficiency

The first objective of this study was to investigate the effect of capital-to-assets ratio (CAR) on the financial sustainability of MFIs in Ethiopia. The results presented in Table 4.6. revealed that CAR has a positive and significant impact on OSS with a p-value of 0.000. The regression result indicates that when CAR is increased by 100%, OSS is also increased by 17.3%. This supports that there is greater financial sustainability as more equity is used to finance assets. This result is in line with those of Muigai (2017) and Daniel (2018), who found a favorable correlation

between performance and cash flows mostly derived from member contributions. These results support the Pecking-Order theory's findings that internal resources are less expensive than external ones and help businesses make more money.

4.6.2 Debt-to-Equity Ratio (DER) and Operational Self-Sufficiency

In respect to the second objective which sought to explore the effect of debt-to-equity ratio (DER) on financial sustainability of microfinance institutions in Ethiopia, results in Table 4.6 shows that debt-to-equity ratio (DER) had a positive impact on operational self-sufficiency (OSS). However, its impact is relatively small. This ratio shows how MFI leveraged its own money to support its loan portfolio. The regression analysis result tells us that when DER is increased by 100%, OSS is also increased by 2.8%, keeping other factors constant. The agency theory also endorses using debt to control agency costs and increase profitability (Kumar, 2012). Coleman (2007) supported the agency hypothesis by pointing out that highly leveraged MFIs perform better because they benefit from greater economies of scale, which makes it possible for them to manage risk, minimizing moral hazard and adverse selection, as well as reaching out to a wider range of customers. Managers are motivated to increase productivity by the risk of liquidation and the loss of personal advantages. Hoque and Chishty (2011) also investigated how commercialization of MFIs affects mission drift, financial sustainability, and MFI funding structures. Debt utilization decreases outreach depth while maintaining financial sustainability, according to panel data regression analysis adjusted for random and fixed effects.

4.6.3 Deposit-to-Loan Ratio (DLR) and Operational Self-Sufficiency

Regarding the third objective of the study, which examined the effect of deposit-to-loans ratio (DLR) on Ethiopian MFIs, the result of fixed effect model Table 4.6 revealed that deposit-to-loan ratio (DLR) had a statistically significant positive relationship with operational self sufficiency with a (p- value = 0.017) a 5% significance level. The result means that an increase in DLR leads in an increase in OSS of sampled MFIs in Ethiopia. The positive co-efficient of 0.208 implies that a one unit change in deposit-to-loan, keeping the other things constant had resulted 0.017 unit change on the level of OSS in same direction. This finding is in consistent with other studies. (Ahlin et al 2010; Campion, 2002; Morduch, 1999 and Sara, 2011). The justification for this is that as more people have access to deposit services and deposit capacity,

this will leave MFIs larger customer base to serve because fewer conventional moneylenders are providing loans to the poor. Increased deposit access leads to an increase demand for MFI loans, which could turn away potential borrowers from informal moneylenders and boost MFI efficiency.

4.6.4 Deposit-to-Asset Ratio (DAR) and Operational Self-Sufficiency

Concerning the fourth objective which sought to explore the effect of deposit-to-asset ratio (DAR) on financial sustainability of microfinance institutions in Ethiopia, the result of fixed effect model in Table 4.6 showed a negative relationship between operational self-sufficiency (OSS) and the deposit to total asset ratio that was statistically insignificant (p-value = 0.247) at the 10 % level of significance. This is contrary to the prior expectation.

4.6.5 Size of MFIs and Operational Self-Sufficiency

Regarding the study's fifth objective, which explored how financial sustainability of Ethiopian MFIs were affected by the size of the firm, as shown in Table 4.6, the size of the MFIs exhibited significantly positive impact on OSS, with a p-value of 0.000. Hence, it follows that as OSS increase by 28.2% when size is increased by 100%. There was a positive and statistically significant relationship between the size of MFIs and their financial sustainability. Large microfinance institutions are therefore more sustainable than their counterpart smaller ones. It also means that MFIs benefited from economies of scale. This could also be because of managerial efficiencies in managing its assets.

The findings on the size of the MFIs suggest that Ethiopian MFIs would become more profitable and sustainable if their asset sizes were increased. It might be put into practice by requesting greater client deposits. Lack of adequate assets will make Ethiopian MFIs more reliant on subsidies, which will ultimately hurt their potential to be profitable and sustainable. This is finding was also evident in the works of various studies. According to studies by Bogan, 2008; Daher and Saout, 2015; Mersland and Storm, 2007; Nyamsogoro, 2010; and Cull et al.,2008; the correlation between MFI sustainability and size is positive and strong, indicating the cost advantages of size (economies of scale).

4.6.6 Age of MFIs and Operational Self-Sufficiency

The six objective of this study was to evaluate the impact of age of the MFIs on financial sustainability. The study's findings showed that MFIs age had a statistically significant negative association with operational self-sufficiency, but not in the way that was anticipated. This indicates that microfinance institutions tend to be inefficient when they become older. The result for the regression model shows that age of the firm impact on OSS was statistically significant at 1% (p-value 0.004). The estimation has specified that as age increased by 100%, OSS decreased by 41.7 %. The finding is inconsistent with the findings of Ayayi and Maty, 2010; Bogan, 2012; Crombrugghe et al.,2008; Cull et al.,2007; Ezeoha and Botha., 2012; Lislevand, 2012; Nadiya et al., 2012; and Tchuigoua, 2015; that claimed higher OSS as MFIs get older. This is due to their reputation for attracting savings and managing cost efficiency. Additionally, the trade-off and agency theories postulate that age of the firm influence capital structure decisions positively since older businesses are more likely to be creditworthy and so more likely to borrow money from other businesses. (Orkaido,2021). In contrast, Nyamsogoro (2010) gave a different perspective, arguing that OSS is completely unaffected by the age of MFIs.

4.6.7 Default Risk and Operational Self-Sufficiency

Finally, the study examined the effect of risk (the proxy used was PAR > 90 days) on the microfinance institutions financial sustainability. Risk, as expected, had a negative impact on OSS, which is statistically significant at 10%, having p-values of 0.067. The greater the PAR, the lower the likelihood of payback and, thus, the lower financial sustainability. From the regression analysis, we can see that when risk is increased by 100%, the OSS is decreased by 3.7%. According to this finding, risk reduction can dramatically lower costs and boost financial performance because MFIs with greater nonperforming loan levels need more resources to manage the higher risk. This result also indicate that the financial sustainability of MFIs depends on a high-quality lending portfolio. The regression outcome was consistent with the findings of Lafourcade et al., 2005; Nyamsogoro, 2010; and Parvin et al., 2020.

CHAPTER FIVE

5. CONCULSION AND RECOMMENDATION

This aim of this chapter is to wrap up the investigation and make recommendations. The researcher attempted to demonstrate the outcomes and implications of the study in the conclusion section. The researcher then offers limitations of the study and future research considerations based on the findings of the investigation.

5.1 Conclusions

The objective of this study was to examine the effect of capital structure indicators on Ethiopian microfinance institutions' financial sustainability. Due to the lack of data for the panel data, the study focused on 20 MFIs for the period of ten years, from 2011 to 2020, In this research, the fixed effect regression model assessed the relationship between the capital structure indicators (CAR, DER, DLR and DAR) and the MFIs' financial sustainability measures (OSS). The following conclusion were drawn based on the findings of the study.

On the scale of operational self-sufficiency, which is a measure of the sustainability of Ethiopian MFIs, the MFIs under investigation had average OSS of 134%. This indicates that the revenue generated from operations of MFIs fully covered their operating costs, financial and loan loss expenses. However, some MFIs were not achieving the required level of financial sustainability. Despite the poor performance by some MFIs, there is a positive development in the financial performance of Ethiopian MFIs in the last decades.

The findings show that capital to asset ratio (CAR) and deposit to loan portfolio (DLR) have positive relationships to financial sustainability. This relationship is statistically significant at 5% level. The study demonstrates that MFIs financial sustainability as measured by OSS will increase by 17.3% for a given percentage change in CAR, assuming other variables remains unchanged and it will also increase by 20.8%, for a given percentage change in DLR still keeping other variables constant.

On the other hand, the study found that debt-to-equity (DER) and deposit-to-total asset (DAR insignificantly related to OSS, but their impact on it was negative and positive, respectively. This

may suggest that the combination of different capital sources used by microfinance institutions does not significantly affect their capacity to sustain financially. The study also revealed that MFIs operational self sufficiency, on average, will increase by 2.8% for given a percentage increase in DER, while it decreases by 5.7% for given a percentage increase in DAR.

Another important finding is that the size of the firm (SIZE) had positive impact on operational self-sufficiency. The conclusion is that larger MFIs benefit from economies of scale, which lowers their operating costs and increases sustainability. If MFIs have more assets, they will have the resources necessary to meet the needs of many loan seekers. The economies of scale will also lower the cost of collecting and processing data, improving the MFIs' sustainability in the long run. The findings might also be taken to suggest that size is related to risk diversification, which will affect the product portfolio and increase sustainability.

Based on the research findings, the study concludes that there is negative relationship between financial sustainability and age of the firm. The anticipated association between these variables, however, was not as expected.

The findings also demonstrated that the portfolios' (PAR> 90days) had a negative impact on the sustainability of MFIs in Ethiopia. This result lends credence to the idea that increased risk translates into declining financial sustainability because a greater PaR ratio percentage suggests low debt recovery. That means considering the higher exposure of MFIs to credit risk, accumulation of unpaid loans and lost interest income will in turn decreases their financial sustainability. These findings show that, on average, MFIs should have good control over the quality of their portfolios and appear to have a considerable, favorable impact on their financial success. This will strengthen their financial sustainability.

5.2 Recommendations

The major conclusions drawn from the findings is followed by the recommendations listed below.

The study makes policy recommendations for the successful and efficient operation of microfinance programs by streamlining loan distribution, improving gross loan portfolio yield,

lowering operating costs, utilizing resources to generate financial revenue, and concentrating on the growth of their total assets' value in Ethiopia.

Additionally, Ethiopian MFIs need to exercise caution when creating portfolios because choosing a portfolio had a negative impact on sustainability, Creditworthiness of a client should be thoroughly examined in order to be financially sustainable in the future. Microfinance institutions should, therefore, try to maximize their repayment rates. These results could be attributable to broad market access, information exchange, and portfolio quality monitoring, all of which have a good effect on long-term financial sustainability.

5.3 Limitations and Future Research Considerations

This study has taken the impact of capital structure on the financial sustainability of microfinance institutions in Ethiopia into account. MFIs sustainability can be evaluated in a variety of ways utilizing various variables. In this study, the sustainability of MFIs was measured by operational self-sufficiency (OSS), which was the only dependent variables. This study did not take financial self-sufficiency and social sustainability into account.

In addition, the study employed five explanatory variables (where one of them was excluded because of multicollinearity) and three control variables. It is advised that future studies use macroeconomic and qualitative data to further assess factors that may have an impact on MFI's financial sustainability. For instance, results from regression and correlation analysis demonstrate that operational self-sufficiency is not correlated with the macroeconomic indicators at the country level. The impact of macroeconomic factors, such as GDP growth on investment in a nation, on the amount of money flowing to firms in the form of grants or equity investments, for instance, makes sense.

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Annex

Annex I. Model Specification Test I: Ramsey RESET Test

```
. **Model Specification Test I: /Ramsey RESET test for omitted variables
. reg oss risk size age car der dlr dar par

      Source |       SS           df       MS      Number of obs   =       200
-------------+----------------------------------   F(8, 191)       =     12.53
       Model |  12.0180277         8  1.50225346   Prob > F        =    0.0000
    Residual |  22.8921601       191  .119854241   R-squared       =    0.3443
-------------+----------------------------------   Adj R-squared   =    0.3168
       Total |  34.9101878       199  .175428079   Root MSE        =     .3462

------------------------------------------------------------------------------
         oss | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        risk |  -.3856641   .3339796    -1.15   0.250    -1.044426    .2730979
        size |   .3535584   .0416056     8.50   0.000     .2714929    .4356239
         age |  -.0152337   .0073113    -2.08   0.039     -.029655   -.0008123
         car |  -.0640799    .153576    -0.42   0.677    -.3670028    .2388429
         der |  -.0861308   .0212205    -4.06   0.000    -.1279875   -.0442742
         dlr |   .0080314   .4200579     0.02   0.985    -.8205168    .8365796
         dar |  -.3236798   .6187399    -0.52   0.601    -1.544121    .8967613
         par |   .1730291   .2389972     0.72   0.470    -.2983838     .644442
       _cons |  -1.145683   .3218645    -3.56   0.000    -1.780548   -.5108172
------------------------------------------------------------------------------

. ovtest

Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of oss

H0: Model has no omitted variables

F(3, 188) =   0.46
 Prob > F = 0.7107
```

Annex II. Model Specification Test II: Linktest

```
. **Model Specification Test II: Linktest
. reg oss risk size age car der dlr dar par

      Source |       SS           df       MS      Number of obs   =       200
-------------+----------------------------------   F(8, 191)       =     12.53
       Model |  12.0180277         8  1.50225346   Prob > F        =    0.0000
    Residual |  22.8921601       191  .119854241   R-squared       =    0.3443
-------------+----------------------------------   Adj R-squared   =    0.3168
       Total |  34.9101878       199  .175428079   Root MSE        =     .3462

------------------------------------------------------------------------------
         oss | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        risk |  -.3856641   .3339796    -1.15   0.250    -1.044426    .2730979
        size |   .3535584   .0416056     8.50   0.000     .2714929    .4356239
         age |  -.0152337   .0073113    -2.08   0.039     -.029655   -.0008123
         car |  -.0640799    .153576    -0.42   0.677    -.3670028    .2388429
         der |  -.0861308   .0212205    -4.06   0.000    -.1279875   -.0442742
         dlr |   .0080314   .4200579     0.02   0.985    -.8205168    .8365796
         dar |  -.3236798   .6187399    -0.52   0.601    -1.544121    .8967613
         par |   .1730291   .2389972     0.72   0.470    -.2983838     .644442
       _cons |  -1.145683   .3218645    -3.56   0.000    -1.780548   -.5108172
------------------------------------------------------------------------------

. linktest

      Source |       SS           df       MS      Number of obs   =       200
-------------+----------------------------------   F(2, 197)       =     51.87
       Model |  12.0422155         2  6.02110777   Prob > F        =    0.0000
    Residual |  22.8679722       197  .116081077   R-squared       =    0.3449
-------------+----------------------------------   Adj R-squared   =    0.3383
       Total |  34.9101878       199  .175428079   Root MSE        =    .34071

------------------------------------------------------------------------------
         oss | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        _hat |   .7544376   .5468604     1.38   0.169    -.3240143    1.832889
      _hatsq |   .0971634   .2128571     0.46   0.649    -.3226076    .5169345
       _cons |   .1487372   .3523002     0.42   0.673    -.5460266    .8435011
------------------------------------------------------------------------------
```

Annex III. Test for Multicollinearity (before dropping PAR)

```
. reg oss size age risk car der dlr dar par, cluster(id)

Linear regression                               Number of obs     =        200
                                                F(8, 19)          =      21.88
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3443
                                                Root MSE          =      .3462

                                    (Std. Err. adjusted for 20 clusters in id)
------------------------------------------------------------------------------
             |               Robust
         oss |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        size |   .3535584     .04899     7.22   0.000     .2510211    .4560956
         age |  -.0152337    .0140727    -1.08   0.293    -.0446882    .0142209
        risk |  -.3856641    .3544305    -1.09   0.290    -1.127496    .3561675
         car |  -.0640799    .1091479    -0.59   0.564    -.2925292    .1643693
         der |  -.0861308    .0179102    -4.81   0.000    -.1236173   -.0486444
         dlr |   .0080314    .3767949     0.02   0.983    -.7806093    .7966722
         dar |  -.3236798    .4858624    -0.67   0.513    -1.340601     .693242
         par |   .1730291    .1809198     0.96   0.351    -.2056405    .5516987
       _cons |  -1.145683    .3414609    -3.36   0.003    -1.860369   -.4309969
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
         dar |     26.90    0.037178
         par |     26.12    0.038288
         dlr |     12.80    0.078120
         car |      3.45    0.290214
        size |      2.52    0.397230
         der |      1.99    0.501299
         age |      1.81    0.553337
        risk |      1.37    0.729405
-------------+----------------------
    Mean VIF |      9.62
```

Annex IV. Test for Multicollinearity (after dropping PAR)

```
. reg oss size age risk car der dlr dar , cluster(id)

Linear regression                               Number of obs     =        200
                                                F(7, 19)          =      17.06
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3425
                                                Root MSE          =     .34577

                                    (Std. Err. adjusted for 20 clusters in id)
------------------------------------------------------------------------------
             |               Robust
         oss |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        size |   .3509812   .0500105     7.02   0.000      .246308    .4556544
         age |   -.015042   .0141446    -1.06   0.301     -.044647     .014563
        risk |   -.321512   .3373219    -0.95   0.352    -1.027535    .3845109
         car |  -.0184529   .0928769    -0.20   0.845    -.2128465    .1759406
         der |  -.0839177   .0181188    -4.63   0.000    -.1218408   -.0459946
         dlr |  -.2651642   .1767495    -1.50   0.150    -.6351051    .1047767
         dar |   .0973004   .1222505     0.80   0.436    -.1585729    .3531737
       _cons |  -1.037187   .3482723    -2.98   0.008    -1.766129   -.3082447
------------------------------------------------------------------------------

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
         dar |      3.14    0.318274
         car |      2.87    0.348983
        size |      2.50    0.400160
         dlr |      2.47    0.404781
         der |      1.95    0.511922
         age |      1.80    0.554064
        risk |      1.27    0.784638
-------------+----------------------
    Mean VIF |      2.29
```

Annex V. Hausman Test for Model Selection

```
. xtreg oss size age risk car der dlr dar , fe

Fixed-effects (within) regression               Number of obs      =       200
Group variable: id                              Number of groups   =        20

R-sq:                                           Obs per group:
     within  = 0.0748                                         min =        10
     between = 0.3693                                         avg =      10.0
     overall = 0.2379                                         max =        10

                                                F(7,173)           =      2.00
corr(u_i, Xb)  = -0.1130                        Prob > F           =    0.0578

------------------------------------------------------------------------------
         oss |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        size |   .2983042   .1073078     2.78   0.006     .0865032    .5101053
         age |  -.0273436   .0141283    -1.94   0.055    -.0552298    .0005425
        risk |  -.1189165   .3068479    -0.39   0.699    -.7245641    .4867311
         car |  -.0193276   .1255164    -0.15   0.878    -.2670683    .2284131
         der |  -.0411522   .0244755    -1.68   0.094    -.0894613    .0071569
         dlr |   .2613661   .2199677     1.19   0.236    -.1727998     .695532
         dar |   .0921056   .1918391     0.48   0.632    -.2865409    .4707522
       _cons |  -.7516376    .746978    -1.01   0.316    -2.226001    .7227261
-------------+----------------------------------------------------------------
     sigma_u |  .25555175
     sigma_e |  .28807218
         rho |  .44039177   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(19, 173) = 5.45                     Prob > F = 0.0000

. estimates store fe

. xtreg oss size age risk car der dlr dar , re

Random-effects GLS regression                   Number of obs      =       200
Group variable: id                              Number of groups   =        20

R-sq:                                           Obs per group:
     within  = 0.0622                                         min =        10
     between = 0.5200                                         avg =      10.0
     overall = 0.3104                                         max =        10

                                                Wald chi2(7)       =     36.92
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         oss |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        size |   .2888862   .0557303     5.18   0.000     .1796569    .3981155
         age |  -.0178025    .008992    -1.98   0.048    -.0354264   -.0001786
        risk |  -.1822652   .3040292    -0.60   0.549    -.7781514     .413621
         car |  -.0286344   .1266355    -0.23   0.821    -.2768355    .2195667
         der |  -.0574235    .022204    -2.59   0.010    -.1009424   -.0139045
         dlr |   .0204061   .1969525     0.10   0.917    -.3656136    .4064259
         dar |   .1218566   .1923895     0.63   0.526    -.2552198     .498933
       _cons |   -.682776   .3893082    -1.75   0.079    -1.445806    .0802541
-------------+----------------------------------------------------------------
     sigma_u |  .1618484
     sigma_e |  .28807218
         rho |  .23992295   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store re
```

```
. hausman fe re
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
size	.2983042	.2888862	.009418	.0917011
age	-.0273436	-.0178025	-.0095412	.0108975
risk	-.1189165	-.1822652	.0633487	.041496
car	-.0193276	-.0286344	.0093068	.
der	-.0411522	-.0574235	.0162713	.0102973
dlr	.2613661	.0204061	.2409599	.0979566
dar	.0921056	.1218566	-.029751	.

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

  Test:  Ho:  difference in coefficients not systematic

              chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =       60.04
            Prob>chi2 =      0.0000
            (V_b-V_B is not positive definite)
```

Annex VI. Fixed Effect Regression Result

```
. xtreg loss lrisk size lage lcar lder ldlr ldar , fe cluster(id)

Fixed-effects (within) regression               Number of obs      =       182
Group variable: id                              Number of groups   =        20

R-squared:                                      Obs per group:
     Within  = 0.1805                                         min =         3
     Between = 0.3685                                         avg =       9.1
     Overall = 0.2750                                         max =        10

                                                F(7,19)            =     22.15
corr(u_i, Xb) = -0.2970                         Prob > F           =    0.0000

                                    (Std. err. adjusted for 20 clusters in id)
------------------------------------------------------------------------------
             |               Robust
        loss | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
       lrisk |  -.0374665   .0192573    -1.95   0.067    -.0777725    .0028396
        size |   .2817974   .0666638     4.23   0.000     .1422685    .4213263
        lage |  -.4173706   .1275295    -3.27   0.004     -.684293   -.1504482
        lcar |   .1731463   .0394159     4.39   0.000     .0906479    .2556446
        lder |   .0282218   .0216514     1.30   0.208    -.0170951    .0735387
        ldlr |   .2077509   .0793431     2.62   0.017     .0416839    .3738179
        ldar |  -.0574187   .0480816    -1.19   0.247    -.1580546    .0432172
       _cons |  -.8213145   .3858396    -2.13   0.047    -1.628886   -.0137429
-------------+----------------------------------------------------------------
     sigma_u |  .21264038
     sigma_e |  .20333945
         rho |  .52234793   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```