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Determinants of Banks Liquidity: Empirical Evidence Using Panel Regression Analysis on Selected Big Asset commercial banks in Ethiopia.

BY:

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APPROVED BY BOARD OF EXAMINERS

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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the Guidance of Master of Business Administration in accounting and finance .All sources of materials used for the thesis have been accordingly acknowledged. I further verify that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any level.

Ayele Hailemarim _____

Name Signature

St. Mary's University, Addis Ababa June, 2018

ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

Dejene Mamo(ASST.PROF.) _____

Advisor Signature

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TABLE OF CONTENT

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List of Acronyms

AB: Awash Bank S.C.

BCBS: Basel Committee for Banking Supervision

BIS: Bank for International Settlement

BLUE: Best Linear Unbiased Estimator

BOA: Bank of Abyssinia S.C

CAP: Capital adequacy

CBE: Commercial Bank of Ethiopia

CLRM: Classical Linear Regression Model

DB: Dashen Bank S.C

DW: Durbin-Watson

FEM: Fixed Effect Model

GDP: Gross Domestic Product HP

IRM: Interest Rate Margin

JB: Jarque- Bera

LG: Loan growth Rate

NBE: National Bank of Ethiopia

NIB: Nib International Bank S.C

OLS: Ordinary Least Square

REM: Random Effect Model

ROA: Return on Assets

UB: United Bank S.C

WB: Wegagen Bank S.C

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The aim of this study is to examine determinants of big asset commercial banks liquidity in Ethiopia by using panel data of seven selected big asset commercial banks from year 2000 to 2016. The previous research that has been conducted in Ethiopia by researchers on the determinant of commercial bank liquidity is some limitations on the method and is not covered all the determinate factors. Hence, this study aims to fill this gap. In view of this fact, the significance of this study is providing valuable information to bank managers in order to enhance their bank liquidity and it enables them to give a due emphasis on the identified variables. The study used fixed effect and dynamic panel regressions models to investigate factors that determine the liquidities of big asset commercial banks. To obtain information relevant to the study, secondary data was used. Besides, in the study all operational big asset commercial banks in Ethiopia were taken as study population and purposive sampling method was used to select sample from this population. The findings of the study show that among the bank specific variables; bank size, loan growth, return on asset and Interest rate margin had significant impact on the determination liquidity of Ethiopian big asset size commercial banks measured by all the three measurements of liquidity i.e. L1, L2 and L3. And among the macro-economic variables real deposit Interest rate had statistically significant impact on liquidity. Similarly, the dummy variables government policy and the previous one lag liquidity had statistical significant impact on liquidity. Hence, bank specific variables have more statistically significant impact on the determination of liquidity of Ethiopian big asset commercial banks, since they are internal variables that can be controlled by management, special emphasis shall be given to those significant variables

Key words: Liquidity, bank specific and macroeconomic factor, dynamic and fixed effect panel

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Bank's liquidity indicates the ability to finance its transactions efficiently. If the bank is unable to do this it is known as the liquidity risk. As this risk increases the bank is considered unable to meet its obligations (such as deposits withdrawal, debt maturity and funds for loan portfolio and Investment) (Ezirim, 2005).

Liquidity creation is the main concerns of commercial banks because it is crucial for its existence. It is known that the banking sector plays an important role in the economic growth of a country. This is made through matching surplus economic units with deficit economic units. However, this fundamental role of banks in the 'maturity transformation' of short term deposits into long term loans make banks inherently vulnerable to liquidity risk, both of an institution specific nature and that which affects markets as a whole (Kiyotaki and Moore, 2008).

Hence, liquidity risk can be defined as the risk of being unable to liquidate a position timely at a reasonable price. Muranaga and Ohsawa, (2002) Liquidity risk has become one of the main concerns of financial institutions following the financial crisis of 2007 (Andrew and Agbada, 2013)

Banks play a central role in all modern financial systems. To perform it effectively, banks must be safe and be perceived as such. The single most important assurance is for the economic value of a bank's 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 recent financial crisis underlined the importance of a second type of buffer, the "liquidity" that banks have to cover unexpected cash outflows. A bank can be solvent, holding assets exceeding its liabilities on an economic and accounting basis, and still die a sudden death if its depositors and other funders lose confidence in the institution (Moore, 2009).

The financial sector in Ethiopia has been experiencing major transformation on its operating environment. On top of this, eighteen commercial banks have been opened during the last twenty years. The study was conducted by examining determinants of liquidity of large asset size commercial banks in Ethiopia. However, factors affecting commercial banks liquidity is still uncultivated part. Therefore, this paper aims to study on the determinants of bank's liquidity in Ethiopian commercial banks. Thus this paper was set to investigate the possible determinants of bank specific and macroeconomic factor of liquidity that could have a causal effect on liquidity. In particular this paper was set to assess whether there exist a relationship between; Capital adequacy, Bank Size, loan growth, return on asset, real interest rate, interest rate margin and real economic growths. These factors were also chosen because they have been used widely in an attempt to predict the causes of liquidity risk problem in commercial banks. Therefore, the main purpose of this study was to empirically examine the determinants of large asset size commercial banks in Ethiopia.

1.2 **Statement of the problem**

Banks play a central role in all modern financial systems. To perform it effectively, banks must be safe and be perceived as such. The single most important assurance is for the economic value of a bank's 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 recent financial crisis underlined the importance of a second type of buffer, the "liquidity" that banks have to cover unexpected cash outflows. A bank can be solvent, holding assets exceeding its liabilities on an economic and accounting basis, and still die a sudden death if its depositors and other funders lose confidence in the institution. (Kiyotaki and Moore, 2008).

Liquidity risk is the possibility that over a specific time period, the bank will become unable to settle obligations with immediacy. It is a risk arising from a bank's inability to meet its obligations when they come due without incurring unacceptable losses. This risk can adversely affect both banks' earnings and the capital and therefore, it becomes the top priority of a bank's management to ensure the availability of sufficient funds to meet future demands of providers and borrowers, at reasonable costs (Moore, 2009).

The type of liquidity determinates involved can result in a variety of implications as to how each individual institution manages its liquidity position. However, the available information shows that all banks generally pursue the same objectives. These are usually; to ensure solvency at all times, to optimize intergroup cash flows (pooling liquidity, thereby reducing dependency on external refinancing), and to optimize the refinancing structure (Kiyotaki and Moore, 2008).

Liquidity risk needs to be monitored as part of the enterprise-wide risk management process, taking into account market risk and credit risk to ensure stability in the balance sheet and dynamic management of liquidity. A bank should only attempt this if it makes good business sense, not use it as a means to keep afloat. Liquidity risk not only affects the performance of a bank but also its reputation (Jenkinson, 2008). A bank may lose the confidence of its depositors if funds are not timely provided to them. The bank's reputation may become at stake in this situation.

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 bank's management to ensure the availability of sufficient funds to meet future demands at reasonable costs. Therefore, identifying the determinants of banks liquidity buffer has become the major concern of all banks and their regulators so as to mitigate liquidity risk (Naser , Mohammed and Masomeh, 2013)

As banks dominate the financial sector in Ethiopia, the process of financial intermediation in the country depends heavily on banks. Hence, keeping their optimal liquidity for banks in Ethiopia is very important to meet the demand by their present and potential customers.

As it clearly indicated, liquidity and liquidity risk is very up to date and important topic. Therefore, identifying the major determinants of banks liquidity has become one of the major activities and responsibilities of all banks and their regulators so as to keep a control on liquidity risk.

Furthermore, the National Bank of Ethiopia has required banks to have their own liquidity policy (NBE, 2010)which enforces banks 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 with their future liquidity position.

Present are a lot of researches conducted by different researchers, their result varies or lack of consistencies. For instance, MitikuCherenet,(2017),Wubayehu,(2017),Mekbib,(2016),and Berhanu,(2015),found that bank size has a significant effect on liquidity but Belete,(2015),found that it has insignificant result. When it comes to the variable Capital adequacy Tseganesh (2012) found that a significant result but, Mitiku Cherenet (2017) andMekbib (2016) and BelaineshYihdego (June, 2017) found that insignificant result. And all have remaining unexplained part .Therefore; the purpose of this study was to fill the above stated gap by analyzing firm specific and macroeconomic determinants of big Asset commercial banks in Ethiopia. The period of this study was recent from period 2000-2016 and adding new variables. Finally, providing full information about the relationship between liquidity and firm specific and macroeconomic determinants of banks liquidities in the recent data was essential for this study.

1.3 Objective of the study

1.3.1General Objective

- The general objective of this study is to identify the determinants of bank's liquidity of large asset size commercial banks in Ethiopia.

1.3.2 Specific Objectives

The study has specific objectives as outlined below: -

1. To determine the effect of capital adequacy on the liquidity of large asset size commercial banks in Ethiopia.
2. To determine the effect of bank size on the liquidity of large asset size commercial banks in Ethiopia.
3. To determine the effect of loan growth on the liquidity of large asset size commercial banks in Ethiopia.
4. To determine the effect of Return on Asset (ROA) on the liquidity of large asset size commercial banks in Ethiopia.

5. To determine the effect of Interest rate margin on the liquidity of large asset size commercial banks in Ethiopia.
6. To determine the effect of economic growth the liquidity of large asset size commercial banks in Ethiopia.
7. To determine the effect of minimum deposit rate on the liquidity of large asset size commercial banks in Ethiopia.

1.4. Hypotheses of the study

In order to evaluate and identify the determinant, the following major hypotheses were tested in the case of large asset size commercial banks in Ethiopia.These hypotheses are predictions about the outcome of the results and they may be written as alternative hypotheses specifying the exact results to be expected (more or less, higher or lower of something). They also may be stated in the null form, indicating no expected difference or no relationship between groups on a dependent variable as stated by (Creswell, 2009).

Therefore, this study developed the following 8hypotheses:

H1: Capital adequacy has significant effect on bank's liquidity.

H2: Bank size has significant effect on bank's liquidity

H3: LOAN growth has significant effect on bank's liquidity.

H4: Interest rate margin has significant effect on bank's liquidity.

H5: Return on Asset (ROA) has significant effect on bank's liquidity.

H6: economic growths have significant effect on bank's liquidity.

H7: minimum deposit rate have significant effect on banks liquidity

1.5 Significance of the Study

The study has great contribution to the existing knowledge in the area of factors determining big asset size commercial banks liquidity risk in the context of Ethiopia. The result of this study is important as reference material to the commercial banks of Ethiopia. It is also draw attention to some of the points where corrective actions are necessary and enables them to make such

correction. Furthermore, this study would serve as an input and basis for other researches, academicians, consultants and some associations who conduct further researches on related fields.

1.6 Scope of the Study

This study is designed to examine the determinants of liquidity in commercial banks of Ethiopia using annual financial report of the selected commercial banks of Ethiopia. In this regard the study delimited on seven commercial banks of Ethiopia such as CBE, Awash bank, Danshen Bank, Absinia Bank, Wegagen Bank, United Bank and Nib bank. The study of banks selected based on asset size we select top seven big asset size commercial banks they are long time experiences in financial market. The study focus on the following variable Bank size ,Capital adequacy ratio ,loan growth rate ,ROA ,Interest rate margin and rgd and rmdr. Therefore, assessing their long time experiences of big commercial banks can help to give insights the commercial banks challenges and opportunities regarding with liquidity risk management practice.

1.7 Limitation of the study

In conducting the study, there was lack of financial data for recent year, 2017 for public owned Banks. Therefore, the study is limited to take data up to the year 2016. Moreover, lack of Sufficient relevant and up to date published literatures mainly in the context of Ethiopia.

1.8 Organization of the study

This study organized into five chapters. Chapter one provides the general introduction about the whole report. Chapter two describes there view of related literatures. Chapter three provide detail description of the methodology employed by the research. Chapter four contains data presentation, analysis and interpretation. Finally, the last chapter concludes the total work of the research and gives relevant recommendations based on the findings

CHAPTER TWO

LITRATURE REVIEW

2.1 Theoretical Review

There have been several theoretical studies on determinates of liquidity risk and determinant. Majority of this theoretical frameworks relating to credit risk emphasize on risk concept, macroeconomic policies as well as structural and governance failures. Highlighted below are some of related definitions, theories and models.

2.1.1 Concept of Banks liquidity and Liquidity Risk

Bank liquidity is ability to meet customers demand and provide advances in the forms of loans and overdrafts. Liquidity is also banks' cash and cash equivalent such as commercial paper, treasury bills, etc. Lucchetta (2007) sees liquidity as assets readily convertible to cash without loss and ability to pay depositors on demand. Shim and Siegal, (2007) define liquidity as a company's ability to meet its maturing short-term obligations and if liquidity is insufficient serious financial difficulty may occur. Poor liquidity is comparable to a person having a fever; it is a symptom of a fundamental problem. However, if banks unable to liquidate a position timely at a reasonable price the bank is faced a liquidity risk. .

In easier terms, liquidity risk can be defined as the risk of being unable to liquidate a position timely at a reasonable price (Muranaga and Ohsawa, 2002). From this definition, there are two key dimensions of liquidity risk cited namely liquidating the assets as and when required; and ata fair market value.

Banks face liquidity risk if they are not liquidating their assets at a reasonable price. The price fetching remains precarious due to frazzled sales conditions, while liquidating any of the bank's assets urgently. This may result in losses and a significant reduction in earnings. Large-scale withdrawal of deposits may create a liquidity trap for banks (Andrew, 2013), but this may not be always the primary source of liquidity risk. There are various other factors creating massive liquidity problems for the banks. For example, the extensive commitment based, and long-term lending may create serious liquidity issues (Kashyap et al, 2002) Banks having large commitments are bound to honor them when they become due. Moreover, banks having a large

exposure in long-term lending may face problems of liquidating the same during times of immense liquidity pressure.

According to Moor (2007), there are two basic facets of liquidity risk: maturity transformation (the maturity of a bank's liabilities and assets) and the inherent liquidity of a bank's asset (the extent to which an asset can be sold without incurring a significant loss of value under any market condition). As such, the two elements of a bank's liquidity are intertwined. Banks do not need to be worried about the maturity transformation if they have the assets that can be sold without bearing any loss. Whereas, banks having assets that are going to be matured in a shorter period may have a less need to keep the liquid assets. This increases the demand of depositors creating liquidity risk. This may cause the failure of a given bank or even the entire banking system due to contagion effect (Diamond and Rajan, 2005). High liquidity increases the leverage and a highly leveraged bank may turn into the consumer of liquidity from the providerOlin (2001) in Yuqi (2008) states that liquidity is a risk not having sufficient current assets (cash and quickly saleable securities) to satisfy current obligations of depositors especially during the time of economic stress. Therefore, without required liquidity and funding to meet obligations, a bank may fail.

Liquidity risk of commercial banks can resulted through several factors. According to Bessie (2002), liquidity risk results from size and maturity mismatches of assets and liabilities. Liquidity deficits make banks vulnerable to market liquidity risk. Liquid assets protect banks from market tensions. Then liquidity has been defined by Keating and Marshall (2010) as the moneyless of an asset. Liquidity, according Schwarz (2010), can be decomposed into market, balance sheet, funding and macroeconomic liquidities. Market liquidity is the ability to transform financial assets into cash at current market prices and the balance sheet liquidity focuses on institution's cash holdings. The institution should be able to convert the underlying assets into cash and this is referred to as the funding liquidity. Lastly, we have the macroeconomic liquidity which focuses on the availability of cash in the economy. There are different methods that can be used to measure banks' asset liquidity such as bid-offer spread, market depth, immediacy and resilience. Basel 3 Accord defined the minimum short-term and long-term resilience that are supposed to be fully adopted by all financial institutions by 1 January 2015 and 1 January 2018 respectively (Basel , 2011)

2.1.2 Theories of Bank Liquidity

In selecting a theoretical framework, many contending theories were considered as possible explanatory frameworks within which to fit the determinants of Bank liquidity. In the banking theory and practice, there are no generally accepted indicators measuring the liquidity of banks. Though, there are not enough acceptable indicators for measuring the liquidity, different authors such as Kiyotaki, and Moore2008, offered their own approaches for measuring and expressing the liquidity of individual banks and the banking system, as a whole.

A. Commercial Loan (Traditional) Theory and Liquidity

The commercial loan theory of credit became obsolete both because of its conceptual flaws and its impracticality. A critical underlying assumption of the theory held that short-term commercial loans were desirable because they would be repaid with income resulting from the commercial transaction financed by the loan. It was realized that this assumption would certainly not hold during a general financial crisis even if bank loan portfolios did conform to theoretical standards, for in most commercial transactions the purchaser of goods sold by the original borrower had to depend to a significant extent on bank credit (Akter and Mahmud, 2014)

Without continued general credit availability, therefore, even short-term loans backing transactions involving real goods would turn illiquid. Rigid adherence to the orthodox doctrine was, furthermore, a practical impossibility if banks were to play a role in the nation's economic development (Ezirim, 2005). Moreover, the practice of continually renewing short- term notes for the purpose of supporting long-term capital projects proved unacceptable. The failure or inability of banks to tailor loan arrangements to the specific conditions encountered with longer-term uses in fact contributed to the demise of the practice (Lucchetta, 2007)

B. The Shift ability Theory of Liquidity

The Shaft ability theory liquidity replaced the commercial loan theory and was supplemented by the doctrine of anticipated income. Formally developed by Harold G, Moulton in 1915, the shaft ability theory held that banks could most effectively protect themselves against massive deposit withdrawals by holding, as a form of liquidity reserve, credit instruments for which there existed a ready secondary market. Included in this liquidity reserve were commercial paper, prime bankers' acceptances and, most importantly as it turned out, Treasury bills. Under normal conditions all these instruments met the tests of marketability and, because of their short terms to

maturity, capital certainty. A major defect in the Shift ability theory was discovered similar to the one that led to the abandonment of the commercial loan theory of credit, namely that in times of general crisis the effectiveness of secondary reserve assets as a source of liquidity vanishes for lack of a market (Kiyotaki and Moore, 2008).

C. Anticipated Income Theory of Liquidity

The doctrine of anticipated income, as formalized by Herbert V. Preshow in 1949, embodied these ideas and equated intrinsic soundness of term loans, which were of growing importance, with appropriate repayment schedules adapted to the anticipated income or cash flow of the borrower. The credit demands of business were well accommodated under this system of banking policy, and the use of loan commitments was freely pursued. Changing economic conditions, however, placed extra demands on the banking system that resulted in a new approach to balance sheet management, and businesses faced new financial challenges. Under this emerging state of affairs, bank loan commitment policies would come to play a more important part in the credit process (Naser , Mohammed and Masomeh, 2013).

2.2 Determinants of Bank Liquidity

In most of the literatures, there are two way and sometimes three ways of classifying the determinants of bank Liquidity. Moore (2009), for instance classified the determinant factors in to two: bank specific (internal) and macroeconomic variables. The internal factors are individual bank characteristics which affect the bank's performance. These factors are basically influenced by the internal decisions of management and board. The external factors are sector wide or country wide factors which are beyond the control of the company and affect the liquidity of banks. Other studies, Kiyotakiand Moore, (2008), attempted to integrate sector specific factors like bank ownership, bank size and concentration as a specific determinant of bank Liquidity. This approach seems to segregate the external factor determinants in to sector specific and macroeconomic variable. However, some authors, Chantapong,(2005); Olweny and shipho, (2011)focused on sector specific variables with total neglecting of the macroeconomic variables like GDP and inflation. In general the two approaches seem similar in context and wide variation is not observed in classifying the determinants of bank liquidity and most of the researchers used both internal and external variables in their studies as follow.

Capital Adequacy and Bank Liquidity

Capital can be defined as common stock plus surplus fund plus undivided profits plus reserves for contingencies and other capital reserves. Besides, a bank's loan loss reserves which serve as a buffer for absorbing losses can be included as bank's capital (Basel, 2011). The primary reason why banks hold capital is to absorb risk including the risk of liquidity crunches, protection against bank runs, and various other risks. According to Ezirim(2005) bank's capital plays a very important role in maintaining safety and solidarity of banks and the security of banking systems in general as it represents the buffer gate that prevents any unexpected loss that banks might face, which might reach depositors funds given that banks operate in a highly uncertain

Environment that might lead to their exposure to various risks and losses that might result from risks facing banks. The recent theories suggest that, bank capital may also affect banks‟ ability to create liquidity. These theories produce opposing predictions on the relationship between capital and liquidity creation.

Bank Size and Bank 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 (Moore et,.al, 2005). 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 (Ezirim, 2005). 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 customersKiyotaki 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.

Loan Growth:-

Loan Growth and Bank Liquidity the loans & advances portfolio is the largest asset and the predominate source of revenue of banks. According to Muranaga, and Ohsawa, (2002), lending

is the principal business activity for banks. Since loans are illiquid assets, increase in the amount of loans means increase in illiquid assets in the asset portfolio of a bank. The amount of liquidity held by banks is heavily influenced by loan demand and it is the base for loan growth (Basel, 2011). If demand for loans is weak, then the bank tends to hold more liquid assets whereas, if demand for loans is high they tend to hold less liquid assets since long term loans are generally more profitable. Therefore, loan growth has negative relationship with bank liquidity..

According to Eakins (2008), in practice the amount of liquidity held by banks is heavily influenced by loan demand that is the base for loan growth. If demand for loans is weak, then the bank tends to hold more liquid assets(short term assets), whereas if demand for loans is high they tend to hold less liquid assets since long term loans are generally more profitable.

Therefore, a growth in loans and advances has negative impact on banks liquidity (Weisel, Harm, &Baddeley, 2003). Loan Growth will be measured by the Current year total loans less previous year total loans over the previous year total loans.

Government policy i.e. National bank bills and GTP plan

Bond is a debt instrument issued for a period of more than one year with the purpose of raising capital by borrowing. The Federal government, states, cities, corporations, and many other types of institutions sell bonds. Generally, a bond is a promise to repay the principal along with interest (coupons) on a specified date (maturity). Some bonds do not pay interest, but all bonds require a repayment of principal. However, the buyer does not gain any kind of ownership rights to the issuer, unlike in the case of equities. On the hand, a bond holder has a greater claim on an issuer's income than a shareholder in the case of financial distress (this is true for all creditors). Bonds are often divided into different categories based on tax status, credit quality, issuer type, maturity and secured/unsecured (and there are several other ways to classify bonds as well). The yield from a bond is made up of three components: coupon interest, capital gains and interest on interest (if a bond pays no coupon interest, the only yield will be capital gains). Some bonds are tax-exempt, and these are typically issued by municipal, county or state governments, whose interest payments are not subject to federal income tax, and sometimes also state or local income tax.

Commercial banks in Ethiopia purchase bills as an investment in order to use idle funds at their disposal and thereby earning interest that will help cover the cost of acquiring funds. To the contrary, The National Bank of Ethiopia as a regulatory body issues bills for two main reasons: the first purpose is collecting excess money circulating in the economy that is using the bill as a tool for the country's monetary policy and financing government projects there by funding budget deficits from local sources at a lower interest rate. It is evident that the country has been suffering from budget deficit for a long period of time and recently the Ethiopian government has introduced "The GTP (The great transformation plan)" and there are enormous projects from railways to electric power station which require a huge amount of fund and commercial banks and international organization like the IMF and World Bank associate the bill policy with the GTP and the ongoing projects in line with the plan.

The bill policy as claimed by commercial banks is sucking up funds that could otherwise have be forwarded to the market as loan thereby taking away one major source of income for them. This is forcing commercial banks to highly depend on income generated from bank fees and foreign trade but, as indicated on the annual reports of these banks income generated from bank fees is very insignificant (taking out Commercial Bank of Ethiopia) which in turn forces banks to highly depend on income generated from foreign trade. To the contrary the National Bank claims that commercial banks are not adequately allocating funds for long term projects which is taken as a rationale for putting out the policy, as long term projects are corner stone's for facilitating and maintaining the economic growth of the country. The liquidity position of banks has also been deteriorating since the policy came in to effect. Maintaining a good and reliable liquidity position has been an issue for banks operating in the country since before the policy came in to effect and the policy is said to aggravate this problem further putting the banks in a very critical position. The National Bank of Ethiopia understanding this problem has lowered the reserve requirement of banks from 15% to 10% on January 2012 and further to 5 % but, Banks are still questioning the adjustment as it fails short to mitigate the liquidity problem.

Gross Domestic Product (GDP):

The economy health of a nation is measured by its growth rate in national income. The economic growth is measured as percentage change in Gross Domestic Product (GDP) or Gross National

Product (GNP). The GNP is broader than GDP, although both proxies are used to measure economic growth.GDP is a macroeconomic factor that affects bank liquidity. For which, a major recession or crises in business operations reduces borrowers' capability to service obligations which increases banks' NPLs and eventually banks insolvency Gavin and Hausmann,(1998). In reference to Painceira(2010), research on liquidity preference during different business cycle states that banks liquidity fondness is low in the course of economic boom. Where, banks confidently expect to profit by expanding loan able funds to sustain economic boom, while restrict loan able funds during economic downturn to prioritize liquidity. To sum up, banks prefer high liquidity due to lower confidence in reaping profits during economic downturn.

2.3 Managing Liquidity Risk

Liquidity risk management is an essential component of the overall risk management framework of the financial services industry, concerning all financial institutions (Guglielmo, 2008) Ideally, a well-managed bank should have a well-defined mechanism for the identification, measurement, monitoring and mitigation of liquidity risk. A well-established system helps the banks in timely recognition of the sources of liquidity risk to avoid losses. The balance sheets of banks are growing in complexity and dependence upon the capital markets has made the liquidity risk management more challenging (Goodhart, 2008). Moore (2005) further argues that the banks having enhanced exposure in the capital markets must have a deep understanding of the risks involved. The said banks should develop the mechanism required for proper risk measurement and management. A bank should have continuous awareness about the breakdown of its various funding sources in terms of individual strata of clientele' financial markets and instruments (Falconer, 2001)

A bank should respond to funding shortfall by acting on the assets side of the balance sheet if it is facing restrictions on raising liquidity. It will be forced to squeeze the advancement of loans to its customers to reduce funding requirements. Despite its features to support funding and increase liquidity, Basel (2011) has narrated two main drawbacks of the above stated policy. First, this strategy needs a bit longer period to be matured. Many of the lending decisions are taken in advance and hard to be reversed instantly, thereby not generating liquidity drainage quickly. Second, reduced lending affects a large part of the economy. In the non-availability of funds to companies and households, it becomes difficult to support long-term investment and consumption in the economy.

2.4 Empirical Studies

2.4.1 Related Empirical studies outside in Ethiopia

Liquidity risk is the possibility that over a specific time period, the bank will become unable to settle obligations with immediacy (Halling and Hayden, 2006). The vulnerability of banks to liquidity risk is determined by the funding risk and the market risk (Gorton and Winton, 2000).The funding liquidity risk is caused by the maturity mismatch between inflows and outflows and/or the sudden and unexpected liquidity needs due to contingency conditions. The market liquidity risk refers to the inability to sell assets at or near the fair value, and in the case of a relevant sale in a small market; it can emerge as a price slump (Hassan, 2009). The study made on bank specific determinants of liquidity on English banks studied (Halling and Hayden, 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 (Hassan, 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.

Naser, Mohammed and Ma' Someh(2013) aimed to examine the effect of liquidity risk on the profitability of commercial banks using of panel data related to commercial banks of Iran during the years 2003 to 2010. In the estimated research model, two groups of bank-specific variables and macroeconomic variables are used. The results of research show that the variables of bank's size, bank's asset, gross domestic product and inflation will cause to improve the profitability of banks while credit risk and liquidity risk will cause to weaken the performance of bank.

In another study from Pakistan, Akter and Mahmud (2014) 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 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-performance loan 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.

Chagwiza (2011) made a study on Zimbabwe, regarding the commercial banks 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-performance loan have a positive and significant relationship with liquidity risk. Reserve requirement ratios and inflation were also significant in explaining liquidity during the studied period.

2.4.2 Related Empirical studies in Ethiopia

Abera, (2012) Studied Factors Affecting Profitability on Ethiopian Banking Industry. This study examined the bank-specific, industry-specific and macro-economic factors affecting bank profitability for a total of eight commercial banks in Ethiopia, covering the period of 2000-2011 using a mixed methods research approach by combining documentary analysis and in-depth interviews. The result of the interview revealed that the liquidity of banks was one of the major determinants of Ethiopian banks profitability. But, the output of the regression analysis and the interview were in agreement in relation to the direction of the effect of liquidity as far as both of them proved the existence of negative or inverse relationship between liquidity and profitability of Ethiopian banks. The study concluded that the impact of Ethiopian banks' liquidity on their performance remains ambiguous and further research is required.

Wubayehu Teshome (January 2017) The study had assessed the factors affecting liquidity of commercial banks in Ethiopia by using the data over the period of 2011 to 2015 on sample size of twelve commercial banks in Ethiopia out of 17 in total with the aim of investigating macroeconomic as well as government policy and bank specific variables which affecting the liquidity of commercial banks in Ethiopia. The study employed sequential mixed research method approach by combining secondary data through balanced random effect regression model and interviews. The results of the study revealed that all macroeconomic and government policy variables were statistically significant in determining the liquidity of commercial banks in Ethiopia. Among those variables foreign direct investment and NBE-bill purchase had negative effect whereas unemployment rate and real GDP growth rate had positive relationship with banks' liquidity. On the other hand, among the bank-specific factors funding cost was statistically insignificant variable in affecting commercial banking liquidity in Ethiopia whereas level of deposit and bank size had statistically significant and negative relationship with banks' liquidity. Thus, the study suggests that macroeconomic factors are more important than firm-specific in determining the Ethiopian commercial banking liquidity. Therefore, banks shall be more concerned about macroeconomic environment in addition to internal environment as a cornerstone while reviewing its policy and developing strategies to enhance their liquidity position.

Belete. fola(2015) the researcher has examined the bank-specific and macro-economic factors affecting bank liquidity for eight commercial banks in Ethiopia, covering the period of 2002-2013 by using balanced fixed effect panel regression. To this end, the researcher has adopted a mixed methods research approach by combining documentary analysis and in-depth interviews. The findings of the study show that capital strength, interest rate margin and inflation had statistically significant and positive relationship with banks' liquidity. On the other hand, loan growth had a negative and statistically significant relationship with banks' liquidity. However, the relationship for profitability, non-performing loans, bank size and gross domestic product were found to be statistically insignificant. The researcher suggests that focusing and reengineering the banks alongside the key internal drivers could enhance the liquidity position of the commercial banks in Ethiopia. Moreover, banks in Ethiopia should not only be concerned about internal structures and policies, but they must consider both the internal environment and

the macroeconomic environment together in developing strategies to improve the liquidity position of the banks.

Alemayehu (2016) also conduct the researcher is to identify the factors significant to explain Ethiopian commercial Banks liquidity. This study has categorized the independent factors into bank specific factors and macroeconomic factors. The bank specific factors include Bank Size, Capital Adequacy, Profitability, Non-Performing Loans, and Loan Growth while the macroeconomic factors include Gross Domestic Product, General Inflation and National bank Bill. The panel data was used for the sample of eight commercial banks in Ethiopia from 2002 to 2013 year and estimated using Fixed Effect Model (FEM), data was present by using descriptive statistics and the balanced correlation and regression analysis for liquidity ratios was conducted. The findings of the study show that capital strength and profitability had statistically significant and positive relationship with banks' liquidity. On the other hand, loan growth and national bank bill had a negative and statistically significant relationship with banks' liquidity. However, the relationship for inflation, non-performing loans, bank size and gross domestic product were found to be statistically insignificant. The study suggests banks must have increase their outreach to tens of millions of people by openings up more and more branches every year through country, and have significantly improve their banking service by introducing new product and services like Agent banking, Mobile banking and Internet Banking through the application of modern technology. Moreover, banks in Ethiopia should not only be concerned about internal structures and policies, but they must consider both the government regulation and the macroeconomic environment together in developing strategies to improve the liquidity position of the banks.

Tseganesh (2012) made study on determinants of banks liquidity and their impact of financial performance on commercial banks in Ethiopia. The aim of her study was concerned with two points; identify determinants of commercial banks liquidity in Ethiopia and 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 nonperforming 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. Also the result of her study revealed that; among the statistically significant factors affecting banks liquidity, capital adequacy and bank size had positive impact on financial performance whereas, Non-performance loan and short term interest rate had negative impact on financial performance while interest rate margin and inflation had negative but statistically insignificant impact on financial performance. At the end she concluded as, the impact of bank liquidity on financial performance was non-linear/positive and negative.

Belainesh Yihdego (June, 2017) the main objective of this paper was to study and identify the main determinants of Ethiopia commercial banks liquidity. In order to achieve the objective a secondary source of data were collected from eight commercial banks in the sample covering the period from 2005 to 2016 and analyzed them with panel data regression analysis. The result of regression analysis showed that Actual reserve ratio had positive and statistically. Bank size, loan growth and GDP had negative and statistically significant impact on banks liquidity measured by Liquid asset to total asset. Capital adequacy, inflation and nonperforming loan had insignificant effect on liquidity. Since, commercial banks do not respond tote dynamics of economic growth which can be taken as an indication of ineffective competition and efficiency in the Banking sector, NBE should come out with strict rules and regulations for control mechanism of firm specific and macroeconomic factors.

2.5 Summary and knowledge Gap

From the above empirical literature review what can draw in that, though There are a lot of researches conducted by different researchers, their result varies or lack of consistencies. For instance, MitikuCherenet (2017) WubayehuTeshome (January 2017) Tseganesh(2012), Mekbib(2016) and Berhanu (2015) found that bank size has a significant effect on liquidity but Belete (2015) found that it has insignificant result. When it comes to the variable Capital adequacy Tseganesh (2012) found that a significant result but, MitikuCherenet (2017)andMekbib (2016) BelaineshYihdego (June, 2017) found that insignificant result.

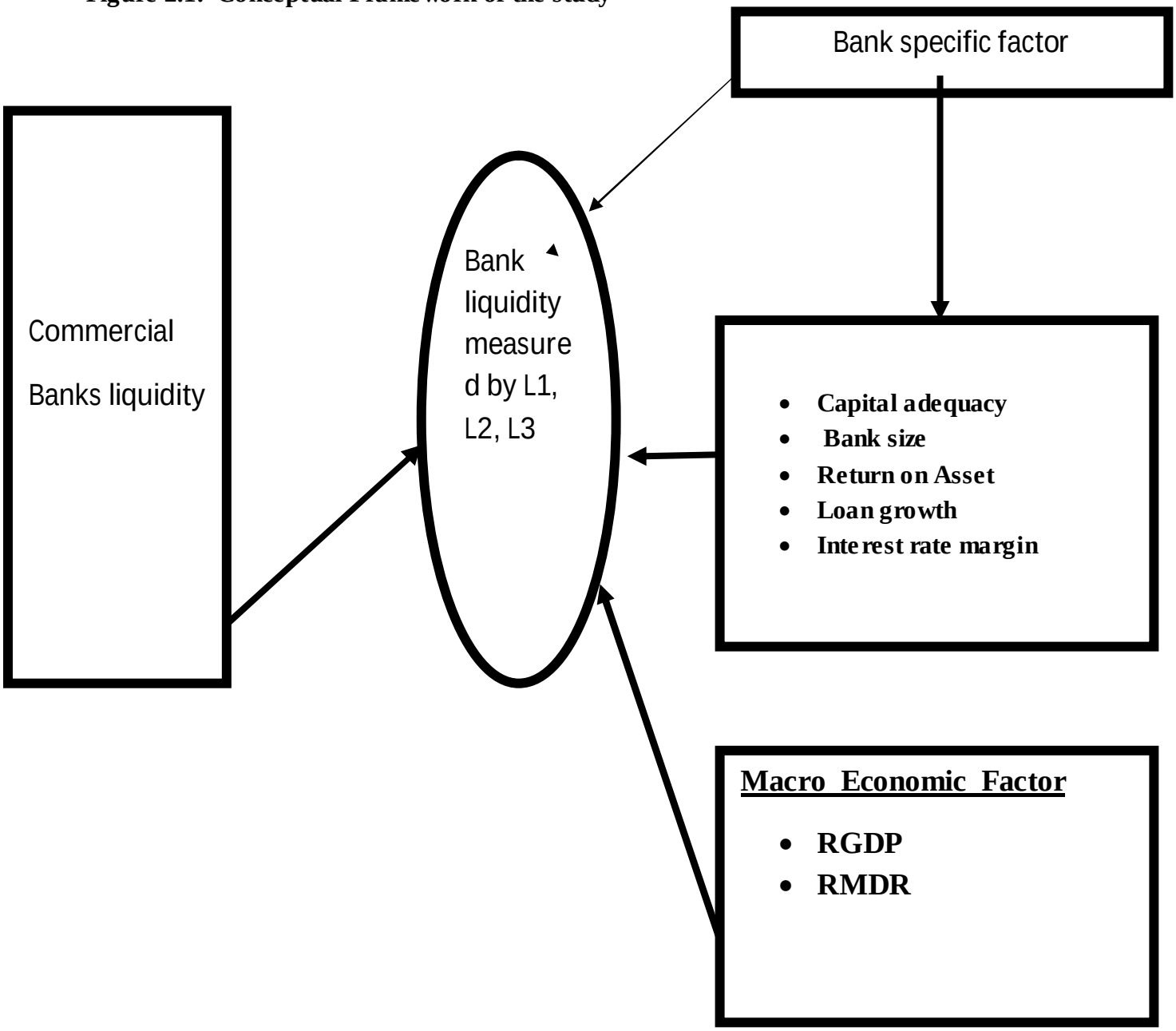
Name	Explained	Unexplained (part)
Mitiku cherenet	75	25
Mekebebe shumeta	67	33
Belayhenshe yhedego	57	43
Wubayhu	87	13
Berehanu	60	40
Belete fola	59	41

Therefore, the purpose of this study was to fill the above stated gap by analyzing firm specific and macroeconomic determinants of big Asset commercial banks in Ethiopia. The period of this study was recent from period 2000-2016 and adding new variables. Finally, providing full information about the relationship between liquidity and firm specific and macroeconomic determinants of banks liquidities in the recent data was essential for this study.

2.6 Conceptual frame work

The conceptual frame work which describes the relationship between bank liquidity with banks specific and macroeconomic determinants based on the theoretical and empirical perspectives was formulated as follows:

Figure 2.1: Conceptual Framework of the study



Source:- Developed by Belete .fola (2015) and additional own self

CHAPTER THREE

Research Design and Methodology

3.1 Research Design

The study is use explanatory research design. According to Muranaga and Ohsawa(2002), a explanatory types of research design is important for a research types if the dependent variable affected by several independent variables. Based on this liquidity risk can be affected by several determinate factors. While the explanatory part of the study designed to use correlation as well as multiple regression analysis. According to Lucchetta, (2007) a correlation as well as regression research design is a procedure in which subjects' score on multiple variables and indicates casual relationships. The study also used to cross-sectional design in which data was gathered just once over the period 2000 to 2016 and cross sectional study used to determine the interrelationship between the variables under consideration among the different commercial banks of Ethiopia.

The explanatory type of research design was found to be suited for this study. The reason was the support of numerous literatures on the relevant studies where they employ quantitative methods approach and explanatory research design to investigate their research problems and verify their hypothesis.

3.2 Research Approach

As described by Creswell (2013), there are three common approaches to conduct a research project in the area of business and social sciences research namely; quantitative, qualitative, and mixed research approaches. With quantitative approach, the researcher primarily uses postpositive claims for developing knowledge, employs inquiry strategies such as experiments and surveys, and also collects data on pre specified instruments that yield statistical data. In order to achieve the objectives of this study and thereby to give answer for its problems, quantitative research approach was used by the researcher due to appropriateness. By using such research approach the researcher enabled to establish a cause-effect relationship between the independent and dependent variables of the study, by testing various hypothesis and theories thereby generalized about determinants of liquidity of commercial banks in Ethiopia.

3.3 Data type and Source of data

Secondary data was obtained from the audited annual financial statements of the concerned commercial banks in Ethiopia and annual report issued by NBE. These data include bank

specific and macroeconomic factors. Bank-specific and industry specific data was sourced from annual reports and statement of accounts of the selected banks. However, data on macroeconomic variable were sourced from annual report bulletins published by the National Population Bank of Ethiopia (NBE) .

3.4 Method of data collection

Document review method was used by the researcher in order to collect all the necessary information thereby to achieve the objective of the study. As a secondary data collection tool for this study, document review mainly focus on reviewing audited financial statement of sample seven banks in Ethiopia to obtain necessary figures those enabled the researcher. The data were collected from 2000 to 2016 on annual base and the figures for the variables were on June 30th of each year under study.

3.5. Study Population & Sampling Frame

In this research, the target population is the banking sector in Ethiopia. According to NBE annual report (2016), Ethiopia consists of 17 Commercial banks. Commercial Bank of Ethiopia (CBE), Dashen Bank S.C (DB), Awash International Bank S.C (AIB), Wogagen Bank S.C (WB), United Bank S.C (UB), Nib International Bank S.C (NIB), Bank of Abyssinia S.C (BOA), Lion International Bank S.C (LIB), Cooperative Bank of OromiaS.C (CBO), Berehan International Bank S.C (BIB), Buna International BankS.C (BUIB), Oromia International Bank S.C (OIB), Zemen Bank S.C (ZB),Abay Bank(AB),Addis International Bank(ADIB), Debub Global Bank(DGB)and Enat Bank (EB). Since the study analyses more depend on the secondary data obtained from NBE annual report and Balance sheet as well as availability other related articles and journals, it is manageable to include 17 years' experience of banks performance of controlling liquidity risk and identifying which factors more affected commercial banks of Ethiopia, therefore the study is compare secondary data from the stated sources from 2000 to 2016 GC. Therefore, these studies was select seven commercial banks based on their asset size and experience in the market such as, CBE, Awash Bank S.C, Dashn Bank, Bank of Abyssinia S.C (BOA), Wegagen and United Bank, NIB Bank.

From the perspective of sample size study was limited to seven commercial banks found in Ethiopia namely CBE, AB, DB, BOA, NIB, UNB, and WB that were registered by NBE before 2000. Seven commercial banks out of eighteen commercial banks was selected using purposive

sampling technique based on two selection criteria set by the researcher those are big asset size banks. And the required banks should operate between 2000and 2016 and having financial statements for consecutive seventeen years.

3.6. Methods of Data Analysis

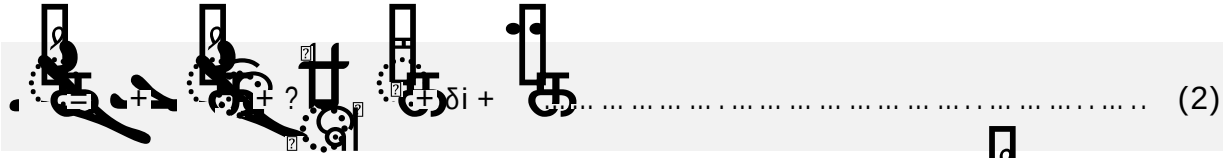
After the data were collected, it was organized and financial ratios were computed for each bank of each bank specific variables. And then, the next step was analyzing and interpreting them accordingly to achieve the stated objectives. In this study two type of statistical analysis was used to test the proposed hypotheses. These are descriptive statistics and inferential statistics 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 were made and finally panel regression analysis was used to determine the relative importance of each independent variable in influencing liquidity of Ethiopian big asset commercial banks. To conduct this, the researcher uses statistical tools Stata 11 software. The researcher has also performed diagnostic tests to ensure whether the assumptions of the linear regression model are violated or not.

3.7 Model specification

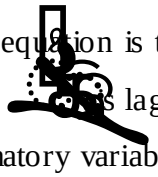
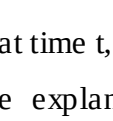
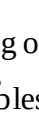
The panel data or longitudinal data comprises of both cross-sectional elements and time-series elements; the cross-sectional element is reflected by the sample of Ethiopian commercial banks and the time-series element is reflected in the period of study (2000-2016). This study, considered whether the use of the particular variable makes economic sense in Ethiopian commercial banks context. The regression model used for this study is dynamic panel which is nobody work before in Ethiopia in financial data analysis and static panel similar with that of made by Mitiku Cherenet (2017) Wubayehu Teshome (January 2017),Tseganesh (2012) and doing by Belete Fola(2015) The panel data model was selected and used for hypothesis testing. Thus, the following equation indicated the general model for this study:

The general model to be estimated is static and dynamic panel model as follows:-

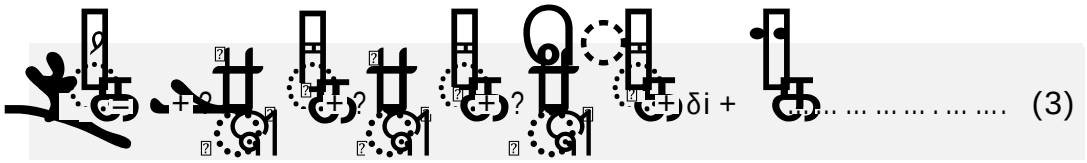
(1)



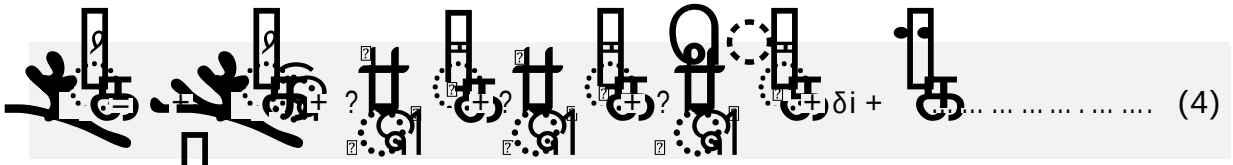
(2)

Where the first equation is the static panel and second is dynamic panel  the liqudity of bank i at time t,  is lag of liquidity of bank with i=1,…,N; t = 1,…,T,  is a constant term,  are explanatory variables and *δi* denotes fixed effects in bank *i* and  the error term. The explanatory variables are grouped in to bank-specific factors, and macroeconomic -variables.

The general specification of model (1) is as follows:-



(3)



(4)

Where the X's with superscripts j, l, and m denote bank-specific variables, and macroeconomic factors respectively. In this study, the bank specific variables are bank size, capital adequacy, loan growth, return on asset (ROA), interest rate margin and macroeconomic variables includes, RGDP and Real minimum deposit rate and Government policy like NBE bill .

3.8 Descriptions of Variables & Hypotheses of the Study

This study is focused on to identify the determinants of banks liquidity in Ethiopian big asset commercial banks through testing the hypotheses regarding to the relationships between liquidity of banks and bank specific and macroeconomic factors affecting it. 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 (bank specific and macroeconomic) were included .The study also considered which determinate factors could influence the liquidity of banks in the Ethiopia big commercial banks context. Therefore, the following variables were selected based on Ethiopian context and previous relevant studies. The description and operational definition of selected variables is discussed here under.

3.8.1. Dependant Variables

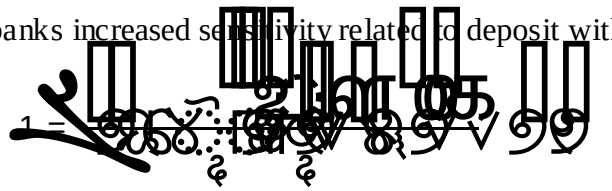
Liquidity of Banks: Bank for International Settlements (2008) defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses". Liquidity can also be defined as a measure of the relative amount of asset in cash or which can be quickly converted into cash without any loss in value available to meet short term liabilities. The liquidity measure provides suggestions about the level of liquidity on which the commercial banks 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 commercial banks, due to the availability of data. For the purpose of this study, the following three 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, and 2013), Tseganesh (2012), Rafique& Malik (2013), Chagwiza, (2014) and Mikubib (2016) are adopted.

Liquid Asset to Deposit & Short Term Borrowing Ratio (L1):

This ratio indicates the percentage of short term obligations that could be met with the banks liquid assets in the case of sudden withdrawals. It is to ascertain whether the bank's short-term assets are readily available to pay off its short-term liabilities. As deposits are able to be

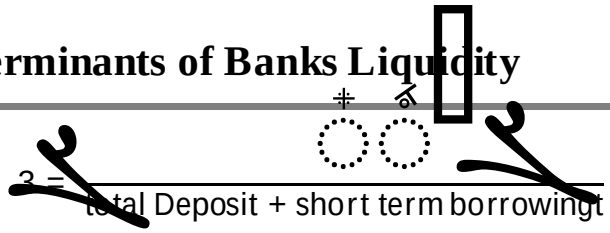
withdrawn at any point in time they play an important role on the banks liquidity position. This ratio is more focused on the banks sensitivity to selected types of funding i.e. customer deposit. The higher this ratio signifies that the bank has the capacity to absorb liquidity shock and the lower this ratio indicates the banks increased sensitivity related to deposit withdrawals.



Liquid Asset to Total Asset Ratio (L2):

The liquid asset to total asset ratio gives information about the general liquidity shock absorption capacity of a bank. In general when the ratio is high, it tells us that the bank has a capacity to absorb liquidity shock and that the bank 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.

Loans to Deposit & Short Term Borrowing Ratio (L3):-As per NBE directive No SBB/43/2008, loans & advances means any financial asset of a bank arising from a direct or indirect advances fund by a bank to a person that is conditioned on the obligation of the person to repay the fund on a specified date or on demand with interest. Loans & Advances are the major portion of a bank's asset and it is the most earning asset of a bank. This ratio tells us the percentage of funding sources tied up by illiquid asset. It relates illiquid asset with liquid liability. This ratio also indicates the percentage of deposit locked in to illiquid asset. The ratio reflects the proportion of the customers' deposits that has been given out in the form of loans and the percentage that is retained in the liquid forms. The ratio serves as a useful planning and control tool in liquidity management since commercial banks use it as a guide in lending and investment decision. Unlike the above two liquidity measures, the higher this ratio, the less the liquidity of the bank is and interpreted inversely.



3.8.2 Control variables

A control variables is a variable that is held constant or whose impact without inference. Control variables should not be confused with controlled variables, which is an alternatives term for independent variables. In this study there are three control variables efficiency ratio financial ratio and government policy likes NBB purchase.

3.8.3. Independent Variables

This section describes the independent variables that are used in the econometric model to estimate the dependent variable i.e. liquidity of commercial banks. The independent variable classified in to two parts study and control variable the discussion and the concern based on study variable.

Capital Adequacy of Banks (CAB): Capital is the amount of own fund available to support the bank's business and act as a buffer in case of adverse situation (Athanasoglou et al, 2005) . Capital of a bank includes paid up capital, undistributed profit (retained earnings), legal reserve or other reserves and surplus fund which are kept aside for contingencies.

Though capital adequacy ratio is measured by the ratio of total capital to risk weight asset, in some literatures it can be also measured by the ratio of capital to total asset and then in this study, the proxy for capital adequacy is the ratio of total capital of the bank to total asset of the bank.

This ratio measures how much of banks asset are funded with owners funds and is a proxy for the capital adequacy of a bank by estimating the ability to absorb losses. As it is discussed in the literature review part, there are two opposing theoretical views regarding to the relationship between banks liquidity and capital adequacy. Some previous studies such as the “financial fragility-crowding out theories predicts that higher capital reduces liquidity creation Diamond and Rajan (2000, 2001) and hence, there is negative relationship between capital adequacy and bank liquidity whereas, Al-Khouri (2012) found that, bank capital increases bank liquidity

through its ability to absorb risk and thus the higher is the bank's capital ratio, the higher is its liquidity creation. This study considered there is a positive relationship between capital adequacy & liquidity and draws the following hypothesis.

H1: Capital adequacy has positive and significant impact on bank's liquidity

Size of the Bank (SIZE): The bank's total asset is another bank specific variable that affects the liquidity of a bank. Bank size measures its general capacity to undertake its intermediary function. There are two opposing arguments regarding to the relationship between bank liquidity and bank 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 bank size and liquidity. In this study, bank size is measured by the natural logarithm of total asset of the bank and it is expected positive relationship between bank size and liquidity and then draws the following hypothesis.

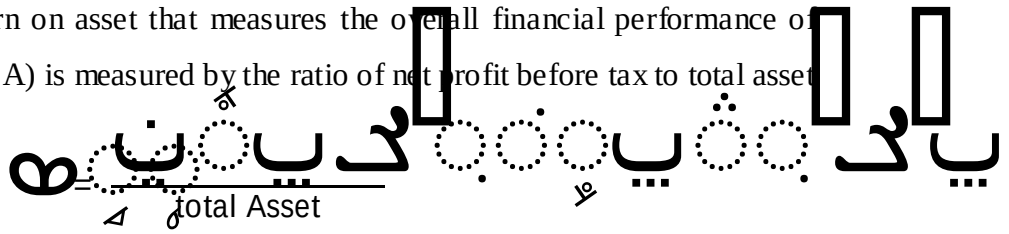
H2: Bank size has positive and significant impact on bank's liquidity

Loan Growth of the Bank (LG): According to NBE directive No. SBB/43/2008, loans & advances means any financial asset of a bank arising from a direct or indirect advances fund by a bank to a person that is conditioned on the obligation of the person to repay the fund on a specified date or on demand with interest. Loans & advances are the major earning asset of the bank. Loans & advances are granted to customer from the amount collected from depositors of the bank. In this regard, when banks transform short term deposits to long term loans, which have a maturity mismatch, they will be vulnerable to liquidity problem**.** Therefore, the increase in loan means increase in illiquid assets and decrease in short term/liquid assets. As it was discussed in the literature review part, it is expected that, there is a negative relationship between bank loan growth and liquidity. For this study loan growth is measured by the annual growth rate of outstanding gross loans & advances of the bank and the following hypothesis is drawn.

H3: Loan growth has negative and significant impact on bank's liquidity

Return on Asset: Liquidity needs constrain a bank from investing its entire available fund. Banks 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, banks 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. Most commonly, profitability is measured by return on asset (ROA) and return on equity (ROE). For the purpose of this study, the proxy of profitability is return on asset that measures the overall financial performance of banks and the return on asset (ROA) is measured by the ratio of net profit before tax to total asset



Accordingly, the following hypothesis is drawn,

H4: ROA has negative and significant impact on bank's liquidity

Interest Rate Margin (IRM): 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).There are number of ways to calculate the interest rate margin, for the purpose of this study, it is defined as the difference between interest income from loan and advances as a fraction of the total loan and advances and the interest paid out on deposit as a percentage of total deposits (previously used by Azeez et al, 2013). As this interest rate margin increases, banks are encouraged to grant more loans from short term deposit and it lowers liquidity, thus the following hypothesis is drawn

H5: Interest rate margin has negative and significant impact on bank's 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 banks 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 borrowers' capability to service their obligations which increases banks NPLs and eventually decreases banks 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 banking liquidity negatively.

H6: Real GDP growth rate has negative and significant impact on bank's liquidity

Real Deposit rate: is an interest rate that has been adjusted to remove the effects of inflation to reflect the real cost of fund to the borrower and the real yield to the lender or to an investor. The real interest rate of an investment is calculated as the difference between nominal (official) Interest rate and inflation (Expected or Actual).

Interest rates and banks liquidity are closely intertwined and, to a large extent, directly related. This relationship between the two variables (i.e., interest rates and banks liquidity) implies that an increase in one variable is likely to have a similar effect on the other variable, and vice versa. For instance, according to Kimari (2013) an increase in the supply of a banks 's liquidity, or an open-market sale of bonds (in the case of government), is likely to increase the interest rate in general, at least in the short term, and vice versa, while holding other market forces of demand and supply constant. Conversely, an increase in the inflation rate is likely to reduce the real interest rate of a bank (Krishnamurthy andVissing-Jorgenesen, 2013). The Theory of Banks Finance by Tirole (2006) also suggests that there is a relationship between interest rates and banks liquidity. According to this theory, an increase in the banks s liquid (money) supply is usually expected to increase interest rates, a phenomenon he calls the liquidity effect. , thus the following hypothesis is drawn.

H7: Real Interest rate has positive and significant impact on bank's liquidity

CHAPTER FOUR

Data Analysis and Interpretation

In this section results and discussions on determinates of liquidity risk of large asset size commercial banks in Ethiopia is presented. The empirical evidence on the determinants of Ethiopian commercial banks' liquidity were explore based on balanced panel data which is all the variables are observed for each cross section and each time period. The study has a time series segment spanning from the period 2000 up to 2016 and a cross section segment which considered top seven large asset size Ethiopian commercial banks, Commercial Bank of Ethiopia (CBE), Awash Bank (AB), Dashen Bank (DB), Bank of Abyssinia (BOA), Wegagen Bank (WB), United Bank (UN) and Nib International Bank (NIB). Moreover, this chapter deals with the results of study which include descriptive statistics of variables, correlation results of variables, and panel regression analysis. The first section presented descriptive analysis of the dependant and independent variables using graphs and tables to provide an insight on the distribution of the data by bank and across time. The second section presented the correlation analysis result of dependant and independent variables. Section three presented the classical linear regression model assumptions diagnostic test results. The fourth section presented the results of the regression analysis and finally discussion of the regression results were presented under section five.

4.1 Descriptive Statistics

The table below (table 4.1) presents the outcomes of the descriptive statistics the main variables involved in the regression model. The result includes dependent variables of the percentage of three bank liquidity measures i.e. liquid asset to deposit (L1), liquid asset to total asset (L2) and loan to deposit (L3) and the independent variables i.e. bank level factor and macroeconomic factor. Key figures summarized the following statistical measures mean, standard deviation, minimum and maximum value were reported. This was generated to give overall description about data used in the model and served as data screening tool to spot unreasonable figure.

From Table 4.1 and 4.2 below we can observe that the total number of observation in the balanced panel were 119 = (17*7). Seventeen (17) indicates number of years between 2000 to 2016 and Seven (7) indicates number of large asset size banks in the sample study.

Table 4.1 presents the three liquidity measures (L1, L2 and L3) of this study. The first measure of liquidity risk is liquid asset-to-deposit and short term borrowing (L1) the summery statistics shows the average liquid assets was 44.61% of deposit and other short term borrowing of studied banks. The standard deviation of 15.22% shows sensible dispersion from its mean; reaches the maximum ratio of 78.2% and the minimum of 16.21 %. The National Bank of Ethiopia uses this ratio as the measurement of banks liquidity level and the liquidity requirement directive is based on this ratio. As per NBE directive number SBB/57/2014 issued by the National Bank of Ethiopia, any licensed commercial banks are required to maintain liquid asset of not less than fifteen percent (15%) of its net current liabilities (which includes the sum of demand deposits, saving deposits, time deposits and similar liabilities with less than one-month maturity). Accordingly the result shows the all summery statistical above the minimum liquidity requirement standard of the supervisory authority which is currently 15%. In general, the higher this ratio signifies that the bank has the capacity to absorb liquidity shock and the lower this ratio indicates the banks increased sensitivity related to deposit withdrawals.

The second measure of liquidity risk is liquid asset-to-total asset ratio (L2) which gives information about the long-term liquidity shock absorption capacity of a bank. The result confirms that the average liquid asset to total asset ratio of studied commercial banks for the period from 2000 to 2016 was 34.14%. The standard deviation of 11.5% shows that there is slight dispersion from the average liquid asset-to-total asset ratio. The maximum and the minimum liquid asset to total asset ratio of the studied banks was 59.41% and 12.96 respectively. As a general rule, the higher the share of liquid assets in total assets, the higher the capacity to absorb liquidity shock, given that market liquidity is the same for all banks in the sample. This measure of liquidity was taken as benchmark measure.

The last measure of liquidity risk is loan to deposit ratio (L3) this ratio serves as a useful planning and control tool in liquidity management since commercial banks use it as a guide in lending and investment decision. Unlike the above two ratio measures, the higher this ratio is the less the liquidity of the banks and interpreted inversely. The descriptive result in table 2 point out

the mean value of loan to deposit ratio or L3 was 66.40%. The standard deviations of 14.37% showed moderate dispersion of loan to total deposits ratio from its mean for the banks in Ethiopia. The minimum and maximum values of L3 were 29.69% and 96.7%, respectively.

Table4.1: Summery Statistics for the Three Measure of Bank Liquidity

Variable	Observation	Mean	Std. Dev	Minimum	Maximum
L1	119	44.61	15.23	16.21	78.2
L2	119	34.14	11.45	12.96	59.41
L3	119	66.40	14.37	29.69	96.7

Source: Stata results of sample big asset commercial banks

Among the bank specific independent variables, bank size which is measured by natural log of total asset it is useful to measure the bank general capability to undertake its intermediary functions. The summery statistics result indicates in table 2 the mean values of bank size were 3.73 with the standard deviation of 0.68. The maximum and minimum values were 5.38 and 2.16 respectively.

As it is shown on table 4.1 below, the average capital adequacy ratio of the studied banks were 12.21. The maximum and minimum CAR ratio of 29.4% and 3.74%. The average standard deviation of 4.94% for CAP reveals that, there was dispersion towards the mean capital adequacy ratio. NBE requirement (NBE directive no SBB/9/95 capital adequacy is measured by the ratio of regulatory capital to risk-weighted assets and accordingly a minimum of 8% is required. However, the proxy for capital adequacy measurement used in this study was the ratio of total equity to total asset. The average result of CAR implies above the minimum requirement set by the NBE. The higher this ratio entails the capability of the bank to absorb losses from its own capital.

Loan growth is measured by the annual growth rate of total loans & advances of a bank. The mean value of the variable loan growth 26.00% with maximum and minimum values of 95.55% and –30.31% respectively. In terms of loan growth sample banks were highly different with the standard deviation of 19.23%.Return on asset was measured by the ratio of net profit before tax to total asset. It is used to measure banks profitability. Net profit before tax was used in order to avoid the impact of different period's tax rate on the net profit of the bank. Table 4.1, shows that

the average returns on asset of studied banks for the period from 2000 to 2016 was 2.67%. The minimum return on asset of -2.16% and the maximum return on asset of 4.86%.The result also presents the descriptive statistics of macroeconomic factors it shows that the mean value of real GDP growth in Ethiopia for the last seventeen years was 8.74%, with a maximum of 12.64% and a minimum of -2.1 %. As per the result GDP had a moderate standard deviation of 3.96% from its mean.

Table4. 2: Summery Statistics Main Independent Variable Affects Bank Liquidity

Variable	Observation	Mean	Std. Dev	Minimum	Maximum
Bank Specific factors					
CAR	119	12.21	4.94	3.74	29.44
Bank size	119	3.73	0.68	2.16	5.38
Loan growth	119	25.79	19.23	-30.31	95.55
ROA	119	2.67	1.09	-2.16	4.86
IRM	119	4.93	2.16	0.95	13.17
Macroeconomic factors					
RMDR	119	-7.52	11.38	-32.4	13.58
RGDP Growth	119	8.74	3.96	-2.1	12.64

Source: Stata results of sample big asset commercial banks

4.2 Correlation analysis

The correlation between the dependant variables and the independent variables have been presented and analyzed in this section. According to Brooks (2008), correlation between two variables measures the degree of linear association between them.

To find the association of the independent variables with dependant variables Pearson Product Moment of Correlation Coefficient was used in this study. 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. 3: Correlation matrix of the dependent and independent variables

	CAR	Bank .s	Loan g	ROA	IRM	RDIR	RGDP
L1	0.07	-0.30	-0.21	-0.03	-0.03	-0.14	-0.04
L2	-0.08	-0.20	-0.30	-0.10	-0.10	-0.15	-0.005
L3	0.38	-0.70	0.45	-0.04	0.16	0.21	-0.20

Source: stata results of sample big asset commercial banks

Table 3: above, shows the correlation coefficient between the dependent variables and independent variables. Among the bank specific variables capital adequacy ratio is positively correlated with L1 with correlation coefficient of 0.07. While bank size, loan growth, return on asset and interest rate margin are negatively correlated with L1. With regard to macroeconomic variables 0.gross domestic product (GDP) and real minimum deposit have negatively correlated with L1. Bank size has shown the highest negative coefficient of -0.3 with respect to L1

All bank specific and macro-economic variables have negatively correlated with L2. The correlation between L2 and gross domestic product is approximately zero.

With regard to the third liquidity ratio (L3, there is a positive linear relation between L3 and Capital adequacy, loan growth, Interest rate margin and real deposit interest rate. Other variables are negatively correlated with L3..

4.3. Testing the Classical Linear Regression Model (CLRM) Assumptions

In this section, the researcher carried out relevant diagnostic testing to identify for any violation of the underlining assumption of the classical linear regression model (CLRM). Five assumptions were made which ensures that the estimation technique, ordinary least squares (OLS), to have a number of desirable properties, and that hypothesis tests regarding the coefficient estimates could validly be conducted. Specifically, it was assumed that average values of the error-term is zero, the variance of the errors are constant (homoscedastic), the covariance between the error-terms are zero (no autocorrelation), the error-terms are normally distributed (normality) and explanatory variables are not correlated (absence of multicollinearity).

i. Testing for the Average value of the error-term is zero

The first CLRM assumption requires, the average value of the errors term should be zero. As per (Brooks, 2008), if a constant term is included in the regression equation, this assumption will never be violated. Therefore, since the constant term was included in the regression equation, this assumption is expected to be not violated.

ii. **Testing for the variance of the error-term is constant**

The second assumption of CLRM is that, the variance of the error-term is constant; this is known as the assumption of homoscedasticity. If the errors do not have a constant variance or if the residual of the regression have systematically changing variability over the sample, they are said to be heteroscedastic means the estimated parameter will not be BLUE because of the inefficient parameter. To test the homoscedasticity assumption the Whites test was applied having the null hypothesis of heteroscedasticity. Both F-statistics and Chi-square ($\chi 2$) tests statistics were applied to decide whether to reject the null hypothesis by comparing p-value with significant level. The following table shows review results for heteroscedasticity of the three dependant variables.

Table 4.4: Heteroskedasticity Test: white test results

	L1	L2	L3
F-statistics	1.79	2.24	1.49
Prob. F(64,54)	0.14	0.13	0.16
Obs*R-Squared	80.92	86.52	65.43
Prob. Chi-squared(64)	0.075	0.3	0.16

The above table 4.4 and (Appendix II) indicates that, both the F-test- and $\chi 2$ versions of the test statistic give the same conclusion that there is no evidence for the presence of heteroscedasticity for both L1, L2 & L3, since the p-values are considerably in excess of 0.05. In general, the entire regression model used in this study reveals that the variance of the error term is constant or homoscedastic.

iii. **Testing for the covariance between the error-terms are zero-(no autocorrelation)**

Assumption three of the CLRM requires absence of autocorrelation or the covariance between the error terms is zero. In other words, 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 auto correlated or that they are serially correlated.

The first step in testing whether the error series from an estimated model are auto correlated would be to plot the residuals and looking for any patterns. However, graphical methods are difficult to interpret in practice and hence a formal statistical test should also be applied. The simplest test is due to Durbin and Watson (1951). The DW values of L1, L2 and L3 for 119 observations in this study are 2.02, 2.00 and 2.01, respectively. The DW value of L1, L2 and L2 lies around 2 it indicates no evidence of autocorrelation region where the null hypothesis of no autocorrelation do not be rejected. Hence, in this study, there is no serial autocorrelation

iv. **Test for Normality**

In this study, we used BJ normality test to test the null hypothesis of normally distributed assumption. The model kurtosis approaches to three which were 3.116518, 3.148091 and 2.430225 for L1, L2 and L3 respectively. On the other hand the p-value for the BJ test were 0.134789, 0.163076 and 0.452381 for L1, L2 and L3 respectively which is not significant even at 10% level of significant to reject the null hypothesis. Thus the result of the test implies that the data were consistent with a normal distribution assumption.

v. **Test for Multicollinearity**

The test for multicollinearity helps to identify the correlation between explanatory variables and to avoid double effects of the independent variables. It describes the relationship between explanatory variables. When the explanatory variables are highly correlated with each other, there exists multicollinearity problem (Brooks, 2008). Though, there is no consistent argument on the level of correlation that causes multicollinearity, Hair et al 2006(cited in Habtamu 2012) argues that correlation coefficient below 0.7 may not cause serious multicollinearity problems.

In this study correlation matrix for seven explanatory variables had been estimated. The results in the following correlation matrix show that the highest correlation of 0.54 existed between ROA and RGDP followed by correlation coefficient of -0.46 which is existed CAR and bank size.

Table 4.5: Correlation Matrix of Explanatory Variables

	CAR	Bank s	Loan g	ROA	IRM	RGDP	RDIR
CAR	1						
Bank .s	-0.4665	1					
Loan .g	0.2003	-0.3293	1				
ROA	0.1942	0.2129	0.2156	1			
IRM	0.4033	-0.0509	0.0146	0.1789	1		
RGDP	-0.1161	-0.3689	-0.0677	0.5458	0.1403	1	
RDIR	0.1104	-0.3098	0.0589	-0.4245	-0.0966	-0.3240	1

Correlation matrix between independent variables is presented in table

4.5. The result of correlation matrix indicates that there were low data correlations among the independent variables. These low correlation coefficients indicate that, there is no problem of multicollinearity in this study. Besides, (Kennedy, 2008) stated that multico linearity problem exists when the correlation coefficient among the variables are greater than 0.70, but in this study there is no correlation coefficient that exceeds or even near to 0.70. Consequently, in this study there is no problem of multicollinearity which enhanced the reliability for regression analysis. Thus, in this study there is no problem of multicollinearity.

4.4. Panel regression analysis

In this section both Static and dynamic panel regression model analysis is used to identify the liquidity risk determinants of large asset size banks in Ethiopia.

There are two classes of static panel estimator approaches that can be employed in financial research: fixed effect and random effect models. Here we outline five definitions that we have seen:

The random effects model is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population while fixed effect model is more appropriate when the entities in the sample effectively constitutes the entire population (Brooks, 2008). On the other hand, according to (Gujarat, 2004) if the number of time series data is large and 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. Accordingly in this study, the number of cross section units is seven and the number of time series data is seventeen which is more than the cross section unit and as the sample of big asset size banks were not selected randomly, the fixed effect model is more appropriate than the random effect model. We can also identify using statistical test the difference between the fixed and random effects estimators specification proposed by Hausman (1978). According to Hausman the null hypothesis of the random effect is appropriate and the alternative of the fixed effect model is appropriate. From the stata result in the appendix shows the level of significant for L1, L2 and L3 less than 0.05. This implies that fixed effect model is more appropriate than the random effect model. Hence, the information collected in the theoretical and statistical test result leads the fixed effect model is used in this study. In addition to fixed effect model we further analysis the data using dynamic panel regression and compare the two model results.

In these study six liquidity determinant models is estimated based on the three measurements i.e. L1, L2, and L3by applying both fixed effect and dynamic panel regression techniques. The robust estimated model is as follows.

i. Determinants of Bank Liquidity Measured by Fixed and Dynamic Model

The empirical model used in this regression analysis is to identify the statistically significant determinants of big asset size commercial banks liquidity measured by liquid asset to deposit & short term borrowing ratio (L1) using fixed effect and dynamic panel models.

Table 4.6: Regression Estimation results of L1 using Model (1) and Model (4)

Dependent Variable: LIQUDITY (L1)				
Method: Panel REGRESSION RESULT				
DATE 04/05/18				
Sample (adjusted): 2000 -- 2016				
Periods included:- 17				
Cross-sections included:- 7				
Total panel (balanced) observations:- 119				
Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
car	0.6018	*0.2410*	*2.5*	*0.014*
Bs	-13.4634	*3.5622*	*-3.7*	*0.000*
Loan .g	-0.1847	*0.5260*	*-3.5*	*0.001*
ROA	3.3 0214	*1.3918*	*2.37*	*0.020*
IRM	-2.5489	*0.6869*	*-3.7*	*0.000*
RGDP	-0.3202	*0.2421*	*-0.26*	*0.189*
RDIR	-0.1954	*0.0777*	*-3.15*	*0.014*
C	154.413	*15.78*	*9.78*	*0.000*

****, **, and * denote significance at 10%, 5%, and 1% levels, respectively*

Source: *Financial statement of sampled commercial banks and own computation through stata*

Table4. 6 above 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 short term borrowing and the independent variables which includes both bank specific variables, macroeconomic variables and dummy of government policy for the sample of seven big asset size Ethiopian commercial banks. The coefficient of determination in the fixed effect model (Model1) is given by with in R-squared of 0.77 and over all R-squared of 0.60, which means 60% of variation of Ethiopian big asset commercial banks liquidity (L1) can be explained by the variation on capital adequacy, bank size, loan growth, return on asset, interest rate margin, real deposit rate, gross domestic product and government policy. The remaining 40% 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 34.81 with p-value of 0.00 which is used to measure the overall significance of the model. Thus, the p-value of F-statistics indicates the null hypothesis is rejected and the model is significant at 1% significant level. The result also shows all statistical significant indicators of dynamic panel regression i.e Wald Chi-square is 541 and p-value is 0.00 in the model 4 indicates good fit of the model analysis include one lags of the liquidity in the regression as independent variable to determines the liquidity of banks.

As it is shown in the above table in Model (1) and Model (4) except real GDP other independent variables like capital adequacy, bank size, loan growth, return on asset, interest rate margin, real deposit rate and government policy were the statistically significant factors affecting liquidity of commercial banks in Ethiopia.

In both fixed effect and dynamic model results in the table, Capital adequacy ratio and return on asset had positive and statistically significant impact on liquidity at 5% level in big size commercial banks. Bank size, interest rate margin loan growth and government policy had negative and significant impact on liquidity at 1% level. And real deposit rate had negative and statistically significant influence on banks liquidity in Ethiopia at 5% level. Whereas, loan growth, real GDP growth rate and short term interest rate were statistically insignificant. The coefficient signs of real GDP growth rate and interest rate margin were opposite to our expectation and in line with the findings of Mikebub (2016), Czechs (Vodova 2011) and the case of emerging markets (Bunda and Desquilbet, 2008)commercial banks analysis.

ii. **Determinants of Bank Liquidity Measured by Model- (2) and (5)**

The table below presents the regression result of the determinants of big size commercial banks liquidity measured by the ratio of liquid asset to total asset.

Table 4.7: Estimation results of L2 using Model (2) and Model (5)

Dependent Variable: LIQUDITY (L2)				
Method: Panel Least Squares				
Date: 04/05/18 Time: 11:01				
Sample (adjusted): 2001-- 2016				
Periods included: 17				
Cross-sections included: 7				
Total panel (balanced) observations: 119				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
car	0.1961	0.1674	1.17	0.244
Bs	-11.9842	2.4742	-4.84	0.000
Loan .g	-0.1331	0.0365	-3.64	0.000
ROA	2.1525	0.9667	2.23	0.028
IRM	-1.9693	0.4771	-4.13	0.000
RGDP	-0.0441	0.1682	-0.26	0.794
RDIR	-0.1698	0.0540	-3.15	0.002

C	134.9	10.96	12.30	0.000

****, **, and * denote significance at 10%, 5%, and 1% levels, respectively*

Source: Financial statement of sampled commercial banks and own computation through stata

As it can be seen from the above fixed effect and dynamic model regression result, bank size, loan growth, Interest rate margin, real deposit rate, government policy and the one lags of liquidity in dynamic model were statistically significant at 1% significant level, return on asset was statistically significant at 5% significant level and the other variables real GDP growth have not statistically significant effect on L2 in the results of both Model 2 and 5.

From the table above the stata result demonstrates among the statistical significant independent variables bank size, loan growth, return on asset, Interest rate margin real deposit rate and government policy had negatively related with L2. Return on asset in Model 2 and Model 5 and lags of the dependant variable in Model 5 have positively related with L2. Thus the result shows that, bank liquidity (L2) decreases with higher loan growth, with bank size, real deposit rate, Interest rate margin and government policies like NBE bill and branch expansion while increases with higher the previous liquidity and higher return on asset. In this regard, only loan growth had coefficient sign which is in-line with our expectations while the coefficient sign of the other statistically significant variables are contrary to our expectations. The regression result shows that, statistically significant influence of bank size, return on asset, loan growth and real deposit rate on liquidity which is measured by L2 was consistent with the result found on the study made by Tseganesh (2012) and Malik et al (2013).

The coefficient of determination in this model is given by R-squared with in variable is 0.81 and over all R-squared is 0.68, which means 68% of variation of Ethiopian big size commercial banks liquidity (L2) can be explained by the variation on capital adequacy, bank size, loan growth, return on asset, interest rate margin, real deposit rate, gross domestic product and government policy. The remaining 32% of changes was explained by other determinants which are not included in this model. Comparing with L1, the explanatory power of the independent variables on the dependent variable is slightly higher in the case of L2 which was in consistent

result mikebub (2016). The value of F-statistics is 44.06 with p-value of 0.00 which is used to measure the overall significance of the model. Thus, the p-value of F-statistics is zero, the null hypothesis is rejected and the model is significant even at 1% significant level.

iii. Determinants of Bank Liquidity Measured by Model- (3) and (6)

The empirical model used in this study to identify the statistically significant determinants of Ethiopian big size commercial banks liquidity measured by loan to deposit & short term borrowing ratio result was as follows.

Table 4.8: Estimation result of L3 using Model (3) and Model (6)

Dependent Variable: LIQUDITY (L3)				
Method: Panel Least Squares				
Date: 04/05/18 Time: 11:00				
Sample (adjusted): 2001 - 2016				
Periods included: 17				
Cross-sections included: 7				
Total panel (balanced) observations: 119				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
car	0.07 11	0.2068	0.34	0.731
Bs	-6.4302	2.9835	-2.16	0.033
Loan .g	0.2320	0.0425	5.46	0.000
ROA	2.8505	1.1644	2.45	0.016
IRM	1.1188	0.5998	1.87	0.065
RGDP	0.0213	0.2124	0.10	0.921

RDIR	-0.0729	0.0688	-1.06	0.292
C	88.25	11.010	8.02	0.000

****, **, and * denote significance at 10%, 5%, and 1% levels, respectively*

Source: Financial statement of sampled commercial banks and own computation through stata

In the above table presents the determinants of Ethiopian big commercial banks liquidity measured by the ratio of loans to deposit. In contrast to the above two liquidity measures, high value of this ratio implies low liquidity and the result have to be interpreted in reverse: positive sign of the coefficient means negative impact on liquidity and conversely. As it is depicted in the above table, the fixed effect model shows over all R-square of the fixed effect model was 0.74. This result implies that, the explanatory power of the model is high and indicates that the change in the independent variables can explain 74% of the change in the dependant variable the model is consistent to the findings ofMekibub (2016). The explanatory power of model 3, liquidity measured by loan to deposit ratio, is better than the explanatory power of liquidity measured by L1 & L2. The value of F-statistics is 25 with p-value of 0.00 which is used to measure the overall significance of the model. Thus, the p-value of F-statistics value indicates the null hypothesis is rejected and the model is significant at 1% significant level. The result also shows all statistical indicators of dynamic panel i.e. the overall significant measures like Wald Chi-square is 351 and p-value is 0.00 of in the dynamic model (model 6) analysis the independent variables mentioned above explains the liquidity of banks.

As it can be seen from the above table in the fixed effect model, Bank size and return on asset were statistically significant at 5% significant level. On the other hand, loan growth and government policy were statistically significant at 1% significant level. Whereas, Capital adequacy ratio, real deposit interest rate and RGDP growth had statistically insignificant impact on banks liquidity measured by L3.

Conversely, dynamic model demonstrates only the lags of l3 and loan growth were statistically significant at 1% significant level and interest rate margin were statistically significant at 10% significant level

In general among the macroeconomic variables, gross domestic product (GDP) had no statistically significant effect on the liquidity of Ethiopian big asset commercial banks in all of the three liquidity measures while the other macroeconomic variables and the entire bank specific variables included in this study had statistically significant impact on liquidity of Ethiopian big asset commercial banks at least in one of the three liquidity measures stated above. On the other hand, the dynamic panel and the fixed effect regression model result had almost no significant different results displayed on the statistical significant and the coefficients estimation on this study.

4.5 Discussion of the panel regression result

On this study, the relationship between the dependent variable and each independent variable were discussed on the basis of the findings. The dependant variable, liquidity of Ethiopian big asset commercial banks, were measured by liquid asset to deposit & short term borrowings ratio (L1), liquid asset to total asset ratio (L2) and loan to deposit & short term borrowing ratio (L3). And the independent variables were, capital adequacy, bank size, loan growth, return on asset, interest rate margin, real minimum deposit rate, gross domestic product, and government policy. Thus, the fixed effect and dynamic panel regression result of each bank specific and macroeconomic variables were discussed in each the liquidity measures.

Capital Adequacy and Banks Liquidity

Capital adequacy was measured by the ratio of total capital of the bank to total asset of the bank and it was hypothesized that capital adequacy has positive and significant impact on banks liquidity. Based on the fixed and dynamic panel regression result capital adequacy was statistically significant impact on the determination of liquidity of Ethiopian big asset commercial banks which was measured by L1 but statistically insignificant measured by L2 and L3. The capital adequacy coefficient sign is around 0.6 in both model estimations which reveals that, there is a positive relation between liquidity of big asset commercial banks measured by L1 and capital adequacy of banks. This indicates that, when capital to total asset is increases by 1 unit, the liquidity of Ethiopian big asset commercial banks is also increased by 0.6 units being other variables remains constant. This positive and significance relation of the share of capital to total asset is consistent with the assumption that a bank with sufficient capital adequacy should be liquid too and in line with the risk absorption theory proposed by Diamond and Dybvig

(1983) and it is also in line with our hypothesis, the findings of Vodova (2013) on Hungary commercial banks and inconsistence results with the findings of Mekubub (2016) Ethiopia commercial banks.

In general, capital adequacy has no statistically significant impact on liquidity of Ethiopian big asset commercial banks as it was measured by L2 & L3 and statistically significant its measured by L1. Hence capital adequacy has positive and significant impact on banks liquidity was rejected in our L2 and L3 liquidity measurement findings and not rejected L1 liquidity measurement.

Bank Size and Bank's Liquidity

The proxy for bank size in this study is the natural logarithm of total asset and hypothesized as bank size has positive and significant impact on banks liquidity. The result in this study found that bank size had a negative and statistically significant impact on liquidity of Ethiopian big asset size commercial banks which was measured by L1, L2 and L3. This negative sign of the coefficient indicates an inverse relationship between asset size and banks liquidity. This finding is fully corresponds to the well-known "too big to fail" hypothesis and seems that if big banks assuming themselves as "too big to fail", their motivation to hold liquid asset is limited. 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(Iannottaet al. 2007). Therefore, "too big to fail" status of large banks 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, Liquidity of Czech Commercial banks and its determints, 2011). The result of the fixed effect model for L1, L2 and L3 reveals that, being other variables constant, a one unit change on bank size had resulted in a -13.5, -11.98 and -6.43 units respectively, change on liquidity of Ethiopian big size commercial banks in opposite direction. Similar results were displayed in the dynamic model coefficients. This was consistent with the findings of Vodova (2011) on Hungary Commercial banks, banks, (Vodova, 2013) on Poland Commercial Banks and Mukibub (2016) Ethiopian privet commercial banks but opposite to the findings of Malik and Rafique (2013) on Pakistan commercial banks. Generally, the result in all L1, L2 and L3 reveals that, bank liquidity decreases with the size of the bank in which

medium and small sized banks may hold a buffer of liquid asset. Thus, the hypothesis: bank size has positive and significant impact on banks liquidity should be rejected.

Loan Growth Rate and Bank's Liquidity

Loans & advances is the major asset of a bank. In this study, the annual growth rate of gross loans and advances to customers was used as a proxy for loan growth. The result of the study indicated that, loan growth had a negative and statistically significant impact on liquidity of Ethiopian big size commercial banks measured by L1, L2 and L3 at 1% significant level in both fixed effect and dynamic panel model. The negative relation and statistically significant impact of loan growth on liquidity was in line with hypothesis. The negative impact of loan growth on liquidity was based on the argument that, when loans & advances of a bank increases, the amount of illiquid asset in the total asset portfolio would also increases and leads to reduction on the level of liquid asset position of the bank. This negative sign of the coefficient indicates an inverse relationship between loan growth and liquidity. According to the regression result, a one unit change in the loan growth rate, keeping other things constant, had resulted in 1.9, 0.13&6.43 change on the level of liquidity of commercial banks measured by L1, L2 and L3 respectively in the opposite direction. The regression result Therefore, the study fails to reject the third hypothesis saying, loan growth has negative and significant impact on banks liquidity.

Return on asset and Banks Liquidity

Return on asset (ROA) in this study measures Profitability of banks. The regression result shows that, profitability had positive and statistically significant impact on liquidity measured by L1, L2 and l3 at conventional level of significant. This positive relation was inconsistent with our expectation and finance theory which emphasizes their negative relationship in both regression models. The coefficient of 3.3, 2.15 and 2.85 for L1, L2 and L3 respectively revealed that, taking other independent variables constant, a one unit change on return on asset had 3.3, 2.15 and 2.85 for L1, L2 and L3 change on liquidity of Ethiopian big asset size commercial banks measured by L1, L2 and L3 respectively in the same direction. This positive relation shows that, higher profitability leads to increase banks liquidity. However, as the major profitability of banks 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 and findings of Mikubub (2016) privet commercial banks in Ethiopia but opposite to Vodova (2011, 2013) on Poland and Slovakia commercial banks respectively. Therefore, the hypothesis stated; profitability has negative and significant impact on banks liquidity should be rejected.

Interest Rate Margin and Bank's Liquidity

In this study, interest rate margin (IRM) was measured by the difference between interest income on loan and advances as a fraction of total loan and advances and the interest paid out on deposit as a fraction of total deposits. According to the regression result of this study, interest rate margin had negative and statistically significant impact on liquidity of commercial banks measured by L1 and L2. The negative effect of interest rate margin highlights the fact that higher interest rate margin do encourage banks to lend more rather it encourage banks to hold more liquid assets. Whereas, Interest rate margin is positive and significant impact on the measurement of L3. The positive effect of interest rate margin highlights the fact that higher interest rate margin do not encourage banks to lend more rather it encourage banks to hold more liquid assets.

The negative coefficient as well of its statistically significant impact on liquidity was supports our hypothesis and expectation and thus the hypothesis stated; interest rate margin has negative and significant impact on banks liquidity should be rejected.

Real deposit Interest rate and Bank's Liquidity

In this study, the proxy for monetary Interest rate policy is the annual policy interest rate minus inflation. The regression result shows that, the real deposit interest rate had negative and statistically significant impact on liquidity of commercial banks in Ethiopia as measured by L1 & L2. But had negative and statistically insignificant impact on banks liquidity measured by L3. The negative coefficient indicates that, the real deposit Interest rate had inverse relation with the liquidity big asset commercial banks and it was opposite to the theory of higher interest rate induce banks to invest more on short term instruments and enhance their liquidity position. Thus, the negative coefficient and its statistically significant impact on liquidity tend to reject the hypothesis stated interest rate has positive and significant impact on banks liquidity.

GDP Growth Rate and Bank's Liquidity

GDP was one of the macroeconomic variables that affect liquidity of commercial banks in Ethiopia and it was measured by the real GDP growth rate. As per the regression result, GDP had negative and statistically insignificant impact on liquidity measured by L1 and L2 while it had positive and statistically insignificant impact on liquidity measured by L3. It has also statistically insignificant impact on liquidity measured by loan to deposit ratio. The only independent variable which has no significant impact on liquidity in any of the three measures is GDP growth rate. This implies that during the study period, the growth rate of GDP of Ethiopia do not have impact on the liquidity of Ethiopian big asset commercial banks the findings consistent with Mikbub (2016) privet commercial bank in Ethiopia. Hence, the hypothesis stating; real GDP growth rate has negative and significant impact on banks liquidity should be rejected.

CHAPTER FIVE

Conclusions and Recommendations

5.1. Summary of Major Findings

The main objective of this study was to identify bank specific and the macroeconomic determinants of liquidity of Ethiopian big asset commercial banks. To comply with the objectives of the bank specific variables includes; capital adequacy, bank size, loan growth, Return on asset, interest rate margin and the macroeconomic variables were real GDP, real deposit rate and Government policy as dummy variable. The study was used panel data for the sample of seven big asset size commercial banks in Ethiopia which had seventeen years of banking service over the period 2000 to 2016. The bank specific data were mainly collected from annual audited financial reports of the respective sample banks and the macroeconomic data were collected from NBE.

Data was presented and analyzed by using descriptive statistics, correlation analysis and balanced fixed effect and dynamic panel regression analysis to identify the determinants of liquidity of Ethiopian big asset commercial banks which were measured by liquid asset to deposit & short term borrowing ratio (L1), liquid asset to total asset ratio (L2) and loan to deposit & short term borrowing ratio (L3). While before performing the regression analysis, test for the robustness of the data to fit the required regression model. Thus, the data fulfilled all assumptions of fixed effect and dynamic regression analysis.

5.2. Conclusions

The result of this study confirmed that, among the bank specific variables; bank size, loan growth, return on asset and Interest rate margin had significant impact on the determination liquidity of Ethiopian big asset size commercial banks measured by all the three measurements of liquidity i.e. L1, L2 and L3. And among the macro-economic variables real deposit Interst rate had statistically significant impact on liquidity of Ethiopian big asset size commercial banks measured by L1 and L2. Similarly, the dummy variables government policy like expansion of bank branches, NBE bill and other financial policy taken by the government and the previous one lag liquidity had statistical significant impact on liquidity.

Whereas capital adequacy on L2 and L3 and GDP on the three liquidity measurement had no statistically significant impact on the determination of liquidity of Ethiopian big asset size commercial banks. The negative relationship between bank size and liquidity was opposite to our hypothesis but consistent with the "too big to fail" hypothesis. The coefficient sign for loan growth revealed negative relationship with liquidity and it was in line with our hypothesis and the finance theory. The result revealed a positive relationship between return on asset and liquidity with strong statistical significant. This result was not in line with our expectation but this could be a sign of prudent policy of banks that, they offset the higher credit risk with better portfolio quality and caution liquidity risk management. It was also found that profitability measured by ROA and liquidity had positively related and it was inconsistent with our hypothesis.

5.3. Recommendation

Based on the finding of the study, the following recommendations were drown

1. As loan growth has statistically significant and negative relation with liquidity, Ethiopian big asset size commercial banks shall give priority so as to maintain the costs of over- and under-investment and the carrying and stock out costs portrayed level of loan growth as it affects both profitability and liquidity.
2. The negative relationship between bank size and liquidity revealed the "too big to fail" hypothesis, in which big banks may encourage to disburse more loans and advances. Thus, big banks needs to manage their liquidity position and shall give due attention on resource mobilization and liquidity management.
3. Ethiopian big asset size commercial banks 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; costs of over- and under-investment and the carrying and stock out costs portrayed

4. Ethiopian commercial banks 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 needs
5. In this study general government policy in GTP I and II had taken in the financial sector as significant key drivers of liquidity of Ethiopian banks sector. Thus, the government specifically National Bank of Ethiopia should revise their polices which affect banks liquidity.
6. In general, the findings of the study reveals that, bank specific variables have more statistically significant impact on the determination of liquidity of Ethiopian big asset commercial banks, since they are internal variables that can be controlled by management, special emphasis shall be given to those significant variables.
7. Recommendation for further study: As this study identifies only limited bank specific and macroeconomic variables for a sample of seven big asset commercial banks in Ethiopia, there have to be further researches which include more bank specific variables, macroeconomic variables and regulatory factors that affect the liquidity of Ethiopian commercial banks.

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Annex

Annex1: Correlation matrix

	l1	l2	l3	car	banksize	longro~h	roa	inters~e	gdpgro~h	realde~e
l1	1.0000									
l2	0.9632	1.0000								
l3	-0.1145	-0.2007	1.0000							
car	0.0778	-0.0877	0.3897	1.0000						
banksize	-0.3025	-0.2253	-0.7632	-0.4665	1.0000					
longrowth	-0.2138	-0.2860	0.4566	0.2003	-0.3293	1.0000				
roa	-0.0307	-0.1032	-0.0442	0.1942	0.2129	0.2156	1.0000			
interstmar~e	-0.2143	-0.2928	0.1660	0.4033	-0.0509	0.0146	0.1789	1.0000		
gdpgrowth	-0.0442	-0.0047	-0.2049	-0.1161	0.3689	-0.0677	0.5458	0.1403	1.0000	
realdeposi~e	-0.1373	-0.1466	0.2130	0.1104	-0.3098	0.0589	-0.4245	-0.0966	-0.3240	1.0000

Annex2: Heteroskedasticity test Result

Heteroskedasticity Test: White for L1

F-statistic	1.793106	Prob. F(64,54)	0.145
Obs*R-squared	80.92198	Prob. Chi-Square(64)	0.751
Scaled explained SS	137.1503	Prob. Chi-Square(64)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/05/18 Time: 11:01
Sample: 2000 2118
Included observations: 119
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4212.747	4264.844	0.987785	0.3277
CAR^2	-0.071378	1.224770	-0.058279	0.9537
CAR*GDPGROWTH	-0.991164	1.787729	-0.554426	0.5816
CAR*INTERSTMARGINE	2.838271	4.757431	0.596598	0.5533
CAR*ROA	1.585571	10.03839	0.157951	0.8751
CAR*REALDEPOSITERATE	0.072106	0.610826	0.118046	0.9065
CAR*NBEBILL	-20.37789	18.73246	-1.087838	0.2815
CAR*LONGROWTH	0.533945	0.370841	1.439824	0.1557
CAR*BANKSIZE	-10.86364	16.63370	-0.653110	0.5165
CAR	137.8218	108.0947	1.275010	0.2078
GDPGROWTH^2	-2.018236	1.844070	-1.094446	0.2786
GDPGROWTH*INTERSTMARGINE	-7.353555	5.621073	-1.308212	0.1963
GDPGROWTH*ROA	22.35479	12.88766	1.734589	0.0885
GDPGROWTH*REALDEPOSITERATE	0.525741	0.874286	0.601338	0.5501
GDPGROWTH*NBEBILL	10.93095	42.89735	0.254816	0.7998
GDPGROWTH*LONGROWTH	0.002876	0.511519	0.005622	0.9955
GDPGROWTH*BANKSIZE	-11.68496	16.94856	-0.689436	0.4935
GDPGROWTH	174.9961	90.70810	1.929223	0.0590
INTERSTMARGINE^2	-13.56849	5.230803	-2.593959	0.0122
INTERSTMARGINE*ROA	26.86301	30.76023	0.873303	0.3864
INTERSTMARGINE*REALDEPOSITERATE	0.797142	1.351112	0.589989	0.5577
INTERSTMARGINE*NBEBILL	43.57538	44.09291	0.988263	0.3274

INTERSTMARGINE*LONGROWTH	-0.367953	0.826343	-0.445279	0.6579
INTERSTMARGINE*BANKSIZE	38.63033	49.78550	0.775935	0.4412
INTERSTMARGINE	-120.7160	282.4707	-0.427358	0.6708
ROA^2	-71.03588	34.73371	-2.045156	0.0457
ROA*REALDEPOSITERATE	3.319024	3.670116	0.904338	0.3698
ROA*NBEBILL	40.50123	132.7630	0.305064	0.7615
ROA*LONGROWTH	1.114254	2.580473	0.431802	0.6676
ROA*BANKSIZE	-113.8840	85.40789	-1.333414	0.1880
ROA	55.07445	486.2241	0.113270	0.9102
REALDEPOSITERATE^2	0.397948	0.236792	1.680575	0.0986
REALDEPOSITERATE*NBEBILL	1.069997	8.477226	0.126220	0.9000
REALDEPOSITERATE*LONGROWTH	0.165126	0.165784	0.996030	0.3237
REALDEPOSITERATE*BANKSIZE	6.212223	8.892742	0.698572	0.4878
REALDEPOSITERATE	13.91999	44.07032	0.315859	0.7533
NBEBILL^2	2401.855	1492.187	1.609620	0.1133
NBEBILL*LONGROWTH	-5.356343	4.859239	-1.102301	0.2752
NBEBILL*BANKSIZE	-351.5481	233.3216	-1.506710	0.1377
LONGROWTH^2	-0.004916	0.057730	-0.085151	0.9325
LONGROWTH*BANKSIZE	5.423033	3.941541	1.375866	0.1745
LONGROWTH	-1.649719	23.62713	-0.069823	0.9446
BANKSIZE^2	21.80305	112.4342	0.193918	0.8470
BANKSIZE	-681.7860	1289.244	-0.528826	0.5991

R-squared	0.680017	Mean dependent var	64.57244
Adjusted R-squared	0.300777	S.D. dependent var	131.5476
S.E. of regression	109.9995	Akaike info criterion	12.54113
Sum squared resid	653394.1	Schwarz criterion	14.05913
Log likelihood	-681.1970	Hannan-Quinn criter.	13.15754
F-statistic	1.793106	Durbin-Watson stat	2.331970
Prob(F-statistic)	0.014455		

Heteroskedasticity Test: White for L2

F-statistic	2.248125	Prob. F(64,54)	0.13
Obs*R-squared	86.52578	Prob. Chi-Square(64)	0.319
Scaled explained SS	185.8256	Prob. Chi-Square(64)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/05/18 Time: 11:04
Sample: 2000 2118
Included observations: 119
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3428.020	2100.672	1.631868	0.1085
CAR^2	-0.306573	0.603267	-0.508187	0.6134
CAR*GDPGROWTH	-0.387754	0.880556	-0.440351	0.6614
CAR*INTERSTMARGINE	1.760855	2.343299	0.751443	0.4556
CAR*ROA	0.618808	4.944464	0.125152	0.9009
CAR*REALDEPOSITERATE	-0.012195	0.300866	-0.040532	0.9678

CAR*NBEBILL	-8.041721	9.226776	-0.871564	0.3873
CAR*LONGROWTH	0.264271	0.182660	1.446796	0.1537
CAR*BANKSIZE	-3.598629	8.193018	-0.439231	0.6622
CAR	58.95678	53.24262	1.107323	0.2731
GDPGROWTH^2	-0.732580	0.908307	-0.806534	0.4235
GDPGROWTH*INTERSTMARGINE	-3.559921	2.768690	-1.285778	0.2040
GDPGROWTH*ROA	9.201499	6.347887	1.449537	0.1530
GDPGROWTH*REALDEPOSITERATE	0.312844	0.430634	0.726474	0.4707
GDPGROWTH*NBEBILL	0.879039	21.12932	0.041603	0.9670
GDPGROWTH*LONGROWTH	-0.150185	0.251951	-0.596086	0.5536
GDPGROWTH*BANKSIZE	-8.100912	8.348106	-0.970389	0.3362
GDPGROWTH	81.13492	44.67877	1.815961	0.0749
INTERSTMARGINE^2	-6.503779	2.576460	-2.524308	0.0146
INTERSTMARGINE*ROA	13.71334	15.15112	0.905104	0.3694
INTERSTMARGINE*REALDEPOSITERATE	0.746926	0.665498	1.122358	0.2667
INTERSTMARGINE*NBEBILL	9.453862	21.71820	0.435297	0.6651
INTERSTMARGINE*LONGROWTH	-0.172853	0.407020	-0.424681	0.6728
INTERSTMARGINE*BANKSIZE	28.34714	24.52212	1.155982	0.2528
INTERSTMARGINE	-119.2136	139.1325	-0.856835	0.3953
ROA^2	-35.78429	17.10828	-2.091636	0.0412
ROA*REALDEPOSITERATE	0.939217	1.807736	0.519554	0.6055
ROA*NBEBILL	2.239864	65.39314	0.034252	0.9728
ROA*LONGROWTH	1.652262	1.271026	1.299944	0.1991
ROA*BANKSIZE	-55.19197	42.06812	-1.311967	0.1951
ROA	121.2869	239.4923	0.506433	0.6146
REALDEPOSITERATE^2	0.230440	0.116633	1.975763	0.0533
REALDEPOSITERATE*NBEBILL	1.252999	4.175504	0.300083	0.7653
REALDEPOSITERATE*LONGROWTH	0.119060	0.081658	1.458027	0.1506
REALDEPOSITERATE*BANKSIZE	4.957110	4.380169	1.131717	0.2628
REALDEPOSITERATE	-3.878171	21.70708	-0.178659	0.8589
NBEBILL^2	2058.436	734.9850	2.800650	0.0071
NBEBILL*LONGROWTH	-4.595657	2.393445	-1.920101	0.0601
NBEBILL*BANKSIZE	-336.3087	114.9239	-2.926362	0.0050
LONGROWTH^2	-0.004910	0.028435	-0.172687	0.8635
LONGROWTH*BANKSIZE	4.598558	1.941428	2.368648	0.0215
LONGROWTH	-5.620928	11.63767	-0.482994	0.6311
BANKSIZE^2	67.50197	55.38006	1.218886	0.2282
BANKSIZE	-802.2439	635.0241	-1.263328	0.2119

R-squared	0.727107	Mean dependent var	30.59533
Adjusted R-squared	0.403679	S.D. dependent var	70.16263
S.E. of regression	54.18086	Akaike info criterion	11.12483
Sum squared resid	158520.5	Schwarz criterion	12.64284
Log likelihood	-596.9274	Hannan-Quinn criter.	11.74125
F-statistic	2.248125	Durbin-Watson stat	2.437763
Prob(F-statistic)	0.001323		

Heteroskedasticity Test: White

F-statistic	1.497960	Prob. F(53,65)	0.1604
Obs*R-squared	65.43051	Prob. Chi-Square(53)	0.1175
Scaled explained SS	57.47179	Prob. Chi-Square(53)	0.3131

Test Equation:

Dependent Variable: RESID^2
Method: Least Squares
Date: 04/05/18 Time: 11:06
Sample: 2000 2118
Included observations: 119
Collinear test repressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1016.678	815.7681	-1.246283	0.2171
CAR^2	-0.355329	0.617374	-0.575549	0.5669
CAR*GDPGROWTH	1.743940	0.876508	1.989645	0.0508
CAR*INTERSTMARGINE	-1.518318	2.334078	-0.650500	0.5177
CAR*ROA	1.867362	4.865018	0.383835	0.7024
CAR*REALDEPOSITERATE	-0.382449	0.279593	-1.367877	0.1761
CAR*NBEBILL	-12.58132	8.615814	-1.460259	0.1490
CAR*LONGROWTH	-0.280974	0.160019	-1.755880	0.0838
CAR*BANKSIZE	-1.801333	7.523193	-0.239437	0.8115
CAR	34.73022	34.89814	0.995188	0.3233
GDPGROWTH^2	0.255804	0.923266	0.277064	0.7826
GDPGROWTH*INTERSTMARGINE	-3.428419	2.889862	-1.186360	0.2398
GDPGROWTH*ROA	9.057918	6.038675	1.499984	0.1385
GDPGROWTH*REALDEPOSITERATE	-0.322637	0.444935	-0.725133	0.4710
GDPGROWTH*NBEBILL	-23.26062	20.69622	-1.123907	0.2652
GDPGROWTH*LONGROWTH	0.035984	0.192384	0.187043	0.8522
GDPGROWTH*BANKSIZE	20.98362	8.565120	2.449892	0.0170
GDPGROWTH	-75.34184	35.82633	-2.102974	0.0393
INTERSTMARGINE^2	0.992535	2.503139	0.396516	0.6930
INTERSTMARGINE*ROA	-14.77128	12.94202	-1.141342	0.2579
INTERSTMARGINE*REALDEPOSITERATE	-0.250071	0.688750	-0.363080	0.7177
INTERSTMARGINE*NBEBILL	11.10878	22.10116	0.502633	0.6169
INTERSTMARGINE*LONGROWTH	0.073647	0.403725	0.182418	0.8558
INTERSTMARGINE*BANKSIZE	-10.64707	21.81981	-0.487954	0.6272
INTERSTMARGINE	77.55459	103.8291	0.746944	0.4578
ROA^2	10.76174	17.42140	0.617731	0.5389
ROA*REALDEPOSITERATE	3.132772	1.707143	1.835096	0.0711
ROA*NBEBILL	41.21349	56.17941	0.733605	0.4658
ROA*LONGROWTH	-0.887356	1.037016	-0.855682	0.3953
ROA*BANKSIZE	-37.40568	36.49302	-1.025009	0.3092
ROA	113.7842	157.6713	0.721655	0.4731
REALDEPOSITERATE^2	-0.149505	0.113802	-1.313735	0.1936
REALDEPOSITERATE*NBEBILL	-0.726883	4.248433	-0.171094	0.8647
REALDEPOSITERATE*LONGROWTH	-0.033624	0.080556	-0.417401	0.6778
REALDEPOSITERATE*BANKSIZE	-5.822251	4.188253	-1.390138	0.1692
REALDEPOSITERATE	23.87994	14.86998	1.605916	0.1131
NBEBILL^2	295.3668	626.8302	0.471207	0.6391
NBEBILL*LONGROWTH	4.137959	2.100353	1.970125	0.0531
NBEBILL*BANKSIZE	-85.18974	115.1521	-0.739802	0.4621
LONGROWTH^2	-0.001999	0.021210	-0.094236	0.9252
LONGROWTH*BANKSIZE	-3.423238	1.853313	-1.847091	0.0693
LONGROWTH	13.91454	7.871919	1.767618	0.0818
BANKSIZE^2	16.17495	42.48784	0.380696	0.7047
BANKSIZE	126.3738	341.3579	0.370209	0.7124

R-squared	0.549836	Mean dependent var	47.27831
Adjusted R-squared	0.182780	S.D. dependent var	68.70165

S.E. of regression	62.10646	Akaike info criterion	11.39840
Sum squared resid	250718.8	Schwarz criterion	12.65952
Log likelihood	-624.2050	Hannan-Quinn criter.	11.91050
F-statistic	1.497960	Durbin-Watson stat	2.197782
Prob(F-statistic)	0.060376		

Annex 3: serial correlation test

Breusch-Godfrey Serial Correlation LM Test for L1:

F-statistic	12.56860	Prob. F(2,106)	0.0000
Obs*R-squared	22.81067	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/05/18 Time: 11:02
Sample: 2000 2118
Included observations: 119
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	0.053126	0.206518	0.257244	0.7975
EFFICENCYRATIO	-0.022072	0.027361	-0.806722	0.4216
FINANCIALRATIO	-0.011740	0.090936	-0.129099	0.8975
GDPGROWTH	-0.010428	0.235766	-0.044232	0.9648
INTERSTMARGINE	-0.116669	0.429274	-0.271783	0.7863
ROA	0.967577	1.233307	0.784539	0.4345
REALDEPOSITERATE	0.090745	0.076347	1.188590	0.2373
NBEBILL	-1.819409	2.510945	-0.724591	0.4703
LONGROWTH	0.010384	0.047501	0.218600	0.8274
BANKSIZE	1.817871	2.214321	0.820961	0.4135
C	-4.905985	12.06791	-0.406531	0.6852
RESID(-1)	0.494097	0.100854	4.899150	0.0000
RESID(-2)	-0.077899	0.100552	-0.774712	0.4402

R-squared	0.191686	Mean dependent var	-5.67E-15
Adjusted R-squared	0.100179	S.D. dependent var	8.069675
S.E. of regression	7.654804	Akaike info criterion	7.011347
Sum squared resid	6211.179	Schwarz criterion	7.314949
Log likelihood	-404.1751	Hannan-Quinn criter.	7.134630
F-statistic	2.094767	Durbin-Watson stat	2.022522
Prob(F-statistic)	0.023105		

Breusch-Godfrey Serial Correlation LM Test for L2:

F-statistic	12.46719	Prob. F(2,106)	0.0000
Obs*R-squared	22.66166	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/05/18 Time: 11:03
Sample: 2000 2118
Included observations: 119
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	0.059190	0.143041	0.413798	0.6799
EFFICENCYRATIO	-0.006607	0.018693	-0.353451	0.7245
FINANCIALRATIO	-0.008129	0.062653	-0.129739	0.8970
GDPGROWTH	0.018388	0.162599	0.113088	0.9102
INTERSTMARGINE	-0.053128	0.296596	-0.179127	0.8582
ROA	0.250471	0.842230	0.297390	0.7668
REALDEPOSITERATE	0.067002	0.052774	1.269592	0.2070
NBEBILL	-0.985785	1.724283	-0.571707	0.5687
LONGROWTH	0.005558	0.032795	0.169477	0.8657
BANKSIZE	0.996662	1.544101	0.645465	0.5200
C	-2.981645	8.397891	-0.355047	0.7233
RESID(-1)	0.497835	0.100070	4.974842	0.0000
RESID(-2)	-0.136783	0.101650	-1.345637	0.1813

R-squared	0.190434	Mean dependent var	3.51E-15
Adjusted R-squared	0.098785	S.D. dependent var	5.554693
S.E. of regression	5.273200	Akaike info criterion	6.265955
Sum squared resid	2947.503	Schwarz criterion	6.569556
Log likelihood	-359.8243	Hannan-Quinn criter.	6.389238
F-statistic	2.077865	Durbin-Watson stat	2.002796
Prob(F-statistic)	0.024366		

Breusch-Godfrey Serial Correlation LM Test for L3:

F-statistic	7.420356	Prob. F(2,107)	0.0010
Obs*R-squared	14.49470	Prob. Chi-Square(2)	0.0007

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/05/18 Time: 11:06
Sample: 2000 2118
Included observations: 119
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	-0.050305	0.179248	-0.280644	0.7795
EFFICENCYRATIO	0.030660	0.023004	1.332782	0.1854
GDPGROWTH	0.167812	0.211291	0.794219	0.4288
INTERSTMARGINE	0.219019	0.383024	0.571815	0.5686

ROA	-0.930906	1.057100	-0.880622	0.3805
REALDEPOSITERATE	0.071654	0.068301	1.049087	0.2965
NBEBILL	1.442161	2.139529	0.674056	0.5017
LONGROWTH	0.038440	0.040070	0.959329	0.3396
BANKSIZE	-0.989911	1.835926	-0.539189	0.5909
C	-0.386676	7.337004	-0.052702	0.9581
RESID(-1)	0.408886	0.106677	3.832920	0.0002
RESID(-2)	-0.025291	0.103691	-0.243905	0.8078

R-squared	0.121804	Mean dependent var	-1.67E-14
Adjusted R-squared	0.031522	S.D. dependent var	6.904997
S.E. of regression	6.795294	Akaike info criterion	6.765724
Sum squared resid	4940.834	Schwarz criterion	7.045971
Log likelihood	-390.5606	Hannan-Quinn criter.	6.879524
F-statistic	1.349156	Durbin-Watson stat	2.015235
Prob(F-statistic)	0.208055		

Annex4: panel regression result

i. Fixed effct model for L1

```
Fixed-effects (within) regression               Number of obs      =       119
Group variable: bankname                        Number of groups   =         7

R-sq:  within  = 0.7734                         Obs per group: min =        17
       between = 0.0658                                        avg =      17.0
       overall = 0.6009                                        max =        17

                                                F(10,102)          =     34.81
corr(u_i, Xb)  = -0.3375                        Prob > F           =    0.0000
```

l1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
car	.6018725	.2410796	2.50	0.014	.1236923	1.080053
banksize	-13.46343	3.56221	-3.78	0.000	-20.52906	-6.3978
longrowth	-.1847074	.0526098	-3.51	0.001	-.2890587	-.0803562
roa	3.302146	1.391894	2.37	0.020	.5413303	6.062963
interstmargine	-2.548976	.6869486	-3.71	0.000	-3.911535	-1.186416
gdpgrowth	-.3202015	.2421915	-1.32	0.189	-.8005872	.1601841
realdepositerate	-.1954308	.0777465	-2.51	0.014	-.3496407	-.041221
nbebill	-16.53146	3.031823	-5.45	0.000	-22.54507	-10.51785
efficencyratio	.0176704	.0297676	0.59	0.554	-.0413734	.0767143
financialratio	-.7820883	.096755	-8.08	0.000	-.9740014	-.5901753
_cons	154.4139	15.78573	9.78	0.000	123.103	185.7248
sigma_u	7.4348203					
sigma_e	7.6199765					
rho	.48770305	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(6, 102) =     5.06              Prob > F = 0.0001
```

i. Dynamic Model for L1

```
Arellano-Bond dynamic panel-data estimation  Number of obs         =       105
Group variable: bankname                     Number of groups      =         7
Time variable: year
                                             Obs per group:    min =        15
                                                               avg =        15
                                                               max =        15

Number of instruments =     94               Wald chi2(11)         =    541.74
                                             Prob > chi2           =    0.0000
One-step results
```

l1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
l1						
L1.	.3371639	.070494	4.78	0.000	.1989981	.4753296
car	.6432908	.2278023	2.82	0.005	.1968065	1.089775
banksize	-8.683091	3.44232	-2.52	0.012	-15.42991	-1.936268
longrowth	-.24011	.0509097	-4.72	0.000	-.3398912	-.1403288
roa	3.25635	1.248857	2.61	0.009	.8086351	5.704066
interstmargine	-2.329388	.6147696	-3.79	0.000	-3.534314	-1.124462
gdpgrowth	-.317437	.2074532	-1.53	0.126	-.7240377	.0891638
realdepositerate	-.1726489	.0659642	-2.62	0.009	-.3019363	-.0433615
nbebill	-13.96577	2.660714	-5.25	0.000	-19.18068	-8.750871
efficencyratio	-.0233565	.0277943	-0.84	0.401	-.0778324	.0311194
financialratio	-.5524728	.1102878	-5.01	0.000	-.768633	-.3363126
_cons	109.6286	17.94692	6.11	0.000	74.45332	144.804

```
Instruments for differenced equation
        GMM-type: L(2/.).l1
        Standard: D.car D.banksize D.longrowth D.roa D.interstmargine D.gdpgrowth D.realdepositerate D.nbebill D.efficencyratio
                  D.financialratio
Instruments for level equation
        Standard: _cons
```

i. Fixed effect model for L2

```
Fixed-effects (within) regression            Number of obs      =       119
Group variable: bankname                     Number of groups   =         7

R-sq:  within  = 0.8120                      Obs per group: min =        17
       between = 0.0205                                     avg =      17.0
       overall = 0.6808                                     max =        17

                                             F(10,102)          =     44.06
corr(u_i, Xb)  = -0.3802                     Prob > F           =    0.0000
```

l2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
car	.196153	.1674479	1.17	0.244	-.1359791	.5282852
banksize	-11.98423	2.474223	-4.84	0.000	-16.89185	-7.076625
longrowth	-.1331791	.0365414	-3.64	0.000	-.2056589	-.0606993
roa	2.152541	.9667755	2.23	0.028	.2349468	4.070136
interstmargine	-1.969326	.4771375	-4.13	0.000	-2.915726	-1.022926
gdpgrowth	-.0441244	.1682202	-0.26	0.794	-.3777884	.2895396
realdepositerate	-.1698899	.0540008	-3.15	0.002	-.2770003	-.0627795
nbebill	-11.7644	2.105829	-5.59	0.000	-15.9413	-7.587494
efficencyratio	-.0061066	.0206758	-0.30	0.768	-.047117	.0349038
financialratio	-.689763	.0672036	-10.26	0.000	-.8230611	-.5564649
_cons	134.892	10.96438	12.30	0.000	113.1442	156.6398
sigma_u	4.8845334					
sigma_e	5.2926474					
rho	.45996349	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(6, 102) =     4.66              Prob > F = 0.0003
```

i. Dynamic effect Model for L2

```
Arellano-Bond dynamic panel-data estimation  Number of obs         =       105
Group variable: bankname                     Number of groups      =         7
Time variable: year
                                             Obs per group:    min =        15
                                                               avg =        15
                                                               max =        15

Number of instruments =     94               Wald chi2(11)         =    551.92
                                             Prob > chi2           =    0.0000
One-step results
```

l2	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
l2						
L1.	.2941898	.0655343	4.49	0.000	.1657449	.4226347
car	.2418235	.1664268	1.45	0.146	-.0843671	.568014
banksize	-8.218772	2.570783	-3.20	0.001	-13.25742	-3.18013
longrowth	-.1807736	.0378573	-4.78	0.000	-.2549725	-.1065746
roa	2.167276	.9194166	2.36	0.018	.3652529	3.9693
interstmargine	-1.76276	.4628983	-3.81	0.000	-2.670024	-.8554961
gdpgrowth	-.1000766	.1539669	-0.65	0.516	-.4018461	.2016929
realdepositerate	-.1469585	.0487789	-3.01	0.003	-.2425635	-.0513535
nbebill	-9.999624	1.980298	-5.05	0.000	-13.88094	-6.11831
efficencyratio	-.0262396	.0201544	-1.30	0.193	-.0657415	.0132622
financialratio	-.4890439	.0831822	-5.88	0.000	-.652078	-.3260098
_cons	98.96088	13.5289	7.31	0.000	72.44472	125.477

```
Instruments for differenced equation
        GMM-type: L(2/.).l2
        Standard: D.car D.banksize D.longrowth D.roa D.interstmargine D.gdpgrowth D.realdepositerate D.nbebill D.efficencyratio
                  D.financialratio
Instruments for level equation
        Standard: _cons
```

i. Fixed effect for L3

```
Fixed-effects (within) regression            Number of obs      =       119
Group variable: bankname                     Number of groups   =         7

R-sq:  within  = 0.6907                      Obs per group: min =        17
       between = 0.8412                                     avg =      17.0
       overall = 0.7466                                     max =        17

                                             F(9,103)           =     25.56
corr(u_i, Xb)  = -0.1010                     Prob > F           =    0.0000
```

l3	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
car	.0711618	.2068085	0.34	0.731	-.338994	.4813177
banksize	-6.430217	2.983509	-2.16	0.033	-12.3473	-.5131304
longrowth	.2320252	.0425315	5.46	0.000	.1476739	.3163765
roa	2.850569	1.164417	2.45	0.016	.5412231	5.159916
interstmargine	1.118815	.5998087	1.87	0.065	-.0707643	2.308394
gdpgrowth	.0213147	.21425	0.10	0.921	-.4035997	.446229
realdepositerate	-.0729428	.0688073	-1.06	0.292	-.2094059	.0635203
nbebill	-9.358238	2.591008	-3.61	0.000	-14.49689	-4.219585
efficencyratio	-.1282595	.0238332	-5.38	0.000	-.175527	-.0809921
_cons	88.25253	11.01067	8.02	0.000	66.41547	110.0896
sigma_u	3.8238552					
sigma_e	6.7592874					
rho	.24244585	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(6, 103) =     3.36             Prob > F = 0.0046
```

ii. Dynamic model for L3

```
Fixed-effects (within) regression               Number of obs      =       119
Group variable: bankname                        Number of groups   =         7

R-sq:  within  = 0.6907                         Obs per group: min =        17
       between = 0.8412                                        avg =      17.0
       overall = 0.7466                                        max =        17

                                                F(9,103)           =     25.56
corr(u_i, Xb)  = -0.1010                        Prob > F           =    0.0000
```

l3	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
car	.0711618	.2068085	0.34	0.731	-.338994	.4813177
banksize	-6.430217	2.983509	-2.16	0.033	-12.3473	-.5131304
longrowth	.2320252	.0425315	5.46	0.000	.1476739	.3163765
roa	2.850569	1.164417	2.45	0.016	.5412231	5.159916
interstmargine	1.118815	.5998087	1.87	0.065	-.0707643	2.308394
gdpgrowth	.0213147	.21425	0.10	0.921	-.4035997	.446229
realdepositerate	-.0729428	.0688073	-1.06	0.292	-.2094059	.0635203
nbebill	-9.358238	2.591008	-3.61	0.000	-14.49689	-4.219585
efficencyratio	-.1282595	.0238332	-5.38	0.000	-.175527	-.0809921
_cons	88.25253	11.01067	8.02	0.000	66.41547	110.0896
sigma_u	3.8238552					
sigma_e	6.7592874					
rho	.24244585	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(6, 103) =     3.36             Prob > F = 0.0046
```

Annex5: HausmanTest Result

i. HausmanTest for L1

	Coefficients (b) fixed	(B) .	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
car	.6018725	.7843498	-.1824773	.1399931
banksize	-13.46343	-16.5283	3.064875	3.16221
longrowth	-.1847074	-.1068034	-.0779041	.0259486
roa	3.302146	1.44607	1.856076	.7691177
interstmar~e	-2.548976	-.0652842	-2.483691	.5995744
gdpgrowth	-.3202015	-.1589282	-.1612733	.0704507
realdeposi~e	-.1954308	-.2164793	.0210485	.0272307
nbebill	-16.53146	-17.54792	1.016458	1.943162
efficencyr~o	.0176704	.0453549	-.0276844	.0147078
financialr~o	-.7820883	-.8216744	.0395861	.039883

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

 Test:  Ho:  difference in coefficients not systematic

              chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =       24.76
            Prob>chi2 =      0.0004
            (V_b-V_B is not positive definite)
```

HausmanTest for 2

	Coefficients (b) fixed	(B) .	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
car	.196153	.2817185	-.0855654	.0963631
banksize	-11.98423	-14.05318	2.068947	2.176681
longrowth	-.1331791	-.0835902	-.0495889	.0178615
roa	2.152541	.8758352	1.276706	.5294157
interstmar~e	-1.969326	-.3490963	-1.62023	.412712
gdpgrowth	-.0441244	.0728404	-.1169648	.0484942
realdeposi~e	-.1698899	-.1862343	.0163444	.0187441
nbebill	-11.7644	-12.1554	.3910031	1.337559
efficencyr~o	-.0061066	.0122139	-.0183205	.010124
financialr~o	-.689763	-.7040094	.0142464	.0274532

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

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 23.24
Prob>chi2 = 0.0007
(V_b-V_B is not positive definite)

HausmanTest for 3

	Coefficients (b) fixed	(B) .	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
car	.0711618	.0671447	.0040172	.1124848
banksize	-6.430217	-7.26376	.8335432	2.535504
longrowth	.2320252	.1888298	.0431954	.0202772
roa	2.850569	4.763645	-1.913075	.6636065
interstmar~e	1.118815	-.0247909	1.143606	.4977551
gdpgrowth	.0213147	-.0477913	.069106	.063849
realdeposi~e	-.0729428	-.0811152	.0081724	.0228305
nbebill	-9.358238	-7.90329	-1.454948	1.706711
efficencyr~o	-.1282595	-.1555742	.0273146	.0133599

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

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 17.83
Prob>chi2 = 0.0067
(V_b-V_B is not positive definite)