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Assessment of Banks Liquidity: Empirical Evidence on Ethiopian Commercial Banks

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Abstract
The purpose of this study is to identify the impact of macroeconomic factors on liquidity of Ethiopian commercial banks. The data covered the period from 2007-2013 for the sample of ten commercial banks in Ethiopia and used secondary data. Macro-economic variables were analyzed by employing the balanced panel fixed effect regression model and the result of the study revealed that real GDP growth rate have negative and statistically significant impacts on liquidity of Ethiopian commercial banks whereas inflation rate, and interest rate margin were found to be statistically insignificant/ has no any impact on liquidity of Ethiopian commercial banks for the tested period.
Keywords: Balanced panel data, Ethiopian commercial banks, macro-economic variables

Introduction

The banking system aids in allocation of resources from those surplus depositors to those deficit borrowers by transforming relatively small liquid deposits in to large illiquid loans (Allen et al. 2010). Bank for International Settlements (2008) defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Liquidity risk arises from the fundamental role of banks in the maturity transformation of short term deposits into long term loans. Therefore, banks have to hold optimal level of liquidity that can maximize their profit and enable them to meet their obligation. As was pointed out by Diamond and Dybvig (1983), one of the key reasons why banks are fragile is their role in transforming maturity and providing insurance as regards depositors' potential liquidity needs. Also Gennaioli et al. (2012) argued by linking financial innovation with financial fragility in that neglect of risks can lead to over issuance of innovative securities.

However, the fundamental role of banks in the 'maturity transformation' of short term deposits into long term loans make banks inherently vulnerable to liquidity risk, both of an institution specific nature and that which affects markets as a whole. This is due to the fact that loans are regarded as the most profitable service yet the most risky service provided by banks. Besides, liquidity creation is one of the pre-eminent function of banks (seen as the primary source of economic welfare contribution by banks) but a major source of their vulnerability to shocks (e.g. Bryant 1980; Diamond and Dybvig 1983; Calomiris and Kahn 1991). With the absence of secondary market the banking sector in Ethiopia currently acts as the link that holds the country's economy together. Thus, keeping their optimal liquidity for banks in Ethiopia is not only important for the banking sector but also for the economy as a whole; hence the intent of this study is to identify macro-economic factors that affect liquidity of Ethiopian commercial banks.

Objective of the study

The concern of this study was that to identify the impact of macroeconomic factors on liquidity of commercial banks in Ethiopia.

Significance of the study

This research is expected to identify macro-economic factors that affected liquidity of Ethiopian commercial banks' and greatly contribute to the existing knowledge in the area of this title in the context of Ethiopia. Its findings are highly important for commercial banks and central banks.

Scope of the study

This study is limited to see the macro-economic factors that affected banks liquidity from the period 2007 to 2013 for ten commercial banks in the sample.

Literature Review

Liquidity can be defined as the ability of a financial institution to meet all legitimate demands for funds (Yeager and Seitz 1989). Also the Basel Committee on Banking Supervision (2008) defines liquidity as the ability of bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses, besides the Basel define liquidity as a bank's ability to accommodate decreases in its liabilities and its ability to fund increases in its assets. Hence, 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 interbank

market or the central bank. It follows therefore that 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 (Moore 2009).

Shen et al. (2009); Rafique & Malik (2013); Bunda & Desquilbet (2008); Vodová (2010 & 2011); Rauch et al. (2008) indicated that macroeconomic variables should be included into liquidity risk analysis of banks since they have considerable influence on the liquidity risk of banks. Emmons (1993) as cited by Gizycki (2001), when considering USA banking failures, concludes that increased risk-taking at individual banks alone does not fully account for the observed pattern of bank failures. Local economic conditions are also important predictors of bank failure. It is the coincidence of risky bank portfolios and difficult economic conditions that makes bank failure most likely.

González et al. (1997), as cited by Gizycki, (2001) in their study of the 1994 Mexican financial crisis, refine the distinction between the effect of bank specific and economy-wide factors on the likelihood of bank failure. They found that factors determining the likelihood of failure differ from those determining the timing of failure. Bank-specific variables, in combination with aggregate banking sector factors help to explain the likelihood of bank failure, while macroeconomic factors play a pivotal role in influencing the time of failure. In Mexico, high real interest rates, exchange rate depreciation and an increase in the overall gearing of the economy triggered bank failures.

Also Chen & Mahajan (2010) indicted that macroeconomic variables such as GDP growth, inflation rate, real short-term interest rate, government budget deficit, credit spread, private credit, and corporate tax rate have a direct and indirect impact on corporate liquidity. It is because that the effects of firm-specific variables on corporate liquidity can be influenced by macroeconomic conditions. The European Central Bank working paper prepared by Nikolaou (2009) noted that the causes of liquidity risk lie on departures from the complete markets and symmetric information paradigm, which can lead to moral hazard and adverse selection. Finally, according to Landau (2011), macroeconomic factors influence global liquidity through actual funding costs, return expectations, and market participants' perceptions of economic risks for individual markets, economies and the world economy as a whole. As a result, macroeconomic policies have a major influence on both the supply and demand of global liquidity.

Vodová (2012) aimed to identify determinants of liquidity of commercial banks in Slovakia. In order to meet its objective the researcher considered both the bank specific and macro economic data over the period from 2001 to 2009. The data was analyzed with panel data regression analysis by using an econometric package Eviews7. The result of the study indicated that; bank liquidity decreases mainly as a result of financial crisis, higher bank profitability, higher capital adequacy and with the size of banks while liquidity measured by lending activity of banks increases with the growth of gross domestic product and decreases with the higher unemployment. Key interest rate, Interest rate margin, rate of inflation, and the level of non-performing loans have no statistically significant effect of the liquidity of Slovak commercial banks.

Determinants of liquidity risk of banks from emerging economies investigated by (Bunda and Desquilbet 2008). The study was aimed to explore how the liquidity of commercial bank assets is affected by the exchange rate regime of the country in which they operate and used sample of commercial banks in 36 emerging countries between 1995 and 2000 with panel data regression analysis. The liquidity ratio as a measure of bank's liquidity assumed to be dependent on individual behavior of banks, their market and macroeconomic environment and the exchange rate regime, i.e. on following factors: total assets as a measure of the size of the bank, the lending interest rate as a measure of lending profitability, the realization of a financial crisis, which could be caused by poor bank liquidity, have negative impact on banks liquidity but the ratio of equity to assets as a measure of capital adequacy, the presence of prudential regulation, which means the obligation for banks to be liquid enough, the share of public expenditures on gross domestic product as a measure of supply of relatively liquid assets, the rate of inflation, which increases the vulnerability of banks to nominal values of loans provided to customers, the exchange rate regime, where banks in countries with extreme regimes (the independently floating exchange rate regime and hard pegs) were more liquid than in countries with intermediate regimes were expected to have positive impact on banks liquidity. The results of their study revealed that; capital adequacy, the presence of prudential regulation, the share of public expenditures on gross domestic product, the rate of inflation and the exchange rate regime have positive impact on banks liquidity whereas, size of the bank, the lending interest rate, the realization of a financial crisis has negative impact on banks liquidity while Shen et al. (2010) made study on macro economic variables that affect banks liquidity and found that both annual percent change of GDP and GDP annual percent change of last year have positive effect on bank's liquidity risk. This provides that higher economic growth of current year and last year make banks run down their liquidity buffer and induce them to lend more. However, higher economic growth of current year and last year make banks attract less customer deposits, thus increasing their financing gap. Besides, annual percent change of inflation and inflation annual percent change of last year have significantly positive correlation with bank's liquidity risk.

Vodová (2011) identifies determinants of liquidity of Czech commercial banks. The data cover the period from 2001 to 2009. The results of panel data regression analysis showed that, among other things, there is a positive link between bank liquidity and interest rates on loans and on interbank transaction. Since, a high interest rate on

loan does not encourage banks to lend more they left with high liquidity. She found a negative influence of inflation rate and financial crisis on liquidity. Positive effect of interest rate on loans can be quite surprising can be said normal. Since, it highlights the fact that higher lending rates do not encourage banks to lend more results banks to be more liquid. This is consistent with the problem of credit crunch and credit rationing. The negative coefficient on GDP growth rate signals that liquidity tends to be inversely related to the business cycle. Most borrowers want to take a loan during expansion when they have valuable investments projects. Banks which would like to satisfy the growing demand for loans would face lower liquidity. During economic downturn, lending opportunities are not so good so banks hold higher share of liquid assets. She also found that unemployment, interest margin, and monetary policy interest rate have no statistically significant effect on the liquidity of Czech commercial banks.

Also Vodová (2011) examined the Determinants of Commercial Bank's Liquidity in Slovakia. Aiming to identify the liquidity of commercial banks, macroeconomic data over the period from 2001 to 2010 were considered and analyzed with panel data regression method. The finding of the study showed that bank liquidity drops basically as a result of the financial crisis. In addition, liquidity measured by lending activities of banks increases with the growth of GDP and decreases with higher unemployment. But interest rates, interest margin, rate of inflation have no statistically significant effect on the liquidity of Slovak commercial banks.

Besides Shen et al. (2009) regarding macroeconomic environment, found that both annual percent change of GDP and GDP annual percent change of last year have positive effect on bank's liquidity risk. This provides that higher economic growth of current year and last year make banks run down their liquidity buffer and induce them to lend more. However, higher economic growth of current year and last year make banks attract less customer deposits, thus increasing their financing gap. Besides, annual percent change of inflation and inflation annual percent change of last year have significantly positive correlation with bank's liquidity risk.

Moore (2010) investigated the effects of the financial crisis on the liquidity of commercial banks in Latin America and Caribbean countries. The study had three main goals: discussing the behavior of commercial bank liquidity during crises in Latin America and the Caribbean; identifying the key determinants of liquidity, and; to provide an assessment of whether commercial bank liquidity during crises is higher or lower than what is consistent with economic fundamentals. Liquidity which was measured by loan to deposit ratio should depend on: cash requirements of customers, captured by fluctuations in the cash-to-deposit ratio expected to have negative impact, the macroeconomic situation, where a cyclical downturn should lower banks' expected transactions demand for money and therefore lead to decreased liquidity expected to have positive impact on liquidity, and money market/short term interest rate as a measure of opportunity costs of holding liquidity expected to have negative effect on liquidity. The regression model was estimated using ordinary least squares. The result of the study showed that the volatility of cash to deposit ratio and money market interest rate have negative and significant effect on liquidity. Whereas, liquidity tends to be inversely related to the business cycle in half of the countries studied, suggesting that commercial banks tend to error on the side of caution by holding relatively more excess reserves during downturns. Generally, the results showed that on average, bank liquidity is about 8% less than what is consistent with economic fundamentals. While studying determinants of liquidity of Polish commercial banks Vodová (2010) found that bank liquidity is strongly determined by overall economic conditions and dropped as a result of financial crisis, economic downturn, higher interest rate margin and increase in unemployment. On contrary, bank liquidity increases with higher inflation and interest rates on loans and interbank transaction.

Liquidity created by Germany's state owned savings banks and its determinants has been analyzed by (Rauch et al. 2009). The study had two important goals: first, it attempted to measure the liquidity creation of all 457 state owned savings banks in Germany over the period 1997 to 2006. In a second step, it analyzed the influence of monetary policy on bank liquidity creation. The study measure the created liquidity using the calculation method set forth by (Berger and Bouwman 2007 and Deep and Schaefer 2004). To measure the monetary policy influence, the study developed a dynamic panel regression model. According to this study, following factors can determine bank liquidity: monetary policy interest rate, where tightening monetary policy expected to reduces bank liquidity, level of unemployment, which is connected with demand for loans having negative impact on liquidity, savings quota affect banks liquidity positively, level of liquidity in previous period has positive impact, size of the bank measured by total number of bank customers have negative impact, and bank profitability expected to reduce banks liquidity. To perform the tests of measuring liquidity and analyzing influential factors on bank liquidity the researcher used bank balance sheet data and general macroeconomic data. The control variable for the general macroeconomic influence shows that there is a positive relationship between the general health of the economy and the bank liquidity creation. The healthier the economy is the more liquidity is created. It was also found that banks with a higher ratio of interest to provision income create more liquidity. Other bank-related variables, such as size or performance revealed no statistically significant influence on the creation of liquidity by the banks.

Methodology

Data type and sources

The panel secondary data was quantitative in nature and encompasses seven years banks' audited financial

statements (balance sheet and income statement). Hence, the data used for this study was pure quantitative.

Sampling design and sampling frame

The target populations were all commercial banks, (i.e both private and public) that exist in the fiscal year 2012/13. According to NBE (2012/13) there are eighteen commercial banks in Ethiopian in the fiscal year 2012/13. Of these two are publicly owned while sixteen are privately owned. The frame for the sample included commercial banks having at least seven years working experiences (i.e from 2007 to 2013) ten commercial banks were selected. The reason behind taking seven years data was to increase the sample size. Hence, the matrix for the frame was 7*10 that included 70 observations.

Regression Model specification

The study used panel/longitudinal data model which involve the pooling of observations on the cross sectional over several time periods. Brooks (2008) stated the advantages of using panel data set; first and perhaps most importantly, it can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time series or pure cross sectional data alone. Second, it is often of interest to examine how variables, or the relationships between them, change dynamically (over time). Third, by structuring the model in an appropriate way, the researcher can remove the impact of certain forms of omitted variables bias in regression results. The regression model used for this study was similar with that of Rafique& Malik (2013) and Vodová (2011). The fixed effect panel data model was selected and used for hypothesis testing. It is one of panel data model which enables to control for unobserved heterogeneity among cross sectional units and to get the true effect of the explanatory variables. Thus, the following equation indicated the general model for this study:

$$yit = \alpha_0 + \Sigma\beta_k x_{k,i,t} + \varepsilon_{i,t}$$

Where yit=the dependent variable (i.e. Liquidity of banks i at time t), Xk, i, t=the independent variables of the study, α_0=intercept/constant term, βK's (β1–β8) = parameters estimated/coefficients of the explanatory variables, i =the cross section, t =time series dimension, εi,t=the error term, and Σ=Summation.

The hypothesis developed by the study was as follows:

H1. The real GDP rate has negative and significant impact on banks liquidity.

H2. Inflation rate has positive and significant impact on banks liquidity.

H3. Interest rate margin has negative and significant impact on banks liquidity.

Data presentation and analysis

Under this part the collected data were presented and important correlation and regression results were discussed. Also important tests of classical linear regression model (CLRM) were made.

Choosing fixed vs random effect model

In order to choose fixed or random effect model a formal test so called hausman test was used which was based on the null hypothesis in favor of random effect model estimator. If p value is higher than 0.05 (i.e. it is insignificant) hence random effects is preferable whereas if p value is lower than 0.05 (i.e. it is significant) fixed effect is preferable (Gujarati 2004). Hence according to hausman test for this panel data model shown in table 1 below, the model is better off if fixed effect model is used since the p-value for the model is 0.0204, which is less than 0.05(significant).

Test cross-section random effects

Table 1

Test summary	Chi-sq. statistic	Chi-sq.d.f	**Prob.**
Cross-section random	14.986646	9	0.0204

Source: E-views output from the financial statements of sampled banks and own computation

Test of the classical linear regression model (CLRM)

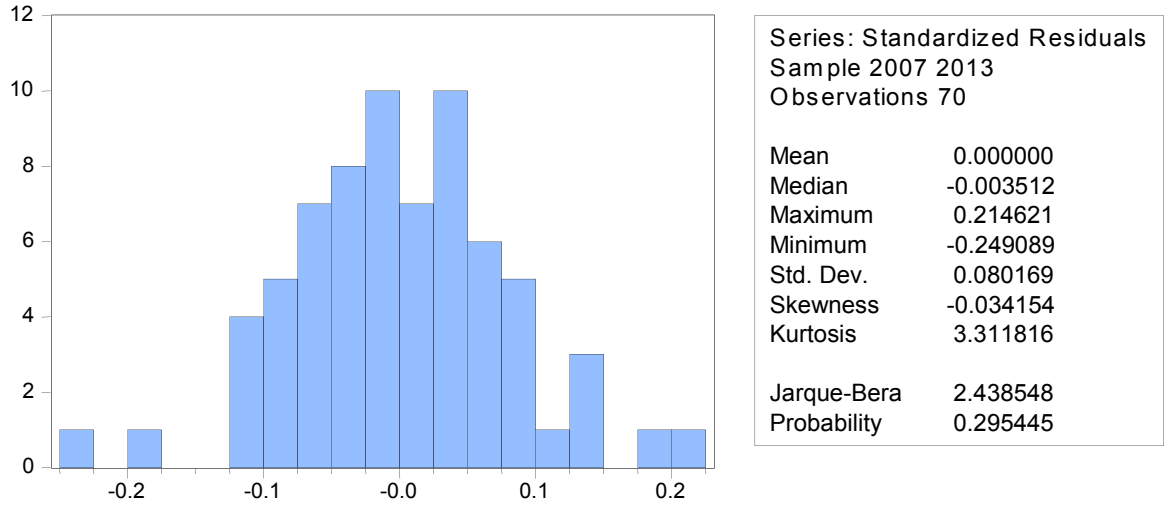
The assumptions of CLRM was tested to know whether the data and the model for this study was fit or not with the assumption. As per Brooks (2008), the first assumption required that the average value of the errors is zero (E (ut) = 0). In fact, if a constant term is included in the regression equation, this assumption will never be violated. Therefore, since the constant term (i.e. α) was included in the regression equation, the average value of the error term in this study was expected to be zero.

i. Test for normality assumption

The normal distribution is not skewed and is defined to have a coefficient of kurtosis 3. Bara Jarque (BJ) test is one of the most commonly applied tests for normality. Hence, if the residuals are normally distributed, the histogram should be bell-shaped and the Bera-Jarque statistic would not be significant. This means that the p value

given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null of normality at the 5% level (Brooks 2008). As shown below, kurtosis approaches to 3 (3.311816) and the Bera-Jarque statistics were not even at 10% level of significance as per the P-values shown in the histogram in the figure1(0.295445). Therefore, the null hypothesis that is the error term was normally distributed should not be rejected and it seems that the error term in this case follows the normal distribution.

Test for Normality; Bera-Jarque(BJ) test



Source: Eviews6 output Figure 1. graphical presentation of normality test.

ii. Test for multicollinearity assumption

If an independent variable is an exact linear combination of the other independent variables, then we say the model suffers from perfect collinearity, and it cannot be estimated by OLS (Brooks 2008). The condition of multicollinearity exists where there is high, but not perfect, correlation between two or more explanatory variables (Cameron and Trivedi 2009; Wooldridge 2006). Churchill and Iacobucci (2005) stated that when there is multicollinearity, the amount of information about the effect of explanatory variables on dependent variables decreases. Even if how much correlation causes multicollinearity is not clearly defined, there is an argument provided by different authors. Hair et al (2006) argue that correlation coefficient below 0.9 may not cause serious multicollinearity problem. Malhotra (2007) stated that multicollinearity 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 multicollinearity problem leading to inefficient estimation and less reliable results. This indicates as there is no consistent argument on the level of correlation that causes multicollinearity. According to correlation matrix table on appendix B, the highest correlation value of 0.451 was observed between nonperforming loan and capital adequacy. Since there is no correlation value above 0.7, 0.75, and 0.9 according to Kennedy (2008), Malhotra (2007) and Hair et al (2006) respectively, hence it was possible to conclude that there was no multicollinearity problem in this study.

iii. Test for Heteroskedasticity assumption

If the residuals of the regression have systematically changing variability over the sample, (i.e. the errors do not have a constant variance) that a sign of Heteroskedasticity is observed. To test this assumption the white test was used having the null hypothesis of Heteroskedasticity. Hence, according to Table 2 below, p-value was in excess of 0.05, therefore it is possible to say that there was no evidence for the presence of Heteroskedasticity.

Table 2. Heteroskedasticity test: white test result

F-statistic	1.876999	Prob. F (9, 60)	0.2250
Obs*R-squared	35.54355	Prob. Chi-square (9)	0.3566
Scaled explained SS	33.66031	Prob. Chi-square (9)	0.3451

Source: E-views output from financial statements of sampled banks and own computation

iv. Test for Autocorrelation assumption

It is assumed that the errors are uncorrelated with one another. Besides if the errors are not uncorrelated with one another it would be stated that they are 'autocorrelated' or that they are 'serially correlated' (Brooks 2008). This test was made by using Durbin and Watson test. Durbin-Watson (DW) is a test for first order autocorrelation i.e. it tests only for a relationship between an error and its immediately previous value. DW is approximately equals to $2(1 - \hat{\rho})$, where $\hat{\rho}$ is the estimated correlation coefficient between the error term and its first order lag (Brooks 2008). Hence, as per appendix C (i.e the regression output), the value of Durbin-Watson stat (i.e. 1.815196) this revealed that there was no serious evidence of autocorrelation in the data since the DW test result approaches two(2) because as per Brook(2008) stated above there is no autocorrelation problem if the DW is near 2. To make it more convincible for the absence of autocorrelation problem a formal test so called Breusch-Godfrey was made because as stated above the Durbin-Watson tests' only for the first order autocorrelation or (i.e. it test only for one lag- value). Since the p-value of F-stat as BG test result indicated in table 4 below was 0.7936, we fail to reject the null hypotheses in that the p-value was above 5% which indicated that there is no autocorrelation problem.

Table 4. Breusch-Godfrey test for the absence of serial autocorrelation

F-statistic	0.473948	Pro. F (10, 50)	0.7936
Obs*R-squared	3.066317	Prob. Chi-square (10)	0.6898

Source: E-views output from financial statements of sampled banks and own computation

Correlation analysis between study variables

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. If it is stated as y and x are correlated, this means that y and x are being treated in a completely symmetrical way. Thus, it is not implied that changes in x cause changes in y, or indeed that changes in y cause changes in x rather it is simply stated that there is evidence for a linear relationship between the two variables, and that movements in the two are on average related to an extent given by the correlation coefficient (Brooks 2008).

As revealed on appendix D, GDP rate was negatively correlated with liquidity, with the correlation coefficient of -0.27105. This revealed that as the real GDP rate increase, liquidity moves in the opposite direction. And interest rate margin was positively correlated with liquidity, with the correlation coefficient of 0.07975 whereas inflation was negatively correlated with liquidity with correlation coefficient of -0.00274. This revealed that as interest rate margin increases, liquidity also increases in the same direction, but inflation rate increase with the opposite direction of liquidity.

Analysis of the regression results

In this section, the output of fixed effect panel regression analysis was discussed. In the previous part, the study discussed the results of the tests for validity of the classical linear regression model (CLRM) assumptions. Accordingly, the model has all the important tests of the CLRM assumptions. Thus, the remaining point was concerned with the discussion of the result of regression analysis which is done by applying the fixed effect panel regression using Eviews6 soft ware econometrics package.

As it could be observed from the regression result on appendix C, adjusted R-square(R2) which measures the degree to which the model explains the actual variations in the dependent variable, indicated that variations of liquidity in Ethiopian commercial banks 80.52% explained by the independent variables which were included in the model. Overall, test of significant F statistics shows that the model was good enough fitted and statistically significant at 1% level (i.e. p-value = 0.000). Thus, the regression model is feasible. Therefore, the regression result that was provided on appendix C was deeply discussed as follows:

Gross domestic product (GDP) was among the macroeconomic variables that affected liquidity of Ethiopian commercial banks and the proxy was annual real GDP rate; which was statistically significant at 5% significance level with the p-value of 0.0251. And has a negative coefficient of (i.e. -2.285726) and which was in line with the hypotheses of this study (H1). The coefficient of -2.285726 indicated that a unit increases in annual real GDP rate leads to 2.285726 unit decreases in liquidity of Ethiopian commercial banks, holding other variables constant. The finding of this study was in line with the findings of Vtyurina(2012); Vodová (2011); (Valla et al.2006); Aspachs et al.(2005). Also this finding was supported the argument of Painceira (2010) and stated that

in periods of economic expansion which are characterized by high degree of confidence of the economic units about their profitability; there is a rise in the level of investment, so economic units decrease their liquidity preference, preferring more risky capital assets with higher return. In this environment, economic units are more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates.

In line with the above argument the 'loan able fund theory of interest' states that the supply for loan (i.e. illiquid assets for banks) increases when the economy is at boom or going out of recession (Pilbeam 2005). Banks hoard liquidity during periods of economic downturn when lending opportunities may not be as good and they run down liquidity buffers during economic expansions when lending opportunities may have picked up. Thus, it can be expected that higher economic growth make banks run down their liquidity buffer and induce banks to lend more (Aspachs et al. 2005). Hence, the finding of this study showed that when the economy growth faster and hence investment increases this means economic units (i.e. Ethiopian commercial banks) preferring more risky capital assets with higher return and they were more likely to hold less liquid capital assets and to incur short-term debt with higher interest rates. Therefore, fail to reject the hypotheses stated; there was negative and statistically significant relationship between GDP growth rate and banks liquidity.

Inflation was the other macroeconomic variables of this study and found to be statistically insignificant factor in explaining liquidity of Ethiopian commercial banks with the p-value of 0.3792.The % change in CPI has a negative coefficient of (i.e.-0.078707); which means that one percent increase in %change in CPI leads to 7.87% decreases in liquidity of Ethiopian commercial banks, holding other variables constant. The finding of this study was consistent with the findings of Vodová (2012); Subedi and Neuwpane(2011). In general, the finding of this study suggested that even though the trends in inflation rate in Ethiopia was on a decreasing stage which has no any impact on liquidity of Ethiopian commercial banks and it was opposite to the hypotheses of this study (H2). Hence, the hypotheses stated; there was positive and statistically significant relationship between inflation rate and liquidity should be rejected.

Interest rate margin was the last macroeconomic variable of this study and found to be positive and statistically insignificant with the p-value of (i.e. 0.4619) in explaining liquidity of Ethiopian commercial banks like the inflation rate above which was opposite to the hypotheses of this study(H3). And the coefficient of 0.013292 indicated that a 1% increase in IRM leads to 1.33% increases in liquidity of Ethiopian commercial banks, holding other variables constant. The finding of this study was consistent with the findings of Vodová (2012); Subedi and Neuwpane(2011).The positive coefficient of IRM is in line with the liquidity preference theory which stated that, lenders need high interest rate which includes the interest rate margin/ liquidity premium in order to lend besides the positive coefficient of interest rate margin was quite surprising because it highlighted the fact that higher interest rate margin didn't encourage banks to lend more rather it encouraged banks to hold more liquid assets. Hence, the hypotheses stated; there was negative and statistically significant relationship between IRM and banks liquidity should be rejected.

Conclusion

Generally, some of the findings of this study were consistent with the previous research done by other scholars. The findings of annual real GDP rate; which was negative and statistically significant variable that affect liquidity of Ethiopian commercial banks and hence it was in line with the findings of Vtyurina(2012); Vodová (2011); (Valla et al.2006); Aspachs et al.(2005). Also this finding was supported the argument of Painceira (2010) and stated that in periods of economic expansion which are characterized by high degree of confidence of the economic units about their profitability; there is a rise in the level of investment, so economic units decrease their liquidity preference, preferring more risky capital assets with higher return. Hence, GDP rate is the only macro-economic variable of this study that significantly affects liquidity of Ethiopian commercial banks for the taste period.

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Appendix A: List of sampled banks,

	Ethiopian commercial banks	Year of establishment
1.	Commercial Banks of Ethiopia	1963
2.	Construction and Business bank	1975
3.	Awash International Bank	1994
4.	Dashen Bank	1995
5.	Abyssinia Bank	1996
6.	Wugagen Bank	1997
7.	United Bank	1998
8.	Nib International Bank	1999
9.	Co-opeartive Bank of Oromia	2004
10.	Lion International Bank	2006

Source: National Bank of Ethiopia

Appendix B: Test for multicollinearity assumption

	LIQ	CAP	NPL	SIZE	PROF	LG	GDP	INF	IRM
LIQ	1								
CAP	-0.29916	1							
NPL	-0.03991	0.451010	1						
SIZE	0.243805	-0.236236	0.185064	1					
PROF	-0.29583	-0.070824	-0.016464	-0.001268	1				
LG	0.01077	-0.006209	-0.153305	-0.039991	-0.103021	1			
GDP	-0.27105	0.071542	-0.000296	-0.016342	-0.090906	0.045384	1		
INF	-0.00274	0.005084	0.000316	-0.069258	-0.111132	0.083236	-0.029452	1	
IRM	0.07975	0.295533	0.220681	-0.340793	-0.016051	0.302571	0.088740	0.096201	1

Source: E-views output from the financial statements of sampled banks and own computation.

Appendix C: Result of fixed effect regression model

Dependent Variable: LIQ
Method: Panel Least Squares
Date: 12/24/14 Time: 21:57
Sample: 2007 2013
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.591624	0.710801	5.052923	0.0000
CAP	-0.505137	0.072600	-6.957807	0.0000***
NPL	-0.598288	0.691987	-0.864594	0.3913
SIZE	0.311664	0.066924	4.656948	0.0000***
PROF	-0.728726	0.322788	-2.257596	0.0283**
LG	0.033774	0.040968	0.824387	0.4136
GDP	-2.285726	0.990677	-2.307238	0.0251**
INF	-0.078707	0.088728	-0.887063	0.3792
IRM	0.013292	0.017931	0.741307	0.4619

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.830694	Mean dependent var	-0.128715
Adjusted R-squared	0.805298	S.D. dependent var	0.297034
S.E. of regression	0.131067	Akaike info criterion	-2.015213
Sum squared resid	1.030708	Schwarz criterion	-2.631250
Log likelihood	68.31279	Hannan-Quinn criter.	-2.865024
F-statistic	32.70972	Durbin-Watson stat	1.815196
Prob(F-statistic)	0.000000		

***, **, *significant@1%, 5% and 10% level of significance

Appendix D: Correlation matrix between dependent and independent variables

	LIQ	CAP	NPL	SIZE	PROF	LG	GDP	INF	IRM
LIQ	1	-0.29916	-0.03991	0.243805	-0.29583	0.01077	-0.27105	-0.00274	0.07975

Source: E-views6 output from financial statements of sampled banks and own computation