Determinants of Growth in Bank Credit to the Private Sector in Ethiopia: A Supply Side Approach

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Abstract

Despite a general awareness of the factors determining the bank credit to private sector, there is limited empirical evidence in Ethiopian context. In this paper the short and long-run impact of bank-specific, monetary policy and macroeconomic variables on bank credit to private sector in Ethiopia, using supply-side approach is empirically examined over the period1978/79-2010/11. The methodology, based on the ARDL econometric approach using annual time-series data was employed, follows work by Imran and Nishat (2012) for the Pakistan. The study includes bank credit to the private sector as dependent variable while domestic deposit, foreign liabilities, lending interest rate, reserve requirement, M2 as percentage of NGDP, RGDP and inflation are major explanatory variables. The finding indicates that domestic deposits, foreign liabilities, real lending interest rate, M2 as percentage of NGDP, GDP and inflation have significant impact on banks credit to the private sector in the long-run. Whereas reserve requirement does not affect commercial banks credit to private sector both in long and short-run. Moreover, in the short-run domestic deposit and economic growth do not influence commercial banks credit to private sector. The coefficient of ECM_{t-1} (-0.757) shows a rapid adjustment process and dictates that the disequilibrium of the previous period shocks is adjusted in to long-run equilibrium in the current period. The long and short-run results do not provide strong support of the influence of banking sector reform on the growth of bank credit to private sector as shown by the coefficient for the dummy variables in Ethiopia. Finally, the results recommend that efforts should be geared towards keeping the inflation rate low and maintaining stable.

Keywords: ARDL Co-integration, Bank Credit, Ethiopia

1. Introduction

Background of the Study

To promote economic advancement private sector investment is a vital element. Finance is one factor that influences private sector investment and it is a backbone of every firms. A growing firm needs a source of finance to assist its operational and non-operational activities. Banks are a crucial source of credit for many families and different sectors Carbo and Rodriguez (n.d.). Commercial banks provide a lending service (grant loans and advances) to individuals, firms and government which may be in the form of short, medium or long term basis bearing in mind, the three principles guiding their operations which are profitability, liquidity and solvency (Olokoyo, 2011). Commercial banks mobilize fund from surplus economic units (savers) in the form of deposit and provide it to the deficit economic units (ultimate borrowers) in the form of credit and this process leads to the introduction of credit system. This system initially characterized by direct financing (Akpanuko & Acha, 2010), a system in which the lenders and borrowers having to search out themselves and deals directly. However, after the innovation of financial institution the system currently have been done indirectly. This means deposits are aggregated from domestic saving by financial institutions like commercial banks for lending it back to the deficit economic units. In developing countries, in the economy with no stock market like Ethiopia, banking industry has dominates the financial sector and this sector is underdeveloped.

According to the global economy report a country said to be has well developed financial system, its banking credit to the private sector as percentage of GDP must be account 70% or above. In some very advanced economy it is even higher than 200%. However, in some poor countries, the amount of credit could be lower than 15% of GDP. According to Bonis and Stacchini (2006) in 2004 the ratio of loans to GDP was in U.S. 46%, France 77% and Germany 100% and the ratio of deposits to GDP was in U.S. 40%, France 68% and Spain 86%. In general, credit to private sector in Ethiopia is limited and concentrated in urban center and performed mainly by banking institutions. Bank credit to private sector as percentage of GDP in Ethiopia is limited below 15% even after the reform, as the graph below shows.

Figure 1.1 and 1.2 below shows that in the case of Ethiopia, the domestic credit by banking sector to privates sector has increasing from 5.9% of GDP in 1978/79 to 10.4% in 2010/11. According to Abuka and Egesa (2007) one of the main advantages of financial reform is the growth of credit expansion to private sector. Figure 1.1 below shows that bank credit to private sector has been increasing continuously starting from 1978/79 to 2010/11 specially, after the banking reform was undertaken in 1994.

Figure 1.1: Total domestic credit provided by banking sector to private sector (in Birr) from 1978/79-2010/11
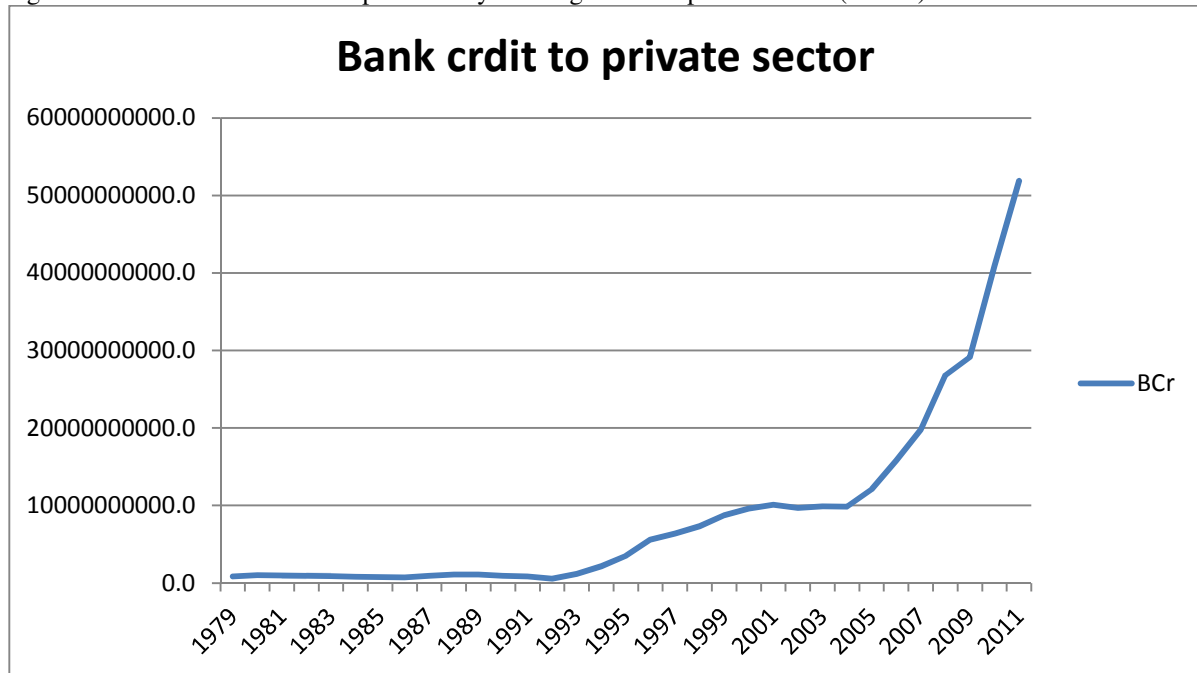
Source: Own Computation based on NBE data (2013)

From figure 1.2, however, bank credit to private sector as percentage of GDP starting from the past few years has been shown a declining trend, even though in aggregate shows an increment (as trend line show upward slope in figure 1.2). Before the banking reform introduced in Ethiopia, bank credit to private sector as percentage of GDP was showing declining trend. Nevertheless, after the banking reform introduced in the country the trend shows a mixed result. Almost, from 1994-2002 bank credit to private sector as percentage of GDP was showing an increasing trend, but from 2003 up to 2011 it has been showing a declining trend. The banking sector decision to allocate credit to the economy can be influenced by different factors, including unstable political environment of the country, the legal risk, unstable government economic policies and investors own characteristics Imran and Nishat (2012). So, it can be difficult to conclude that the financial reform has positive association with bank credit growth to private sector in the case of Ethiopia.

Figure 1.2: Domestic credit provided by banking sector to private sector (% GDP) from 1978/79-2010/11
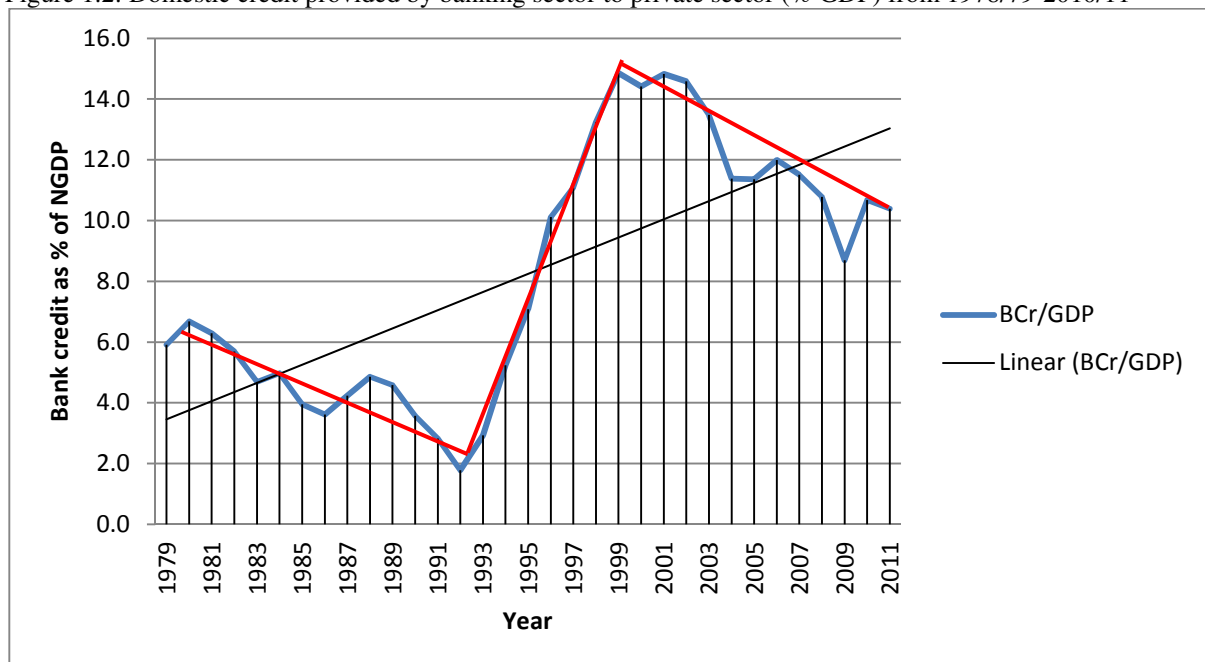
Source: Own Computation based on NBE data base (2013)

Imran and Nishat (2012) suggest that it is important issue to discuss the factors that influence bank credit supply

due to the growing trend of bank loan in the world economies specially, in emerging market from the bank side point of view.

Statement of the problem

In order to identify the factors that affect growth of bank credit to private sector and to explain their relationship between those factors, different studies have been carried out in different parts of the world. According to Imran and Nishat (2012) the determinants of bank credit can be studied at a demand side (firms or individual's access to credit) or at supply side (financial intermediaries like banks). For example: Imran and Nishat (2012); Vodova (2008); Olokoyo (2011); Djiogap and Ngomsi (2012) are some researchers those study the determinants bank credit growth to private sector based on supply-side approach while Abuka and Egesa (2007); Qayyum (2002); Afzal and Mirza (2010); Awan (2009); Khawaja (2007); Ljubaj (2007); Fetene (2010) are also some researchers those study based on demand-side approach. Balazs, Backe, and Zumer, 2006 suggested that the supply-side studies have considered the influence of changes in the borrowers on the availability of credit and banks financial positions.

Despite a general awareness of the factors determining the bank credit to private sector, there is limited empirical evidence provided in the literature on Ethiopia. Fetene, 2010; Sisay, 2008 are some few studies have been done for Ethiopia considering the demand-side approach. However, the issue of bank credit determinants failed to attract the attention of researchers in Ethiopia specially, from the supply-side approach. Thus, as per the knowledge of the researcher, not any study has been undertaken considering the supply-side variables of bank credit in Ethiopia and there is a knowledge gap on the area to be filled in the present study.

Objective of the study

Therefore, by keeping the above justification in mind, the main objective of the present study attempts to empirically identify the determinants of bank credit provision to private sector from supply-side approach in Ethiopian context using a time-series data set over the period between 1978/79 & 2010/11. The study also empirically identifies, if the bank credit behavior is different after and before banking-reform period in Ethiopia. The rest of study is organized as follows: Section 2 includes literature reviews, while section 3 gives the data and estimation techniques. Empirical results are provided in section 4 and conclusion with recommendations is drawn in section 5.

2. Literature review

Imran and Nishat (2012) conducted a study on "Determinants of bank credit in Pakistan: A supply side Approach" for the period between 1971 and 2010 using ARDL model. The study concluded that in long-run foreign liabilities, domestic deposits, economic growth, exchange rate, and the monetary conditions (proxy by M2 as percentage of GDP) have significant and positive association with private credit, while the inflation and money market rate do not affect the private credit. Likewise, in short-run all the variables are significant and positively associated with private credit except domestic deposit and inflation which do not influence the private credit in Pakistan. According to the authors the reason for domestic deposit dose not influence bank credit in short-run may be due to banks are no issue immediate credits from the current deposited amount by account holders. Finally, the researcher tried to find the impact of financial liberalization on bank credit, using it as dummy variable. However, the result dose not shows any impact of the financial liberalization on bank credit in Pakistan.

Olokoyo (2011) conducted study a period between 1980 and 2005 on "determinants of commercial banks' lending behavior in Nigeria." It implies that volume of deposit and the lagged volume of commercial banks' loan and advance, investment portfolio, GDP, and foreign exchange are significant and have positive relationship with loans and advances. The author also includes other important variables like lending interest rate, cash reserve requirement and liquidity reserve. These variables are positive but do not significantly influence the loan and advance. The reason for the low influence of cash reserve requirement on loan and advance is commercial banks' may not necessarily convert lower proportion of banks' funds available for lending.

Djiogap and Ngomsi (2012) studied "determinants of bank long-term lending behavior in the Central African Economic and Monitory Community (CEMAC)," for the period between 2001 and 2010 using a panel data model for the six countries. The study found that bank size, bank capitalization, long-term liability and GDP are strong and have positive effect on long-term bank credit to business but inflation has insignificant impact.

Vodova (2008) study entitled the "Credit market and prediction of its future development in Czech Republic" for the period between 1994 and 2006, using disequilibrium models to identify the significant variables that influence demand and supply credit. Vodova summarized the possible determinants of credit demand and credit supply functions after extensive reviewing of literatures and past empirical studies in a tabular form as follows:

Table 2.1: Possible determinants of credit demand and credit supply functions

Determinants of credit demand function	Exp. Sign
Expected fixed investments or industrial production	+
Short-term or long-term interest rate	_
Expected inflation	+
GDP	?
Indebtedness of private sector	_
Capital market index	+
Volume of credit in previous period	+
Difference between interest rate of loans and corporate bonds	_
Retained profits of companies	?
Determinants of credit supply function	**Exp. Sign**
Deposits	+
Bank's capital	+
Interest rate for loans	+
Market capitalization of corporate bonds and shares	+
Expected inflation	_
Expected industrial production	+
Volatility of prices of banks´ shares	_
Lending capacity of banks	+
GDP	+
Share of capital on assets	+
Share of classified loans on total loans	_
Interest rate margin	+
Profitability of banks	+
Competition on bank market	?
Volume of credit in previous period	+
Difference between interest rate of loans and corporate bonds	+
Rate of minimum required reserves	_
Capital market index	+
Share of created reserves and loan loss provisions on classified loans	_
Cost of banks for deposits	_
Dummy variables for specific influences (changes in regulation, banking or financial crises)	?

Source: Adapted from Vodova, 2008

Even though, vodova (2008) summarized the potential determinants of demand and supply credit on the above table, he did not incorporate all the determinants in his study because; only some of the variables are suitable for the analysis of Czech credit market. Hence, the researcher includes the lending capacity and GDP in the supply side. The empirical analysis on the supply credit indicates that lending capacity of banks is positively associated with bank credit. However, GDP is negatively influence the real volume of bank credit. The author justified that the negative sign for GDP is due to banks may behave anti-cyclical, if they expect a decline in output in the future, they can lower the credit supply in the present.

3. Data and Estimation Techniques

The study has taken 33 years annual time-series data covered from 1978/79-2010/11and it is Quantitative secondary source in nature. The study conducted on commercial banks of Ethiopia including both private and government owned. The main sources of the data obtained from Banking Supervision Department of National Bank of Ethiopia (NBE), Central Statistical Agency (CSA) of Ethiopia and Ministry of Finance and Economic Development (MoFED) database. As well as other publications such as directives and various annual bulletins published by the NBE and the banking institutions were reviewed.

Based on the empirical and theoretical frameworks, the most relevant factors of commercial banks credit to private sector are incorporated in the model. This study used E-views version 3.1 statistical package software. The current study has been adopted, specified and developed the baseline economic model by the standard literature following Imran and Nishat, 2012. The explanatory variables used in previous studies such as

Imran and Nishat (2012) are invoked and also extended. All the variables include in Imran and Nishat study are found relevant also in Ethiopian context, except money market rate and exchange rate. Because, money market rate has an existence of short-time period since it introduced in Ethiopia. In addition both the money market rate and exchange rate are not strongly supported by the loanable funds theory and other empirical studies. Apart from these indicators, this study also include a number of additional variables that are potentially relevant in the Ethiopian context and strongly supported by the lonable funds theory and the previous empirical studies such as cash reserve requirement and lending interest rate.

The model used in this study formulated in equation (1) below as follows:

$$BCr = \beta_0 + \beta_1 DD_t + \beta_2 FL_t + \beta_3 LIR_t + \beta_4 RR_t + \beta_5 M2G_t + \beta_6 RGDP_t + \beta_7 CPI_t + \mu_t \dots (1)$$

Where

BCr is bank credit to private sector

DD is domestic deposit with commercial banks

FL is foreign liability with commercial banks

LIR is lending interest rate

RR is reserve requirement

M2G is broad money as percentage of   nominal GDP

RGDP is real gross domestic product

CPI is consumer price index

μ_t is stochastic error term capturing the left over effects.

By concluding the existing literature and according to the theory the real lending interest rate, deposits by the domestic businesses and individuals, foreign liabilities, M2, and economic performance (GDP) expects a positive impact on the growth of bank credit to private sector, whereas the reserve requirement and inflation expect to reduce the bank credit to private sector from the supply side.

To find the long and short-run equilibrium relationship between the dependent and independent variables at the same time, in terms of methodology this study used the robust econometric technique of bound testing approach to co-integration within the framework of the Autoregressive Distributed Lag (ARDL). According to Imran and Nishat (2012) the ARDL approach was developed first by Pesaran (1997); Pesaran and Pesaran (1997); Pesaran and Shin (1999), Pesaran, Shin & Smith (2001).

The first step in ARDL approach start with bound test to estimate equation (1) to test the co-integration among the variables by ordinary least square (OLS) techniques. To test the long-run relationship equilibrium among the variables F-test is used and the ARDL representation of the equation (1) was formulated in such general form as follows:

$$\Delta BCr_t = a_0 + \sum_{i=1}^{p} \beta_i \Delta BCr_{t-i} + \sum_{i=0}^{p} \rho_i \Delta DD_{t-i} + \sum_{i=0}^{p} \gamma_i \Delta FL_{t-i} + \sum_{i=0}^{p} \varphi_i \Delta RLIR_{t-i} + \sum_{i=0}^{p} \delta_i \Delta RR_{t-i}$$

$$+ \sum_{i=0}^{p} \pi_i \Delta M2_{t-i} + \sum_{i=0}^{p} \tau_i \Delta RGDP_{t-i} + \sum_{i=0}^{p} \omega_i \Delta CPI_{t-i} + \lambda_1 BCr_{t-1} + \lambda_2 DD_{t-1} + \lambda_3 FL_{t-1}$$

$$+ \lambda_4 LIR_{t-1} + \lambda_5 RR_{t-1} + \lambda_6 M2_{t-1} + \lambda_7 RGDP_{t-1} + \lambda_8 CPI_{t-1}$$

$$+ \epsilon_t \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (2)$$

Where

Δ is first difference operator of the concerned variables

P is the optimal lag length

The term with λ represent long run relationship

The term with Σ represent the short run dynamics and

ϵ_t is the random error.

All these variables are taken in natural logarithmic form (*ln*) except real landing interest rate (RLIR), because it has negative sign and impossible to convert it in to logarithmic form. ARDL approach estimates different regressions to select the optimal order of lag length for each variable. The model can be selected based on Schwartz-Bayesian Criteria (SBC) and Akaike's Information Criteria (AIC), before the model is estimated by OLS.

At start, the null hypothesis of no co-integration against the alternative hypothesis for existence of a long-run relationship is tested by using Wald or F-statistics. To implement this technique a joint significance test was performed as:

$H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = 0$ against the alternative hypothesis

$H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq \lambda_7 \neq 0$

The null hypothesis indicates to non existence of long-run relationship while the alternative indicates to existence of long-run relationship. The calculated F-statistics value is compared with two sets of critical values given by Narayan (2004) or Pesaran et al (2001) for the given level of significance, for small samples size from

30-80. One set assumes that all the variables are $I(0)$ referred to as lower bound and other set assumes that they are all $I(1)$ referred to as upper bound. If the calculated F-statistics exceeds the upper critical value, then null hypothesis of no co-integration would be rejected irrespectively of whether the variable is $I(0)$ or $I(1)$ which implies that there exists the co-integration. If the F-statistic lies below the lower critical bounds values, then null hypothesis of no co-integration cannot be rejected irrespectively of whether the variable is $I(0)$ or $I(1)$, it means no co-integration. If the F-statistic falls into the critical bounds, the test becomes inconclusive. At this stage of estimation process, the researchers may have to carry out the unit root tests on variables entered into the model (Pesaran and Pesaran 1997).

In case the co-integration was found, that means if long-run relationship exists in the variables, the following long-run model and the short-run model is performed from the equation (3) and equation (4) respectively. The long-run model is formulated as follows:

$$BCr_t = a_1 + \sum_{i=1}^{p} \beta_{1i} BCr_{t-i} + \sum_{i=0}^{p} \rho_{1i} DD_{t-i} + \sum_{i=0}^{p} \gamma_{1i} FL_{t-i} + \sum_{i=0}^{p} \varphi_{1i} LIR_{t-i} + \sum_{i=0}^{p} \delta_{1i} RR_{t-i} + \sum_{i=0}^{p} \pi_{1i} M2_{t-i}$$
$$+ \sum_{i=0}^{p} \tau_{1i} RGDP_{t-i} + \sum_{i=0}^{p} \omega_{1i} CPI_{t-i} + \mu_t \dots \dots \dots \dots \dots \dots \dots \dots (3)$$

The ARDL specification of the short-run dynamics was derived by formulating an error correction model in the following form:

$$\Delta BCr_t = a_2 + \sum_{i=1}^{p} \beta_{2i} \Delta BCr_{t-i} + \sum_{i=0}^{p} \rho_{2i} \Delta DD_{t-i} + \sum_{i=0}^{p} \gamma_{2i} \Delta FL_{t-i} + \sum_{i=0}^{p} \varphi_{2i} \Delta LIR_{t-i} + \sum_{i=0}^{p} \delta_{2i} \Delta RR_{t-i}$$
$$+ \sum_{i=0}^{p} \pi_{2i} \Delta M2_{t-i} + \sum_{i=0}^{p} \tau_{2i} \Delta RGDP_{t-i} + \sum_{i=0}^{p} \omega_{2i} \Delta CPI_{t-i} + \psi ECM_{t-1}$$
$$+ \upsilon_t \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (4)$$

Where

ECM_{t-1} is the error correction term, which was the lagged value of the residual of the equation of the long-run relationship, equation (3) in this case.

Ψ is coefficient in disequilibrium. The error correction model indicates the speed of adjustment returning back to long-run equilibrium after a short-run shock.

Finally, to ensure the fitness of the model, the diagnostic and stability tests are also conducted; the diagnostic tests examine the serial correlation, functional form, normality and heteroscedasticity associated with the selected model. Cumulative sum (CUSUM) and cumulative sum of squares recursive residuals (CUSUMSQ) tests are conducted for the stability of the model.

4. Discussion of Empirical Results

Table 4.1: Summary of descriptive statistics of the variables

	BCr	DD	FL	RLIR	RR	M2/NGDP	RGDP	CPI
Mean	8.88*	18.9*	1.16*	2.018182	2.25*	27.14848	79.8*	66.5181
Median	3.51*	8.57*	0.80*	3.200000	0.411	27.45926	59.2*	62.6000
Maximum	51.9*	112.0*	5.72*	21.30000	20.5*	39.57418	415.0*	210.200
Minimum	0.572*	1.10*	0.0431*	-24.20000	0.0057*	14.42410	36.5*	21.6000
Std. Dev.	12.3*	25.4*	1.28*	9.856960	4.65*	7.066995	69.3*	46.0067
Skewness	2.05188	2.128613	1.465432	-0.491132	2.74726	-0.005842	3.65275	1.68485
Kurtosis	6.81606	7.359900	5.769191	3.311843	9.72506	2.327816	17.7985	5.39159
Jarque-Bera	43.1794	51.05746	22.35528	1.460370	103.697	0.621455	374.505	23.4777
Prob.	0.00000	0.000000	0.000014	0.481820	0.00000	0.732914	0.00000	0.00000
Sum	293.0*	624.0*	38.4*	66.60000	74.1*	895.8997	2630.0*	2195.10
Sum Sq. Dev.	4.8E+21	2.0E+22	5.2E+19	3109.109	6.9E+20	1598.157	1.5E+23	67731.7
Obs.	33	33	33	33	33	33	33	33

Source: Author's Computation using EVIEWS software (2013)

*in billions of Birr

4.1 Econometric model results

4.1.1 Unit root test

The test result shown in table 4.2 below, shows a mixture of level $I(0)$ and $I(1)$ of underlying variables, hence the study can proceed the ARDL methodology.

Table 4.2: ADF and PP unit root test results on log levels of variables

Variables	AIC lags	ADF		Critical value at 5%	PP		Critical value at 5%	Decision
		Level	1st Difference		Level	1st Difference		
LBCr	2	-1.6543	-3.6520**	-3.5614	-1.8894	-3.6978**	-3.561	I(1)
LDD	2	-1.4869	-7.4326*	-3.5614	-1.4308	-7.3943*	-3.561	I(1)
LFL	1	-1.7061	-5.6613*	-3.5614	-2.0122	-5.7313*	-3.561	I(1)
RLIR	1	-3.9014**	___	-3.5562	-9082**	___	-3.556	I(0)
LRR	1	-0.7188	-5.3153*	-3.5614	-0.8578	-5.3099*	-3.561	I(1)
LM2G	1	-1.2428	-5.1743*	-3.5614	-1.2082	-5.1563*	-3.561	I(1)
LRGDP	2	-4.6491*	___	-3.5562	-4.7217*	___	-3.556	I(0)
LCPI	1	-0.4985	-4.1091**	-3.5614	-1.1528	-4.1258**	-3.561	I(1)

Source: Author's Computation using EVIEWS software (2013)

ADF and PP statistics with trend and intersect

*, ** & *** statistically significant at the 1%, 5% & 10% of level significance respectively

4.1.2 Co-integration test

The co-integration result of the calculated value of F-statistic was 5.23 being greater than the upper bound critical value (4.306 at 5% level of significance) suggested by Narayan (2004) for small sample (between 30-80 observations). It implies that null hypothesis of no co-integration cannot be accepted at 5 % level of significance and, therefore, it is concluded from F-statistics that there exist co-integration or long-run relationship among the variables.

4.1.3 Estimation of long-run coefficients

From table 4.3 below the calculated value of the F-statistic (340.38) is greater than the upper bound of the critical value (5.966 at 1% level of significance). This implies that there exists long-run relationship.

Table 4.3: Estimated long-run model coefficient using ARDL approach (1, 2, 1, 1, 0, 0, 2, 1)

Dependent Variable: LBCR
Method: Least Squares
Date: 05/10/13   Time: 03:13
Sample(adjusted): 1981 2011
Included observations: 31 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.690826	4.074963	-1.641935	0.1229
LBCR_1	0.620833*	0.208820	2.973052	0.0101
LDD	1.225931***	0.695703	1.762147	0.0999
LDD_1	0.476610	0.306185	1.556610	0.1419
LDD_2	0.118688	0.268163	0.442596	0.6648
LFL	0.344118*	0.093274	3.689328	0.0024
LFL_1	-0.172212	0.122496	-1.405858	0.1816
RLIR	0.034167**	0.015052	2.269953	0.0395
RLIR_1	-0.003134	0.003776	-0.829906	0.4205
LRR	0.211559	0.134489	1.573054	0.1380
LM2	-1.452370**	0.608569	-2.386532	0.0317
LGDP	0.212854**	0.085604	2.486491	0.0261
LGDP_1	0.159034**	0.076300	2.084320	0.0559
LGDP_2	0.040937	0.108783	0.376322	0.7123
LCPI	3.036285***	1.593776	1.905089	0.0775
LCPI_1	-3.379248**	1.647359	-2.051312	0.0594

R-squared	0.997436	Mean dependent var		22.08563
Adjusted R-squared	0.994506	S.D. dependent var		1.423317
S.E. of regression	0.105502	Akaike info criterion		-1.358337
Sum squared resid	0.155828	Schwarz criterion		-0.571957
Log likelihood	38.05423	F-statistic		340.3860
Durbin-Watson stat	2.123762	Prob(F-statistic)		0.000000

Source: Author's Computation using EVIEWS software (2013)

*, ** and *** are statically significant at 1, 5, and 10 percent respectively. Tab. 2-tailed t-values are 2.750, 2.042 and 1.697 in that order

The impact of each variable is discussed in turn below:

Volume of credit in previous period: Table 4.3 shows that the t-value of *one year lagged volume of bank credit provided to private sector affects bank credit to private sector positively and statistically significant at 1% in Ethiopia, in the long-run.* Last year performance of bank credit provision to private sector affects the performance of bank credit to private sector positively in the long-run. If the one year lagged volume of bank

credit to private sector increase by Birr 1 billion, it has a power to increase bank credit to private sector by Birr 0.62 billion in the long-run, cetris peribus. This result support the study by Olokoyo (2011) that the previous year banks' lending performance is significantly and positively affects the current year bank credit performance.

Domestic deposit: Table 4.3 above shows in the long-run, in line with prior expectation, the t-statics reveal that *volume of domestic deposit influence the growth of bank credit to private sector positively and statistically significant at 10% level*. Total domestic liabilities of banking system from non-central government mostly consist of time deposit, saving account and current account. Olokoyo (2011) explained that total liabilities of the banking sector, used as major source of fund for making credit to private sector produce significant result. Therefore banks should struggle hard to manage their deposits efficiently so that their objective of profitability can be achieved and the multiplier effects maintained to the maximum. This implies that generation of more deposits is tangent to the survival of Ethiopian banks as a whole. The coefficient on the domestic deposit shows that, keeping other variables constant, Birr 1 billion increase in the domestic deposit will lead to increase bank credit to private sector by about Birr 1.23 billion in the long-run. This coefficient shows that domestic deposit plays the major role in affecting banking sector credit to private sector in the long-run. The implication for the result is that as commercial banks deposit increase their assets and liquidity also increase, as a result they provide credit to private sector at domestic level in the long-run Imran and Nishat (2012). The result is supports the loanable funds theory and the empirical results by Djiogap and Ngomsi (2012); Imran and Nishat (2012); Olokoyo (2011).

Foreign liabilities: the t-value from table 4.3 depicts that *foreign liabilities have significantly influence in determining bank credit to private sector positively at 1%*. Similarly, as banks get loan from foreign financial institutions their assets as well as their liquidity goes up, as a result they can lend more at domestic level Imran and Nishat (2012). If foreign liabilities increase by Birr 1 billion, bank credit to private sector also will increase by Birr 0.28 billion in the long-run, cetris peribus. It shows that the coefficient for the foreign liabilities is very low. This result also supports the loanable funds theory and the empirical results by Guo and Stepanyan (2011); Imran and Nishat (2012).

Real lending interest rate: This study also shows that *real lending interest rate is determined bank credit provision to private sector positively and statistically significant at 5% in long-run.* 1% increase in lending interest rate will cause to increase bank credit to private sector by Birr 1.035 billion[2] in the long-run, Cetris peribus. It depict that commercial banks in Ethiopia are provides large volume of credit to private sector in the long-run, if the lending interest rate is high as justified by the lonable funds theory. This may be due to the fact that commercial banks still have the highest market share in Ethiopia. The result is consistent with the loanable funds theory and empirical result of Olokoyo (2011).

Reserve requirement: In table 4.3 above this *variable shows a positive coefficient but not significant to affect bank credit to private sector in Ethiopia*. Even though, the loanable funds theory and many empirical result of previous study found a negative relationship between reserve requirement and bank credit, nevertheless, this study does not confirm it. However, Olokoyo (2011) also come up with positive and insignificant result for the variable, similar with this finding. Therefore, the result shows that reserve requirement change has little impact on bank credit to private sector in the long-run or the effect of high reserve requirement on commercial banks' is not pronounced Olokoyo (2011). The insignificant impact of reserve requirement on bank credit to private sector does not seem strange because the reserve requirement ratio does not show a noteworthy value during the sample period. Even though reserve ratio in Ethiopia has shown changes since 2007 it has been constant starting form 1978/79-2006/07. That is why it found no significant to influence bank credit. However, the positive sign for reserve requirement contradict the loanable funds theory and most empirical study. The first reason for the contradicting sign for the variable is that the reserve requirement may not necessarily convert into lower proportion of commercial banks' funds available for lending (Olokoyo, 2011). Second, implication is that monetary policies such as cash reserve requirement ratio do not impact negatively on banks' lending behavior. Bank should therefore always ensure compliance with these policies. Third, according to Demirgüç and Huizinga, 1999 banks income could be higher, if the available funds would lend out instead of reserved. This increment in commercial banks income leads to increase their credit to private sector. Hence, the above justification may be the reason for contradicted sign of reserve requirement in Ethiopia.

M2/NGDP: As table 4.3 shows, the M2 considers as an alternative gauge of monetary conditions measured by broad money divided by nominal GDP as Imran and Nishat used, *has negatively influence bank credit significantly at 5%*, although, a positive sign was expected. This result suggests that as monetary conditions of the country going up, the growth of bank credit to private sector will reduce in the long-run. 1% increase in M2/NGDP will result in Birr 1.45 billion reduction in bank credit to private sector in the long-run, remaining all other variables constant. The sign of broad money in this study contradict the loanable funds theory and

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[2] BCr is in natural log form while RLIR is in the level form. An anti-natural log of the coefficient of RLIR, which is 0.034167, is 1.035

empirical result of Imran and Nishat (2012). It can be concluded that when money in circulation increase, the supply of credit to private sector will decrease. Because fast growth in broad money can result higher money in circulation which in return cause higher inflation in the country. Hence high inflation can reduce bank credit to private sector, because the households and firms capacity to deposit will reduce. According to the economic review of global economy report the M2 measure includes the money in circulation as well as bank deposits such as demand, time, and savings accounts and a fast growth in broad money results in higher inflation, after few years and longer.

GDP: Strong economic condition measured by real GDP has produced the result as expected. *The coefficient is positive and statistically significant at 5% to affect bank credit to private sector in the case of Ethiopia.* Imran and Nishat (2012), increase in real GDP boost up the manufacturing sector's income as well as the general peoples earning, which leads to higher domestic deposits, hence increase the liquidity of banks and they can lend more for investment needs. So GDP has a positive association with the growth of bank credit to private sector. Birr 1 billion increase in GDP, will lead to increase bank credit to private sector by Birr 0.21 billion in the long-run, all other variables remain constant. This finding is consistent with loanable funds theory and previous empirical evidences of Djiogap and Ngomsi (2012); Guo and Stepanyan (2011); Imran and Nishat (2012); Olokoyo (2011).

Inflation: *Current year expected inflation does significantly impact the growth of bank credit to private sector positively at 10%* indicates that bank credit to private sector also increases with the expected inflation in the long-run. In the current year, if price level expected to increase by 1%, bank credit will increase in the current year by Birr 3.04 billion. Inflation has the highest coefficient value of 3.04. This explanatory variable has the highest impact and influence on the lending behavior of commercial banks and a change in it will yield the highest change in banks' loans and advances. This result shows commercial banks are provides large amount of credit to private sector in the current year, if inflation expected to increase in the next year Djiogap and Ngomsi (2012). However, the credit will decrease staring from the next year (i.e., at the time the credit increased actually), in the long-run. In previous year, if the price level expected to increase by 1%, bank credit to private sector will decrease in the long-run by Birr 3.38 billion, all other things remain constant. The result indicates that commercial banks reduce their credit to private sector, because they are not willing to provide credit at lower real lending interest rate. Real lending interest rate is the result of nominal lending interest rate minus inflation rate. The result of this variable is as expected and supports the loanable funds theory and the empirical results by Guo and Stepanyan (2011); Imran and Nishat (2012).

4.1.4   Estimation of short-run coefficients

Table 4.4: Estimated short-run model coefficient using ARDL approach (2, 2, 1, 0, 1, 1, 2, 1)

Dependent Variable: DLBCR
Method: Least Squares
Date: 05/10/13   Time: 03:17
Sample(adjusted): 1982 2011
Included observations: 30 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.036145	0.059628	0.606171	0.5567
DLBCR_1	0.444323***	0.224356	1.980439	0.0732
DLBCR_2	-0.157690	0.098215	-1.605564	0.1367
DLDD	0.393978	0.447324	0.880746	0.3973
DLDD_1	0.343243	0.325610	1.054154	0.3144
DLDD_2	0.075686	0.221911	0.341066	0.7395
DLFL	0.288698*	0.064207	4.496377	0.0009
DLFL_1	-0.009527	0.116711	-0.081633	0.9364
DRLIR	0.041396*	0.011672	3.546532	0.0046
DLRR	0.080422	0.102656	0.783416	0.4499
DLRR_1	-0.045883	0.106588	-0.430474	0.6752
DLM2	-1.051384**	0.440919	-2.384529	0.0362
DLM2_1	-0.257503	0.394904	-0.652066	0.5277
DLGDP	0.125365	0.099771	1.256529	0.2350
DLGDP_1	0.067856	0.086068	0.788406	0.4471
DLGDP_2	0.033434	0.085229	0.392290	0.7023
DLCPI	3.226683**	1.263782	2.553196	0.0268
DLCPI_1	-4.318032*	1.364659	-3.164185	0.0090
ECM_1	-0.757553**	0.315700	-2.399601	0.0353

R-squared	0.946051	Mean dependent var		0.132093
Adjusted R-squared	0.857770	S.D. dependent var		0.237144
S.E. of regression	0.089435	Akaike info criterion		-1.727249
Sum squared resid	0.087984	Schwarz criterion		-0.839824
Log likelihood	44.90874	F-statistic		10.71643
Durbin-Watson stat	1.770078	Prob(F-statistic)		0.000146

Source: Author's Computation using EVIEWS software (2013)

*, ** and *** are statically significant at 1, 5, and 10 percent respectively. Tab. 2-tailed t-values are 2.750, 2.042 and 1.697 in that order

For the short-run dynamics equation (4) was estimated. In this equation, the error correction term ECM_{t-1} is the lagged value of the residual of equation (3) of the long-run relationship. The results are reported in the above table 4.4.

The results of error correction model are given in table 4.4. Most of the results are similar in both long-run and short-run. However, in short-run some difference exists, domestic deposits and GDP do not significantly influence bank credit to private sector in short-run. Nevertheless, the impact of each variable is discussed in turn below:

Volume of credit in previous period: from the above table 4.4 the t-value shows that *one year lagged volume of bank credit to private sector is significantly influence the growth of bank credit to private sector in the short-run period positively at 10% level*. If the last year bank credit to private sector increased by Birr 1 billion, it will result in increase bank credit to private sector in short-run by Birr 0.44 billion, all other things remain constant. This result is the same with long-run result.

Domestic deposit: *volume of domestic deposit is insignificant to influence bank credit to private sector in short-run*. According to Imran and Nishat (2012) the reason could be that banks do not issue loan immediately from the currently deposited amount by account holders. From perspective of loanable funds theory, the result is correct as the sign is positive. It means any increase of bank funds will be transformed into credit. However, the coefficient is very low indicating the low sensitivity of the variable in short-run. It may provide evidence that banking industry need a structural overhaul to make it more sensible to the deposit change Mongid (n.d.).

Foreign liability: *foreign liability has influence bank credit positively and statistically significant at 1% in short-run also*. Birr 1 billion increase in foreign liability will lead to increase bank credit provision to private sector by Birr 0.288 billion, Cetris peribus. This result also the same like in the case of long-run.

Real lending interest rate: *in short-run as shown in table 4.4 above, real lending interest rate influence bank credit positively and statistically significant at 1%*. 1% increase in real lending interest rate will cause to increase the growth of bank credit to private sector by Birr 1.043 billion[3] in short-run. The result is similar with the result in the case of long-run.

Reserve requirement: *in short-run, reserve requirement is also not significant and has positive sign as in the case of long-run to affect bank credit provision to private sector*. This result still contradicts the theory and pervious empirical results.

M2/NGDP: *in short-run, monetary condition measured by broad money as a ratio of NGDP is also significant and has negative sign as in the case of long-run, at 5%*. Birr 1% increases in broad money as percentage of NGDP will lead to reduce bank credit to private sector by Birr 1.051 billion in short-run. Similarly, in short-run also fast growth of money in circulation may result to high inflation in the country. Which is also leads to reduction in bank credit provision to private sector.

RGDP: *The coefficient of real GDP in table 4.4 above shows that positive as expected but not significant*. This result may come due to the economic condition could not generate enough additional domestic deposit in short-run in Ethiopia. That is way it does not influence bank credit provision to private sector significantly during the study period.

Inflation: *Current year expected inflation does significantly impact the bank credit to private sector positively at 5% in short-run*, indicates that bank credit to private sector also increases with the expected inflation. If price level expected to increase by 1% in the next year, bank credit will increase in the short-run by Birr 3.226 billion. This result shows that commercial banks are provide large amount of credit to private sector in the current year, if inflation expected to increase in the next year. However, the credit will decrease staring from the next year at the time the credit increase actually in the short-run. The result indicates that commercial banks are not willing to provide credit at lower real lending interest rate, because real lending interest rate is the result of nominal lending interest rate minus inflation rate. If the price level expected to increase by 1%, it will result to decrease in bank credit provision to private sector by Birr 4.32 billion in short-run.

Error correction mechanism (ECM): The result of error correction model is given in table 4.4 demonstrate that the lagged error correction term ECM_{t-1} is negative and highly significant as expected. Its coefficient of ECM_{t-1} (-0.757) shows a rapid adjustment process and dictates that the disequilibrium of the previous period shocks is adjusted in to long-run equilibrium in the current period.

Banking reform: Another factor which can affect the bank credit to private sector is financial liberalization reforms. Ethiopia adopted these reforms in 1994 to promote the financial sector. To capture the impact of financial liberalization reforms on bank credit to private sector, the study estimates models incorporating a dummy variable having value 1 from 1993/94 to 2010/11 and 0 otherwise. The results do not exhibit some

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[3] BCr is in natural log form while RLIR is in the level form. An anti-natural log of the coefficient of RLIR, which is 0.041396, is 1.043

different patter. The long and short-run results do not provide strong support of the influence of financial sector reform on private credit. This suggests that there is more to be done by government in terms of liberalizing their financial sectors further.

Finally, this study performs a number of diagnostic tests to the ECM. The results of those diagnostic tests proofed that the model has not serial correlation and heteroskedasticity (ARCH effect), the residual is normally distributed and the model has no omitted variables and the functional form of the model is well specified.

Figure 6.1 and 6.2 plot the results for CUSUM and CUSUMSQ tests. The plots of CUSUM and CUSUMSQ statistics well exist within the critical bounds, implying that all coefficients of short-run model (ECM) are stable. In other words, the results indicates that the absence of any instability of the coefficients because the plot of the CUSUM and CUSUMSQ statistic fall inside the critical bands of the 5% confidence interval of parameter stability.

5.   Conclusions and Recommendations

In Ethiopia commercial banks remain dominant in the banking system in terms of their shares of total assets and deposit liabilities. A major component of their total credits to the private sector are still on the increase in spite of the major constraints placed by the government regulations, institutional constraints and other macro economic factors. Some previous studies regarding determinants of bank credit in Ethiopia mainly focused on demand side factors. This study is an endeavor to examine empirically the determinants of bank credit growth to private sector at supply side. This study examines whether monetary policy variables, banking sector variable and macroeconomic variables play an important role in determining the bank credit growth to private sector. In general, the empirical result of this study support the loanable funds theory and the base line indicator of Imran and Nishat (2012) as well as other empirical study, except for the variables of reserve requirement and money supply. Therefore, both government and commercial banks should be aware of the facts that the environments in which they operate are important factors in the bank performance and behavior. Based on the study findings the researcher recommends the following points:

➢ Domestic deposit does not affect bank credit to privates sector in short-run. The reason may be that commercial banks do not generate sufficient deposit in short-period. Therefore, commercial banks in Ethiopia should focus on mobilizing more deposits by planning on how to attract and retain more deposits so as to further improve on their short-period lending performance. It can be also achieved if banks expand new branches in rural areas and introduce new and fast banking innovations or technology to attract and retain the customers.

➢ The findings of macroeconomic factors revealed that inflation negatively affect bank credit to privates sectors. As inflation increase, the purchasing power of money lodged in deposit accounts reduce to the extent that savers per force pay an inflation tax. Thus, Ethiopian government should be committed to maintain a low and stable inflation rate, because higher inflation rate fluctuations will lead to macroeconomic instability. So maintaining macroeconomic stability is crucial in making commercial banks to grow their credit to private sector. In addition government should gear its effort towards reducing inflation in order to arrest its negative impact on real interest rates.

➢ In Ethiopia broad money as percentage of GDP has influence the growth of bank credit to private sector inversely. Broad money in Ethiopia comprises money in circulation, demand deposit, time and saving deposit. Many studies found that higher broad money (money in circulation) can cause inflation in the country. Therefore, the monetary authority should focus more on control the broad money to stabilize inflation.

➢ National Bank of Ethiopia's capacity in controlling and guiding the activities of financial institutions and financial intermediaries should be strengthened and must be in the proper way to control the inflation rate and enhance the economic growth.

➢ The effect of banking reform has no positive effect on the growth of bank credit to private sector because there is more need of deregulation of interest rate ceiling. This rate has been negative in the current years due to high inflation in Ethiopia. Therefore, the monetary authority should be doing more in banking sector liberalization by deregulating the interest rate ceiling so that saving could be mobilized to promote the availability of loanable funds for credit.

Finally, it is necessary for future research to focus on demand side of bank credit growth to private sector in addition to the supply side.

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Figure 6.1: Plot of CUSUM Test for equation (3)
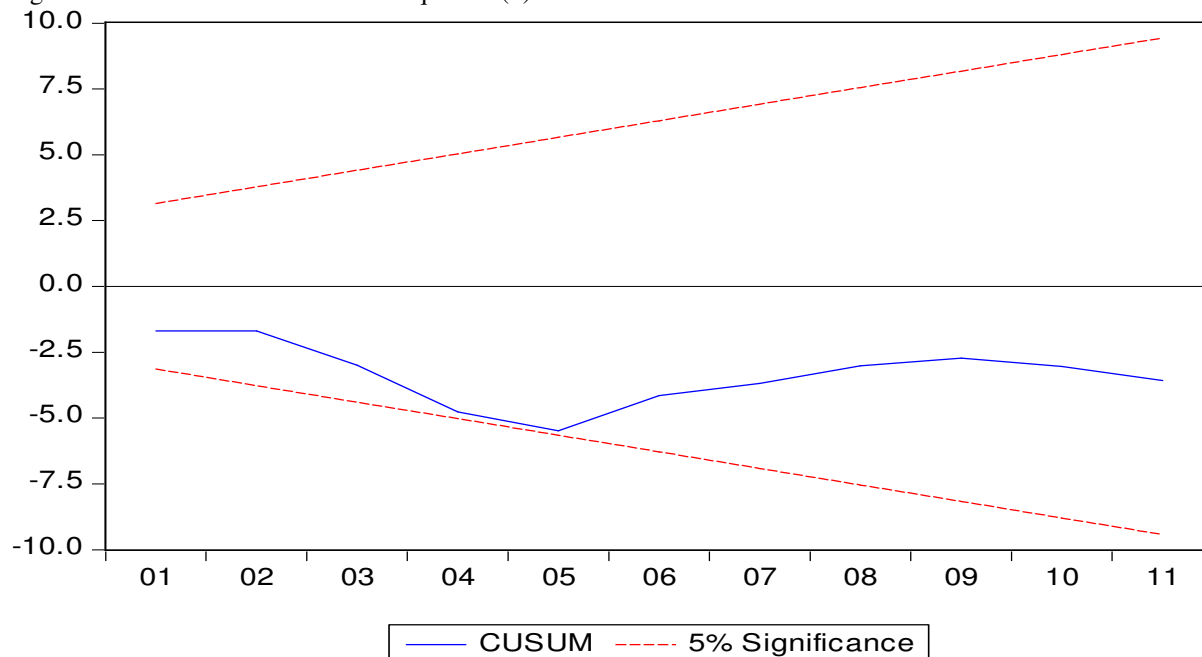
Source: Author's Computation using EVIEWS software (2013)
The straight lines represent critical bounds at 5% significance level.

Figure 6.2: Plot of CUSUMSQ Test for equation (3)
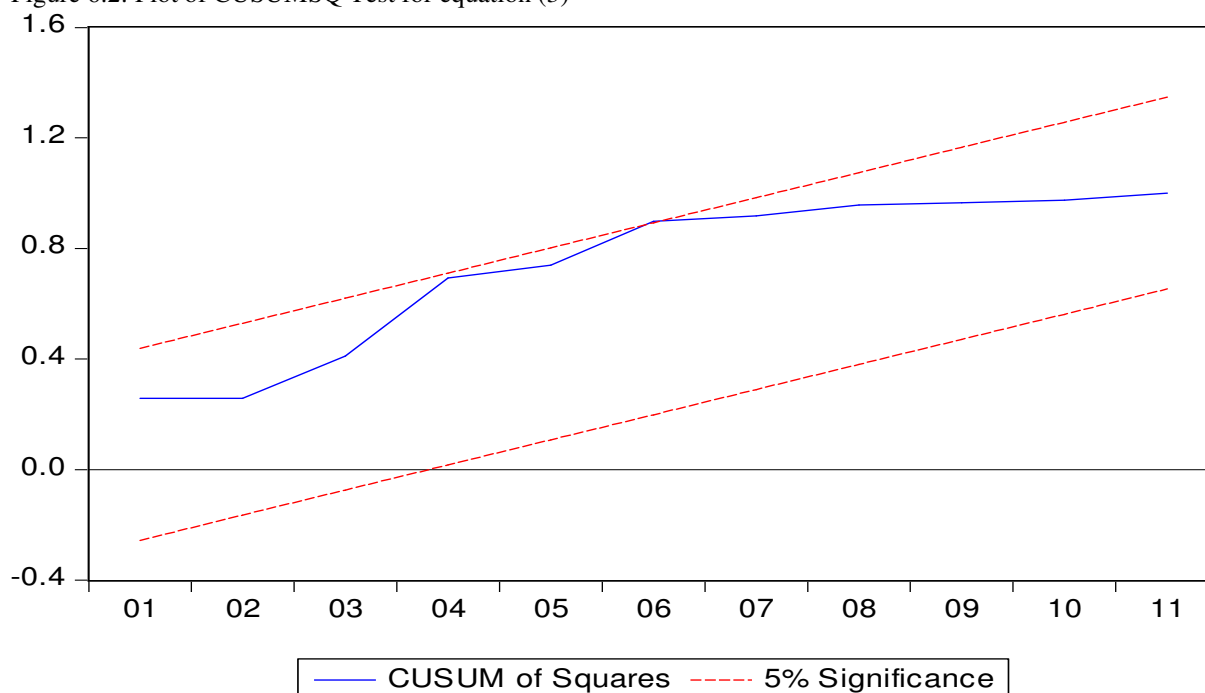
Source: Author's Computation using EVIEWS software (2013)
The straight lines represent critical bounds at 5% significance level.

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