DETERMINANT OF LIQUIDITY IN MICROFINANCE INSTITUTION: (IN CASE OF ETHIOPIAN MICROFINANCE INSTITUTION)

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Abstract

Liquidity is one of the major concerns for financial institution and thus achieving the optimum level of liquidity is crucial. The main objective of this study was to identify the determinants of liquidity of microfinance institutions in Ethiopia. In order to achieve the research objectives, data was collected from a sample of 12 microfinance institutions in Ethiopia over the period from 2005 to 2014. MFIs specific and macroeconomic variables were analyzed by using the balanced panel random effect regression model. MFIs liquidity is measured in two ratios: liquid asset to deposit and liquid asset to total asset. The findings of the study revealed that, FDI has negative and statistically significant impact on liquidity; while GD, profitability and inflation have positive and statistically significant impact on liquidity of Ethiopian microfinance institutions. However, non-performing loan has no statistically significant effect on the liquidly of Ethiopian microfinance institutions.

Keywords: Determinants of Liquidity, Ethiopian microfinance institutions, Liquidity Ratio, Balanced Panel Random Effect Regression Model

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Acronyms

AEMFI: Association of Ethiopian Microfinance Institution

MFI: Microfinance Institution

CLRM: Classical Linear Regression Model

CPI: Consumer Price Index

ESRB: European Systemic Risk Board

FEM: Fixed Effect Model

GDP: Gross Domestic Product

HP: Hypotheses

INF: General inflation rate

IRL: Interest rate on Loans & Advances

IRM: Interest Rate Margin

LCR: The Liquidity Coverage Ratio

LOLR: Lender of Last Resort

LATO: Liquid asset to total asset ratio

LATD: Liquid asset to deposit ratio

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

NPL: Non-performing loans

NSFR: Net Stable Funding Ratio

OLS: Ordinary Least Square

ROA: Return on Assets

ROE: Return on Equity

CHAPTER ONE

1.1 BACKGROUND OF THE STUDY

Microfinance institutions (MFIs) are found among the institutions which provide different financial service for the poor who are out of the conventional banking system particularly in developing countries. It provides financial services to poor clients who in most cases have no access to formal financial institutions. During the last three decades, microfinance has captured the interest of both academics and policy makers. This is, among other things, due to the success of the industry (Assefa et al., 2013). It has become an important tool for poverty reduction in many parts of the world. Provided the incidence of poverty, financing is seen as crucial in achieving the poverty reduction goal. As Ganka (2010) states, the microfinance paradigms focus on reduction of income poverty through improving access to finance and financial services.

Many microfinance institutions have set out on a development path towards becoming true financial intermediaries; offering not only loans, but a full range of banking services including savings, checking and other non-cash payment services. Dealing not only with the fluctuating demand for loans but also with erratic deposit variations makes the task of Liquidity management quite complex and requires systematic planning**.** Liquidity therefore a major concern of every microfinance institution. Liquidity is of major importance to both the internal and external analysts because of its close relationship with day to day operations of a business. A weak liquidity position poses a threat to the solvency as well as profitability of a firm and makes it unsafe and unsound (Inrush, 2012).

According to bank for International Settlements (2008), liquidity is defined as "the ability of financial institution to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses". In this regard, when microfinance institution transforms short term deposits to long term loans, which have a maturity mismatch, they will be vulnerable to liquidity problem. As a consequence, microfinance institution fundamentally needs to hold optimal level of liquidity to maintain efficiency and operative excellence. Effective & efficient liquidity management is a paramount importance as a liquidity problem in one bank may have industry wide repercussion. On the other hand, maintaining large amount of liquid asset affects profitability of a microfinance institution, that raises the importance of liquidity management and sustaining the optimal level of liquidity is a real art of microfinance institution management. In the microfinance industry, maintaining of optimum level of liquidity is greatly linked with the efficient microfinance operations.

Liquid assets are important to have in times of crisis or emergency because they can be readily converted into cash. Without liquidity, money can become tied up in systems that are difficult to cash out of and even more difficult to assess for actual cash value (Chaplin, Emblow and Michael, 2015). During times of emergency, large financial institutions shut down, making it difficult for people to access the cash they need to buy essentials like food, gasoline and other emergency supplies

Malik and Rafique (2013), when the financial institution is not adequately managing its liquidity, it may lead to insolvency (in case of low liquidity) or low profitability (in case of high liquidity) and ultimately destroy the wealth of shareholder and breakdown of entire financial institution. Hence, maintaining the optimum level of liquidity is very important in order to make the MFIs successfully functioning and profitable. In this regard Greuning and Bratonovic (2014.) suggested that, in order to manage liquidity of financial institution, they must have a well-defined liquidity management policy that is communicated in the whole organization and there must be a liquidity control strategy that specifies certain rules regarding management of assets and liabilities.

Therefore, the study is centered on investigating whether the liquidity in microfinance institution is likely to be influenced by microfinance size, profitability, inflation, non-performing loan, GDP, credit risk and foreign direct investment (see also: Mohamed, 2015; Tseganesh,2012; Vodova,2011; Greuning and Bratonovic ,20014; Malik and Rafique ,2013; Chaplin, Emblow and Michael, 2015;)

1.2 STATEMENT OF PROBLEM

Liquidity risk is among the factors affecting the reputation of financial institution as customers confidence is deteriorated due to financial institution unable to withdraw their deposits when they need it. The current financial situations especially MFIs in Ethiopia deemed the responsible organs should maintain their financial safety and soundness by keeping their liquidity level at optimal position. MFIs liquidity position is measurement for financial stability as it plays a major role in the Ethiopian financial system. Depending on impacts that come from liquidity in the financial system in general and banks in particular, the interest of scholars on studies of determinants of banks liquidity in Ethiopia is increased in the past few years (Wubayehu, 2017).

In recent days, following the financial crisis of 2007, liquidity risk has become one of the major concerns of financial institutions throughout the world. The financial crisis revealed that; liquidity

becomes one of the top priorities of a micro finance management to ensure the availability of sufficient funds to meet future demands at reasonable costs. Therefore, identifying the determinants of MFIs liquidity buffer has become the major concern of all financial institution and their regulators so as to mitigate liquidity risk.

In order to meet the liquidity requirements in financial institution determinant factor that affect liquidity have to be carefully investigated. The first factor that determines liquidity is profitability. Profitability accounts for the impact of better financial soundness on MFIs risk bearing capacity and, on their ability, to perform liquidity transformation Rauch et al. (2008) and Shen et al. (2010). A sound and profitable banking sector is better able to withstand negative shocks and contribute to the stability of the financial system Athanasoglou et al, (2005). According to Bourke (1989), financial institution holding more liquid assets benefit from a superior perception in funding markets, reducing their financing costs and increasing profitability. On the other hand, Molyneux and Thornton (1992); Goddard et al, (2004) argued that holding liquid asset imposes an opportunity cost on the MFIs and has an inverse relationship with profitability.

The other factor that determine liquidity in MFIs is non-performing loan, Bloem and Gorter (2001), states that though non-performing loans may affect all sectors, the most serious impact is on financial institutions which tend to have large loan portfolios. Another factor that pointed out in the literature is size. Large banks are likely to perform higher levels of liquidity creation that exposes them to losses associated with having to sale illiquid assets to satisfy the liquidity demands of customers (Kiyotaki and Moore, 2008). Further more liquidity of MFIs can affect by GDP, inflation, and foreign direct investment as noted by Painceira (2010); Huybens and Smith (1999); Ferrouhi and Lehadiri (2013) and Derelioglu and Gurgen, (2011).

According to directives issued by national bank of Ethiopia pursuant to the authority vested in it by article 41 of the monetary and banking proclamation No 83/1994 and by article 25 of the licensing and supervision of the business of microfinance institutions proclamation No 40/1996 microfinance institutions shall maintain at all times liquid asset at least equal to 20% of their total deposit. However, there are microfinance institutions that have even 0 liquid asset to deposit ratio so this shows there is a liquidity problem in microfinance institution. This initiate the researcher to conduct a research on the title of determinant of liquidity in microfinance institutions.

To the knowledge of the researcher, many researches are conducted on the determinant of liquidity one related study was conducted by Tseganesh (2012), which tries to identify the impact of bank

specific and macroeconomic variables on liquidity Ethiopian commercial banks including public banks many other research are conducted on either public or private banks. While there are no prior studies made which considers Ethiopian micro finance institution and hence, the lack of sufficient research on the determinants of liquidity in the context of Ethiopian micro finance institution initiated this study. Therefore, this study seeks to fill the gap by providing information about macroeconomic and other specific factors that affects the liquidity of Ethiopian micro finance institution.

1.3 OBJECTIVE OF STUDY

1.3.1 General objective

The general objective of this study is to identify the determinants 0f liquidity in microfinance institution

1.3.2 Specific objective

- To examine the impact of microfinance size on liquidity of microfinance institution in Ethiopia.
- To determine the impact of profitability on the liquidity of microfinance institution in Ethiopia.
- To study the impact of non- performing loan on the liquidity of microfinance institution in Ethiopia.
- To examine the effect of inflation on the liquidity of microfinance institution in Ethiopia
- To study the impact of foreign direct investment on the liquidity of microfinance institution in Ethiopia.
- To determine the impact of gross domestic product on the liquidity of microfinance institution in Ethiopia.

1.4HYPOTHESIS OF THE STUDY

The purpose of this study is to identify the determinants of liquidity in Ethiopian microfinance institution. In order to evaluate and identify the determinants and to break down the research problem, the following major hypotheses will be tested in the case of Ethiopian microfinance institution.

H1: Microfinance size has positive and significant impact on microfinance liquidity

H2: Profitability has negative and significant impact on microfinance liquidity

H3: Inflation has negative and significant impact on microfinance liquidity

H4: Non-performing loans has negative and significant impact on microfinance liquidity

H5: Foreign direct investment has positive and significant impact on microfinance liquidity

H6: Real GDP has positive and significant impact on microfinance liquidity

1.5 SCOPE AND LIMITATION OF THE STUDY

This paper is confined in identifying determinants of liquidity on Ethiopian microfinance institution. Both MFIs specific and macroeconomic variables by using balanced panel fixed effect regression model. There are more than 30 microfinance institutions in Ethiopia. The study selected 12 microfinance institution who have more than or equal to 10 years data as well as full data or accessible data. As the MFIs is young in Ethiopia, there is no long period data for all MFIs operating in Ethiopia in order to randomly determine the sample size. Therefore, the selected 12 are based on their time and availability of data.

1.6 SIGNIFICANCE OF THE STUDY

The issue of liquidity management has now got great attention in the Ethiopian finance industry. Moreover, the supervisory authority has required microfinance to have their own liquidity policy which enforces them to monitor their funding structure and their ability to handle short term liquidity problems and provide them with a better means of assessing the present and future liquidity risk associated. Specifically, this study is significant in the sense that:

- The policy makers and the government can use the study finding in building and widening the awareness of liquidity.
- Study will have great contribution to the Ethiopian microfinance institution to assess their liquidity requirement and to produce their liquidity policy and to give due attention on those factors which have significant impact on their liquidity.
- It has also a great contribution to the existing knowledge in the area of factors determining microfinance institution liquidity.

1.7 Organizations of the paper

This research report was organized under five chapters. The first chapter provides the general overview of the study. The second chapter reviewed the related literatures on the determinants of MFIs liquidity. The third chapter focuses on the methodology of the study. The fourth chapter was provided results and discussion. The final chapter includes conclusion and recommendations and at the end references and appendixes were attached.

Chapter Two

Review of Related Literatures

Micro finance institution plays a central role in all modern financial systems. To perform its role effectively, they must be safe and be perceived as such. The single most important assurance is the economic value of microfinance institution assets to be worth significantly more than the liabilities that it owes. The difference represents a cushion of "capital" that is available to cover losses of any kind. However, the global financial crisis underlined the importance of a second type of buffer, the "liquidity" that enables banks to cover unexpected cash outflows. A bank can be solvent, by holding assets that exceed its liabilities on an economic and accounting basis, and still die a sudden death if the bank does not have enough liquidity to meet its obligations when they fall due including continuing obligation such as those to fund the holding of assets (BCBS, 2004).

Most importantly, the primary role of banks in the economy is to create liquidity by funding illiquid loans with liquid demand deposits or in other words banks actually collecting short term deposit and issuing loans for long terms (Diamond 1984, Ramakrishnan and Thakor 1984). This liquidity creation role exposed banks for liquidity problem that banks need to manage in order to prevent itself from a sudden death. When bank does not have enough liquidity to fulfil its obligation, the bank is said to face liquidity risk.

It is known that all businesses including banks face liquidity risk. However, the banks liquidity risk is inherent from its intermediation role of providing mismatched maturities of deposit and loans (short-term deposit for long-term loans). As a consequence, banks fundamentally need to hold an optimal level of liquidity to maintain efficiency and operative excellence.

This review of the literature part establishes the framework for the study and clearly identifying the gap in the literature that help to formulate the research hypotheses for the study. The remainder part of this chapter is organized as follows: Section 2.1 discusses about the theoretical aspects of bank liquidity and measurement of banks liquidity. Section 2.2 discusses the determinants of bank liquidity. Section 2.3 extensively reviews important related empirical studies in the area of developed, developing and least developed countries including related empirical studies in Ethiopia. Finally, section 2.4 summaries the chapter and briefly discuss the knowledge gap from past literatures.

2.1 Review of Related Theoretical Literature

2.1.1 Conceptual Background

A first requirement to study bank's liquidity buffers is to find an adequate definition of liquidity. The financial economics literature distinguishes between two concepts of liquidity: market liquidity and funding liquidity (Drehmann and Nikolaou, 2009). Market liquidity describes a particular characteristic of an asset: a high degree of market liquidity implies the ability to offset or eliminate a position in a given asset at or close to the current market price. This feature of the asset may not be constant over time. An asset which is currently market liquid may not necessarily have been market liquid in the past, nor need it be continuously market liquid in the future. Factors such as market concentration or the prevalence and distribution of asymmetric information may affect the degree of market liquidity.

Funding liquidity describes particular characteristics of a financial agent: it refers to its ability to meet obligations as they come due. Funding liquidity risk is the risk that the bank will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. At any point in time, a financial institution is either funding liquid or not. Nevertheless, the two concepts are linked (Brunnermeier, 2009). Suppose a bank only holds assets which are perfectly market-liquid. In this case the bank will also be funding liquid, as long as it is solvent. Market liquidity, however, may vary over time, and an institution's funding liquidity may thus change accordingly. Suppose a sufficiently large portion of the bank's assets suddenly become perfectly market illiquid, while the bank remains solvent. The bank will no longer be able to honor its short-term obligations and will become distressed. This is, in fact, a stylized description of the difficulties encountered by a large number of financial institutions during 2007, the previously highly liquid market for mortgage-backed securities dried up. This situation highlights the crucial importance of liquidity to the functioning of markets and the banking sector as well as links between funding and market liquidity risk, interrelationships of funding liquidity risk and credit risks, reputation effects on liquidity, and other links among liquidity and other typical banking features.

For the purpose of this study, we require a measure of market-liquid assets held by banks to guarantee constant funding liquidity. Yet the example above highlights the difficulty of obtaining a

Measure that adequately accounts for the dynamic nature of market liquidity. To circumvent this problem, we focus only on those assets in banks‟ portfolios which - virtually by their definition – are permanently market-liquid: cash and due from banks. We expect that this narrow definition of liquidity captures banks‟ qualitative choices about liquidity buffers.

Liquidity risk refers to the risk that a financial agent will be unable to meet obligations at a reasonable cost as they come due. In other words, it reflects the probability that the agent will become funding illiquid during a given time period. As explained in the previous section, banks‟ core business is to "borrow short and lend long" they are especially prone to liquidity risk. Banks manage the liquidity risk inherent in their balance sheets by maintaining a buffer of market-liquid assets - such as cash or government securities which anticipates their depositors‟ liquidity demands within the relevant timeframe.

As pointed out by Diamond and Dybvig (1983), banks thus benefit from the ability to pool liquidity risk over a large group of depositors. It would be undesirable for banks to invest only in perfectly market-liquid assets at all times as this would effectively eliminate the pooling advantage banks have compared to the liquidity risk management that could be undertaken by their individual customers. Yet, it would be equally undesirable for banks not to invest in market-liquid assets at all, as this would burden depositors with excessive liquidity risks.

Until recently, liquidity risk was not the main focus of banking regulators. The 2007-2009 crisis showed, however, how rapidly market conditions can change exposing severe liquidity risks in institutions, many times unrelated to capital levels. Now, there is wide agreement that insufficient liquidity buffers were a root cause of this crisis and the on-going disruptions of the world financial system, making the improvement of liquidity risk analysis and supervision a key issue for the years to come (Brunnermeier, 2009 and BCBS, 2008).

Efforts are underway internationally as well as in individual countries to establish or reform (existing) liquidity risk frameworks, most notably by the Basel Committee for Banking Supervision

(BCBS). The BCBS‟s new regulatory framework (Basel III) proposes a short and long-term liquidity requirement to reinforce the resilience of banks to liquidity risks (BCBS, 2010 and BCBS, 2013). The Liquidity Coverage Ratio (LCR) is a short-term ratio requiring financial institutions to hold enough liquid assets to withstand a thirty-day stress period. The second measure, the Net

Stable Funding Ratio (NSFR) aims at improving banks‟ longer-term, structural funding. BCBS (2013) also requires institutions to disclose certain elements regarding their fulfilment of these minimum requirements. Recently the European Systemic Risk Board (ESRB) has recommended national supervisory agencies to intensify the supervision of liquidity and funding risks as well (ESRB, 2013).

2.1.2 Microfinance institution liquidity Creation and Financial Fragility Theory

According to the theory of financial intermediation, an important role of banks in the economy is to provide liquidity by funding long term illiquid assets with short term liquid liabilities. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy. Banks perform valuable activities on either side of their balance sheets; on the asset side, they make loans to illiquid borrowers and on the liability side, they provide liquidity on demand to depositors. As of Diamond and Rajan (1998) depositors get better access to their funds than they would if they invested directly and earned the same expected return: this is liquidity creation. Borrowing firms too can find the bank to be a more reliable source of funding than another firm or individuals: banks insure borrowers against the liquidity risk that funding will be cut off prematurely. Diamond and Dybvig (1983) emphasize the "preference for liquidity" under uncertainty of economic agents to justify the existence of banks: banks exist because they provide better liquidity insurance than financial markets; however, as banks are liquidity insurers, they face transformation risk and are exposed to the risk of run on deposits. In general, the higher is liquidity creation to the external public; the higher is the risk for banks to face losses from having to dispose of illiquid assets to meet the liquidity demands of customers

The usual justification for the existence of deposit taking institutions, thereby giving an explanation for the economically important role of banks in providing liquidity, was initially modelled by (Bryant 1980; Diamond and Dybvig 1983). They showed that by investing in illiquid loans and financing them with demandable deposits, banks can be described as pools of liquidity in order to provide households with insurance against idiosyncratic consumption shocks. However, this structure is also the source of a potential fragility of banks since in case of an unexpected high number of depositors deciding to withdraw their funds for other reasons than liquidity needs, a bank run will result.

Kashyap et.al (2002) conducted a related analysis justifying the existence of bank liquidity creation. They argued that as banks carry out lending and deposit taking under the same roof, synergies must exist between these two tasks. These synergies can be found in the way deposits and loan commitments are secured through the holding of liquid assets as collateral against withdrawals. They regard these liquid assets as costly overheads. Diamond and Rajan (2005) provides a detailed analysis of the link between liquidity shortages and systemic banking crises. It is argued that the failure of a single bank can shrink the pool of available liquidity to the extent that other banks could be affected by it. Generally, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long term loans.

2.1.3 Quantitative Framework for Measuring Microfinance institution Liquidity

Financial institution can mobilize resources through new deposits, maturing assets, borrowed funds and/or using the discount window (borrowing from the central bank). While financial institution may encounter liquidity risk. According to Rochet (2008), the three sources of liquidity risk are; on the liability side, there is a large uncertainty on the volume of withdrawals of deposits or the rolled-over of inter-bank loans, on the asset side, there is an uncertainty on the volume of new requests for loans that a bank will receive in the future, and off-balance sheet items, like credit lines and other commitments taken by the bank.

Some of the mechanisms to insure liquidity crises are: microfinance institution hold buffer of liquid assets on the asset side of the balance sheet such as cash, balances with central banks and other banks, debt securities issued by governments and similar securities or reverse repo trades reduce the probability that liquidity demands threaten the viability of the bank. The second strategy is, banks can rely on the interbank market where they borrow from other banks in case of liquidity demand. The last strategy is that, the central bank typically acts as a Lender of Last Resort/LOLR to provide emergency liquidity assistance to particular illiquid institutions and to provide aggregate liquidity in case of a system-wide shortage (Aspachs et al. 2005).

The two most widely used approaches to measure liquidity of banks are by liquidity gap approach (flow perspective) or liquidity ratio approach (stock perspective). The liquidity gap/flow approach treats liquidity reserves as a reservoir which the bank assesses its liquidity risk by comparing the variability in inflows and outflows to determine the amount of reserves that are needed during the period. The liquidity gap approach adapts the variation between assets and liabilities both current

and future period. A positive liquidity gap means for deficit, requiring for liabilities to be increased (Bassis, 2009).

The liquidity ratio/stock approach, in contrast, employs various balance sheet ratios to identify liquidity trends. The various ratios label for immediate viable source of funding. This indeed entitles portfolio of assets that can be sold off without any fuss and also adequate amounts of stable liabilities. Various authors like Moor (2010), Rychtarik (2009), or Praet and Herzberg (2008) have also provided similar understandings with liquidity ratios such as liquid assets to total assets, liquid assets to deposits, loans to total assets and loans to deposits. In short, the liquidity ratio carries varies balance sheet ratios to identify liquidity needs.

Though both approaches are intuitively appealing, the flow approach is more data intensive and there is no standard technique to forecast inflows and outflows. As a result, the stock approaches are more popular in practice and the academic literatures, due to the availability of more standardized method (Crosse and Hempel 1980; Yeager and Seitz, 1989; Hempel et al. 1994). According to Crosse and Hempel (1980), the most popular stock ratios are liquid asset to deposit, loan-to-deposit ratio and the liquid asset-to-total asset ratio. When the higher the loan-to-deposit ratio (or the lower liquid asset to deposit ratio and the liquid asset-to-total asset ratio) the less able a bank to meet any additional loan demand (indicate for less liquidity). Both indicators have their shortcomings: the loan-to-deposit ratio does not show the other assets available for conversion into cash to meet demands for withdrawals or loans, while the liquid assets ratio ignores the flow of funds from repayments, increase in liabilities and the demand for bank funds. Nevertheless, according to Crosse and Hempel (1980), these ratios likely to move in parallel trend.

Hence, to meet the objectives of this study, the liquidity ratio/stock approach was chosen over the flow/liquidity gap approach. The researcher chooses to employ three liquidity ratios to overcome the shortcomings of one from the other. The researcher mainly chooses the liquid asset-to-depot ratio because the liquidity framework from NBE is favorable towards this ratio. Liquid asset-to-total assets ratio and loan-to-deposit ratio were used as a robustness check.

2.2. Determinants of banks Liquidity

The determinants of microfinance institution liquidity level can be classified into four broad categories. These include: the opportunity cost of liquidity holding, microfinance institution specific characteristics, moral hazard motives and macroeconomic fundamentals, as discussed here below.

2.2.1 Opportunity Cost of Liquidity Holdings

The early literature on bank liquidity buffers views liquidity management at banks as akin to a standard inventory problem (Baltensperger, 1980 and Santomero, 1984). The costs of keeping a stock of liquid assets of a particular size are weighed against the benefit of reducing the chance of being „out of stock". The key prediction of these theories is that the size of the liquidity buffer should reflect the opportunity cost of return foregone from holding liquid assets rather than loans. It should also relate to the distribution of liquidity shocks the bank may face, and in particular to the volatility of the funding basis as well as the cost of raising funds (eg in the interbank market) at short notice. In an extension of this literature, Agenor et al (2004) test whether the credit crunch in Thailand, 1998 was related to supply or demand factors, and to this end estimate a bank "demand function for reserves. They derive a demand function for excess reserves that depends both on the distribution of the deposits withdrawals, the external cost of finance (penalty rates applied by the central bank) and the impact of regulation.

The determination of a microfinance institution optimal liquidity buffer involves a trade-off between self-insurance against liquidity risk and the returns from illiquid, higher-yielding assets. Baltensperger (1980) as well as Santomero (1984) for instance argue that the size of banks" liquidity buffers is determined by the opportunity costs to hold liquid assets. Similar arguments can be found in Agénor et al. (2004) who shows, using aggregate data for Thailand, that bank liquidity holdings are positively related to the volatility of the money market rate, which proxies the need for self-insurance.

Unfortunately, we cannot observe liquidity risk exposure and banks investment opportunities directly. We can, however, observe banks" structure and operating environment as well as their realized liquid buffers. Based on the trade-off described above, we can therefore hypothesize as to the manner in which different firm-specific and environmental aspects of a bank business should affect its liquid buffer. In particular, any observed factor that would be expected to lower (raise) liquidity risk should reduce (increase) observed liquidity buffers.

2.2.2 Moral Hazard Motives

As noted above, microfinance institutions have three possible layers of insurance; a buffer of liquid assets in banks" individual portfolios, unsecured lending/borrowing in the interbank market and central banks"

Leander of Last Resort (LOLR). Repullo (2003) develops a model of strategic interactions between the central bank and one representative bank and shows that the presence of LOLR support may affect the bank choice as regards the share of liquid assets in its portfolio. The central banks‟ objective is to trade off the fiscal cost of lending to the bank and the cost of the bank's failure. The bank objective is to maximize the expected payoffs to its shareholders. Given this set-up, Repullo (2003) determines the equilibrium strategy of the bank taking into account the LOLR‟s response function and vice-versa. One finding is that, the choice among risky assets is not related to the presence of the LOLR. Nevertheless, the presence of a LOLR is shown to influence the level of the optimal buffer of liquid assets: the share of safe assets in the bank portfolio decreases with the introduction of a LOLR.

In an empirical study, Gonzalez Eiras (2003) draws conclusions consistent with Repullo (2003). He examines how Argentinean banks changed the amount of their liquidity holdings and demands after a Repo Agreement was implemented at the end of 1996, which enhanced the ability of the central bank to act as LOLR. He founds that this particular event implied a reduction in the banks‟ liquidity holdings. That is, the greater the potential support from the central bank in case of liquidity crises, the lower the liquidity buffer the banks hold.

2.2.3. Microfinance institution Specific Characteristics

The internal (microfinance institution-specific) factors are factors that are related to internal efficiencies and managerial decisions. Such factors include determinants such as microfinance institution profitability, capital adequacy, microfinance institution size, asset quality (non-performing loans), growth of loan, interest rate margin and the like.

Profitability and microfinance institution Liquidity:

Profitability accounts for the impact of better financial soundness on bank risk bearing capacity and, on their ability, to perform liquidity transformation (Rauch et al. 2008 and Shen et al. 2010). A sound and profitable banking sector is better able to withstand negative shocks and contribute to the stability of the financial system (Athanasoglou et al. 2005). One of the highest yielding assets of a bank is loans & advances that provide the largest portion of operating revenue. In this respect, banks are faced with liquidity risk since loans and advances are funds from deposit of customers. The higher the volume of loans & advances extended to customers, the higher the interest income

and highest profit potentials for banks but it affects liquidity of the bank. Thus, banks need to strike a balance between liquidity and profitability.

The relationship between profitability and liquidity varies among different literatures. According to Bourke (1989), banks holding more liquid assets benefit from a superior perception in funding markets, reducing their financing costs and increasing profitability. On the other hand, the studies made by (Molyneux and Thornton 1992; Goddard et al. 2004) argued that holding liquid asset imposes an opportunity cost on the bank and has an inverse relationship with profitability. Further, Myers and Rajan (1998) emphasized the adverse effect of increased liquidity for financial institutions stating that, "although more liquid assets increase the ability to raise cash on short-notice, they also reduce management ability to commit credibly to an investment strategy that protects investors" which, finally, can result in reduction of the firm capacity to raise external finance" in some cases. Thus, this indicates the negative relationship between bank profitability and liquidity. The trade-offs that generally exist between return and liquidity risk are demonstrated by observing that a shift from short term securities to long term securities or loans raises a banks return but also increases its liquidity risks. As a result of the two opposing views, the management of banks faced with the dilemma of liquidity and profitability.

Non-performing loans and microfinance institution Liquidity:

Non-performing loans are loans & advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment term of the loan or advance is in question (NBE directive No. SBB/43/2008). According to (Ghafoor, 2009), non-performing loans are loans that a bank customer fails to meet his/her contractual obligations on either principal or interest payments exceeding the scheduled repayment dates. Thus, NPLs are loans that give negative impact to banks in developing the economy. Rise of non-performing loan portfolios significantly contributed to financial distress in the banking sector.

The banking systems play the central role of mobilizing and allocating resources in the market by channeling fund from surplus economic units to deficit economic units. This activity of transforming short term deposit to long term loans & advances will generate most profits for banks. However, it involves high risk and eventually if not managed properly will leads to high amount of non-performing loans. The increased on non-performing loan reflects deteriorated asset quality, credit risk and its inefficiency in the allocation of resources. According to Bloem and Gorter (2001),

though non-performing loans may affect all sectors, the most serious impact is on financial institutions which tend to have large loan portfolios. On the other hand, large volume of non-performing loans portfolio will affect the ability of banks to provide credit and leads to loss of confidence and liquidity problems. Therefore, the amount of non-performing loans has a negative impact on bank's liquidity.

Microfinance institution Size and Liquidity:

When bank size grows it will help them to overcome the risk but it should be noted that it may leads also to failure. According to the "too big to fail" argument, large banks would benefit from an implicit guarantee, thus decrease their cost of funding and allows them to invest in riskier assets (Iannotta et al. 2007). If big banks are seeing themselves as "too big to fail", their motivation to hold liquid assets is limited. In case of a liquidity shortage, they rely on a liquidity assistance of Lender of Last Resort (Vodova, 2011). Thus, large banks are likely to perform higher levels of liquidity creation that exposes them to losses associated with having to sale illiquid assets to satisfy the liquidity demands of customers (Kiyotaki and Moore, 2008). Therefore, "too big to fail" status of large banks could lead to moral hazard behavior and excessive risk exposure and thus there can be negative relationship between bank size and liquidity.

In agreement for positive relationship between bank size and liquidity (Rauch et al ,2009 and Berger and Bouwman (2009), state that smaller bank tend to emphasis on intermediation processes and transformation activities and they do have smaller amount of liquidity. Hence, there can be positive relationship between bank size and liquidity.

Interest Rate Margin and microfinance institution Liquidity

Interest rate margin is one of the most important factors that gauge the efficiency of financial institutions. Interest rate margin is the difference between the gross cost paid by a borrower to a bank and the net return received by a depositor (Brock and Suarez 2000). According to (Azeez et al, 2013), interest rate margin is defined as the difference between interest income from loan and advances as a fraction of the total loans and advances and the interest paid out on deposit as a percentage of total deposits. In the financial intermediation process, a bank collects money on deposit from one group (the surplus unit) and grants it out to another group (the deficit unit). These roles involve bringing together people who have money and those who need money. In such intermediation function, the bank will earn interest from loans & advances and pay interest for

depositors. Thus, how well a bank manages its assets and liabilities is measured by the spread between the interest earned on the bank‟s assets and interest costs on its liabilities.

According to the liquidity preference theory, lenders need high interest rate which includes the liquidity premium in order to lend. The basic idea underlining this theory is that, lenders of funds prefer to lend short, while borrowers generally prefer to borrow long. Hence borrowers are prepared to pay interest rate margin/ a liquidity premium to lenders to induce them to lend long. The size of interest rate margin/ liquidity premium increases with the time to maturity. Therefore, as they got higher premium, lenders give up their liquid money (Pilbeam 2005). Higher interest rate margin will force banks to lend more and reduce their holding of liquid assets. On the other hand, holding of liquid asset reduce the risk that banks may face liquidity shortage in case of unexpected withdrawals and thus as liquid assets increases, a bank‟s liquidity risks decrease, which leads to a lower liquidity premium component of the net interest margin (Angabazo1997). Therefore, there is a negative relationship between interest rate margin and banks liquidity.

2.2.4 Macroeconomic Fundamentals

The external or macro determinants are variables that are not related to bank management but reflect the economic and legal environment that affects the operation and liquidity positions of institutions. The macroeconomic factors that can affect bank's liquidity include factors such as GDP growth rate; inflation rate and short-term interest rate among others.

GDP Growth and microfinance institution Liquidity:

Gross Domestic Product (GDP) is one of the macroeconomic factors that affect liquidity of banks. A major recession or crises in business operations reduces borrowers‟ capability to service obligations which increases banks‟ NPLs and eventually banks insolvency (Gavin & Hausmann, 1998). During economic boom, the demand for differentiated financial products is higher and may improve bank‟s ability to expand its loans and securities at higher rate and thus reduce liquidity.

The other study made by Painceira (2010) stated that, banks liquidity fondness is low in the course of economic boom where banks confidentiality expects to profit by expanding loanable fund to sustain economic boom while restricted loanable fund during economic downturn to prioritize liquidity. In line with this argument the loanable fund theory of interest states that, the supply for loan increases when the economy is at boom or going out of recession (Pilbeam 2005).

Aspachs, et al (2005) has also inferred that, banks prioritize liquidity when the economy plummets, during risk lending opportunities, while neglecting liquidity during economic boom when lending opportunities may be favourable. On the other hand, the studies made by Bordo et al. (2001) suggested that during recession, it is likely for an increase in the number of loan default. This causes depositors to perceive high solvency risk and immediately tend to withdraw deposits held at financial institutions.

The Rate of Inflation and microfinance institution Liquidity:

Inflation reflects a situation where the demand for goods and services exceeds their supply in the economy. Existing monetary theories agree that, inflation increases the opportunity cost of holding liquidity and thus distorts the allocation of resources which require liquidity in transaction. Recent theories emphasize the importance of informational asymmetries in credit markets and demonstrate how increases in the rate of inflation adversely affect credit market frictions with negative repercussions for financial sector performance and therefore long-run real activity (Huybens and Smith 1998, 1999).

The feature of these theories is that, there is an informational friction whose severity is endogenous. Given this feature, an increase in the rate of inflation drives down the real rate of return not just on money, but on assets in general. According to Huybens and Smith (1999), the implied reduction in real returns worse the credit market frictions which leads to the rationing of credit; hence credit rationing becomes more severe as inflation rises. As a result, the financial sector makes fewer loans, resource allocation is less efficient, and intermediary activity diminishes with adverse implications for capital/long term investment. Further, the amount of liquid assets held banks will rise with the rise in inflation. High inflation rate and sudden changes of inflation have a negative impact on real interest rates and bank's capital. In this respect, the bank's non-performing loans will expand, collateral security values deteriorate and value of loan repayments on banks loans declines. This way, it has been found that inflation rate significantly determines bank liquidity (Heffernan; 2005).

Short Term Interest Rate and microfinance institution Liquidity:

Short term interest rate is the rate paid on money market instruments. Money market instruments are securities that have a year or less to maturity, which includes Treasury bills, commercial papers banker’s acceptances, certificates of deposit, repurchase agreements. Treasury bills are the most important since they provide the basis for all other domestic short-term interest rates. The money

market is important because many of these instruments are held by banks as part of their eligible reserves, that is, they may be used as collateral if bank wishes to raise funds from central bank because they are short maturing and have less default risk. The higher short-term interest rate induces banks to invest more in the short term instruments and enhance their liquidity position Pilbeam, (2005). Therefore, short term interest rate has positive relationship with liquidity.

2.3 Review of Related Empirical Studies

This section gives a brief review of the previous studies made on the determinants of bank's liquidity from both developed and developing nations. Moreover, most of the studies undertaken on bank liquidity consider both bank specific and macroeconomic factors to examine the determinants of liquidity of banks. So, the studies conducted in related to bank's liquidity are reviewed as follows.

2.3.1 Related Empirical Studies in other continent Countries

Bank specific and macroeconomic determinants of liquidity of English banks were studied by (Aspachs et al, 2005). The researchers used unconsolidated balance sheet and profit and loss data for a panel of 57 UK-resident banks, on a quarterly basis, over the period 1985 to 2003. They assumed that the liquidity ratio as a measure of the liquidity was dependent on the following factors: Probability of obtaining the support from LOLR, which should lower the incentive for holding liquid assets, interest rate margin as a measure of opportunity costs of holding liquid assets expected to have negative impact, bank profitability which is according to finance theory negatively correlated with liquidity, loan growth, where higher loan growth signals increase in illiquid assets, size of the bank expected to have positive or negative impact, gross domestic product growth as an indicator of business cycle negatively correlated with bank liquidity, and short term interest rate, which should capture the monetary policy effect with expected negative impact on liquidity.

The study made on bank specific determinants of liquidity on English banks studied (Valla et al.2006) and assumed that, the liquidity ratio as a measure of the liquidity should be dependent on the following factors: bank profitability and loan growth had negatively correlated with liquidity while size of the bank is ambiguous. Liquidity created by Germany's state-owned savings banks and its determinants has been analyzed by (Rauch et al. 2009). In the first step they attempted to measure the liquidity creation of all 457 state owned savings banks in Germany over the period 1997 to 2006 and they analyzed the influence of monetary policy on bank liquidity creation. To

measure the monetary policy influence, the study developed a dynamic panel regression model. According to this study, the following factors determine bank liquidity: monetary policy interest rate, where tightening monetary policy expected to reduces bank liquidity, level of unemployment, which is connected with demand for loans having negative impact on liquidity, savings quota affect banks liquidity positively, size of the bank measured by total number of bank customers have negative impact, and bank profitability expected to reduce banks liquidity.

Vodova (2011) examined the determinants of liquidity of commercial banks in Czech Republic through four liquidity ratios and related them with bank specific and macroeconomic data over a period from 2001 to 2010. This study observed drop of banks‟ liquidity as a result of the Global financial Crisis. The study reveals that the share of liquid assets in total assets and liquid asset in deposits and short-term funding decreases with bank profitability, higher capital adequacy and bigger size of banks. In their opinion big banks rely on the interbank market and on liquidity assistance of Lender of Last Resort (LOLR). Liquidity measured by share of loans in total assets and in deposits and short-term borrowings increases with growth of domestic product. They did not find any significant relationship between interest rates on loans, interest rate on interbank transactions or monetary policy interest rates, interest rate margins, the share of non-performing loans and the rate of inflation with liquidity.

The study made by Lucchetta (2007) on the hypothesis that "interest rates affect banks‟ risk taking and the decision to hold liquidity across European countries". The liquidity measured by different liquidity ratios should be influenced by: behavior of the bank on the interbank market. The more liquid the bank is, the more it lends in the interbank market. The results of the study revealed that the risk-free interest rate negatively affects the liquidity retained by banks and the decision of a bank to be a lender in the inter-bank market. Conversely, the inter-bank interest rate has a positive effect on such decisions. Typically, it is the smaller, risk-averse banks that lend in the inter-bank markets. Meanwhile, the risk-free interest rate is positively correlated with loans investment and bank risk-taking behavior.

Vodova (2013) had also studied on the determinants of liquidity of Polish commercial banks. The data cover the period from 2001 to 2010. The results of panel data regression analysis showed that bank liquidity is strongly determined by overall economic conditions and dropped as a result of financial crisis, economic downturn and increase in unemployment. Bank liquidity decreases also with higher bank profitability, higher interest rate margin and bigger size of banks. On contrary,

bank liquidity increases with higher capital adequacy, inflation, share of nonperforming loans and interest rates on loans and interbank transaction

2.3.2 Related Empirical Studies in Emerging Economies

Moore (2010) investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries and specifically addresses the behavior of commercial bank liquidity during crises in Latin America and the Caribbean. They identify the key determinants of liquidity, and to provide an assessment of whether commercial bank liquidity during crises is higher or lower than what is consistent with economic fundamentals. The regression model was estimated by using ordinary least squares. The result of the study showed that the volatility of cash-to-deposit ratio and money market interest rate have negative and significant effect on liquidity. Whereas, liquidity tends to be inversely related to the business cycle in half of the countries studied, suggesting that commercial banks tend to error on the side of caution by holding relatively more excess reserves during downturns.

Karlee et al. (2013) studied the determinants of liquidity of 15 commercial banks in Malaysia in period (2003-2012). They used bank specific factors; size of bank, capital adequacy, profitability, credit and macroeconomic factors such as GDP, interbank rate, financial crisis. The empirical results show that all factors included are significant except interbank rate. The factors with positive influence on bank liquidity are Non-Performing Loan, Profitability and Gross Domestic Product. On the other hand, factors to bring negative effect to bank's liquidity are Bank Size, Capital Adequacy, and Financial Crisis. While Interbank Rate turned out insignificant

The other study made by Vodová (2012) aimed to identify the determinants of liquidity of commercial banks in Slovakia. In order to meet its objective, the researcher considered the data for bank specific factors over the period from 2001 to 2009. The data was analyzed with panel data regression analysis by using an econometric package Eviews7and the findings of the study revealed that bank liquidity decreases mainly as a result of higher bank profitability, higher capital adequacy and with the size of bank. The level of non-performing loans has no statistically significant effect on the liquidity of Slovakia commercial banks.

In another study from Pakistan, Malik and Rafique (2013) examines bank specific and macroeconomic determinants of commercial bank liquidity in Pakistan. Their study period covers from 2007 to 2011. They have used two models of liquidity. The first model L1 is based on cash

and cash equivalents to total assets. The second model L2 is based on advances net of provisions to total assets. Their results suggest that, Non-Performing Loan (NPL) and Return on Equity (ROE) have a negative and significant effect with L1. Capital adequacy (CAP) and inflation (INF) are negatively and significantly correlated with L2, additionally there is a significant and positive impact of financial crisis on the liquidity of commercial banks. The central bank regulations greatly affect the liquidity of commercial banks which means tight monetary policy can regulate the undesirable effect of inflation on liquidity.

The study made by Vodová (2013) with the aim of identifying the determinants of liquidity of Hungarian commercial banks which cover the period from 2001 to 2010 and used panel data regression analysis. The result of the study showed that bank liquidity is positively related to capital adequacy of banks, interest rate on loans and bank profitability and negatively related to the size of the bank, interest rate margin, monetary policy interest rate and interest rate on interbank transaction.

Sushil et al (2013) had made a study on the relationship between liquidity of selected Nepalese commercial banks and their impact on financial performance and found that capital adequacy, share of non-performing loans in the total volume of loans had negative and statistically significant impact on banks liquidity whereas loan growth, growth rate of gross domestic product on the basis price level, liquidity premium paid by borrowers and short term interest rate had negative and statistically insignificant impact on banks liquidity. Bank size had positive and significant impact and inflation rate had positive and insignificant impact on banks liquidity.

2.3.3 Related Empirical Studies in African Countries

Chagwiza (2011) made a study on Zimbabwe, regarding the commercial bank's liquidity and its determinants. The main objective of his study was to identify the determinants of liquidity in Zimbabwean commercial banks. The result of his study revealed that, there is a positive link between bank liquidity and capital adequacy, total assets, gross domestic product and bank rate. While the adoption of multi-currency, inflation rate and business cycle have a negative impact on liquidity. The other studies made by Laurine (2013) in Zimbabwe regarding Zimbabwean Commercial Banks Liquidity Risk Determinants after dollarization. The aim of his paper was that empirically investigating the determinants of Zimbabwean commercial banks liquidity risk after the country adopted the use of multiple currencies exchange rate system. To attain the intended

objective, panel data regression analysis was used on monthly data from the period of March 2009 to December 2012. The result of the study revealed that, capital adequacy and size have negative and significant influence on liquidity risk whereas spread and non-performing loans have a positive and significant relationship with liquidity risk. Reserve requirement ratios and inflation were also significant in explaining liquidity during the studied period.

Agbada and Osuji (2013) studied the efficacy of liquidity management and banking performance in Nigeria using survey research methodology. Data obtained were first presented in tables of percentages and pie charts. The data were empirically analyzed by Pearson product-moment correlation coefficient. Findings from the empirical analysis were quite robust and clearly indicate that there is significant relationship between efficient liquidity management and banking performance and that efficient liquidity management enhances the soundness of a bank.

A study made by Fadare (2011), on the banking sector liquidity and financial crisis in Nigeria with the aim of identifying the key determinants of banking liquidity and assessing the relationship between determinants of banking liquidity and financial frictions within the economy. It was employed a linear least square model and time series data from 1980 to 2009. The study found that monetary policy rate and lagged loan-to-deposit ratio were significant for predicting banking sector liquidity. It also showed that a decrease in monetary policy rate, volatility of output in relation to trend output, and the demand for cash, leads to an increase in current loan-to-deposit ratios; while a decrease in currency in circulation in proportion to banking sector deposits; and lagged loan-to-deposit ratios leads to a decline in current loan-to-deposit ratios.

The other study made by Mohamed(2015) on Tunisia banks shows that , financial performance, capital / total assets, operating costs/ total assets, growth rate of GDP, inflation rate, delayed liquidity have significant impact on bank liquidity while size, total loans / total assets, financial costs/ total credits, total deposits / total assets does not have a significant impact on bank liquidity.

2.3.4 Related Empirical Studies in Ethiopia

As to the author's knowledge, the first study was conducted by Tseganesh (2012). She studied the determinants of banks liquidity and their impact on financial performance on commercial banks in Ethiopia including both public and private banks. Her study focused on two steps; first, to identify determinants of commercial banks liquidity in Ethiopia and then to see the impact of banks liquidity up on financial performance through the significant variables explaining liquidity. The data was

analyzed by using balanced fixed effect panel regression model for eight commercial banks in the sample covered the period from 2000 to 2011 and the result of her study indicate that capital adequacy, bank size, share of non-performing loans in the total volume of loans, interest rate margin, inflation rate and short term interest rate had positive and statistically significant impact on banks liquidity. Whereas, Real GDP growth rate and loan growth had statistically insignificant impact on banks liquidity.

2.4. Summary and knowledge Gap

The fundamental role of financial institution in the maturity transformation of short-term deposits into long-term loans makes financial institution inherently vulnerable to liquidity risk both of an institution-specific nature and that which affects markets as a whole. Virtually every financial transaction or commitment has implications for microfinance institution liquidity. Effective liquidity risk management helps to ensure a microfinance institution ability to meet cash flow obligations, which are uncertain as they are affected by external events and another agents' behavior.

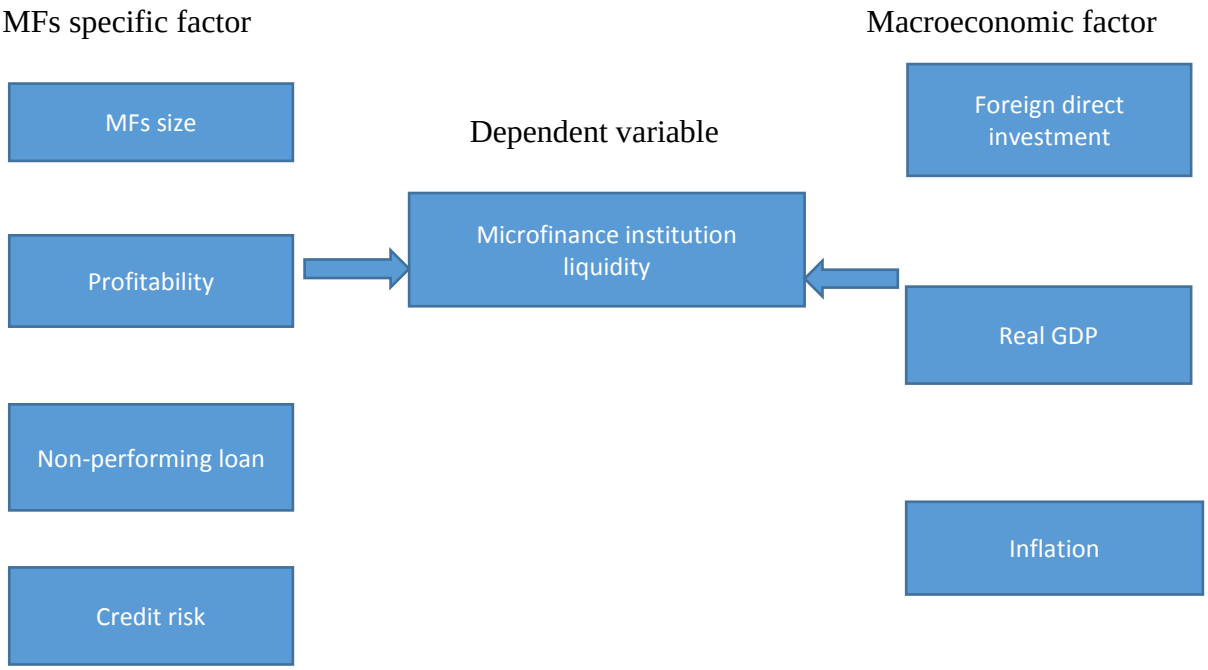
Financial market developments in the past decade have increased the complexity of liquidity risk and its management. The global market turmoil that began in mid-2007 re-emphasized the importance of liquidity to the functioning of financial markets and the banking sector. The financial crisis illustrated how quickly liquidity can evaporate and that illiquidity can last for an extended period of time. The banking system came under severe stress, which necessitated central bank action to support both the functioning of money markets and, in a few cases, individual institutions.

As it was discussed in the literature review part, liquidity of banks can be affected by bank specific as well as macroeconomic factors. It was also discussed that some factors which have significant impact on liquidity of banks in one country may not have the same impact on another country. However, the prior studies are focused on determining liquidity only on bank sector particularly; so, it is important to identify the determinants of liquidity of Ethiopian microfinance institution.

As to the knowledge of the researcher, there are many studies made by many researchers on liquidity of Ethiopian commercial banks including both public banks and private banks. While there is no study made to identify the determinants of liquidity on microfinance institution taking private. Therefore, the objective of this study is to identify the determinants of liquidity of Ethiopian microfinance institution.

2.5 Conceptual Framework

On the basis of the hypotheses that developed from the literature part and the regression model of the study, the following conceptual frame work can be developed



Chapter Three

Research Methodology

This chapter specifically gives a brief description of the research method that have been employed to capture determinant factors of liquidity. This include research design, source and method of data collection, study population and sampling frame, the research instruments used in collecting data for the study and the data collection and data analysis methods. It also discusses about the model and the components of the model both the dependent and the independent variables.

3.1. Research Design

The research methodology begins by presenting the overall research design, as the research design provides an important framework & guidelines on how to collect and analyze data. The choice of appropriate research design will help the researcher to answer the research questions and to satisfy the research objectives. Therefore, it is a paramount to properly define and evaluate the research design before conducting the research.

According to Creswell (2009), there are three basic research approaches; these are quantitative, qualitative and mixed research approaches. The quantitative data research relies on the measurement and analysis of statistical data to produce quantifiable conclusions. Quantitative research is a means for testing objective theories by examining the relationship among variables (Creswell, 2009). Therefore, for this study quantitative research approach used to see the relationship between the liquidity of microfinance institution and the MFS specific and macroeconomic factors affecting MFS liquidity in Ethiopia by establishing causal relationship. This study also adapted an explanatory approach by using balanced panel research design to meet the research objective. As explained by Bhattacherjee (2012), explanatory research attempts to identify causal factors and outcomes of the target phenomenon. According to Brooks (2008), a panel of data will embody information across both time and space and it measures some quantity about them over time. The advantage of using panel data is to address a broader range of issues and tackle more complex problems than would be possible with pure time-series or pure cross-sectional data alone. Panel data has also the advantage of giving more informative data as it consists of both the cross-sectional information, which captures individual variability, and the time series information, which captures dynamic adjustment (Brooks 2008 pp 488).

3.2 Source and Method of Data Collection

In order to carry out any research activity information should be gathered from proper sources. Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of research findings (Koul, L 2006). The sources of data for this research were secondary sources. MFIS specific data will be collected from audited financial statements (i.e. Balance Sheet and Profit & Loss Statement) of each selected MFIS included in the sample.

3.3. Study Population & Sampling Frame

The study population includes all microfinance institution in Ethiopia. There are around 35 microfinance institutions in our country. The sampling frame for drawing the sample includes those microfinance institutions having at least 10 years of experience and accessible data. The rationale for using 10 years of data is to increase the number of observations.

For some researches, it is possible to collect data for the entire population as it can be manageable and data is available, while for some other researches data is collected on sample base. Sampling provides a valid alternative when it is impractical to survey the entire population and when there is budget and time constraint to surveying the entire population (Saunders et al, 2009). There are two types of sampling techniques; probability or representative sampling and non-probability or judgmental sampling. In the probability sampling, the chance or probability, of each case being selected from the population is known and is usually equal for all cases while in the non-probability sampling, the probability of each case being selected from the total population is not known (Saunders. et al, 2009). According to Bhattacherjee (2012), non-probability sampling is sampling technique in which some units of the population have zero chance of selection or where the probability of selection cannot be accurately determined rather samples are selected based on certain non-random criteria, such as quota or convenience.

The sampling technique used in this research is a non-probabilistic sampling and among the non-probabilistic sampling methods, this research used purposive sampling. As stated by Saunders et al (2009), purposive sampling is often used when working with small samples and when we wish to select cases that are particularly informative. Thus, the researcher used purposive sampling by considering the availability of full data for the selected time period. In Ethiopia there are around 35

microfinance institutions exist. Among the MFIs, 12 of them have more than 10 years of data and available of full data for the selected time period.

3.4. Methods of Data Analysis

After the data were collected, it was organized and financial ratios were computed for each MFIS of each MFIS specific variables. And then, the next step was analyzing and interpreting them accordingly to achieve the stated objectives. In this study two type of statistical analysis have been used to test the hypotheses. These are descriptive statistics and inferential statistics/multiple regression analysis to see the effect (relationship) of explanatory or independent variables on the dependent variable. The descriptive statistics of both dependent and independent variables were calculated over the sampled periods. This helps to convert the raw data in to a more meaning full form which enables the researcher to understand the ideas clearly. And then interpret with statistical description including standard deviation, mean, and minimum & maximum. Then, correlation analyses between dependent and independent variables was made and finally a multiple linear regression used to determine the relative importance of each independent variable in influencing liquidity of MFIS.

3.5. Variable Definition & Hypotheses of the Study

This study is focused on to identify the determinants of MFIs liquidity. It is apparent that the most significant task is to select the appropriate explanatory variables. As it was discussed in the literature review part, some determinant factors which have positive relation with liquidity in one country may have negative relation with other country and some determinant factors which have significant impact on liquidity in one country may not have significant impact on liquidity in another country. Though various bank specific and macrocosmic variables were conducted in the previous studies made worldwide, in this study some variables (MFIs specific and macroeconomic) was included. Therefore, the following variables selected based on Ethiopian context and previous relevant studies. The description and operational definition of selected variables is discussed here under.

3.5.1. Dependent Variables

Liquidity of MFIs: Bank for International Settlements (2008) defines liquidity as “the ability of bank to fund increases in assets and meet obligations as they come due, without incurring

unacceptable losses". Liquidity can also be defined as a measure of the relative amount of asset in cash or which can be quickly converted into cash without any loss in value available to meet short term liabilities. As it was discussed in the literature, there are two methods of measuring liquidity of MFIs which are liquidity ratios (stock approach) and liquidity gap (flow approach). The liquidity gap is the difference between assets and liabilities whereas liquidity ratios are various balance sheet items ratios which identify liquidity trends. The liquidity measure provides suggestions about the level of liquidity on which the MFIs are operating. The first approach, liquidity ratio, uses different balance sheet ratios and it is easy to compute whereas, the second approach, funding gap, is the difference between inflows and outflows which is difficult to measure because it is more data intensive and there is no standard technique to forecast inflows and outflows.

Most academic literatures prefer liquidity ratio due to a more standardized method and therefore, this study is intended to use liquidity ratios, to measure liquidity of MFIs, due to the availability of data. For the purpose of this study, the following two types of liquidity ratios, which are most of the time used by the National Bank of Ethiopia and which were previously used by Vodova(2011, 2012, 2013), Tseganesh(2012), Rafique & Malik (2013) and Chagwiza, (2014) are adopted.

Liquid Asset to Deposit Ratio (LATD):

According to NBE directive No SBB/57/2014, liquid asset includes cash (local & foreign currency), deposits with the National bank and other local and foreign MFIs having acceptance by the National bank, other assets readily convertible into cash expressed and payable in Birr or foreign currency having acceptance by the National bank and other assets as the National Bank may from time to time declare to be liquid assets. Accordingly, deposit refers to demand (current) deposits, savings deposits and fixed time deposits of MFIs while short term borrowing refers any borrowing secured from the National Bank of Ethiopia or any other interbank loans with maturity period of less than one year.

This ratio indicates the percentage of short-term obligations that could be met with the bank liquid assets in the case of sudden withdrawals. It is to ascertain whether the bank short-term assets are readily available to pay off its short-term liabilities. As deposits are able to be withdrawn at any point in time, they play an important role on the bank liquidity position. This ratio is more focused on the bank sensitivity to selected types of funding i.e. customer deposit. The higher this ratio

signifies that the bank has the capacity to absorb liquidity shock and the lower this ratio indicates the bank increased sensitivity related to deposit withdrawals.

$$LATD = \frac{\text{Liquid asset}}{\text{(Deposit + Short term borrowing)}}$$

Liquid Asset to Total Asset Ratio (LTA):

The liquid asset to total asset ratio gives information about the general liquidity shock absorption capacity of a MFIs. In general, when the ratio is high, it tells us that the MFIs have a capacity to absorb liquidity shock and that the MFIs is in a better position to meet its withdrawals. While, the higher this ratio may indicate inefficiency since liquid assets, most of the time non-earning assets, yield lower income. As a result, maintaining optimum level of liquidity is required to optimize the trade-off between liquidity and profitability by investing excess liquid asset to generate higher return.

$$LTA = \frac{\text{Liquid asset}}{\text{Total asset}}$$

3.5.2. Independent Variables

Size of the MFIs (SIZE): The MFIs is one of the specific variables that affects the liquidity of a MFIs. MFIs size measures its general capacity to undertake its intermediary function. There are two opposing arguments regarding to the relationship between MFIs liquidity and MFIs size. The first view is the "too big to fail" hypothesis which considers negative relationship between bank size and liquidity whereas; the second view considers there is a positive relationship between MFIs size and liquidity. In this study, MFIs size is measured by the natural logarithm of total asset of the MFIs and it is expected positive relationship between MFIs size and liquidity and then draws the following hypothesis.

H1: MFIs size has positive and significant impact on MFIs liquidity

Non-performing Loans (NPL): Non-performing loans means loans & advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment term of the loan or advance is in question (NBE directive No SBB/43/2008). The rise of non-performing loan portfolios in MFIs significantly contributed to financial distress in

the MFIs sector. Non-performing loans are the main contributor to liquidity risk, which exposes MFIs to insufficient funds for operations. As loans & advances are the major portion of MFIs asset, when they become non-performing, it will affect both profitability and liquidity of the MFIs.

For the purpose of this study, the proxy for non-performing loans is the share of non-performing loans on total volume of loans & advances. Based on prior studies, it is expected that there is a negative relationship between non-performing loans and liquidity of the MFIs and as a result the following hypothesis is drawn.

H2: The share of non-performing loans in the total volume of loans & advances has negative and significant impact on MFIs liquidity

Profitability of the MFIs (ROA): Liquidity needs constrain a MFIs from investing its entire available fund. MFIs need to be both profitable and liquid which are inherently conflicts between the two and the need to balance them. As more liquid asset is investing on earning assets such as loans & advances, profitability will increase by the expense of liquidity. As a result, MFIs should always strike a balance between liquidity and profitability to satisfy shareholders wealth aspirations as well as liquidity requirements. The study made by Owolabi, et al (2011) evidence that, there is a trade-off between profitability and liquidity in that, the increase in either one would decrease the other. The other study made by Vodova (2013), suggest a negative influence on bank profitability (measured by return on equity) and bank liquidity.

H3: Profitability has negative and significant impact on MFIs liquidity

Gross Domestic Product (GDP): GDP is an indicator of the economic health of a country as well as the gauge of a country's standard of living. It is the measurement of level of economic activity of a country. According to previous studies, when the economy is at boom or goes out of recession, economic units including MFIs are optimistic and increase their loans & advances and as a result decrease their holding of liquid assets. On the other hand, during recession, business operations reduce borrower’s capability to service their obligations which increases MFIs NPLs and eventually decreases MFIs liquidity. For the purpose of this study, GDP is measured by the annual real growth rate of gross domestic product and it is hypothesized to affect MFIs liquidity negatively.

H4: Real GDP growth rate has negative and significant impact on MFIs liquidity

Inflation (INF): Another important macroeconomic variable which may affect liquidity of MFIs is the inflation rate. During inflation, the central bank can raise the cost of borrowing and reduce the credit creating capacity of financial institution. Recent theories emphasize the importance of informational asymmetries in credit markets and demonstrate how increases in the rate of inflation adversely affect credit market frictions with negative repercussions for financial sector performance. During inflation, it is expected that, MFIs will make fewer loans and the amount of liquid or short-term assets held by economic agents including MFIs will rise. On the other hand, during inflation the cost of living will rise and deposits are expected to be reduced and as a result liquidity will be affected negatively. For the purpose of this study, inflation is measured by the annual general consumer price index and a negative relationship between inflation rate and MFIs liquidity is expected.

H5: Inflation rate has negative and significant impact on MFIs liquidity

FDI: IMF and OECD (2004) defines foreign direct investment enterprise is an enterprise (institutional unit) in the financial or non-financial corporate sectors of the economy in which a non-resident investor owns 10 per cent or more of the voting power of an incorporated enterprise or has the equivalent ownership in an enterprise operating under another legal structure. Though FDI benefited a country by contributes to high economic growth through triggers technology spillovers, assists human capital formation, contributes to international trade integration, helps create a more competitive business environment and enhances enterprise development, it also deteriorate balance of payments as profits are repatriated, weak linkages with local communities, harmful environmental, social disruptions of accelerated commercialization in less developed countries, and the effects on competition in national markets (OECD, 2002; Contessi and Weinberger, 2009; Petrović and Stanković, 2009). Ferrouhi and Lehadiri (2013) investigated foreign direct investment had a positive relationship with the liquidity of MFIs in Morocco, as a decline in foreign direct investment, leads to a decline in exports, an increase of unemployment rate and closure of bank. Thus, Foreign Direct Investment (FDI) to GDP used as the proxy for FDI.

H6: There is a positively significant relationship between the Foreign Direct Investment and MFIs liquidity.

3.6. Definition of variables and Model Specification

Independent variables

MFIs Size: is measured as the logarithms total assets that refer to the sum of current and non-current assets at the end of firm's reporting year.

Profitability: the profitability of the MFIs is measured by return on asset.

Foreign direct investment: is an enterprise (institutional unit) in the financial or non-financial corporate sectors of the economy in which a non-resident investor owns 10 per cent or more of the voting power of an incorporated enterprise or has the equivalent ownership in an enterprise operating under another legal structure.

Inflation: Inflation reflects a situation where the demand for goods and services exceeds their supply in the economy. It is measured by the annual general consumer price index.

Gross Domestic Product (GDP): GDP is an indicator of the economic health of a country as well as the gauge of a country's standard of living. GDP is measured by the annual real growth rate of gross domestic product

Non-performing loan: Non-performing loans means loans & advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment term of the loan or advance is in question (NBE directive No SBB/43/2008). The proxy for non-performing loans is the share of non-performing loans on total volume of loans & advances.

As it was discussed in the research design section of this paper, the nature of data is a balanced panel data which was deemed to have advantages over simple cross sectional and time series data. Panel data involves the pooling of observations on the cross sectional over several time periods (Brooks 2008). The panel data or longitudinal data comprises of both cross-sectional elements and time-series elements; the cross-sectional element is reflected by the sample of MFIs and the time-series element is reflected in the period of study. The regression model used for this study is adopted from Vodova(2011,2102, 2013), Tseganesh(2012), Rafique & Malik (2013). Thus, the following equation indicated the general model for this study.

$$\boldsymbol{Lit = \alpha + \beta Xit + \delta i + \varepsilon it}$$

where L_{it} is one of the three liquidity ratios for MFIs i in time t, Xit is a vector of explanatory variables for MFIs i in time t, α is constant, β are coefficient which represents the slope of variables, δi denotes fixed effects in MFIs i and εit is the error term. The subscript i denote the cross-section and t representing the time-series dimension.

Therefore, the general models which incorporate all of the variables to test the determinants of MFIs liquidity is:

$$LATDit = \alpha + \beta 1\ (FDIit) + \beta 2\ (SIZEit) + \beta 3(NPLit) + \beta 4\ (ROAit) + \beta 5\ (CRit) + \beta 6\ (GDPt) + \beta 7\ (INFt) + \delta i + \varepsilon it$$ **…….(Model 1)**

$$LTAit = \alpha + \beta 1\ (FDIit) + \beta 2\ (SIZEit) + \beta 3\ (NPLit) + \beta 4\ (ROAit)) + \beta 5(GDPt) + \beta 6\ (INFt) + \delta i + \varepsilon it$$ **…….(Model 2)**

Where:

***LATDit*:** represents the MFIs liquidity measured by liquid asset to deposit & short-term borrowing ratio of i^{th} MFIs on year "t**"**

***LTAit*:** represents the MFIs liquidity measured by liquid asset to total asset ratio of i^{th} MFIs on year "t**"**

***SIZEit*:** is the size of i^{th} MFIs on the year "t"

***NPLit*:** is the share of non-performing loan on total volume of loans & advances of i^{th} MFIs on the year "t".

ROAit: is the return on asset of i^{th} MFIs on the year "t".

***GDPt*:** is the real gross domestic product growth of Ethiopia on the year "t".

***INFt*:** is the inflation rate in Ethiopia on the year "t".

***FDIit*:** is foreign direct investment of i^{th} on the year "t".

δi: denotes fixed effects in bank "i"

***εit*:** is a random error term

The specific variables are both cross-sectional and time variant whereas the macroeconomic variables are only time variant but are converted into panel data type by including macroeconomic variables for each cross-sectional unit.

Chapter Four:

Data Presentation and Analysis

In the preceding chapters, the review of relevant literature helped this study to understand the problem and design an appropriate research approach to deal with. The previous chapter also discussed the research design employed to achieve the objectives of the study and to test the research hypotheses there on. In this chapter, the study analyses the collected data using various statistical tools and presents the results and discussion accordingly. This chapter is organized in two sections. The first sub section presents the result which includes descriptive statistics, CLRM Assumptions and Diagnostic tests, correlation analysis, the regression results and interview result. The second section is dedicated to the discussion of results.

4.1. Descriptive Analysis

This section essentially present descriptive statistics of dependent and explanatory variables included in this study. The dependent variable of this study is liquid asset to deposit and liquid asset to total asset and explanatory variable are non-performing loan, size, ROA, FDI, GDP and inflation. The total observation for each dependent and independent variable was 120 (data for 12 MFIs for the period from the year 2005 to 2014). The descriptive statistics include mean, median, maximum, minimum and standard deviation of all study variable (see table 4.1).

Table 4.1: Summary of descriptive statistics

	LATD	LTA	SIZE	ROA	NPL	FDI	GDP	INFLATION
Mean	0.2967	0.327008	8.157514	0.032321	0.020528	0.1812	0.1559	0.1707
Median	0.29	0.331	7.924385	0.03	0	0.1595	0.1385	0.1465
Maximum	0.832	0.874	9.927381	1.2	0.175	0.329	0.341	0.364
Minimum	0	0.0032	6.713233	-0.27	-0.0114	0.118	-0.093	0.028
Std. Dev.	0.1943	0.204074	0.841064	0.132831	0.038382	0.059317	0.125109	0.109771
Observati	120	120	120	120	120	120	120	120

Source: Output of Eviews 8

As shown in table 4.1 above, the first dependent variable of this study, liquid asset to deposit have a mean value of 0.2967 this shows the sampled microfinance institutions on average they have 0.2967 cents for each of one birr of their liability and standard deviation of 0.1943 shows dispersion from its mean. On the other hand, the minimum and maximum value of 0 and 0.832 indicate that from the sampled MFIs with 0.832 have maximum liquid asset to deposit ratio while MFIs with 0 have a minimum liquid asset to deposit ratio. In general, the higher this ratio signifies that the MFIs have

the capacity to absorb liquidity shock and the lower this ratio indicates the MFIs increased sensitivity related to deposit withdrawals.

As shown in table 4.1 above, the second dependent variable of this study, liquid asset to total asset, have a mean value of 0.327008 this shows the sampled microfinance institutions on average they have 0.327008 percent of liquid asset from the total asset and standard deviation of 0.204074 shows dispersion from its mean. On the other hand, the minimum and maximum value of 0.0032 and 0.874 indicate that from the sampled MFIs with 0.874 have maximum liquid asset to total asset ratio while MFIs with 0.0032 have a minimum liquid asset to total asset ratio. In general, the higher value of this ratio reflects higher capacity of MFIs to absorb liquidity problems.

As shown in table 4.1 above, the independent variable, size have a mean value of 8.157514 and standard deviation of 0.841064. This implies that during the study period the sampled MFIs have total asset, on average, with log value of 8.157514. On the other hand, the minimum and maximum value of 6.713233 and 9.927381 indicate that form the sampled MFIs with 9.927381 have the highest total asset while MFIs with 6.713233 have a minimum total asset. The entire figure shows that the Ethiopian MFIs have averagely log 8.157514 total asset that implicate size of the MFIs.

Profitability measure, return on asset shows, how much return the MFIs have generated from the asset employed. In this case, return on asset has a mean value of 0.032321 and standard deviation of 0.132831. Thus, the management of the MFIs have generated on average 0.032321 return for each asset employed and the deviation from the mean value was 0.132831. Besides, the minimum and maximum amount of return on asset of the sampled MFIs is -0.27 and 1.2 respectively. This indicates that there is a MFIs with a maximum return on asset ratio of 1.2 and MFIs with a minimum return on asset ratio of -0.27.

The other independent variable is non-performing loan which is loans & advances whose credit quality has deteriorated such that full collection of principal and/or interest in accordance with the contractual repayment term of the loan or advance is in question. In this case non-performing loan has a mean value of 0.020528 and standard deviation of 0.038382. So, MFIs have 0.020528 percent of non-performing loan on average and the deviation from mean value was 0.038382. Furthermore, the minimum and maximum amount of NPL of sampled MFIs is -0.0114 and 0.175 respectively. This indicate that there is a MFIs with a maximum NPL of 0.175 and MFIs with a minimum NPL of -0.0114.

The mean for Foreign Direct Investment level measured by FDI to Gross Domestic Product (GDP) is 0.1812 with minimum and maximum of 0.118 and 0.329, respectively; and its standard deviation is 0.059317. Consequently, the variation in FDI is small for the sampled period in Ethiopia with fluctuating rate from time to time.

The mean for real GDP growth rate for the sampled period in Ethiopia is 0.1559 with median of 0.135 having the minimum and the maximum of -0.093 and 0.341, respectively. The standard deviation is 0.125109, which indicates that the minimum fluctuation in the growth rate of GDP in the sampled period. This could show that there is a rapid GDP growth rate in the country based on international best practice.

Another important macroeconomic variable which may affect liquidity of MFIs is the inflation rate. During inflation, the central bank can raise the cost of borrowing and reduce the credit creating capacity of financial institution. The above figure shows that, the mean value of the general inflation rate of Ethiopia over the past sixteen years was 0.1707 with the median of 0.1465 having the minimum and the maximum of 0.028 and 0.364, respective. The rate of inflation was highly dispersed over the periods under study towards its mean with standard deviation of 0.109771.

4.1.2 CLRM Assumptions and Diagnostic tests

4.1.2.1 Heteroscedasticity

It is a test made to check whether error terms variance is constant (homoscedasticity) or not (heteroscedasticity). To test for the presence of heteroscedasticity, the popular white test was employed (Brooks 2008). One of the important assumptions of the multiple regression reveals that the variance of the disturbance term is constant. This is called the assumption of homoscedasticity. If disturbance terms (errors) do not have constant variance, they are said to be heteroscedasticity (Gujarati, 2004).

In this case as presented in table 4.2, both the F-statistic and Chi-Square versions of the test statistic gave the same conclusion that there is evidence for the presence of heteroscedasticity in this particular study, since the p-values are considerably less than 0.05. Therefore, the null hypothesis that the variance of the errors is constant (homoscedasticity) should be rejected.

Table 4.2: Heteroscedasticity test: White test

	Liquidity 1(LATD)	**Liquidity 2(LTA)**
F-statistic	1.964357	2.167792
Prob. F(21,98)	0.0143	0.0059
Obs*R-squared	35.54849	38.06228
Prob. Chi-Square(21)	0.0246	0.0127
Scaled explained SS	35.549543	39.97178
Prob. Chi-Square(21)	0.0246	0.0075

4.1.2.2 Autocorrelation

The other Assumption of classical linear regression model is Autocorrelation. The diagnostic test for CLRM assumption of no autocorrelation was tested by this study. According to Gujarati, (2004) the assumption of no autocorrelation between the disturbances assumes that given any two X values, Xi and Xj (i≠j), the correlation between any two ui and uj(i≠j), is zero. According to Chris Brooks (2008) it is assumed that the errors are uncorrelated with one another. If the errors are not uncorrelated with one another, it would be stated that they are 'autocorrelated' or that they are 'serially correlated'. This assumption was tested by Durbin Watson (DW) test of autocorrelation. Durbin--Watson (DW) is a test for first order autocorrelation -- i.e. it tests for a relationship between an error and its immediate previous value. One way to motivate the test and to interpret the test statistic would be in the context of a regression of the time *t* error on its previous value

$ut = \rho ut-1 + vt$

Where $vt \sim N(0, \sigma^2 v)$ and ρ is the coefficient of autocorrelation. The DW test statistic has as its null and alternative hypotheses. Under the null hypothesis, the errors at time $t-1$ and t are independent of one another (the errors at time $t-1$ and t are uncorrelated), and the alternative hypothesis says the errors at time $t-1$ and t are independent (the errors at time $t-1$ and t are serially correlated). Therefore

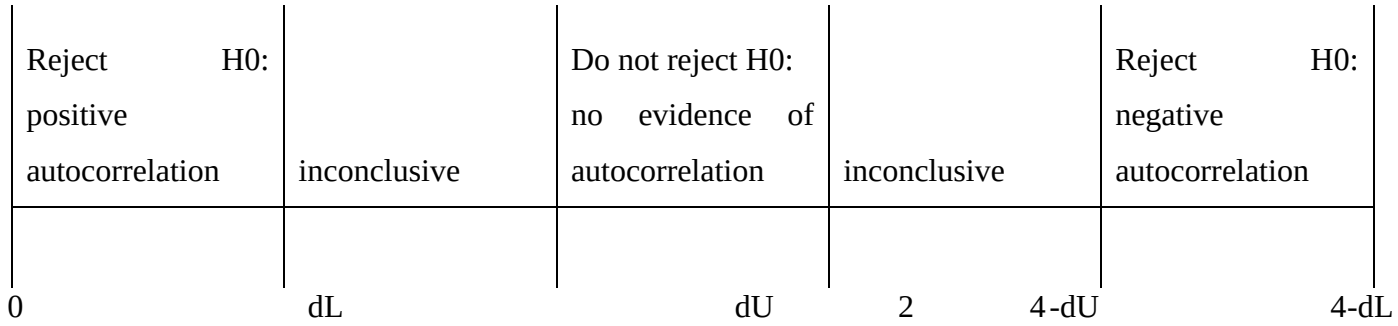
H0: $\rho = 0$ (no autocorrelation)

H1: $\rho \neq 0$ (autocorrelation)

DW has 2 critical values: an upper critical value (dU) and a lower critical value (dL), and there is also an intermediate region where the null hypothesis of no autocorrelation can neither be rejected

nor not rejected! The rejection, non-rejection, and inconclusive regions are shown on the number line in figure 4.1

Figure 4.1 Rejection, non-rejection, and inconclusive regions for DW test



According to Brooks (2008) the following is the decision rule to reject and not to reject the null hypothesis

- null hypothesis is rejected and the existence of positive autocorrelation presumed if DW is less than the lower critical value dL;
- the null hypothesis is also rejected and the existence of negative autocorrelation presumed if DW is greater than 4 minus the lower critical value dL;
- The null hypothesis is not rejected and no significant residual autocorrelation is presumed if DW is between the upper critical value dU and 4 minus the upper critical value dU.
- The null hypothesis is neither rejected or fails to be rejected if DW is between lower critical value dL and the upper critical value dU or if DW is in between4 minus the upper critical value dUand4 minus the lower critical value DL.

Figure 4.2 DW test result

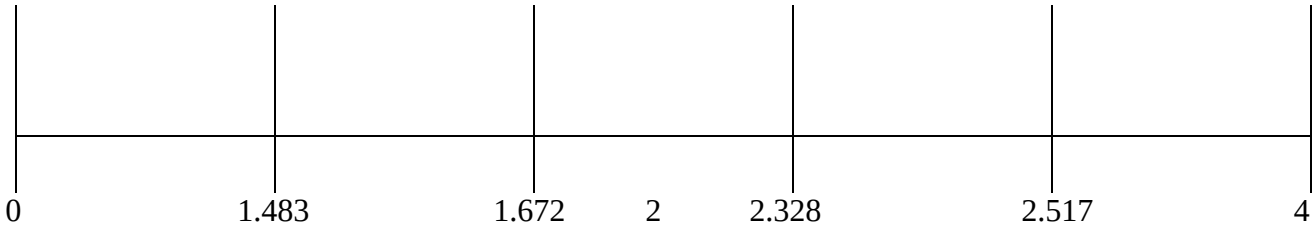


Table 4.3: DW test result test of autocorrelation

Test	DW test statistics	
	LATD	***LTA***
DW result	***1.806052***	***1.781185***

This study has six explanatory variables (k) with 120 observations and the dL and dU values are **1.483** and **1.672,** respectively. The DW value of LATD and LTA lies in the no evidence of autocorrelation region where the null hypothesis of no autocorrelation should not be rejected.

4.1.2.3 Normality

One of the classical linear regression model assumption is normally distribution of the residual. The classical normal linear regression model assumes that each ui is distributed normally with mean and standard deviation values are near to 0 and 1 respectively Gujarati (2004).

To test the normality assumption in this study the researcher applied the Jarque-Bera (JB) test. As noted by Brooks (2008) JB uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments -- the mean and the variance.

The standardized third and fourth moments of a distribution are known as its skewness and kurtosis. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distributed. If the residuals are normally distributed, the histogram should be bell-shaped and the Jarque-Bera statistic would not be significant. This means that the p-value given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null of normality at the 5% level.

As clearly plotted in figure the normality test for this study shows a p-value of Jarque-Bera 0.452631 and 0.5156 for LATD and LTA respectively; which is greater than 0.05 and the histogram is also bell-shaped implying that the residuals of this study is normally distributed.

Table 4.4:* Jarque-Bera *test result of Normality

	LATD(L1)	LTA(2)
Jarque-bera	1.585358	1.324464
probability	0.452631	0.515699

Source output of Eview 8

4.1.2.4 Multicollinearity

The other very important assumption of the classical linear regression model is multicollinearity. According to Guajarati (2004) one of the assumptions of the classical linear regression model is that there is no multicollinearity among the explanatory variables, the X's. Broadly interpreted,

multicollinearity refers to the situation where there is either an exact or approximately exact linear relationship among the explanatory variable. To test the multicollinearity problem the current study used correlation matrix between the explanatory variables.

According to Kennedy (2008) multicollinearity problem exists when the correlation coefficient among the variables are greater than 0.70. Table 4.4 below shows the correlation coefficient among explanatory variables in this study. The highest correlation coefficient for this study explanatory variable is 0.68357 that is between inflation and GDP, which is less than 0.7. Therefore, there is no evidence for presence of multicollinearity problem in this study model.

Table 4.5 Correlation Matrix for independent variables

	SIZE	ROA	NPL	FDI	GDP	INFLATION
SIZE	1					
ROA	0.120653	1				
NPL	-0.45898	-0.40021	1			
FDI	-0.20049	-0.14505	0.256292	1		
GDP	-0.02629	0.026504	0.063851	-0.22551	1	
INFLATION	0.067269	0.086376	-0.10344	-0.14625	0.68357	1

4.2 Correlation Analysis

In this section, the correlation between the dependent variables and the independent variables have been presented and analyzed. According to Brooks (2008), correlation between two variables measures the degree of linear association between them. Correlation coefficient between two variables ranges from +1 (i.e. perfect positive relationship) to -1 (i.e. perfect negative relationship) and a correlation coefficient of zero, indicates that there is no linear relationship between the two variables.

Table 4.6 Correlation Matrix

	LATD	LTA	SIZE	ROA	NPL	FDI	GDP	INFLATION
LATD	1							
LTA	0.994376	1						
SIZE	0.633638	0.640011	1					
ROA	0.164449	0.162949	0.120653	1				
NPL	-0.34686	-0.34711	-0.45898	-0.40021	1			
FDI	-0.32452	-0.32769	-0.20049	-0.14505	0.256292	1		
GDP	-0.23857	-0.2378	-0.02629	0.026504	0.063851	-0.22551	1	
INFLATION	0.063146	0.079194	0.067269	0.086376	-0.10344	-0.146251	0.68357	1

Table above, shows the correlation coefficient between the dependent variables and independent variables. Among the independent variables size, inflation and Roa are positively correlated with LATD with correlation coefficient of 0.633638, 0.063146 and 0.164449, respectively. While Npl, FDI and GDP are negatively correlated with LATD with correlation coefficient of 0.34686, 0.32452 and 0.238574, respectively. Size has shown the highest positive coefficient of 0.633638 and GDP has shown the highest negative coefficient of 0.23857 with respect to LATD while inflation shows the lowest positive coefficient of 0.063146 and NPL has shown the lowest negative coefficient of 0.34686 in relation with LATD. Size, inflation and ROA have positively correlated with LTA with 0.64, 0.079194 and 0.162949 correlation coefficient, respectively. While Npl, FDI and GDP are negatively correlated with LTA.

4.3 Model Selection Test: Random Verses Fixed Effect Model

In order, achieve the objective of the study the researcher-employed panel Data model. As far as the Data is concerned, comprising both time series and cross-sectional elements panel model is appropriate. In order, achieve the objective of the study the researcher-employed panel Data model. As far as the Data, comprising both time series and cross-sectional elements panel model is appropriate. The choice of these method is comparing time series and cross-sectional units and by using Hausman specification test.

As noted by Gujarati (2004) if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model and random effect model. Hence, the choice here is based on computational convenience. On this score, random effect model may be preferable.

The best alternative to make a choice between fixed effects and random effects model is conducting Hausman specification test. In this study the Hausman specification tests is utilized to decide which

model is appropriate to fit the sample data. Hausman specification test is the classical test of whether the fixed or random effects model should have used.

Running a Hausman specification test at five percent level enables the researcher to choose between fixed effects and random effects models (Hausman, 1978). The hypothesis for Hausman specification test is:

Null hypothesis: Random- effect model is more appropriate

Alternative hypothesis: Fixed-effect model is more appropriate

Decision rule: if the P-value from the Hausman test is statistically significant (less than five percent) the fixed-effect model is preferred in favor of random effect, otherwise the random effect model is selected.

The result from Hausman test in **table** allow as to not reject the null hypothesis that random model is better in this regression analysis. This implies that a random effect model is more appropriate than fixed effect model to undertake the panel regression estimation for this study.

Table 4.7 Hausman Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	7	1.0000

4.4. Results of Regression Analysis

This section discusses the regression results of random effect model that determines the liquidity of MFIs in Ethiopia. In this study, liquidity is measured by the ratio of liquid asset to deposit & liquid asset to total asset.

Determinants of MFIs Liquidity Measured LATD

The empirical model used in this study to identify the statistically significant determinants of Ethiopian MFIs liquidity measured by liquid asset to deposit was:

$$Latd = \alpha + \beta 1\ (FDIit) + \beta 2\ (SIZEit) + \beta 3(NPLit) + \beta 4\ (ROAit) + \beta 5\ (GDPt) + \beta 6\ (INFt) + \delta i + \varepsilon it$$

The following table presents the regression result of the determinants of MFIs liquidity measured by the ratio of liquid asset to deposit.

Table 4.8 Regression results of liquidity measured by LATD

Dependent Variable: LATD
Method: Panel EGLS (Cross-section random effects)
Date: 05/28/19 Time: 15:06
Sample (adjusted): 2005 2014
Periods included: 10
Cross-sections included: 12
Total panel (balanced) observations: 120
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.685787	0.174755	-3.924279	0.0001
SIZE	0.141549	0.019638	7.207791	0.0000
ROA	0.145826	0.086502	1.685811	0.0946
NPL	0.135000	0.362913	0.371990	0.7106
FDI	-0.855080	0.190446	-4.489881	0.0000
GDP	0.788783	0.118377	6.663322	0.0000
INFLATION	0.575409	0.131710	4.368742	0.0000

	Effects Specification	
	S.D.	Rho
Cross-section random	0.042210	0.1261
Idiosyncratic random	0.111131	0.8739

Weighted Statistics

R-squared	0.574172	Mean dependent var	0.189840
Adjusted R-squared	0.551561	S.D. dependent var	0.177217
S.E. of regression	0.118675	Sum squared resid	1.591451
F-statistic	25.39419	Durbin-Watson stat	1.806052
Prob(F-statistic)	0.000000		

The above table shows the results of the regression analysis on the determinant of the dependent variable (liquidity) which was measured by the ratio of liquid asset to deposit and the independent variables which includes both MFIs specific variables and macroeconomic variables for the sample of 12 Ethiopian microfinance institution. The coefficient of determination in this model is given by R-squared of 0.574172 and Adjusted R-squared of 0.551561, which means 57.42% of variation of Ethiopian MFIs liquidity (Latd) can be explained by the variation on size, non-performing loans, return on asset, gross domestic product, inflation and foreign direct investment.

The remaining 43.58% of changes was explained by other determinants which are not included in this model. Thus, the explanatory power of the model is high. The value of F-statistics is 25.39419 with p-value of 0.000000 which is used to measure the overall significance of the model. Thus, the p-value of F-statistics is zero at six digits, the null hypothesis is rejected and the model is significant even at 1% significant level.

As it is shown on table above, MFIs size, return on asset (ROA), inflation, FDI, GDP and inflation had statistically significant factors affecting liquidity of Ethiopian MFIs which is measured by Latd. Among the statistically significant variables, MFIs size, ROA, inflation and GDP had positively related with liquidity (Latd) whereas FDI have negatively related with liquidity (Latd).

The above table also depicts that, MFIs size, FDI, GDP and inflation (INF) had statistically significant influence on Ethiopian MFIs liquidity (Latd) at 1% significant level. The other statistically significant variables, return on asset (ROA) had statistically significant impact on liquidity (LATD) at 10% significant level. The other variable non-performing loan were statistically insignificant impact on liquidity (Latd). On the other hand, the coefficient sign of MFIs size, return on asset, inflation, FDI and GDP were contrary to our expectations whereas the coefficient sign of profitability was in-line with our expectations.

Determinants of MFIs Liquidity Measured by LTA

The empirical model used in this study to identify the statistically significant determinants of Ethiopian MFIS liquidity measured by liquid asset to total asset ratio was:

$$LTAit = \alpha + \beta 1(SIZEit) + \beta 2(NPLit) + \beta 3\ (ROAit)) + \beta 4\ (GDPt) + \beta 5\ (INFt) + \beta 6(FDIt) + \delta i + \varepsilon it$$

The following table shows the regression result of the determinants of MFIs liquidity measured by the ratio of liquid asset to total asset.

Table 4.9: Regression result of liquidity measured by LTA

Dependent Variable: LTA
Method: Panel EGLS (Cross-section random effects)
Date: 05/28/19 Time: 15:09
Sample (adjusted): 2005 2014
Periods included: 10
Cross-sections included: 12
Total panel (balanced) observations: 120
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.729985	0.188743	-3.867608	0.0002
SIZE	0.151405	0.021249	7.125104	0.0000
ROA	0.152106	0.089585	1.697887	0.0923
NPL	0.201216	0.377731	0.532698	0.5953
FDI	-0.912710	0.197685	-4.616988	0.0000
GDP	0.863484	0.122565	7.045109	0.0000
INFLATION	0.661170	0.136312	4.850401	0.0000
	Effects Specification			
			S.D.	Rho
Cross-section random			0.048190	0.1498
Idiosyncratic random			0.114816	0.8502
	Weighted Statistics			

R-squared	0.592362	Mean dependent var	0.196779
Adjusted R-squared	0.570717	S.D. dependent var	0.183959
S.E. of regression	0.120529	Sum squared resid	1.641579
F-statistic	27.36779	Durbin-Watson stat	1.781151
Prob(F-statistic)	0.000000		

The above table shows the results of the regression analysis on the determinant of the dependent variable (liquidity) which was measured by the ratio of liquid asset to total asset and the independent variables which includes both MFIs specific variables and macroeconomic variables for the sample of 12 Ethiopian microfinance institution. The coefficient of determination in this model is given by R-squared of 0.592362 and Adjusted R-squared of 0.570717, which means 59.2% of variation of Ethiopian MFIs liquidity (Latd) can be explained by the variation on size, non-performing loans, return on asset, gross domestic product, inflation and foreign direct investment. The remaining 40.8% of changes was explained by other determinants which are not included in this model. Thus, the explanatory power of the model is high. The value of F-statistics is 27.36779 with p-value of 0.000000 which is used to measure the overall significance of the model. Thus, the p-value of F-statistics is zero at six digits, the null hypothesis is rejected and the model is significant even at 1% significant level.

As it is shown on table above, MFIs size, return on asset (ROA), inflation, FDI, and GDP had statistically significant factors affecting liquidity of Ethiopian MFIs which is measured by LTA. Among the statistically significant variables, MFIs size, ROA, inflation and GDP had positively related with liquidity (LTA) whereas FDI had negatively related with liquidity (LTA).

The above table also depicts that, MFIs size, FDI, GDP and inflation (INF) had statistically significant influence on Ethiopian MFIs liquidity (Latd) at 1% significant level. The other statistically significant variables, return on asset (ROA) had statistically significant impact on liquidity (LTA) at 10% significant level. The other variable non-performing loan were statistically insignificant impact on liquidity (LTA). On the other hand, the coefficient sign of MFIs size, return on asset, inflation, FDI and GDP were contrary to our expectations whereas the coefficient sign of profitability was in-line with our expectations.

4.5. Discussion of the Regression Results

In this section, the relationship between the dependent variable and each explanatory variable were discussed on the basis of the findings on this study. The dependent variable, liquidity of Ethiopian MFIs, were measured by: - liquid asset to deposit (LATD) and liquid asset to total asset ratio (LTA). And the independent variables were size, non-performing loans, return on asset, gross domestic product, inflation and foreign direct investment. Thus, the regression result of each MFIs specific and macroeconomic variables was discussed in each the liquidity measures.

MFIs Size and MFIs Liquidity

The proxy for MFIs size in this study is the natural logarithm of total asset and hypothesized as MFIs size has positive and significant impact on MFIs liquidity. The result in this study found that MFIs size had a positive and statistically significant impact on liquidity of Ethiopian MFIs which was measured by LATD and LTA at 1% significant level. This positive sign of the coefficient indicates direct relationship between MFIs size and MFIs liquidity. This finding is not corresponding to the well-known "too big to fail" hypothesis and seems that if big MFIs assuming themselves as "too big to fail", their motivation to hold liquid asset is limited. According to the "too big to fail" argument, large MFIs would benefit from an implicit guarantee, thus decrease their cost of funding and allows them to invest in riskier assets (Iannotta et al. 2007).

Therefore, "too big to fail" status of large MFIs could lead to moral hazard behavior and excessive risk exposure. In case of a liquidity shortage, they rely on a liquidity assistance of Lender of Last Resort (Vodova, 2011).

The result of LATD & LTA reveals that, being other variables constant, a one-unit change on MFIs size had resulted in a 0.141549 units and 0.151405 units respectively, change on liquidity of Ethiopian MFIs. This was not consistent with the findings of Vodova(2011) on Hungary Commercial banks, Vodova (2013) on Poland Commercial Banks but consistent to the findings of Malik and Rafique (2013) on Pakistan commercial banks. Generally, the result in both LATD & LTA reveals that, MFIs liquidity increase with the size of the MFIs in the same direction. Thus, the hypothesis: MFIs size has positive and significant impact on MFIs liquidity should be not be rejected.

Profitability and MFIs Liquidity

Profitability in this study is measured by the return on asset (ROA). The regression result shows that, profitability had positive and statistically significant impact on liquidity measured by LATD & LTA at 10% level of significant. This positive relation was inconsistent with our expectation and finance theory which emphasizes their negative relationship. The coefficient of 0.145826 and 0.152106 for LATD & LTA respectively revealed that, taking other independent variables constant, a one percent change on return on asset had a 14.5826% and 15.2106% change on liquidity of Ethiopian MFIs measured by LATD & LTA respectively in the same direction.

This positive relation shows that, higher profitability leads to increase MFIs liquidity. However, as the major profitability of MFIs comes from loans and advances and in return the increase on loans leads to decrease in liquid asset, the result should have been in the opposite direction. In general, the result of this study was consistent with the findings of Vodova(2011) on Hungary commercial banks but opposite to Vodova (2011, 2013) on Poland and Slovakia respectively. Therefore, the hypothesis stated; profitability has negative and significant impact on MFIs liquidity should be rejected.

Non-Performing Loans and MFIs Liquidity

The proxy for non-performing loans is the share of non-performing loans on total volume of loans & advances. The regression result of the model indicates that non-performing loans has statistically insignificant impact on liquidity which was measured by LATD and LTA. The only independent variable which has no significant impact on liquidity in any of the two measures is NPL. This implies that during the study period, the NPL do not have impact on the liquidity of Ethiopian MFIs. Hence, the hypothesis stating; NPL has negative and significant impact on MFIs liquidity should be rejected.

Gross Domestic Product (GDP) and MFIs liquidity.

GDP was one of the macroeconomic variables that affect liquidity of MFIs in Ethiopia and it was measured by the real growth rate. GDP has statistically significant and positive impact on liquidity of Ethiopian MFIs since its P-value is 0% and coefficient is 0.788783 and 0.863484 in LATD and LTA respectively. The positive sign of coefficient indicates that the increase in real GDP growth rate leads to increase in the liquidity of MFIs consistent the studies conducted by Tseganesh (2012),

Belete (2015), and Nigist (2015). However, the finding of this study against with studies conducted by Angora and Roulet (2011) and Cucinelli (2013).

Furthermore, a unit change in real GDP growth rate changes the liquidity of MFIs by 0.788783 and 0.863484 in LATD and LTA respectively units in the same direction, i.e. one unit increase in real GDP growth rate increase the MFIs liquidity by 0.788783 and 0.863484 in LATD and LTA respectively and vice versa. Therefore, the real GDP growth rate has significantly positive relationship with liquidity of MFIs in Ethiopia for the study period cover 2005 to 2014.

Foreign Direct Investment (FDI) and MFIs

The coefficient of Foreign Direct Investment (FDI) to explain the liquidity ratio is -0.855080 and -0.912710 with the P-value of 0.0000% in LATD and LTA respectively. Thus, the null hypothesis of FDI does not have significant effect on liquidity is rejected even at the significant level of 1%, meaning that FDI has statistically significant effect on liquidity of MFIs. One unit change in foreign direct investment leads to 0.855080 and 0.912710 in LATD and LTA respectively; units change in liquidity of MFIs Ethiopia in opposite direction. In other word, FDI had the inverse relationship with the liquidity of MFIs against Ferrouhi and Lehadigi (2013) found that FDI had positive relationship with the liquidity. However, this study finding is in consistent with the conclusion of Kirabaeva (2008) and Johnmark et al. (2013).

Inflation Rate and MFIs Liquidity

The other macroeconomic variable included in this study was the inflation rate of Ethiopia and was measured by the annual general consumer price index. Inflation had negative and statistically significant impact on liquidity of Ethiopian MFIs measured by LATD & LTA at 1% significant level. This positive relation was based on the theory that during inflationary economy, MFIs are refraining from long term investment and prefer to hold risk free liquid asset. That is during, inflation it is expected that, MFIs will make fewer loans and the amount of liquid or short-term assets held by economic agents including MFIs will rise. The positive relation was consistent with the findings of Vodova (2013) on Poland commercial banks and Tseganesh(2012) on Ethiopian commercial banks. The positive coefficient of 0.575409 and 0.661170 for LATD & LTA indicates that a one percent change on inflation rate of the country, other things being constant, liquidity of Ethiopian MFIs leads to a 57.5409% and 66.1170% respectively change in the same direction.

Chapter Five:

Conclusion and Recommendations

The preceding chapter presented the results and discussion, while this chapter deals with the conclusions and recommendations based on the findings of the study. Accordingly, this chapter is organized into two sub-sections. The first section presents the conclusions and the second presents the recommendations.

5.1. Conclusions

The main objective of this study was to identify the macroeconomic and MFIs specific determinants of liquidity of Ethiopian microfinance institution. To comply with the objectives of the study, three MFIs specific and three macroeconomic variables were used. The MFIs specific variables includes; MFIs size, non-performing loans and profitability while the macroeconomic variables were real GDP, inflation rate and FDI. The study was used panel data for the 12 MFIs over the period 2005 to 2014. The MFIs specific data were mainly collected from annual financial reports of the respective MFIs and the macroeconomic data were collected from NBE and MoFED. Data was presented and analyzed by using descriptive statistics, correlation analysis and balanced random effect regression analysis to identify the determinants of liquidity of Ethiopian microfinance institution which were measured by liquid asset to deposit (LATD) and liquid asset to total asset ratio (LTA).

The result of this study confirmed that, among the MFIs specific variables; MFIs size and profitability had statistically significant impact on the determination liquidity of Ethiopian MFIs measured by LATD & LTA whereas NPL had no statistically significant impact on the determination of liquidity of Ethiopian microfinance institution. And among the macro-economic all variables had statistically significant impact on liquidity of Ethiopian microfinance institution.

The positive relationship between MFIs size and liquidity was the same to our hypothesis but not consistent with the “too big to fail” hypothesis. It was also found that profitability and liquidity had positively related and it was inconsistent with our hypothesis but it was consistent with Bourke (1989) result. The positive and statistically significant impact of inflation was in consistent with our hypothesis but it is consistent with the result of Huybens and Smith (1999). They argued that in the inflationary economy, economic units including financial institution refraining from long term investments due to the decline in the real value of their investments that aggravate the credit market rationing and prefer to hold risk free liquid assets. Foreign Direct Investment negatively strong

significant impact on MFIs liquidity in Ethiopia. As FDI has direct relationship with demand for loans, the MFIs liquidity could be declined. GDP has statistically significant and positive impact on liquidity of Ethiopian MFIs positive sign of coefficient indicates that the increase in real GDP growth rate leads to increase in the liquidity of MFIs consistent the studies conducted by Tseganesh (2012), Belete (2015), and Nigist (2015).

5.2. Recommendations

This study was intended to identify the determinants of liquidity of Ethiopian microfinance institution; and hence on the basis of the findings of the study, the following recommendations were drown:

- Ethiopian microfinance institution should have liquidity management policy to ensure that they are operating to satisfy their profitability target as well as the ability of meeting the financial demands of their customers by maintaining optimum level of liquidity;

- Among the macroeconomic variables included in this study almost exists as significant key drivers of liquidity of Ethiopian microfinance institution. This is a clear signal to all MFIs in Ethiopia that they cannot ignore the macroeconomic indicators when strategizing to improve on their position of liquidity. Thus, MFIs in Ethiopia should not only be concerned about internal structures and policies/procedures, but they must consider both the internal environment and the macroeconomic environment together in developing their strategies to efficiently manage their liquidity position.

- In general, the finding of the study reveals that, MFIs specific variables have more statistically significant impact on the determination of liquidity of Ethiopian MFIs, since they are internal variables that can be controlled by management, special emphasis shall be given to those significant variables.

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Appendix

Appendix I- Regression Result of LATD, LTA

LATD

Dependent Variable: LTA

Method: Panel EGLS (Cross-section random effects)

Date: 05/28/19 Time: 15:09

Sample (adjusted): 2005 2014

Periods included: 10

Cross-sections included: 12

Total panel (balanced) observations: 120

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.729985	0.188743	-3.867608	0.0002
SIZE	0.151405	0.021249	7.125104	0.0000
ROA	0.152106	0.089585	1.697887	0.0923
NPL	0.201216	0.377731	0.532698	0.5953
FDI	-0.912710	0.197685	-4.616988	0.0000
GDP	0.863484	0.122565	7.045109	0.0000
INFLATION	-0.661170	0.136312	-4.850401	0.0000

	Effects Specification	
	S.D.	Rho
Cross-section random	0.048190	0.1498
Idiosyncratic random	0.114816	0.8502

Weighted Statistics

R-squared	0.592362	Mean dependent var	0.196779
Adjusted R-squared	0.570717	S.D. dependent var	0.183959
S.E. of regression	0.120529	Sum squared resid	1.641579
F-statistic	27.36779	Durbin-Watson stat	1.781151
Prob(F-statistic)	0.000000		

LTA

Dependent Variable: LTA

Method: Panel EGLS (Cross-section random effects)

Date: 05/28/19 Time: 15:09

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GDP	0.863484	0.122565	7.045109	0.0000
INFLATION	-0.661170	0.136312	-4.850401	0.0000

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	S.D.	Rho
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S.E. of regression	0.120529	Sum squared resid	1.641579
F-statistic	27.36779	Durbin-Watson stat	1.781151
Prob(F-statistic)	0.000000		

Appendix II- Heteroskedasticity test of LATD, LTA

LATD

Heteroskedasticity Test: White

F-statistic	1.964357	Prob. F(21,98)	0.0143
Obs*R-squared	35.54849	Prob. Chi-Square(21)	0.0246
Scaled explained SS	35.54954	Prob. Chi-Square(21)	0.0246

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 06/14/19 Time: 14:46

Sample: 2005 2124

Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.014561	0.018987	-0.766903	0.4450
SIZE^2	0.001716	0.000765	2.241735	0.0272
SIZE*ROA	0.029093	0.022877	1.271714	0.2065
SIZE*NPL	-0.016630	0.061514	-0.270337	0.7875
SIZE*FDI	-0.072859	0.057536	-1.266324	0.2084
SIZE*INFLATION	0.081793	0.022504	3.634542	0.0004
SIZE*GDP	0.054291	0.033043	1.643067	0.1036
ROA^2	0.049019	0.069117	0.709216	0.4799
ROA*NPL	1.361119	1.245320	1.092987	0.2771
ROA*FDI	-0.618940	0.535967	-1.154809	0.2510
ROA*INFLATION	1.781475	0.794248	2.242972	0.0272
ROA*GDP	2.345183	0.870480	2.694127	0.0083
NPL^2	1.664890	2.168418	0.767790	0.4445
NPL*FDI	0.151752	1.386727	0.109432	0.9131
NPL*INFLATION	0.290746	1.329103	0.218753	0.8273
NPL*GDP	-0.674936	1.536123	-0.439376	0.6614
FDI^2	1.068719	1.029819	1.037774	0.3019
FDI*INFLATION	1.867776	1.462221	1.277356	0.2045
FDI*GDP	1.584464	1.657812	0.955756	0.3415
INFLATION^2	0.612095	1.334337	0.458726	0.6474
INFLATION*GDP	0.480332	2.111287	0.227507	0.8205
GDP^2	0.167052	0.969419	0.172322	0.8635

R-squared	0.296237	Mean dependent var	0.018749
Adjusted R-squared	0.145431	S.D. dependent var	0.028029
S.E. of regression	0.025910	Akaike info criterion	-4.304198
Sum squared resid	0.065792	Schwarz criterion	-3.793158
Log likelihood	280.2519	Hannan-Quinn criter.	-4.096662
F-statistic	1.964357	Durbin-Watson stat	1.738056
Prob(F-statistic)	0.014316		

LTA

Heteroskedasticity Test: White

F-statistic	2.167792	Prob. F(21,98)	0.0059
Obs*R-squared	38.06228	Prob. Chi-Square(21)	0.0127
Scaled explained SS	39.97178	Prob. Chi-Square(21)	0.0075

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 06/14/19 Time: 14:43

Sample: 2005 2124

Included observations: 120

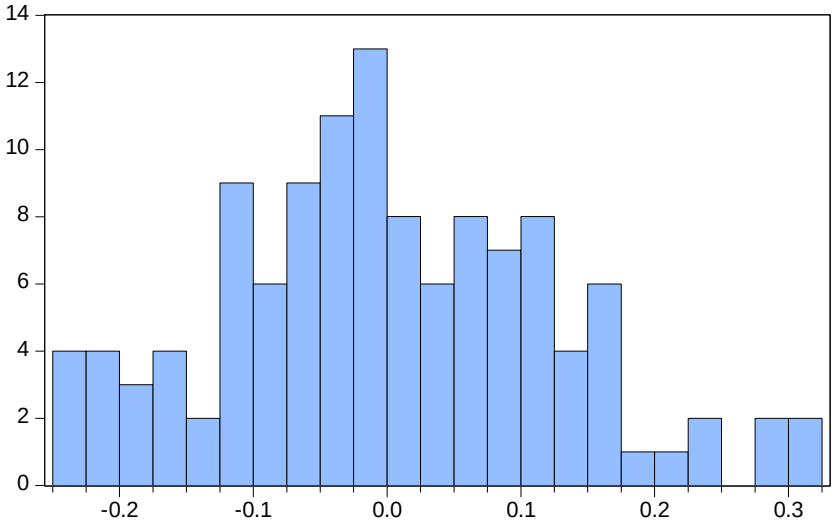
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.009192	0.018135	-0.506867	0.6134
SIZE^2	0.001751	0.000731	2.395705	0.0185
SIZE*ROA	0.022905	0.021850	1.048297	0.2971
SIZE*NPL	-0.026333	0.058752	-0.448201	0.6550
SIZE*FDI	-0.077399	0.054952	-1.408481	0.1622
SIZE*INFLATION	-0.087902	0.021494	-4.089611	0.0001
SIZE*GDP	0.058276	0.031559	1.846555	0.0678
ROA^2	0.045933	0.066014	0.695812	0.4882
ROA*NPL	1.214519	1.189406	1.021114	0.3097
ROA*FDI	-0.556361	0.511903	-1.086849	0.2798
ROA*INFLATION	1.746431	0.758587	2.302217	0.0234
ROA*GDP	-2.053738	0.831396	-2.470229	0.0152
NPL^2	1.410669	2.071057	0.681134	0.4974
NPL*FDI	0.250618	1.324464	0.189222	0.8503

NPL*INFLATION	0.356745	1.269427	0.281028	0.7793
NPL*GDP	-0.323960	1.467152	-0.220809	0.8257
FDI^2	1.094574	0.983581	1.112846	0.2685
FDI*INFLATION	2.224393	1.396568	1.592757	0.1144
FDI*GDP	-1.814285	1.583378	-1.145832	0.2547
INFLATION^2	0.469591	1.274426	0.368473	0.7133
INFLATION*GDP	-0.283397	2.016492	-0.140540	0.8885
GDP^2	0.033182	0.925892	0.035838	0.9715

R-squared	0.317186	Mean dependent var	0.017741
Adjusted R-squared	0.170868	S.D. dependent var	0.027178
S.E. of regression	0.024747	Akaike info criterion	-4.396075
Sum squared resid	0.060017	Schwarz criterion	-3.885035
Log likelihood	285.7645	Hannan-Quinn criter.	-4.188539
F-statistic	2.167792	Durbin-Watson stat	1.791412
Prob(F-statistic)	0.005877		

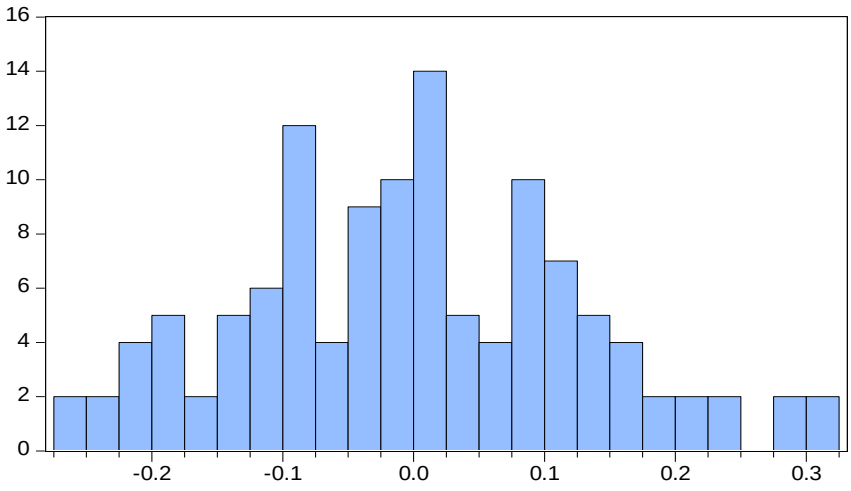
Appendix III: Normality Test of LATD, LTA

LATD



Series: Standardized Residuals	
Sample 2005 2014	
Observations 120	
Mean	-1.88e-16
Median	-0.010499
Maximum	0.319378
Minimum	-0.234721
Std. Dev.	0.126003
Skewness	0.264109
Kurtosis	2.804916
Jarque-Bera	1.585358
Probability	0.452631

LTA



Series: Standardized Residuals	
Sample 2005 2014	
Observations 120	
Mean	-6.38e-17
Median	-0.002576
Maximum	0.318815
Minimum	-0.250392
Std. Dev.	0.129314
Skewness	0.196599
Kurtosis	2.667902
Jarque-Bera	1.324464
Probability	0.515699