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**EFFECT OF LIQUIDITY ON PROFITABILITY OF
ETHIOPIAN PRIVATE COMMERCIAL BANKS**

BY

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Effect of Liquidity on Profitability of Ethiopian Private Commercial Banks

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This is to certify that the thesis prepared by Samuel Adinew, entitled: Effect of Liquidity on Profitability of Private Commercial Banks in Ethiopia and submitted in partial fulfillment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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DECLARATION

I, the undersigned declare that this thesis is my original work, prepared under the guidance of Zinegnaw Abiy (PhD). All sources of materials used for this thesis have been duly acknowledged. I further confirm that this thesis has not been submitted either in part or in full to any higher learning institution for the purpose of earning any degree.

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ENDORSEMENT

This thesis has been submitted to St. Mary University, school of graduate studies for examination with my approval as a University advisor.

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St. Mary's University, Addis Ababa

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ACRONYMS

AIB - Awash International Bank

BOA - Bank of Abyssinia

CBE – Commercial Bank of Ethiopia

CLRM - Classical Linear Regression Model

GMM – Generalized Method of Moment

LDR – Loan to Deposit Ratio

L_TA - Loan to Total Asset

L_TD - Loan to Total Deposit

LA_TD - Liquid Asset to Total Deposit

LOLR - Lender of Last Resort

OLS - Ordinary Least Square

NBE - National Bank of Ethiopia

ROA - Return on Asset

ROE - Return on Equity

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ABSTRACT

The study sought to find out the effect of liquidity on profitability of all private commercial Banks in Ethiopia through the significant variables explaining liquidity and profitability by secondary data's gathered from NBE and annual financial reports of the banks. Three variables for liquidity and one variable for profitability were taken to measure liquidity and profitability of commercial banks in Ethiopia, loan to total asset, loan to total deposit, liquid asset to total deposit and return on asset respectively. Unbalanced panel regression model was used for data covered from 1994 -2015. Heteroscedasticity test, auto-correlation tests, multi-collinearity and normality tests were performed to test whether the variables satisfy the assumptions of the research. The regression results showed that all the three variables, loan to total asset, loan to total deposit and liquid asset to total deposit had statistically significant effect on banks profitability. Among these significant variables affecting banks profitability loan to total asset had positive effect whereas, loan to total deposit and liquid asset to total deposit had negative effect on profitability. This implies that liquidity has both significant positive and negative impact on profitability; therefore the study suggests that, management of banks should give an adequate emphasis to these two conflicting goals of banks and maintain optimal level of liquidity to maximize its profit and to enhance the banks competitiveness in the industry.

Key Words: Commercial Banks, Liquidity, Profitability

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Financial institutions have contributed significantly to the effectiveness of the entire financial system as they offer an efficient institutional mechanism through which resources can be mobilized and directed from less essential uses to more productive investments (Wilner, 2000). In the performance of this financial intermediation role, the financial institutions play a crucial role in the economy by being an effective channel between savers (Fund Lenders) and borrowers (Fund Seekers). Among these financial institutions commercial banks are primarily engaged in the business of providing various services to individuals and other organizations.

Broadly, the two main activities of any commercial banks are to accept funds through deposits and to grant loans. However, efficient financial intermediation by commercial banks demand the purposeful attention of the bank's management to the conflicting goals of liquidity and profitability as they are key drivers of stability for any commercial entities. These goals are important to corporate survival and growth but both goals run in opposite direction in the sense that an attempt by a bank to achieve higher profitability will certainly take a toll on the liquidity level and solvency position and vice versa (Olagunji et al, 2011).

Liquidity refers to a bank's capacity to increase fund in assets and meet both anticipated and unanticipated obligations at reasonable cost without running into unacceptable losses. Traditionally, liquidity has been defined as the capacity of financial institutions to finance increases in their assets and comply with the terms of their liabilities as they mature (Odunayo et al, 2015). Liquidity plays a pivotal role in the successful operation of a banking business. During the recent global financial crisis several banks experienced some difficulties because they failed to manage liquidity in a prudent manner. Thus the crisis emphasized the importance of liquidity to the proper functioning of financial markets and the banking sector. Before the financial crisis, financial intermediaries were stable as funding was readily available and at low cost. The rapid reversal in market conditions illustrated how quickly liquidity can evaporate, and that illiquidity

can reserve already earned profits as financial institutions are either forced to sell assets well below their market value or borrow at interest rates charges above their weighted return on assets. Though insufficient liquidity is one of the major reasons for bank failures, holding liquid assets has an opportunity cost of higher returns. Bourke (1989) finds a positive significant link between bank liquidity and profitability. However, in times of instability banks may choose to increase their cash holding to mitigate risk. Unlike Bourke (1989), Molyneux and Thornton (1992) came to a conclusion that there is a negative correlation between liquidity and profitability levels. The liquidity crisis significantly affected banks' operational environment. In response to the catastrophe, financial bodies such as the Basel Committee for bank supervision advocated for the active management of liquidity risk. Banks are required to hold a considerable position in liquid assets while on the other hand; they are required to be profitable for them to be sustainable. Despite the increased efficiency in many banks resulting from holding higher positions of liquid assets, profitability has severely suffered. Liquidity and profitability are inversely related, when liquidity increases profitability decreases and vice versa while on the other hand, there is a direct relationship between higher risk and higher return, hence the dilemma in liquidity management is finding a balance between liquidity and profitability (Marozva, 2015).

Profitability is the measure of the difference between the bank's operating expenses and income. It is the ultimate objective of companies. Businesses cannot survive in the market for the long run without profitability. In doing so, banks earn their profits by mobilizing funds, paying interest and lending these funds to borrowers by charging higher interests. Failing to do this and earning low profit margin would eventually discourage the investors to invest as well encourage selling off the shares if proper dividends are not earned. Hence they have to earn profits for their shareholders and at the same time satisfy the withdrawal needs of its customers. Therefore, according to Eichengreen and Gibson (2001) to maximize the profit the amounts of funds tied up in liquid investments must be fewer so that higher profitability can be generated.

For these reasons these two conflicting goals of the commercial banks, which are need to maximize profit, maintain optimal level of liquidity in order to guarantee safety, attain the highest level of owner's net worth coupled with the attainment of other corporate objectives

requires an adequate and purposeful attention of the bank management as it affects corporate profitability in today's business and cannot be over emphasized.

Therefore, there must be a tradeoff between these two objectives of the firms, but it should not be at cost of the each other because both have their importance. If we do not care about profit, we cannot survive for a longer period. On the other hand, if we do not care about liquidity, we may face the problem of insolvency or bankruptcy (Kimondo, 2014). Thus, banks have to hold optimal level of liquidity that can maximize their profit and enable them to meet their obligations.

1.2. Overview of banking history in Ethiopia

The agreement that was reached in 1905 between Emperor Minilik II and Mr. MaGillivray, representative of the British owned National Bank of Egypt marked the introduction of modern banking in Ethiopia. Following the agreement, the first bank called Bank of Abyssinia was inaugurated in Feb16, 1906 by the Emperor. It was a private bank whose shares were sold in Addis Ababa, New York, Paris, London, and Vienna (NBE 2010). In 1931, Emperor Haile Selassie introduced reforms into the banking system and the Bank of Abyssinia was liquidated and became the Bank of Ethiopia, a fully government-owned bank providing central and commercial banking services until the Italian invasion of 1936. During the Italian invasion, Bank of Italy was formed a legal tender in Ethiopia. In 1943, after Ethiopia regains its independence from fascist Italy, the State Bank of Ethiopia was established, with two departments performing the separate functions of an issuing bank and a commercial bank. In 1963, these functions were formally separated and the National Bank of Ethiopia (the central and issuing bank) and the Commercial Bank of Ethiopia are formed. In the period up to 1974, several other financial institutions emerged including the state owned as well as private financial institution.

Further, as per the NBE (2010), following the declaration of command economy by Dergue regime in 1974 the government extended its control and nationalized all of previously established private banks and merged into one bank. After nationalization the Dergue regime leave only three government banks; the National Bank of Ethiopia, the Commercial Bank of Ethiopia and agricultural and Industrial Development Bank (Mortgage Bank). This was reversed when the socialist regime was overthrown in 1991. Subsequently, the licensing and supervision

of Banking Business Proclamation No. 84/1994 was issued in 1994 which led to the beginning of a new era for Ethiopia banking sector.

Consequently shortly after the proclamation the first private bank, Awash International Bank was established in 1994 followed by Dashen Bank and Bank of Abyssinia which was established on 1995 and 1996 respectively. After a year of the establishment of BOA, Wegagen Bank joined the banking industry and started its operation in 1997. The fifth private bank, United Bank was established in September, 1998 followed by Nib International Bank that started operation in May, 1999 and ten more banks were established in succession, with Enat Bank being the 16th private bank to join the banking industry on March, 2013.

In doing so, as the competition gets higher and higher in the sector, so does the minimum paid up capital. According to industry players, back in the days, the first private banks in to be incorporated in Ethiopia has started operations with much smaller paid up capital; in a range of 20 to 50 million birr. Through time, the threshold was slowly lifted and was declared to 75 million birr via NBE directive issued in 1999. Almost a decade later, the threshold was raised again, this time around to 500 million birr, causing quite a stir in the industry. Although not yet written in the form of directive, NBE has informed bankers that they are to be required to post a minimum of one billion birr and more paid up capital during the coming five years to continue as a bank in Ethiopia. In addition to that, the governor also issued a notice that they (the banks) have to expand their branch networks by 25pc from what they are at the moment and of these 75pc of all new branches should be located off the capital and the main business centers in the country.

When viewed against these bank capital concepts and ramifications, currently, we find the state-owned banks to have the required paid-up capital, with the Commercial Bank of Ethiopia (CBE), the largest bank in the industry, holding four times the future minimum paid-up capital requirement totaling 8.1 billion Br at end June 2015.

Of the sixteen private commercial banks, AIB had by June 2015 close to 1.8 billion Br, Wegagen Bank holds nearly 1.5 billion Br, and three other banks, namely, Nib International, Dashen and Bank of Abyssinia have paid-up capital just above one billion birr. United Bank has paid-up

capital below one billion birr, amounting Br. 975 million. These six private banks are categorized as medium-sized banks. The remaining ten banks, categorized as small banks in the banking industry, holding paid-up capital ranging from br. 198 million to br. 865 million.

1.3. Statement of the Problem

Through the financial inter-mediation role, the commercial banks reactivate the idle funds borrowed from the lenders by investing such funds in different classes of portfolios. Such business activity of the bank is not without problems since the deposits from these fund savers which have been invested by the banks for profit maximization, can be recalled or demanded when the latter is not in position to meet their financial obligations. Considering the public loss of confidence as a result of bank distress which has bedeviled the financial sector in the last decade; and the intensity of competition in the banking sector due to the emergence of large number of new banks, every commercial bank should ensure that it operates on profit and at the same time meets the financial demands of its depositors by maintaining adequate liquidity. Many banks in recent history have defaulted not because of lack of profit but because of short term liquidity. To stay in the business the bank must be able to pay out legitimate withdrawals and credit requests instantly.

In Ethiopia beginning from the last two decades the banking sector has been playing important role in the economic development of the country by enhancing savings and investments (NBE Annual Report, 2014/15). Ethiopia's financial sector is largely bank-based as the secondary market is still not found in the country. Banks dominate the financial sector in Ethiopia and as such the process of financial intermediation in the country depends heavily on banks. In fact the banking sector in Ethiopia is currently acts as the link that holds the country's economy together. Hence, keeping their optimal liquidity for banks in Ethiopia is very important to meet the demand by their present and potential customers. As some studies made by Worku (2006) and Semu (2010), indicated Ethiopian banks have been affected negatively by excess liquidity problems until the credit cap was lifted. The banks were operating with high liquidity because of NBE's directives which enforce them to tie their investable funds. This has led banks to low insolvency risk but with the trade-off of low profitability.

However, currently Ethiopian banks are situated in an economy with a tight monetary policy and with directives that drains out a huge portion of their liquid resources and channels them into long-term projects. In addition, the raised (revised) minimum paid up capital required by banks to operate in the industry reaching to br. 500 million and the new plan informed to banks to set the minimum paid up capital to two billion birr, has led the competition to be stiff where they are all chasing the same market and expose most of the existing banks to face an uphill tasks and puts them in frustration in maintaining the minimum requirement and also operating in the industry (Addis Fortune, 2011).

The liquidity crunch encountered by private banks is mainly due to the directive compelling them to invest 27pc of their gross loan disbursement into five-year government bonds; as they collect savings at two-three years maturity, even shorter in some cases but to freeze these resources for five years at a rate lower than the cost of funds (IMF report, 2012). In addition, the more the loans that are disbursed the higher the funds that go into the NBE five-year bonds. When funds build up in DBE's bonds, private banks experience liquidity problems. According to the report of NBE in 2014/15 the total investment of the 16 private banks in the NBE five-year bonds reached br. 37.4 billion by the end of June 2015.

Over the two-decade long journey that private banks have been on in this country, the industry has reached a loan-to-deposit ratio of 57.4pc, whereas the NBE bonds-to-deposit ratio has, in just two years, already reached an alarming level. If the growth continues at this pace, it will significantly damage private banks. In 2011/12 alone, private banks invested Br. 5.9 billion into DBE bonds, and disbursed net loans and advances of Br. 8.9 billion, whilst mobilizing deposits of Br. 9.4 billion. To fill the funding gap, they had to use the cash and bank balances accumulated over the years. This reduced their total cash and bank balances by 14.7pc (Br. 24.83 billion), as well as other liquidity measures, such as liquid assets to deposits ratio. It is also worth noting that this decline in cash holdings happened whilst bank branch networks expanded by around 23pc (Addis Fortune, 2012).

Further studies into the details (excluding the deposits in foreign banks, reserves and payment settlement accounts held at the NBE), show that private banks are getting very tight. Banks need to hold a reasonable amount of cash in their branches to smoothly run day to day activities. The

total amount of cash holdings at a bank should increase in line with the increase of branch numbers.

On the other hand, the minimum paid up capital that chopped out three new banks which were under formation – Tsehay, Kokeb& Noh - at the beginning of its effective season, has now come with doubling the requirement taking into two billion in the next future years. The banks having a capital of lesser than one billion categorized as medium and small banks in the industry, would be the ones which would be hard-hit by the minimum capital requirement. It is very difficult task for the banks to attract additional shareholders while they keep on injecting their annual earning to augment the capital. Shareholders want to see feasible short term gains to their investments.

All together, these private commercial banks would clamor to raise a combined capital of Br. 5.6 billion until the deadline for the new directive is reached. This appears to be the worries of the bankers; whether the system would have enough capacity to be able to muster such amount of financial resources. According to some economists, in the absence of a stock market this would be a difficult hill to climb.

In general, the 27pc NBE bill requirement, required minimum paid up capital, required loan structure portfolio and greater control of state owned banks (CBE) in the industry with that of the privilege of handling exclusively the 40/60 and 20/80 housing scheme and the unanticipated actions that led run on banks to the industry by siphoning-off funds away from other banks, has brought a serious problem to the private banks in terms of liquidity and profitability.

The main purpose of this study is therefore, determining the effect of liquidity on profitability of the private commercial banks in Ethiopia regarding to the need to acquire the major corporate goals of maintaining high level of profitability and optimal level of liquidity in the absence of secondary market, in the requirement of high paid up capital and investment of 27pc of their gross loan disbursement into five-year government bonds for 3% interest rate which is below the interest rate paid to acquire/mobilize it.

1.4. Objectives of the study

1.4.1. General objective

The general objective of this study is to determine the effect of liquidity on profitability of the private commercial banks in Ethiopia in the face of the need to attain both corporate goals of maintaining optimum level of liquidity and profitability as both variables can make or destroy its future.

1.4.2. Specific objectives

The specific objectives of this research are:-

- To measure the impact of liquid asset to total deposit ratio on the profitability of the banks,
- To measure the effect of loan to total assets ratio on profitability of the banks and
- To examine the effect of loan to total deposit ratio on profitability of the banks.

1.5. Scope and limitation of the Study

The scope of the study is delimited in determining the effect of liquidity on profitability of the 16 private commercial banks in Ethiopia by taking into consideration the liquid asset holdings, level of total asset, level of deposits and volume of loan and advances since 2015.

1.6. Significance of the Study

The findings of this research reveal the effect of liquidity on profitability of the private banks. As the failure of one bank is contagious, this research will help to indicate on what positions the private and majority (medium & small or newly opened) banks are situated, so that the regulator body can take the necessary remedy before it is too late. In addition, it contributes to the banking industry (managements) since both corporate goals of commercial banks liquidity and profitability can make or destroy its future. The research will help distinguish empirically, whether firms' holdings of liquid assets have a significant impact on their profitability. Should this be the case, such basic empirical information is crucial to proper calibration in the context of domestic and international liquidity regulation.

The findings of the study can guide finance managers in banks to make investment decisions that will satisfy the stakeholders' interest with regard to liquidity and profitability needs of the investors. This in turn contributes to the wellbeing of the financial sector of the economy and the society as a whole. Therefore, bank managements, regulatory bodies, the academic staff and the society as a whole in the country will be beneficiaries from this study with respect to creating more awareness on the sensitivity of liquidity and profitability to the management of commercial banks and caballing them to acquire the optimum level of both goals of the bank and make themselves profitable as well, maintain stable economic growth and trust/confidence of the society. Further the research adds to the body of knowledge in finance as well as further evidence on how banks are managed.

1.7. Organization of the study

This research report is organized in five chapters. Chapter one provides the general introduction about the whole report. Chapter two describes the review 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

2. LITERATURE REVIEW

2.1. Theoretical Literature Review

According to business dictionary, liquidity is a measure of the extent to which a person or organization has cash to meet immediate and short-term obligations or assets that can be quickly converted to do this. Archer and D'Ambrosio states that, "liquidity means cash and cash availability, and it is from current operations and previous accumulations that cash is available, to take care of the claims of both the short-term suppliers of capital and the long-term ones". In other words, it is the ability of a financial institution to meet all legitimate demands for funds (Yeager and Seitz 1989). Moore (2009:9) explained that "a bank needs to hold liquid assets to meet the cash requirements of its customers. If the institution does not have the resources to satisfy its customers' demand, then it either has to borrow on the inter-bank market or the central bank". Otherwise, a bank unable to meet its customers' demands leaves itself exposed to a run and more importantly, a systemic lack of confidence in the banking system.

An asset for a bank is liquid if it can be sold quickly without significant losses. What determines the liquidity of an asset is still a debatable issue among theorists (Kyle 1985). The conventional wisdom found in the bank management literature states that an asset is liquid if it is widely known to have low risk such as government debt and if it has a short maturity (a short maturity implies that the asset's price is less sensitive to interest rate movements, making large capital losses unlikely) (Garber and Weisbrod 1992 and Hempel et al. 1994). The typical bank assets which are liquid according to that definition include cash, reserves representing an excess of reserves required by law (i.e., funds held in the account at the central bank), securities (e.g., government debt, commercial paper), and interbank loans with very short maturity (one to three days).

There is a large volume of theoretical literature dealing with bank liquidity creation (Bryant 1980; Diamond and Dybvig 1983; Holmstrom and Tirole 1998 and Kashyap et al. 2002). Most

researches focuses on measuring the amount of liquidity created in the banking sector (Deep and Schaefer 2004 and Berger and Bouwman 2007); and few studies tried to see determinants of bank liquidity creation. Therefore, this chapter focuses on the review of relevant theoretical and empirical literatures on bank liquidity and profitability.

The chapter has four broad sections. Section 2.1 discusses about the theoretical aspects of banks liquidity, quantitative framework of liquidity risk measurements and the impact of liquidity on profitability. Section 2.2 explains important empirical studies on the area of bank liquidity and its impact on profitability. Then, section 2.3 asses related empirical studies in Ethiopia. Finally, section 2.4 give summaries to the chapter and briefly discusses knowledge gap in the relevant literatures.

2.1.1. Theories of bank liquidity

2.1.1.1. Bank Liquidity creation and financial fragility: theory

According to the theory of financial intermediation, an important role of banks in the economy is to provide liquidity by funding long term, illiquid assets with short term, liquid liabilities. Through this function of liquidity providers, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy. Diamond and Dybvig (1983) emphasize the “preference for liquidity” under uncertainty of economic agents to justify the existence of banks: banks exist because they provide better liquidity insurance than financial markets. However, as banks are liquidity insurers, they face transformation risk and are exposed to the risk of run on deposits. More generally, the higher is liquidity creation to the external public, the higher is the risk for banks to face losses from having to dispose of illiquid assets to meet the liquidity demands of customers. A natural justification for the existence of deposit-taking institutions, thereby giving also an explanation for the economically important role of banks in providing liquidity, was initially modeled by (Bryant 1980 and Diamond and Dybvig 1983). They showed that by investing in illiquid loans and financing them with demandable deposits, banks can be described as pools of liquidity in order to provide households with insurance against idiosyncratic consumption shocks. However, this structure is also the source of a potential fragility of banks since in case of an unexpected high number of depositors deciding to withdraw their funds for other reasons than liquidity needs, a bank run will result. Both papers

stand in the tradition of prior research on the liquidity of assets, for example by (Tobin 1965 or Niehans 1978) as well as on bank runs, by (Friedman and Schwartz 1963).

The Bryant-Diamond/Dybvig models have been subject to a large number of follow-up papers, extending or testing the models. Of particular relevance for this study are the papers by Calomiris and Kahn (1991), Qi (1998) and Diamond and Rajan (2001), which develop and emphasize the point that demandable debt has interesting incentive implications for disciplining the bank management. The argument goes like this: on their asset side banks have illiquid loans whose market prices would be below their internal/book values in case of a fire sale. Having to sell or to call loans prematurely would involve a loss. The greater part of the activities which banks undertake – and need to undertake – to monitor their loans, which includes their active involvement in the governance of borrowing corporations, are not really observable for outsiders. However, at least a certain part of a bank's liability are call or sight deposits which are by definition and by law to be paid back on demand and on a first-come first-serve basis. This rule of distribution makes depositors wary that they might be late or stand too far behind in the waiting line in the case a bank encounters problems, and it makes them even aware of what little information they may have on the monitoring activity of the bank. This situation can lead to a bank run, and the danger of a run is what induces banks to do what their depositors want them to do, namely to be active delegated monitors in the spirit of (Diamond 1984). Based on this argument Diamond and Rajan (2001), raised the question whether or not financial fragility where small shocks lead to large effects on assets prices is a desirable state for banks. They argue that the existence of the fragility itself gives banks the right incentives to create liquidity. According to them, any kind of regulation, such as capital standards, impair this liquidity creation and should thus be avoided.

Kashyap et al. (2002) also conducted a related analysis justifying the existence of banks liquidity creation. They argue that because banks carry out lending and deposit taking under the same roof, synergies must exist between these two tasks. These synergies can be found in the way deposits and loan commitments are secured through the holding of liquid assets as collateral against withdrawals. They regard these liquid assets as costly overheads. These overheads can be share by the two separate functions, hence the synergy. A detailed analysis of the link between liquidity shortages and systemic banking crises is given by (Diamond and Rajan, 2005). It is

argued that the failure of a single bank can shrink the pool of available liquidity to the extent that other banks could be affected by it. A contagion effect is the result. However, as solvency and liquidity effects interact it is hard to determine the root of a crisis. Generally, liquidity risk arises from the fundamental role of banks in the maturity transformation of short-term deposits into long term loans. According to Joint Forum of the Basel Committee (2006), banks liquidity risk includes two types of risk: funding liquidity risk and market liquidity risk. Funding liquidity risk is the risk that the bank will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. Market liquidity risk is the risk that a bank cannot easily offset or eliminate a position at the market price because of inadequate market depth or market disruption. There are strong interactions between funding liquidity risk and market liquidity risk, especially in periods of crisis. Drehmann and Nikolau (2009) pointed to the fact that shock to funding liquidity can lead to asset sales and may lead to decrease of asset prices. Lower market liquidity leads to higher margin which increase funding liquidity risk.

Events in the second half of 2007 and early 2008 highlight the crucial importance of liquidity to the functioning of markets and the banking sector as well as links between funding and market liquidity risk, interrelationships of funding liquidity risk and credit risks, reputation effects on liquidity, and other links among liquidity and other typical banking features. Liquidity risk is not an isolated risk like credit or market risks (although credit risk often arise as a liquidity shortage when the scheduled repayments fall due), but a consequential risk, with its own intrinsic characteristics, that can be triggered or exacerbated by other financial and operating risks within the banking business (Chen et al. 2005).

2.1.1.2. Quantitative framework for measuring liquidity risk

A financial institution can utilize a number of sources to meet its liquidity needs; these include new deposits, maturing assets, borrowed funds and/or using the discount window (borrowing from the central bank). Given that access to these measurement and management is an important activity in most commercial banks. Before going to see the methods for measuring liquidity risk, sources of liquidity risk and possible ways to mitigate them should be clearly stated. Rochet (2008) states three main sources of liquidity risk: on the liability side, there is a large uncertainty

on the volume of withdrawals of deposits or the renewal of rolled-over inter-bank loans, especially when the bank is under suspicion of insolvency or when there is an aggregate liquidity shortage, on the asset side, there is an uncertainty on the volume of new requests for loans that a bank will receive in the future, and off-balance sheet operations, like credit lines and other commitments, positions taken by banks on derivative markets.

According to Aspach et al. (2005), there are some mechanisms that banks can use to insure against liquidity crises: firstly, banks hold buffer of liquid assets on the asset side of the balance sheet. A large enough buffer of assets such as cash, balances with central banks and other banks, debt securities issued by governments and similar securities or reverse repo trades reduce the probability that liquidity demands threaten the viability of the bank. Second strategy is connected with the liability side of the balance sheet. Banks can rely on the interbank market where they borrow from other banks in case of liquidity demand. However, this strategy is strongly linked with market liquidity risk. The last strategy concerns the liability side of the balance sheet, as well. The central bank typically acts as a Lender of Last Resort/LOLR to provide emergency liquidity assistance to particular illiquid institutions and to provide aggregate liquidity in case of a system-wide shortage.

Liquidity risk of banks can be measured by liquidity gap/flow approach or liquidity ratio/stock approach. The liquidity gap is the difference between assets and liabilities at both present and future dates. At any date, a positive gap between assets and liabilities is equivalent to a deficit that has to be filled (Bessis 2009). Liquidity ratios are various balance sheet ratios which should identify main liquidity trends. These ratios reflect the fact that bank should be sure that appropriate, low-cost funding is available in a short time. This might involve holding a portfolio of assets than can be easily sold (cash reserves, minimum required reserves or government securities), holding significant volumes of stable liabilities (especially deposits from retail depositors) or maintaining credit lines with other financial institutions. Various authors like Moore (2010), Rychtárik (2009), or Pratt and Herzberg (2008) provide various liquidity ratios such as liquid assets to total assets, liquid assets to deposits and short term financing, loans to total assets and loans to deposits and short term borrowings. To sum up, the stock approach employs various balance sheet ratios to identify liquidity trends. The flow approach, in contrast, treats liquid reserves as a reservoir: the bank assesses its liquidity risk by comparing the

variability in inflows and outflows to determine the amount of reserves that are needed during a period. Although both approaches are intuitively appealing, the flow approach is more data intensive and there is no standard technique to forecast inflows and outflows. As a result, the stock approaches are more popular in practice and in the academic literature (see Crosse and Hempel 1980; Yeager and Seitz 1989; Hempel et al. 1994; Vodova 2011).

As per Crosse and Hempel (1980), the two most popular stock ratios are the loan-to-deposit ratio and the liquid asset to total assets ratio, where the higher the loan-to-deposit ratio (or the lower the liquid asset to total assets ratio) the less able a bank to meet any additional loan demands. Both indicators have their short-comings: the loan-to deposit ratio does not show the other assets available for conversion into cash to meet demands for withdrawals or loans, while the liquid assets ratio ignores the flow of funds from repayments, increases in liabilities and the demand for bank funds. Fortunately, the ratios tend to move together (Crosse and Hempel 1980). Therefore, for the purpose of this research the above two ratios of the stock approach and other ratios were used.

2.1.1.3. The impact of bank liquidity on profitability

Profitability accounts for the impact of better financial soundness on bank risk bearing capacity and on their ability to perform liquidity transformation (Rauch et al. 2008 and Shen et al. 2010). Loans are among the highest yielding assets a bank can add to its balance sheet, and they provide the largest portion of operating revenue. In this respect, the banks are faced with liquidity risk since loans are advanced from funds deposited by customers. However, the higher the volume of loans extended the higher the interest income and hence the profit potentials for the commercial banks. At this point, it is also worth noting that banks with a high volume of loans will also be faced with higher liquidity risk. Thus, the commercial banks need to strike a balance between liquidity and profitability.

It is argued that when banks hold high liquidity, they do so at the opportunity cost of some investment, which could generate high returns (Kamau 2009). The trade-offs that generally exist between return and liquidity risk are demonstrated by observing that a shift from short term securities to long term securities or loans raises a bank's return but also increases its liquidity risks and the inverse is true. Thus a high liquidity ratio indicates a less risky and less profitable

bank (Hempel et al. 1994). Thus management is faced with the dilemma of liquidity and profitability. Myers and Rajan (1998) emphasized the adverse effect of increased liquidity for financial institutions stating that, “although more liquid assets increase the ability to raise cash on short-notice, they also reduce management’s ability to commit credibly to an investment strategy that protects investors” which, finally, can result in reduction of the “firm’s capacity to raise external finance” in some cases. Thus, this indicates the negative relationship between bank profitability and liquidity.

Berger (1995) analyses the statistical relationships between bank earnings and capital for U.S. banks over the period of 1983-1989 and finds that, contrary to what one might expect in situations of perfect capital markets with symmetric information (see Modigliani, 1958 and Miller, 1963) in which there is no relationship between earning and bank capital), there is a positive relationship between capital and return on equity. This result, according to the author, is consistent with the “expected bankruptcy cost hypothesis.” More specifically, Berger’s results suggest that banks with higher levels of capital see their funding costs decrease to such an extent that it more than offsets the cost of issuing additional capital. While Berger (1995), applies the concept of the “expected bankruptcy cost hypothesis” in the realm of capital, it is also conceptually applicable to the impact of liquid assets on profitability, whereby banks holding more liquid assets benefit from a superior perception in funding markets, reducing their financing costs and increasing profitability.

At the same time, a recent paper by Morris and Shin (2010), develops a model where the total credit risk of a bank is decomposed into “insolvency risk” (“the conditional probability of default due to deterioration of asset quality if there is no run by short-term creditors”) and “illiquidity risk” (“the probability of a default due to a run when the institution would otherwise have been solvent”). The model provides a formula for “illiquidity risk” and the authors show that an increase in the liquidity ratio of a bank decreases the probability of an “illiquid” default.

These two concepts can be drawn together in the context of the current paper. If an increase in the relative liquid assets holdings of a bank decreases its probability of default, and if the “expected bankruptcy cost hypothesis” is indeed correct, then holdings of liquid assets should exhibit a positive relationship with bank profits. At the same time, holding liquid assets imposes

an opportunity cost on the bank given their low return relative to other assets, thereby having a negative effect on profitability. Thus, overall, liquid assets exhibit a non-linear relationship to bank profitability in which increasing liquid assets would improve a bank's profitability through the "expected bankruptcy cost hypothesis", as long as the marginal benefit of holding additional liquid assets outweighs the opportunity cost of their low relative return.

2.2. Review of related empirical studies

2.2.1. Effects of liquidity on profitability-empirical studies

Adebayo et al, (2011) tries to examine the liquidity management and commercial banks' profitability in Nigeria. The major aims of the study were to find empirical evidences of the degree to which effective liquidity management affects profitability in commercial banks and how commercial banks can enhance their liquidity and profitability positions. Quantitative methods of research were applied and Pearson correlation data analysis was used to test hypothesis. Findings from the testing of this hypothesis indicate that there is significant relationship between liquidity and profitability. Hence, profitability in commercial banks is significantly influenced by liquidity and vice versa. The study concluded by suggesting that for the success of operations and survival, commercial banks should not compromise efficient and effective liquidity management and that both illiquidity and excess liquidity are "financial diseases" that can easily erode the profit base of a bank as they affect bank's attempt to attain high profitability-level.

Rengasamy D. (2014) on his paper tries to examine the impact of Loan Deposit ratio on the profitability of Malaysian commercial banks for the period of 2009 to 2013. The study included all the eight locally owned commercial banks in Malaysia. Loan deposit ratio of the banks was the independent variable of the study. The dependent variable was profitability which measures through Return on Assets (ROA). Data were obtained from the annual reports of the banks. The ratio analysis along with descriptive, correlation analysis, paired T- test and regression analysis were used in this study. The result of the study indicated that there was a positive and non-significant impact of LDR on ROA in five banks (Bank 1, 2, 3, 4 and 8). Further the study revealed that only one bank (Bank 5) had a negative and non-significant impact of LDR on ROA and bank 7 had positive and significant impact.

M. Shahchera (2012), on his paper tries to analyze the impact of liquid asset holdings on bank profitability for a sample of Iranian banks. Using the Generalized Method of Moment (GMM), the study analyzes the profitability of listed banks using unbalanced panel data over the period of 2002-2009. The study uses the liquidity asset and liquidity asset ratio square for estimating liquid asset and profitability relationship. The results found on the study shows that there is a non-linear relationship between profitability and liquid asset holdings. An important finding of this study is that the business cycle significantly affects bank profits. The coefficient of business cycle has a positive and statistically significant impact on bank profitability in results of the model; this suggests that profitability exhibits pro-cyclical behavior. The coefficient of regulation is negative and significant. Therefore, if regulators reduce the constraints imposed on banks, banks can make profits.

The study made by Bordeleau and Graham (2010), presented empirical evidence regarding the relationship between liquid asset holdings and profitability for a panel of Canadian and U.S. banks over the period of 1997 to 2009. In short, results suggested that a nonlinear relationship exists, whereby profitability was improved for banks that hold some liquid assets, however, there was a point beyond which holding further liquid assets diminishes a banks' profitability, all else equal. Conceptually, this result is consistent with the idea that funding markets reward a bank, to some extent, for holding liquid assets, thereby reducing its liquidity risk. However, this benefit is can eventually be outweighed by the opportunity cost of holding such comparatively low-yielding liquid assets on the balance sheet. At the same time, estimation results provide some evidence that the relationship between liquid assets and profitability depends on the bank's business model and the risk of funding market difficulties. The researchers recommended that adopting a more traditional i.e., deposit and loan-based business model allows a bank to optimize profits with a lower level of liquid assets.

There are also other researchers investigated the relationship between bank liquidity risk and financial performance by taking liquidity as an endogenous variable. For instance, we can find that the effect of liquidity risk on bank profitability is mixed. Some studies found out the positive effect (e.g. Molyneux and Thornton 1992; Barth et al.2003); others found out the negative effect (e.g. Bourke 1989; Demirgüç-Kunt and Huizinga 1999; Kosmidou et al. 2005; Kosmidou 2008). Besides, previous studies found that banks with high liquidity have lower net interest margins.

(e.g. Demirgüç-Kunt and Huizinga 1999; Shen et al. 2001; Demirgüç-Kunt et al. 2003; Naceur and Kandil 2009).

2.3. Related empirical studies in Ethiopia

Some related studies were conducted by different researchers in Ethiopia. Specifically, Worku (2006) argued that liquidity has an impact on the performance of commercial banks in Ethiopia and there was an inverse relation between deposit/net loan and ROE. And the coefficient of liquid asset to total asset was positive and directly related with ROE. Worku (2006) also studied capital adequacy and found that the capital adequacy of all banks in Ethiopia were above threshold, means there was sufficient capital that can cover the risk-weighted assets. Depositors who deposit their money in all banks were safe because all the studied banks fulfilled NBE requirement (Worku, 2006). Worku used different ratios when analyzing liquidity effect on banks performance and these ratios were liquid asset/net profit, liquid asset/total assets, net loans/net deposits, interest income/net deposit and interest income/interest expense (Worku, 2006).

The study conducted by Semu (2010) intended to assess the impact of reducing or restricting loan disbursement on the performance of banks in Ethiopia. It also attempts to examine the possible factors that compel the banks to reduce or restrict lending. Quantitative method particularly survey design approach was adopted for the study. The findings of the study showed that deposit and capital have statistically significant relationship with banks performance measured in terms of return on equity (ROE). New loan and liquidity have relationship with banks performance measured in terms of both return on asset (ROA) and ROE. However, the relationship was found to be statistically insignificant. Deposit and capital have no statistically significant relationship with banks performance in terms of ROA. The study suggested that when banks face lending constraints, they have to use their funds like by purchasing treasury bills and bonds. Moreover, banks must develop non-interest generating services. Excess cash maintained by banks should be used by diversifying credit options and to avoid inefficiencies.

Tseganesh (2012), on her paper tries to identify determinants of commercial banks liquidity in Ethiopia and then to see the impact of banks liquidity up on financial performance through the significant variables explaining liquidity. Balanced fixed effect panel regression was used for the

data of eight commercial banks in the sample covered the period from 2000 to 2011. The results of panel data regression analysis showed that the impact of bank liquidity on financial performance was non-linear/positive and negative. It reveals that there is some level of liquidity up to which liquidity enhances financial performance and beyond that point it hinders financial performance of the banks.

Lily (2014), on her study tried to assess the impact of liquidity on profitability of Awash International Bank S.C. Quantitative method particularly descriptive design was used for the study. Multiple regressions were adopted to analyze the time series data retrieved from the financial statements during 1995 to 2013. The result shows that liquidity has significant negative and positive impact on profitability. The study suggests that AIB should maintain its liquidity position measured by different liquidity indicators at its optimal level to maximize its profit and enhance its competitiveness in the industry.

2.4. Conclusion and knowledge gap

In line with the discussed theoretical and empirical reviews, liquidity is important to all business specially for banking industry since their function is creation of liquidity on both their asset and liability side of their balance sheet.

However, most of the empirical studies on the area of bank liquidity and its impact on profitability were done following the U.S. subprime mortgage crisis. Hence, an important gap still exists in the empirical literature about liquidity and its impact on profitability. Even though there are few studies done on impact of liquidity on profitability, since the banking industry is in the growth stage with aggressive expansion and competition with that of absence of active secondary stock exchange in the country, it is important to notify the effect of liquidity on profitability by making empirical investigation to already established banks. Therefore, the study tries to examine the effect of liquidity on profitability by taking the private commercial banks in the country.

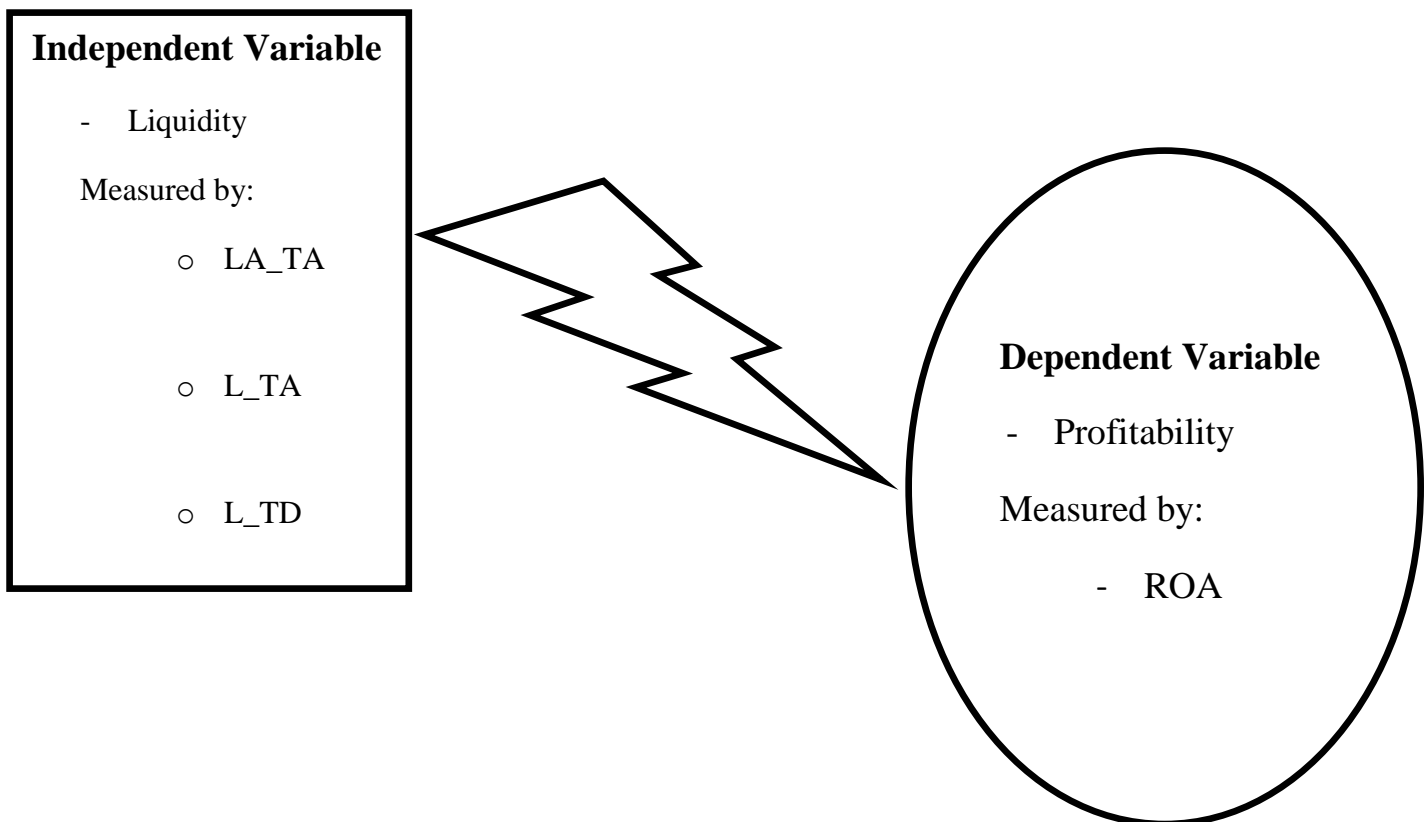
To the knowledge of the researcher this paper is different from other previous researches by considering larger sample size and time period. So that it enables to fulfill the gap of other researches especially in this time where most of the private banks are in high stress by the

directives from the central bank enforcing them to invest 27pc of their each loan disbursement on bond and the double increment of the minimum required capital to operate and continue as a bank in the industry.

2.5. Conceptual Framework

The conceptual framework which describes the relationship between liquidity and profitability based on the theoretical and empirical perspectives was formulated as follows:

Figure 2.1. Relationship between liquidity and profitability



CHAPTER THREE

3. RESEARCH DESIGN AND METHODOLOGY

This section presents the methodology that was followed in conducting the study. It is composed of five sub sections. The subsections are presented in the following coherence. The first section states the research design used in the study, followed by research approach & source, sample design, data analysis and finally model & variable description

3.1. Research Design

The research design sets the conceptual structure with in which a study is conducted. It constitutes the blue print for collection, measuring, presentation and analysis of data collected. According to (Solomon 2011) research design helps the researcher organize his ideas in a form whereby it will be possible for him to look for flaws and inadequacies.

The impact level of liquidity on profitability can be measured by assessing important variables between two or more points at a time. This can be accomplished by collecting data from more than one point in time and study the relationships between dependent & independent variables (Saundra et al., 2007). Thus, the design that best fits this study was found to be an explanatory design and was used by the researcher.

3.2. Research Approach

In the investigative study there are three common approaches to business and social research namely, quantitative, qualitative and mixed methods approach (Creswell 2003). Quantitative research is a means for testing objective theories by examining the relationship among variables (Creswell 2009). It involves counting and measuring of events and performing the statistical analysis of a body of numerical data. On the other hand, qualitative research approach is a means for exploring and understanding the meaning of individuals or groups ascribe to a social or human problem with intent of developing a theory or pattern inductively (Creswell 2009).

Finally, mixed methods approach is an approach in which the researchers emphasize the research problem and use all approaches available to understand the problem (Creswell 2003).

Therefore, based on the above discussions in order to achieve the objective of the study this study used quantitative research approach. This approach will allow examining the relationship among the dependent and independent variables and these variables in turn can be measured on instruments and analyzed using statistical procedures (Creswell 2009).

Quantitative research involves a considerable amount of activity towards measuring concepts with scales that either directly or indirectly provides numeric values which can then be used in statistical computations and hypothesis testing (Zikmund et al 2011).

3.3. Data source

The study was conducted based on secondary data. The paper used a dataset that was assembled from annual financial reports of the sampled banks and NBE reports. When using secondary data sources the study must to lookout mainly for the quality and reliability of the data's. Therefore, the sources used in the study are audited annual financial reports of the sampled commercial banks and different reports of NBE within the time period of the study to examine the relationship between the dependent and independent variables.

3.4. Sample Design

The population in this study included 16 private commercial banks registered by NBE. Currently as per NBE (2015) publication No. 120 of Birritu magazine there are 19 banks in the country. But according to further analysis made by the researcher one of the governmental banks has merged from the biggest governmental bank and has decreased the number of banks in the country to eighteen. From the 18 banks in the country 17 of them are commercial and 16 are private owned or share companies.

A Purposive sampling method is employed to select the private commercial banks from the overall banks operating in the country by taking their total capital on end of June, 2015 as selection criteria. Different studies classify commercial banks in the country into three levels

based on their capital as Big, Medium, and Small banks. Accordingly, a total of sixteen medium & small banks were selected in order to construct the unbalanced panel model.

According to Ted (2010), “to say you will engage in purposive sampling signifies that you see sampling as a series of strategic choices about with whom, where and how to do your research”. Two things are implicit in that statement. First is that the way that you sample has to be tied to your objectives. Second is an implication that follows from the first, i.e., that there is no one “best” sampling strategy because which is “best” will depend on the context in which you are working and the nature of your research objective (s). Hence, as the objective of the study revolves around the liquidity and profitability of the commercial banks, the researcher have selected the private commercial banks that have reported the lowest capital as compared to public owned commercial bank until end of June, 2015.

3.5. Data Analysis and Model

In order to achieve the objective of the paper, the study was conducted primarily based on panel data obtained through unstructured document review. According to (Baltagi 2005), the advantage of using panel data is that it controls for individual heterogeneity, leads to less collinearity among variables and tracks trends in the data (something which simple time-series and cross-sectional data cannot provide). Hence, this panel data was examined using descriptive statistics, correlations and multiple linear regression analysis. Mean values and standard deviations were used to analyze the general trends of the data from 1994 to 2015 based on the sample of sixteen commercial banks and a correlation matrix was also used to examine the relationship between the dependent variable and explanatory variables. A random effect method of panel multiple linear regression model and t-static was used to determine the significance level of each independent and control variable in influencing profitability. The multiple linear regressions model was run using OLS through E-Views 6 econometric software package, to test the casual relationship between the firms’ profitability and liquidity and to determine the most significant and influential liquidity indicators affecting the financial performance of the sampled commercial banks. According to (Petra 2007), OLS outperforms the other estimators when the following holds; the cross section is small and the time dimension is short. Therefore, as far as both the above facts hold true in this study it was found reasonable to use OLS in this study. In

connection to this, the general model for this study, as is mostly found in the existing literature is represented by;

$$Y_{i,t} = \alpha + \beta X_{i,t} + \varepsilon_{i,t}$$

The subscript i representing the cross-sectional dimension and t denote the time-series dimension. The left-hand variable $Y_{i,t}$, represents the dependent variable in the model, which is the firm's ROA. $X_{i,t}$ contains the set of independent variables in the estimation model, is taken to be constant over time t and specific to the individual cross-sectional unit i . If α is taken to be the same across units, then OLS provides a consistent and efficient estimate of α and β .

In light of the above model, the balanced panel data constructed by taking ten commercial banks was analyzed by using the following multivariate regression model.

$$ROA_{i,t} = \beta_0 + \beta_1 LA_TD_{i,t} + \beta_2 L_TD_{i,t} + \beta_3 L_TA_{i,t} + \varepsilon$$

Where:

ROA = Net Income / Total Asset

LA_TD = Liquid Asset / Total Deposit

L_TD = Loan / Total Deposit

L_TA = Loan / Total Asset

ε is an error term

In this study, as it is described above, liquidity indicators are selected as the independent variables which are those variables in which the banks' management can exert control over. These are Liquid Asset to Total Deposit Ratio (LA_TD), Loan to Total Deposit Ratio (L_TD) and Loan to Total Asset Ratio (L_TA). On the other side, bank profitability ratio is dependent variable which is measured by Return on Asset (ROA).

3.5.1. Variable Description

As stated in the first chapter the objectives of the study are to determine the effect of liquidity on profitability of the selected commercial banks, by considering and measuring the impact of different liquidity ratios and NBE directive on the banks profitability.

The dependent and independent variables taken for the study based on liquidity and profitability measurements are discussed as follows:

3.5.1.1. Dependent Variables

Profitability of the sample banks are the dependent variable. It is measured by Return on Equity and Return on Asset. For the purpose of this study Return on Asset (Net Income after tax / Total asset) is used as it is a measure of how efficiently a company uses its assets.

Why use ROA as Profitability Measurement

As Golin (2001) points out, the ROA has emerged as key ratio for the evaluation of bank profitability and has become the most common measure of bank profitability. Most authors and researchers also used ROA as a measure of bank profitability (performance). The ROA reflects the ability of a bank's management to generate profits from the bank's assets. It shows the profits earned per birr of assets and indicates how effectively the bank's assets are managed to generate revenues. Basically, the higher ROA means better performance and vice-versa. Technically ROA can be raised by bank from either profit margin or assets turnover but not at the same time due to their trade-off.

This is probably the most important single ratio in comparing the efficiency and operating performance of banks as it indicates the returns generated from the assets that bank owns. Although ROA shows good information of profitability of bank, but it is not what shareholders care the most. Shareholders of bank more concern with how much bank earned for their investment to equity measured by ROE, which shows the net income after tax per Birr from equity capital.

3.5.1.2. Independent Variables

Liquidity of the sample banks are the independent variable and it is measured by liquidity ratios. Liquidity ratio shows the ability of a bank to match its financial obligations within period to avoid default risk or financial distress in the future (Ross, Westerfield & Jaffe, 2005). Ratios will be applied to measure banks' ability to meet its short term obligations, keep its cash position and collect interest receivables. With general perspective, the higher the liquidity position is, the greater its ability to cover periodical obligations and guarantee safety for both its customers and depositors. Approaches to liquidity ratio in this study which are considered as independent variables include:

Liquid Assets to Total Deposit Ratio (LA_TD)

It is the composition of the balance sheet relating liquid (short term) assets to volatile liabilities where the difference between the two is the net liquidity position of the bank (deficit or surplus) and is a measure of its exposure to liquidity risk. As it is stated earlier in the literature part, this measure is being used as controlling mechanism or measure of liquidity for commercial banks by the central bank (NBE) enforcing them to maintain a certain level of liquid assets vis-à-vis their current liabilities revising from time to time. It is calculated as;

$$L2 = \frac{\text{Liquid Asset}}{\text{Deposit}}$$

Loan to Total Deposit Ratio (L_TD)

It is a commonly used for assessing a bank's liquidity by dividing the banks total loan to its total deposits. It indicates the percentage of bank's loans funded through deposit, in other words it relates illiquid assets with liquid liabilities. If the ratio is too high, it means that banks might not have enough liquidity to cover any unforeseen fund requirements; if the ratio is too low, banks may not be earning as much as they could be.

$$L3 = \frac{\text{Liquid Asset}}{\text{Total Deposit}}$$

Loan to Total Asset Ratio (L_TA)

This ratio measures the share of loans in total assets. It indicates what percentage of the assets of the bank is tied up in illiquid loans. Therefore the higher this ratio the less liquid the bank is.

$$L_A = \frac{\text{Loan}}{\text{Total Asset}}$$

CHAPTER FOUR

4. DATA ANALYSIS AND DISCUSSION

As was stated in the first chapter, the main objective of the study was to examine the impact of liquidity on profitability of private commercial banks in Ethiopia. In order to achieve this objective the model presented below was used.

$$ROA_{i,t} = \beta_0 + \beta_1 LA_{TDi,t} + \beta_2 L_{TDi,t} + \beta_3 L_{TAi,t} + \varepsilon$$

Where:

ROA = Net Income / Total Asset

LA_TD = Liquid Asset / Total Deposit

L_TD = Loan / Total Deposit

L_TA = Loan / Total Asset

ε is an error term

The dependent variable in the model is Return on Asset (ROA) while the explanatory variable is liquidity which is measured by three variables; liquid asset to total deposit (LA_TD), loan to total deposit (L_TD) and loan to total asset ratios (L_TA).

4.1. Results and Tests for CLRM

This part of the paper discusses the basic findings and presents the tests for the classical linear regression model. It is structured as follows. First, it gives the descriptive statistics of the variables used in the research. Second, it presents the results of correlation analysis and tests for the Classical Linear Regression Model assumptions respectively. Then the result of the regression analysis is presented in the last section.

4.1.1. Descriptive Statistics

The study examines the impact of liquidity on profitability of sixteen private commercial banks over years 1994 to 2015. The descriptive statistics of the dependent and explanatory variables for the sampled commercial banks is summarized in Table-4.1. The table presents mean, median, maximum, minimum and standard deviation values for the dependent and independent variables for the total observation of 168.

Table 4.1: Descriptive Statistics of the Variables

	ROA	LA_TD	L_TD	L_TA
Mean	0.022381	0.477798	0.678274	0.526012
Median	0.020000	0.450000	0.645000	0.470000
Maximum	0.280000	1.280000	1.200000	6.100000
Minimum	-0.040000	0.060000	0.070000	0.260000
Std. Dev.	0.024107	0.196159	0.161564	0.445902
Observations	168	168	168	168

The mean of ROA for the private commercial banks is 2.24pc with the standard deviation of 2.41pc. This shows that most of the selected commercial banks have reached a profitability rate of 2.24pc in the period taken and the standard deviation shows that there is little variance on the reported profitability. Even if there are banks that reported a ROA which was as high as 28pc, there are also banks with low profitability (loss) that reported at -4pc. Profitability for the sample period has ranged from -4 to 28pc with a standard deviation of 2.41pc. Even if the standard deviation shows the existence of low level of variation in the group profitability, the range shows the existence of great variation in profit among the selected commercial banks.

The descriptive result for one of the most widely used measures of liquidity shows that on average the liquid asset to total deposit ratio of private banks for the sampled period is 47.78pc. According to NBE directive, “any licensed commercial bank shall maintain liquid asset of not less than 15pc of its net current liabilities”. In doing so, the average performance result of the

banks taken under the study is by far above the statutory requirement of the central bank which indicates safe liquidity position to of the banks to liquidity risk. The maximum value of LA_TD for the banks is found to be at 128pc while the minimum is low to 6pc. The result of the maximum and minimum range shows that, even if there are some banks with strict liquidity management policies, the maximum value is also an indicator that there exist banks with lenient liquidity policies (surplus of liquid asset).

The other variable taken as an indicator of liquidity risk is loan to total deposit ratio (L_TD). The mean value of this ratio shows 67.83pc which is considerably lower than the international standard for loans to deposit ratio (i.e. 75pc (CBRC 2012)), whereas its standard deviation of this ratio shows 16.16pc. This indicates that on average a rational amount of volatile liabilities/deposits were tied up with illiquid loans and there is high dispersion of L_TD towards its mean among banks respectively. The maximum and minimum values of L_TD are 120 and 7pc which is far above and far below the standard respectively. This indicates that there are some private banks having surplus of liquidity (banks having < 75pc L_TD) and others facing liquidity stress (banks having > 75pc L_TD).

The last variable considered as an indicator for liquidity risk is loan to total asset ratio (L_TA). The standard deviation and mean of L_TA shows 44.59pc& 52.6pc respectively. The minimum value for LA_TA is low to 26pc while the maximum is about 610pc. This implies that there are banks which are illiquid because of the amount/level of investment of their assets (banks with 610pc).

4.1.2. Correlation Analysis

One of the measures used to identify the degree of linear association between variables is correlation. Values of the correlation coefficient are always ranged between +1 and -1. A correlation coefficient of +1 indicates that the existence of a perfect positive association between the two variables; while a correlation coefficient of -1 indicates perfect negative association. A correlation coefficient of zero, on the other hand, indicates the absence of relationship (association) between two variables (Brooks 2008). In this study, the researcher employed the Pearson product moment of correlation coefficient in order to find the association of the independent variables with the profitability of selected commercial banks.

As it can be seen from the result of the correlation matrix in Table-4.2, profitability (dependent variable) was negatively correlated with liquid asset to total deposit (LA_TD) & loan to total deposit ratio (L_TD) while positively correlated with liquid asset to total asset (LA_TA) & loan to total deposit (L_TD).

This indicates that banks profitability has a significant negative correlation with liquid asset to total deposit ratio (LA_TD) and loan to total deposit ratio (L_TD) when a bank holds high level of liquid asset or increase its liquid asset holding comparing to its total mobilized deposit (liability) and invest its liquid liabilities on less income generating investments or fail to collect its investments on time then the lesser profitable it will be because of the higher cost of acquiring the funds.

In contrast profitability has positive and significant correlation with loan to total asset ratio (L_TA). This indicates that profitability increases for the L_TA ratio increases and it is true that for banks that invest their assets on high income generating investments.

Table 4.2: Correlation Matrix

	ROA	L_TA	L_TD	LA_TD
ROA	1.000000			
L_TA	0.809308	1.000000		
L_TD	-0.071968	0.230675	1.000000	
LA_TD	-0.195163	-0.138116	-0.171303	1.000000

4.1.3. Tests for the Classical Linear Regression Model (CLRM) Assumptions

In order to make the data ready for analysis and to get reliable results from the research, the model stated previously is tested for five CLRM assumptions. Among them the major ones are: test for heteroscedasticity, autocorrelation, multicollinearity and normality. Accordingly, the following sub-section presents the tests made.

- **Assumption one: the errors have zero mean ($E(\varepsilon) = 0$)**

The first assumption states that the average value of the errors should be zero. According to (Brooks 2008) if the regression equation contains a constant term, this presumption will never be breached. Therefore, since the constant term (i.e. β_0) was included in the regression equation; this assumption holds good for the model.

- **Assumption two: homoscedasticity (variance of the errors is constant ($VAR U\tau = \sigma^2 < \infty$))**

Heteroscedasticity is a systematic pattern in the errors where the variances of the errors are not constant. When the variance of the residuals is constant it is referred as homoscedasticity, which is desirable. To test for the absence of heteroscedasticity Breusch-Pagan test was used in this study. In this test, if the p-value is very small, less than 0.05, it is an indicator for the presence of heteroscedasticity (Gujarati 2004). Accordingly, based on the result of Breusch-Pagan test the P-value is found to be greater than the level of significance (i.e., $0.11 > 0.05$). Hence, the variance of the residuals is constant and referred as homoscedasticity.

Table 4.3: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.713151	Prob. F(7,160)	0.1093
Obs*R-squared	11.71371	Prob. Chi-Square(7)	0.1104
Scaled explained SS	13.08873	Prob. Chi-Square(7)	0.0700

Source: Output of EViews 6

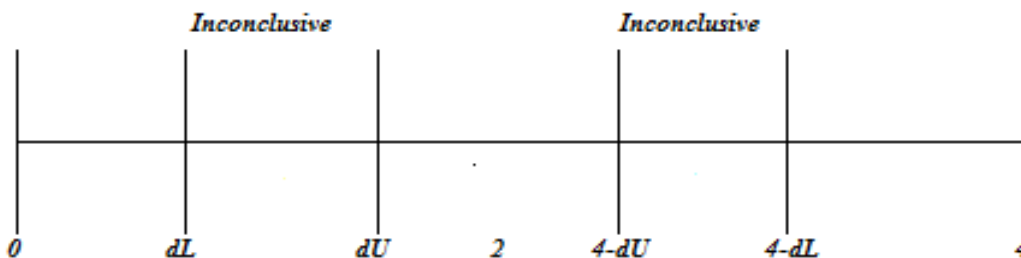
- **Assumption three: covariance between the error terms over time is zero ($cov u_i u_j = 0$)**

This assumption states that covariance between the error terms over time or cross-sectional, for that type of data is zero. That is, the errors should be uncorrelated with one another. If the errors are correlated with one another it is an indicator for the presence of autocorrelation or serial correlation (Brooks 2008).

Accordingly, two tests were made in order to figure out the presence of autocorrelation. The two tests used in this study are the Durbin-Watson (DW) and Breusch–Godfrey serial correlation LM test.

According to Brooks (2008), DW has 2 critical values: an upper critical value and a lower critical value, and there is also an intermediate inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. The rejection, non-rejection, and inconclusive regions are shown on the number line in Figure 4.1. So, the null hypothesis is rejected and the existence of positive autocorrelation presumed if DW is less than the lower critical value; the null hypothesis is rejected and an existence of negative autocorrelation is presumed if DW is greater than 4 minus the lower critical value; the null hypothesis is not rejected and no significant residual autocorrelation is presumed if DW is between the upper critical value and 4 minus the upper limits; the null hypothesis is neither rejected nor not rejected if DW is between the lower and the upper limits, and between 4 minus the upper and 4 minus the lower limits.

Figure 4.1 Rejection and Non-Rejection Regions for DW Test



Where, dU is an upper critical value and dL is a lower critical value.

Since the Durbin-Watson statistic can be difficult to interpret and it is difficult to judge the presence of autocorrelation if the value lies in the inconclusive region. Another way of showing the presence/absence of autocorrelation is by using the Breusch–Godfrey test (shown in table 4.5). The result of the statistic labeled “obs*R-squared”, which is the LM test statistic for the null hypothesis of no serial correlation shows a p-value of 0.10 (which is greater than 0.05) which strongly indicates the absence of autocorrelation.

Another common method of adjusting for serial correlation is to include autoregressive (AR) and/or moving average (MA) terms in the equation. But these methods give somewhat higher values for both the Akaike and the Schwarz information criteria indicating that the previous lag model should be preferred and the researcher also used this model to account for the problem of autocorrelation in this study. Thus, the result of Breusch-Godfrey LM Test after the inclusion of these lagged variables in the model is given in the Table 4.4. The result of the statistic labeled “obs*R-squared”, which is the LM test statistic for the null hypothesis of no serial correlation shows a p-value of 0.10 which as was stated earlier is an indicator of the absence of autocorrelation.

Table 4.4: Autocorrelation test

Breusch-Godfrey Serial Correlation LM Test:

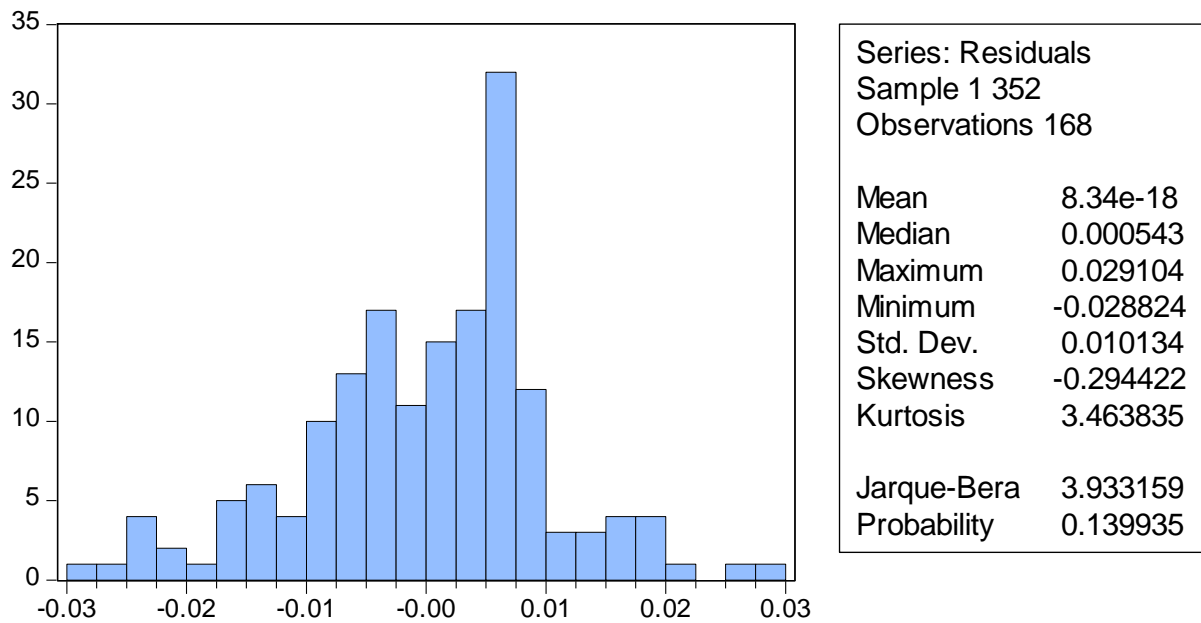
F-statistic	1.373171	Prob. F(26,134)	0.1256
Obs*R-squared	35.34428	Prob. Chi-Square(26)	0.1044

- *Assumption four: Normality (errors are normally distributed($ut \sim N(0, \sigma^2)$))*

A normal distribution is not skewed and is defined to have a coefficient of kurtosis-3. Jarque-Bera formalizes this by testing the residuals for normality and testing whether the coefficient of skeweness and kurtosis are zero and three respectively. Normality assumption of the regression model can be tested with the Jarque- Bera measure. If the Jarque-Bera value is greater than 0.05, it’s an indicator for the presence of normality (Brooks 2008).

The normality tests for this study as shown in Figure 4.2 the kurtosis is close to 3, and the Jarque-Bera statistic has a P-value of 0.14 which is greater 0.05 implying that the data were consistent with a normal distribution assumption.

Figure 4.2 Normality Test result



- Assumption five: Multi-collinearity Test

According to (Churchill and Iacobucci 2005), multi-collinearity is concerned with the relationship which exists between explanatory variables. When there exists the problem of multi-collinearity, the amount of information about the effect of explanatory variables on dependent variables decreases and as a result, many of the explanatory variables could be judged as not related to the dependent variables when in fact they are. How much correlation causes multi-collinearity, however, is not still clearly defined. Many authors have suggested different level of correlation to judge the presence of multi-collinearity. While (Hair, et al. 2006) argued that correlation coefficient below 0.9 may not cause serious multi-collinearity problem. (Malhotra, 2007) stated that multi-collinearity problem exists when the correlation coefficient among variables is greater than 0.75. (Kennedy 2008) suggests that any correlation coefficient above 0.7 could cause a serious multi-collinearity problem leading to inefficient estimation and less reliable results. This indicates that there is no consistent agreement on the level of correlation that causes multi-collinearity.

Therefore, in this study correlation matrix for three of the independent variables is shown below in Table 4.5. The results of the estimated correlation matrix shows that the highest correlation of 0.23 which is between loan to total deposit ratio (LA_TD) and loan to total asset ratio (LA_TA). Since there is no correlation above 0.7, 0.75 and 0.9 according to (Kennedy2008), (Malhotra 2007) and (Hair, et al. 2006) respectively, it can be concluded that there is no problem of multicollinearity.

Table 4.5: Correlation matrix between explanatory variables

	L_TA	L_TD	LA_TD
L_TA	1.000000		
L_TD	0.230675	1.000000	
LA_TD	-0.138116	-0.171303	1.000000

Source: Output of E-Views 6

4.1.4. Regression results

This regression analysis has been done to know the impact of liquidity on the bank's profitability which is measured by the return on asset (ROA). The regression has been run using multiple linear regression models for ROA along with the explanatory variables. The E-Views 6 regression result is summarized and presented as shown in the table below.

Table 4.6: Regression Analysis Result between ROA and Explanatory Variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.031845	0.004360	7.304771	0.0000
LA_TD	-0.009176	0.004407	-2.082033	0.0389
L_TD	-0.042448	0.005155	-8.233930	0.0000
L_TA	0.046138	0.001857	24.84536	0.0000
VAR1	-0.054047	0.010569	-5.113455	0.0000
VAR2	0.043058	0.010551	4.080833	0.0001
VAR3	-0.048291	0.010605	-4.553492	0.0000
VAR4	-0.034520	0.010486	-3.291920	0.0012
R-squared	0.823274	Mean dependent var		0.022381
Adjusted R-squared	0.815542	S.D. dependent var		0.024107

S.E. of regression	0.010353	Akaike info criterion	-6.256557
Sum squared resid	0.017151	Schwarz criterion	-6.107797
Log likelihood	533.5508	Hannan-Quinn criter.	-6.196183
F-statistic	106.4794	Durbin-Watson stat	0.848588
Prob(F-statistic)	0.000000		

The regression model arising from the above data is of the form;

$$ROA_{i,t} = 0.032 + 0.046 L_{TA_{i,t}} - 0.042 L_{TD_{i,t}} - 0.009 LA_{TD_{i,t}} + \varepsilon$$

The R-squared of the regression result indicates 82.3pc which implies that 82.3pc of variation on ROA is explained by the variation of the included explanatory variables.

Accordingly, the regression result indicates there is a positive and highly significant relationship between profitability (ROA) and loan to total asset ratio (L_TA) having coefficient of 0.0461. These implies for every increase in loan to total asset ratio profitability increases by 4.61pc.

In contrary the regression result of loan to total deposit (L_TD) and liquid asset to total deposit ratio (LA_TD) indicates there is negative highly significant relationship with profitability (ROA) by having a coefficient of 0.042 and 0.009. This indicates that for every increase in loan to total deposit and liquid asset to total deposit ratio profitability decreases by 0.042pc and 0.009pc respectively.

4.1.5. Discussion of regression results

The negative and statistically significant effect of liquid asset to total deposit ratio (LA_TD) on profitability of Ethiopian commercial banks agrees with the results of (Kamau, 2009) and (Hempel, 1994). According to their result when banks hold high liquidity, they do so the opportunity costs of the investments, which could generate high returns. As the result shows, this negative and significant relation implies Ethiopian commercial banks hold high liquid assets which could have and suppose to generate high returns in the cost of their profitability. One of the reasons for this could be the enforcement of NBE regarding to 40pc of their disbursement on loans to be short term which is not preferable by investors because of its high interest and shorter period. The other reason is the 27pc bond purchase on every loan disbursement which ties up

their disburseable funds by far less interest than the cost of acquiring the funds for 5 years which discourage banks to grant loan in an investment pool where all banks chase same target group or sectors. Thus as maintaining high liquidity at the cost of profitability dissatisfy the interest of the shareholder and vice versa the depositors, optimizing the level of liquid asset is necessary for attaining both goals (liquidity and profitability) simultaneously.

The other negative and significant factor affecting profitability is loan to total deposit ratio (L_TD). The banks profit is based on the interest charged against the deposits; it means the profit is generated through the positive difference between interest of loans and interest on deposits supported a study by J. Tamkin & Towpek (2006). A high L_TD indicates two things, firstly the bank is issuing out more of its deposits in the form of interest bearing loans; secondly the bank generates more income. But in case of poor asset quality and failure in repayment or collection of granted loans (increment of NPLs), as banks are liable for the mobilized funds they are expected to repay the deposit money with its interest which by default decreases banks profit. In addition, the current situation of Ethiopian commercial banks is in danger because of the enforcement of investment on bonds (poor asset quality in terms of asset quality of banks) generating less return than the cost of acquiring the funds. This has its own negative impact on their profit as the discussion of J. Tamkin, (2006). This fund was mobilized to generate positive return for the banks. Because of such scenarios loan to total deposit ratio have negative impact on Ethiopian commercial banks profitability. Similarly, the study made by Samuel O. (2014) and Rengasamy D. (2014) in line with the result of this study by having similar result of loan to deposit ratio as negative but non-significant on return on asset.

The coefficient of loan to total asset ratio (L_TA) is found to be positive and highly significant, showing that an increase in loan over total asset will result in a significantly higher profitability of commercial banks. This ratio indicates how much a firm is financially leveraged and the more leverage the more the risky it is. But as commercial banks are financial intermediaries and earn their profits from debts they collect its normal activity as long as they manage the transformation risks. In doing so, from the current result it can be said Ethiopian commercial banks have positive relation of this ratio with profit because they are less leveraged according to their asset. In other words commercial banks deposits (liabilities) are small in comparison to their assets. One of the main reasons for this could be the monopolistic activity of the public bank or

Commercial Bank of Ethiopia in many ways. The favor of the government is much higher than for the private commercial banks in Ethiopia. The 20/80 and 40/60 saving housing project is one of the favor given to CBE, and the other is that the deposit funds from governmental agencies and also the free loan disbursement from the 27pc bond purchase enforcement which discourages the existence of private commercial banks.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. Summary and Conclusion

The main objective of this study was to examine effect of liquidity on profitability of commercial banks in Ethiopia. Using 22 years data (1994-2015) and 16 private commercial banks, the study carried out by constructing unbalanced panel regression model based on OLS and random effects using secondary data obtained from the annual audited financial statements of the banks under the study.

The overall result obtained from the regression model indicates that liquidity as a determinant defines profitability of commercial banks to an important extent. This is indicated by the R-squared of the regression result implying 82.3pc of variation on ROA is explained by the variation of the included explanatory variables.

The explanatory variables used in order to achieve the objectives stated were; Liquid Asset to Total Deposit (LA_TD), Loan to Total Deposit (L_TD) and Loan to Total Asset (L_TA) ratios. Among these, all the variables found to have a significant impact on profitability of commercial banks. From these liquid asset to total deposit ratio appears to have a positive relation with profitability while, loan to total deposit and loan to total asset ratio is found to have a significant negative impact on the financial performance of commercial banks.

As a result, it is found that government and central bank rules and regulations as well enforcements on activities of private commercial banks have brought a serious pressure upon their liquidity as well profitability. Hence, as the contingent characteristics of bank failure, it is very necessary and urgent to consider the current situations of the private commercial banks and take the necessary early remedy action before it is too late.

5.2. Recommendation

Finally, based on the critical evaluation of the above findings, the researcher make the following recommendations with the sincere conviction that they will help to reduce if not totally eradicate the problems associated with liquidity and profitability in private commercial banks.

- Since the success and survival of commercial banks depend on liquidity and profitability commercial banks should not solely concentrate on the profit maximization concept but should also adopt measures that will ensure effective liquidity management by shortening asset maturities, improving the average liquidity of assets, lengthening liability maturities, issuing more equity, reducing contingent commitments and obtaining liquidity protection in order to satisfy their financial obligations to customers or depositors and maximize profits for the shareholders.
- The optimal liquidity level is reached if the commercial banks devotedly maintained the minimum liquidity requirement as stated by the NBE. This attempt helps to reduce cases of bank distress.
- For the fact that the monetary policies of NBE grossly affect liquidity management of the commercial banks, NBE should take the interest of the later into consideration while establishing and implementing these monetary policies in general and the liquidity ratio in particular. To achieve this feat, NBE is expected to create a forum whereby its policy makers and the management of commercial banks interact and dialogue for acceptable monetary policies.
- The National Bank should be encourage maintaining a flexible Minimum Monetary Policy or discount rate so as to enable the commercial banks take advantage of the alternative measures of meeting the unexpected withdrawal demands, and reduce the tendency of maintaining excess idle cash at expense of profitability.
- The monetary authority should as a matter of urgency create and legitimate the use of credit cards and enforce cheque usage for huge amounts in the day to day business transactions. This action will go a long way to remedy the problem of maintaining huge idle cash in vault in expectation of unprecedented withdrawal, as the movement of cash will be highly reduced. In addition, NBE should institute the most efficient and effective clearing system, which will play supporting and facilitating role for the use of credit cards and other electronic money transfer, as it is done in most advance countries.

- It is finally recommended that interested researchers should dwell on the same area of this research extensively using a wider data and area of coverage.

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APPENDIXS

Appendix –I List of Private Commercial Banks in Ethiopia

No.	Name of Banks	Est. Year
1	Awash International Bank	1994
2	Dashen Bank	1996
3	Bank of Abyssinia	1996
4	Wegagen Bank	1997
5	United Bank	1998
6	NIB International Bank	1999
7	Cooperative Bank of Oromia	2007
8	LION International Bank	2006
9	Oromia International Bank	2008
10	Bunna International Bank	2009
11	Zemen Bank	2009
12	Abay Bank	2010
13	Berhan International Bank	2010
14	Addis International bank	2011
15	Debub Global Bank	2012
16	Enat Bank	2013

Appendix-II Descriptive Statistics

	ROA	LA_TD	L_TD	L_TA
Mean	0.022381	0.477798	0.678274	0.526012
Median	0.020000	0.450000	0.645000	0.470000
Maximum	0.280000	1.280000	1.200000	6.100000
Minimum	-0.040000	0.060000	0.070000	0.260000
Std. Dev.	0.024107	0.196159	0.161564	0.445902
Observations	168	168	168	168

Appendix-III Multi-Collinearity

	L_TA	L_TD	LA_TD
L_TA	1.000000	0.230675	-0.138116
L_TD	0.230675	1.000000	-0.171303
LA_TD	-0.138116	-0.171303	1.000000

Appendix-IV Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.373171	Prob. F(26,134)	0.1256
Obs*R-squared	35.34428	Prob. Chi-Square(26)	0.1044

Appendix-V Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.713151	Prob. F(7,160)	0.1093
Obs*R-squared	11.71371	Prob. Chi-Square(7)	0.1104
Scaled explained SS	13.08873	Prob. Chi-Square(7)	0.0700

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

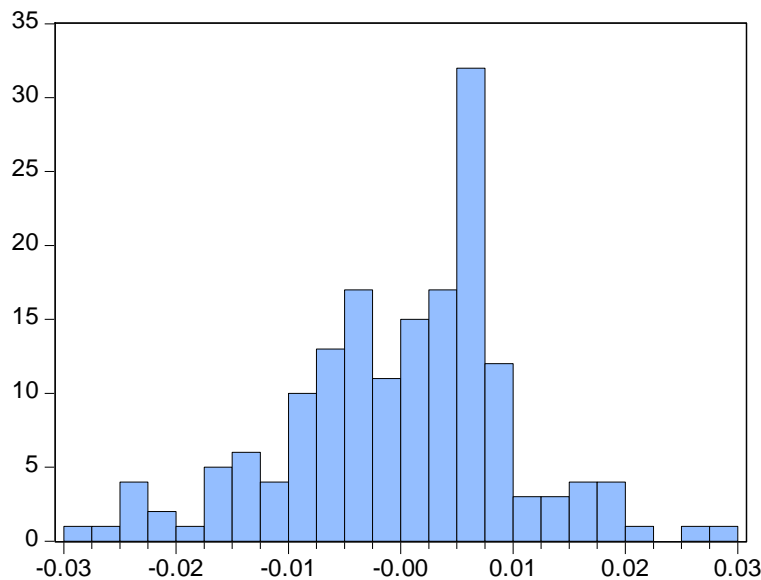
Date: 06/09/16 Time: 10:00

Sample: 1 352

Included observations: 168

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000110	6.67E-05	1.656335	0.0996
L_TA	-3.50E-06	2.84E-05	-0.123126	0.9022
L_TD	-0.000121	7.89E-05	-1.529692	0.1281
LA_TD	0.000167	6.74E-05	2.473903	0.0144
VAR1	-0.000192	0.000162	-1.184630	0.2379
VAR2	-0.000191	0.000161	-1.185150	0.2377
VAR3	-0.000194	0.000162	-1.193746	0.2343
VAR4	-0.000162	0.000160	-1.007790	0.3151
R-squared	0.069724	Mean dependent var		0.000102
Adjusted R-squared	0.029025	S.D. dependent var		0.000161
S.E. of regression	0.000158	Akaike info criterion		-14.61678
Sum squared resid	4.01E-06	Schwarz criterion		-14.46802
Log likelihood	1235.810	Hannan-Quinn criter.		-14.55641
F-statistic	1.713151	Durbin-Watson stat		1.542049
Prob(F-statistic)	0.109345			

Appendix-VI Normality Test



Series: Residuals	
Sample 1 352	
Observations 168	
Mean	8.34e-18
Median	0.000543
Maximum	0.029104
Minimum	-0.028824
Std. Dev.	0.010134
Skewness	-0.294422
Kurtosis	3.463835
Jarque-Bera	3.933159
Probability	0.139935

Appendix-VII Regression Result

Dependent Variable: ROA
 Method: Least Squares
 Date: 06/09/16 Time: 09:59
 Sample: 1 352
 Included observations: 168

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.031845	0.004360	7.304771	0.0000
LA_TD	-0.009176	0.004407	-2.082033	0.0389
L_TD	-0.042448	0.005155	-8.233930	0.0000
L_TA	0.046138	0.001857	24.84536	0.0000
VAR1	-0.054047	0.010569	-5.113455	0.0000
VAR2	0.043058	0.010551	4.080833	0.0001
VAR3	-0.048291	0.010605	-4.553492	0.0000
VAR4	-0.034520	0.010486	-3.291920	0.0012
R-squared	0.823274	Mean dependent var		0.022381
Adjusted R-squared	0.815542	S.D. dependent var		0.024107
S.E. of regression	0.010353	Akaike info criterion		-6.256557
Sum squared resid	0.017151	Schwarz criterion		-6.107797
Log likelihood	533.5508	Hannan-Quinn criter.		-6.196183
F-statistic	106.4794	Durbin-Watson stat		0.848588
Prob(F-statistic)	0.000000			

Appendix-VIII Correlation Matrix

	ROA	L_TA	L_TD	LA_TD
ROA	1.000000			
L_TA	0.809308	1.000000		
L_TD	-0.071968	0.230675	1.000000	
LA_TD	-0.195163	-0.138116	-0.171303	1.000000