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STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

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APPENDIX/ANNEXURE

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DOES BANK CREDIT CAUSE ECONOMIC GROWTH IN THE LONG-RUN? TIME-SERIES EVIDENCE FROM ETHIOPIA

K.SREERAMA MURTY
PROFESSOR & PRINCIPAL
COLLAGE OF ARTS & COMMERCE
ANDHRA UNIVERSITY
VISAKHAPATNAM

K. SAILAJA
ASST. PROFESSOR
DEPARTMENT OF ECONOMICS
ANDHRA UNIVERSITY
VISAKHAPATNAM

WONDAFERAHU MULUGETA DEMISSIE
RESEARCH SCHOLAR
DEPARTMENT OF ECONOMICS
ANDHRA UNIVERSITY
VISAKHAPATNAM

ABSTRACT

The issue of causal relationship between bank credit and economic growth is very crucial in a small open economy like Ethiopia especially during the global credit crisis. The objective of this paper is to examine the long-run relationship between bank credit and economic growth for the period 1971/72 – 2010/11 applying the Johansen cointegration analysis taking into account the maximum eigenvalues and trace statistics tests and Granger casualty tests, respectively. Bank credit is measured by credit to the private sector as a ratio of GDP. Economic growth proxied by Real GDP per capita income. The Augmented Dickey Fuller (ADF) and Phillips and Perron (PP) unit root tests indicate that the variables of the study are stationary in their first differences. The Johansen cointegration test suggests the existence of a significant long-run equilibrium relationship between bank credit and economic growth in Ethiopia. In the Vector Autoregressive (VAR) framework, the application of Granger Causality test provides evidence that there is a unidirectional causal relationship between bank credit and economic growth with the direction from bank credit to economic growth for Ethiopia Thus, the policy implication is that Ethiopia needs to give policy priority to promoting bank credit to the private sector to propel long-run economic growth..

KEYWORDS
Bank Credit, Economic Growth, Ethiopia, VAR model Model, Granger Casualty.

1. INTRODUCTION

Long-term sustainable economic growth depends on the ability to raise the rates of accumulation of physical and human capital, to use the resulting productive assets more efficiently, and to ensure the access of the whole population to these assets. Financial intermediation supports this investment process by mobilising household and foreign savings for investment by firms, ensuring that these funds are allocated to the most productive use, and spreading risk and providing liquidity so that firms can operate the new capacity efficiently.

The Ethiopian financial system, which is dominated by the banking sector, has gone through several changes in last few years. The financial sector was a highly regulated one prior to the onset of structural reforms in 1992. At that time all of the banks were government owned, interest rates completely regulated, a substantial portion of the credit was earmarked for priority sectors, and there was a flourishing unorganized market for credit. In 1992 Ethiopia adopted development strategies that prioritize the modernization of its financial systems to provide better financial services, and to increase its gross domestic product (GDP) growth rate. Since then, the country has implemented reforms policies in its financial systems within the context of structural adjustment proposed by the Bretton Woods institutions. These reforms ought to foster financial development through the reduction of governmental intervention in the financial sectors and participation of private banks in order to promote economic growth through higher mobilization of savings and increase in domestic and foreign investments.

However, little information is available about the activities of the financial industry and how they affect the economy where they operate. Specifically, the relationship between bank credit and economic growth has attracted little attention from researchers in Ethiopia. The position of the country makes it somehow important to see the contribution of the financial sector in stimulating growth within the economy. In essence, can we say that the financial institutions are well positioned to assist the economy in generating growth thereby improving the well being of the population? Thus, this paper is an attempt to fill such gap and stimulate ideas within this relatively under researched areas using time series data. Based on the aforementioned, it may be apt to state the research questions as follows:-

1) Is bank credit a significant instrument for generating economic growth in Ethiopia in the long-run?
2) Is there a long-run causal relationship between bank credit and economic growth in Ethiopia?

Therefore, looking at the importance of bank credit in Ethiopian economy, the main objective of this study is to investigate the long-run relationship between bank credit and economic growth in Ethiopia using the Johansen cointegration and Granger casualty tests.

The remainder of the paper proceeds as follows: Section two provide review of related literature. Then, the data and the specification of bivariate VAR model are described. The empirical results of Johansen cointegration and Granger causality tests are presented analytically and discussion issues resulted from this empirical study are developed in section four, while in the final section conclude the study.

2. REVIEW OF LITERATURE

The relationship between the size of a country's financial sector and its rate of economic growth has been the subject matter of research since last few decades. However, the empirical evidence on the impact of finance upon economic growth has been mixed and remained a debated subject. Central to this debate is the question of whether strong economic performance is finance-led or growth driven. The question is germane because the determination of the causal pattern between finance and growth has important implications for policy-makers' decisions about the appropriate growth and development polices to adopt. Keynes

(1930) as cited in Arestis (2005), in his '*A Treatise on Money*', argued for the importance of the banking sector in economic growth. He suggested that bank credit is the pavement along which production travels, and the bankers if they knew their duty, would provide the transport facilities to just the extent that is required in order that the productive powers of the community can be employed at their full capacity. In the same spirit Robinson (1952) as one of the initial supporters of the demand-following hypothesis argues that financial sector has minor effect on growth. Economic development creates demand for financial intermediates leading to growth in lending facilities of the credit institutions.

On the other hand, Schumpeter (1934) emphasized the importance of banks and credit in economic development as early as 1911. According to Schumpeter, banks channel savings to firms and entrepreneurs who offer feasible and profitable investment projects. By doing so, banks and financial institutions may affect economic growth and development. However, one should note that increased saving is not necessary in this view; supplying and allocating available savings more efficiently to firms and entrepreneurs might also spur economic growth (King and Levine, 1993; Bloch and Tang, 2003). Gurley and Shaw (1955) as the initial supporters of the supply-leading hypothesis underline the effects of financial system on macroeconomic growth.

Stiglitz and Weiss (1981) were the first to consider the importance of banks in allocating credit efficiently, particularly to new and innovative investments. A high risk premium would only encourage the riskier borrowers, as the higher the risk the higher the expected return from investment. The expected return of the borrowers is an increasing function of the riskiness of their projects. This fact would discourage less risky investments from taking place, although they could be more productive (selection effect). Safe borrowers, which deal with banks only, will be left with no other choice. At times of high interest rates, investors would favour investments with a high probability of default (incentive effect). Reducing opportunities to innovate will have a negative impact on economic growth in the long run.

There is a substantial literature on the role of credit market frictions for economic growth (e.g. Greenwood and Jovanovic, 1990 and Bencivenga and Smith, 1991). Their common view is that a higher level of financial activity spurs economic growth. They also stressed the financial sector in an economy can be important in determining the average productivity of capital, itself being one of the main channels of economic growth. The screening and monitoring of investment projects, which the financial system routinely engages in, are likely to help boost the efficiency of investment (Pagano, 1993). Fry (1995) also demonstrates that the development of financial system has positive effects on (i) the long-run rate of economic growth or (ii) the volume or efficiency of investment However, the causal nature of this relationship is now known to exhibit considerable variation across countries, which indicates that institutional factors or policies may play a critical role in determining how the process of financial development affects economic growth in a given country (Arestis and Demetriades, 1997).

King and Levine (1993) use bank credit to the private sector as one of the measures of bank development for several countries and find that bank based financial structure development can spur economic growth in the long run. However, some economists still would argue that finance and growth are unrelated. A good example of this view is Lucas (1988) who argues that economists `badly over-stress' the role of the financial system, thereby reinforcing the difficulties of agreeing on the link and its direction between finance and growth. Khan and Senhadji (2000) also used domestic credit to the private credit as a share of GDP as one of the variables to measure financial depth in their study of financial development and growth relationship in 159 countries over the period 1960-1999 and found that it has statistically significant affect economic growth. Further Levine, (2002) shows that the impact of bank credit on economic growth acts mainly through total factor productivity rather than through capital accumulation or savings rates and concludes that 'maybe Schumpeter was right'. He also emphasized the critical importance of the banking system in economic growth and highlight circumstances when banks can actively spur innovation and future growth by identifying and funding productive investments.

A somewhat different conclusion, albeit supportive for the general direction of the argument is that of Aghion et al (2005) who claim that financial development explains whether there is convergence or not but it does not exert a direct effect on steady-state growth. An increasing number of recent contributions including, Beck and Levine (2004), Loayza and Rancière (2006), and Saci et. al (2009) have also provided evidence (for a variety of sample periods, sample of countries and techniques) in favour of a negative (and significant) impact of banking sector activity upon economic growth in the short-term, although the impact becomes positive and significant in the long run. Beck and Levine (2004) initially constructed a panel with data averaged over five-year intervals over the period 1986-1998 for 40 countries. The averaging was aimed at removing the effect of the business cycle. This study found that both financial markets and banks did indeed play a positive and significant role in influencing economic growth, even when selected control variables were added to the model. However, the relationship between financial variables and economic growth broke down, in particular for the banking variable when using annual data. They tentatively suggested that this was due to "credit surges" that had also been found to be good predictors of banking crises and subsequent economic slowdowns.

In a recent paper, Loayza and Rancière (2006) empirically investigated and provided supportive evidence to Beck and Levine (2004) in this apparent debate. They empirically proved that the relationship between financial variables and economic growth (measured by the rate of growth of GDP per capita) is significant and positive only in the long-run using a model with domestic credit by banks and other financial institutions as a percentage of GDP as their financial development variable and a number of other well established control variables (always included in cross-section study). The technique they adopted was a panel error-correction model that allows the estimation of both short and long-run effects from a general Autoregressive Distributed Lags (ARDL) model. Their sample consisted of annual data with 75 countries over the period 1960-2000. Saci et.al (2009) estimated the relationship for 30 developing countries with annual data over the period 1988-2001 applying two-step GMM. They found that domestic credit by banks and other financial institutions as a percentage of GDP has a significantly negative coefficient with stock market traded value over GDP. When stock market traded value over GDP is replaced by, stock market turnover ratio, the effect of domestic credit by banks and other financial institutions as a percentage of GDP became insignificant. However, in each case the effect of the stock market variables on growth is positive and significant.

A Granger Causality test designed by Mishra et.al (2009) to test credit market development and economic growth reveals that the direction of causality run from credit to the private sector to economic growth in India for the period of 1980-2008. In other words they provide evidence in support of the fact that credit market development spurs economic growth. However, the findings of Pradhan (2009) provides evidence for a bidirectional causality between economic growth and bank credit in India using monthly data set for the period 1993 - 2008. Unlike Mishra et.al (2009), who use annual time series data on real GDP and credit to the private sector as a ratio of nominal GDP in their analysis, the empirical investigation of Pradhan (2009) uses the index of industrial production as a proxy for economic growth (for monthly data for GDP is not available) and bank credit, as a measure of economic growth and credit market development, respectively. But nothing is mentioned whether bank credit represents total bank credit or bank credit to the private sector only in the later work.

Vazakidis and Adamopoulos (2009) investigated the relationship between credit markets development and economic growth in Italy for the period 1965-2007 using Vector Error Correction Model (VECM). The empirical results indicated that economic growth had a positive effect on credit market development, while inflation rate had a negative effect. Bank development was determined by the size of bank lending directed to private sector at times of low inflation rates leading to higher economic growth rates. The study by Dişbudak (2010), which examine the relationship between financial development and economic growth in Turkey for the period 2001-2008 using the ARDL technique indicates that a higher level of bank credit has caused economic growth between 1961 and 2002 in Turkey, but it has inversely worked between 2003 and 2008.

In Africa, the most recent studies about the subject include the Ghirmay (2004), Agbetsiafe (2004), Abu-Bader and Abu-Qarn (2008), Baliamoune-Lutz (2008), Atindehou et.al (2005), Odhiambo (2007), and Esso (2010). As it is elsewhere, there is no consensus on direction of causality between financial development and economic growth. For example, the results by Ghirmay (2004) provided evidence in support of finance-led growth in eight out of the thirteen Sub-Saharan countries investigated. In the same way, Agbetsiafe (2004) found unidirectional causality running from financial development to economic growth in seven African countries lending credence to finance-led growth hypothesis. Abu-Bader and Abu Qarn (2008) equally provided evidence in support for finance-led growth in Egypt, Morocco, and Tunisia. However, Odhiambo (2007) found conflicting results for three Sub-Saharan African countries investigated. He found evidence in support of demand-following hypothesis in Kenya and South Africa while in Tanzania the supply-leading hypothesis was supported. Similarly, Baliamoune-Lutz (2008) obtained mixed results for North African countries. Atindehou et al (2005) however, found weak causal relationship in almost all the twelve West African countries included in their study.

Esso (2010) examine the cointegrating and causal relationship between financial development and economic growth in the ECOWAS countries for the period 1960 - 2005. The study uses real gross domestic product per capita and credit to private sector as a ratio of GDP as a measure for economic growth, and financial development, respectively. The results show that there is a long - run relationship between financial development and economic growth in five countries, namely, Cape Verde, Cote d'Ivoire, Ghana, Guinea and Liberia. In addition, the Granger casualty results provide evidence that GDP per capita significantly causes financial development in Cote d'Ivoire (demand following hypothesis) while financial development 'leads' economic growth in Ghana, Guinea, Liberia and Mali. There is bidirectional causality in the case of Cape Verde and Sierra Leone

3. DATA AND METHODOLOGY

The data that are used in this study are annual time series data spanning the period from 1972 to 2011 for Ethiopia regarding 1999/2000 as a base year. All the data were obtained from the Ministry of Finance and Economic Development (MoFED), National Bank of Ethiopia (NBE) Macro database (2010/11) on Ethiopian economy, and International Monetary Fund (IMF)- (2012) CD-ROM.

This study adopts the Vector Autoregressive Model (VAR) to estimate the direction of causality between credit market development and economic growth in Ethiopia. To this end, we used the log of credit to private sector to gross domestic product (GDP)[1]. According to (Shan and Jianhong, 2006), credit to private sector ratio is an appropriate measure of financial development because it is associated with mobilizing savings to facilitating transactions, providing credit to producers and consumers, reducing transaction costs and fulfilling the medium of exchange function of money. This ratio stresses the importance of the role played by the financial sector, especially the deposit money banks, in the financing of the private economy. It isolates credit issued to the private sector from credit issued to governments, government agencies, and public enterprises. Also, it excludes credits issued by the Central Bank (Levine et al, 2000 and Vazakidis, 2006). The underlying assumption is that credit provided to the private sector generated increases in investment and productivity to a much larger extent than the credits to the public sector. It is also argued that loans to the private sector are given under more stringent conditions and that the improved quality of investment emanating from financial intermediaries' evaluation of project viability is more significant for private sector credits (Levine and Zervos, 1998). Following, the study by Esso, (2010) we used the log of real GDP per capita income as a measure of economic growth. Thus, the VAR model is given as follows:

$$\ln RGDPY_t = \alpha_0 + \beta_1 \ln PBC_{t-i} + \varepsilon_t \quad \text{---------- (1)}$$

Where, $RGDPY$ is real GDP per capita income as a proxy for economic growth and PBC is bank credit to private sector as a percentage of GDP in Ethiopia. Both $RGDPY$ and PBC variables are expressed in national currency. $\alpha, \beta,$ and ε_t are the drift term, estimated coefficients, and the error term, respectively. In this study, PcGive 12.0 econometrics software is for regression estimation.

3.1. STATIONARY TEST

The pre-requisite of cointegration test is the stationarity of each individual time series over the sample period. The conventional Granger causality (Granger, 1988) test based on VAR is very conditional with respect to stationarity of the variables. Hence, if the time series are non-stationary, the stability condition of VAR is not met, implying that the test statistic of Granger causality is invalid. In this case, cointegration and Vector Error Correction Model (VECM) are recommended to investigate the relationship between non-stationary variables. So the first and prime condition of VAR process is to test the stationarity of the variables. The modelling procedure of unit root test of the series at their level is described as follows:

$$\Delta Y_t = \alpha_0 + \alpha_2 Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad \text{---------- (2a)}$$

Where Y is the variable of choice; Δ is the first- difference operator; α_i (for i = 1 and 2) and δ_i (for $i = 1,2,\ldots, p$) are constant parameters; and ε_t is a stationary stochastic process. p is the number of lagged terms chosen by Akaike Information Criterion (AIC) to ensure that ε_t is white noise. The hypotheses of the above equation form are:

$H_0 : \alpha_2 = 0$, i.e., there is a unit root – the time series is non-stationary.

$H_1 : \alpha_2 \neq 0$, i.e., there is no unit root – the time series is stationary.

If the calculated ADF test statistic is higher than McKinnon's critical values, then the null hypothesis (H_0) is accepted this means that a unit root exists in Y_{t-1} and ΔY_{t-1}, implying that the series are non-stationary or not integrated of order zero, i.e., I(0). Alternatively, the rejection of the null hypothesis implies stationarity of the underlying time series. Failure to reject the null hypothesis leads to conducting the test on the difference of the time series, so further differencing is conducted until stationarity is achieved and the null hypothesis is rejected (Harris, 1995). Hence, in order to determine the order of integration of a particular series, equation (2a) has to be modified to include second differences on lagged first and k lags of second differences. This is as follows:

$$\Delta^2 Y_t = \psi_1 \Delta Y_{t-1} + \sum_{i=1}^{p} \theta_i \Delta^2 Y_{t-i} + \xi_t \quad \text{---------- (2b)}$$

In this case, the hypotheses to be tested are:

$H_0 = \psi_1 = 0$, i.e., there is a unit root – the time series is non-stationary.

$H_1 = \psi_1 \neq 0$, i.e., there is no unit root – the time series is stationary.

If the time series are stationary in their first differences(that is $\psi_1 \neq 0$), then they can be said integrated of order one, i.e., I (1); if stationary in their second differences, then they are integrated of order two, i.e., I(2). To test for stationarity, the Augmented Dickey Fuller (ADF) [Dickey and Fuller, 1981] and Phillips and Perron (PP) [Phillips and Perron, 1988] tests are applied to equations (2a) and (2b).

[1] The measures of bank credit used in this study address the stock-flow problem of financial intermediary balance sheets items being measured at the end of the year, while nominal GDP is measured over the year. To circumvent any inconsistency when employing a ratio of a stock and a flow variable, a number of authors have attempted to deal with this problem by calculating the average of the financial development measures in year t and $t-1$ and dividing by GDP in year t (King and Levine 1993).

3.2. COINTEGRATION TEST

The necessary criterion for stationarity among non-stationary variables is called cointegration. Testing for cointegration is necessary step to check if our modelling empirically meaningful relationships (Gutierrez et.al, 2007). In financial economics, two variables are said cointegrated when they have long-term, or equilibrium relationship between them (Engle and Granger, 1987). Thus, in this study Johansen (1988) cointegration analysis has been performed to investigate long term relationship between bank credit and real economic growth in Ethiopia. The purpose of the cointegration test is to determine whether a group of non-stationary series is cointegrated or not. The vector autoregressive (VAR) model as considered in this study is:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_p Y_{t-p} + BX_t + \varepsilon_t \quad \text{---------- (3)}$$

Where Y_t is a k -vector of non-stationary I(1) endogenous variables; X_t is a d -vector of exogenous deterministic variables; $A_1 \ldots A_p$ and B are matrices of coefficients to be estimated and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right hand side variables. Since most economic time series are non-stationary, the above stated VAR model is generally estimated in its first-difference form as:

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + BX_t + \varepsilon_t \quad \text{---------- (4)}$$

Where, $\Pi = \sum_{i=1}^{p} A_i$ and $\Gamma_i = -\sum_{j=i+1}^{k} A_j$

Granger's representation theorem asserts that if the coefficient matrix Π has reduced rank $r < k$, then there exist kxr matrices α and β each with rank r such that The method states that if Π matrix has reduced rank $r < k$, then there exists kxr matrices of α and β each with rank r such that $\Pi = \alpha\beta'$ and $\beta' Y_t$ is $I(0)$. r is the number of co-integrating relations (the co-integrating rank) and each column of β' is the co-integrating vector and α is the matrix of error correction parameters that measures the speed of adjustments in ΔY_t . The Johansen approach to cointegration test is based on two test statistics, viz., the trace test statistic, and the maximum eigenvalue test statistic, as suggested by Johansen (1988) and Oseterwald Lenum (1992).

Trace Test Statistic: The likelihood ratio statistic (LR) for the trace test (λ_{trace}) as suggested by Johansen (1988) can be specified as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{k} \log(1 - \hat{\lambda}_i) \quad \text{---------- ---------- (5a)}$$

Where, $\hat{\lambda}_i$ is the i^{th} largest eigenvalue of matrix Π and T is the number of observations. In the trace test, the null hypothesis is that the number of distinct cointegrating vector(s) is less than or equal to the number of cointegration relations (r). In this statistic λ_{trace} will be small when the values of the characteristic roots are closer to zero.

Maximum Eigenvalue Test: The maximum eigenvalue test as suggested by Johansen (1988) examines the null hypothesis of exactly r cointegrating relations against the alternative of $r+1$ cointegrating relations with the test statistic:

$$\lambda_{\max}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \quad \text{---------- ---------- (5b)}$$

Where $\hat{\lambda}_{r+1}$ is the $(r+1)^{th}$ largest squared eigenvalue. In the trace test, the null hypothesis of $r = 0$ is tested against the alternative of $r+1$ cointegrating vectors. If the estimated value of the characteristic root is close to zero, then the λ_{trace} will be small.

An important aspect of empirical research based on VAR is the choice of the lag order, since all inference in the VAR model depends on the correct model specification. The most common traditional information criteria being the Akaike Information Criteria (AIC), Schwarz Criterion (SC), Hannan and Quinn's (HQ) and the likelihood ratio (LR). As a result, since Johansen's cointegration tests are very sensitive to the choice of lag length, the optimal lags required in the cointegration test were chosen using the AIC.

3.3. VECTOR ERROR CORRECTION MODEL (VECM)

Since the variables included in the VAR model are found to be cointegrated, the next step is to specify and estimate a vector error correction model (VECM) including the error correction term to investigate dynamic behaviour of the model. Once the equilibrium conditions are imposed, the VEC model describes how the examined model is adjusting in each time period towards its long-run equilibrium state. The dynamic specification of the model allows the deletion of the insignificant variables, while the error correction term is retained. The final form of the vector error-correction model (VECM) was selected according to the general to specific methodology suggested by Maddala, (1992), and Harris (1995).The size of the error correction term indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium state (Engle and Granger, 1987). The general form of the vector error correction model (VECM) is the following one:

$$\Delta \ln RGDPY = \alpha_0 + \sum_{i=1}^{k} \beta_1 \Delta \ln RGDPY_{t-i} + \sum_{i=1}^{k} \beta_2 \Delta \ln PBC_{t-i} + \gamma ECT_{t-1} + \varepsilon_t \quad \text{------(6)}$$

Where Δ is the first difference operator, ECT_{t-1} is the error correction term lagged one period, γ is the short-run coefficient of the error correction term $(-1 < \gamma < 0)$, ε_t is the white noise term.

3.4. LONG-RUN GRANGER CASUALTY TEST

This study uses Granger Causality test for testing the causality between bank credit and economic growth in Ethiopia in the long-run. The Granger procedure is selected because it consists the more powerful and simpler way of testing causal relationship (Granger, 1986). This test in the VAR framework formulates the null and alternative hypotheses as:

H_0 : No causal relation between bank credit and real economic growth

H_1 : There is causal relationship between bank credit and real economic growth

The above hypotheses are tested in the context of the VAR of the form:

$$\ln RGDPY_t = \alpha_1 + \sum_{i=1}^{p} \beta_i \ln RGDPY_{t-i} + \sum_{i=1}^{p} \delta_i \ln PBC_{t-i} + \varepsilon_{1t} \quad \text{---------- (7a)}$$

$$\ln PBC_t = \alpha_2 + \sum_{i=1}^{p} \lambda_i \ln PBC_{t-i} + \sum_{i=1}^{p} \psi_i \ln RGDPY_{t-i} + \varepsilon_{2t} \quad \text{---------- (7b)}$$

where $RGDPY$ is the dependent and PBC is the explanatory variable in log form and ε_t is the white noise error term in (7a) while PBC is the dependent and $RGDPY$ is the explanatory variable in (7b). Moreover, t is the sample size and p is the lag length of the unrestricted VAR model. According to Seddighi et al. (2000: 310), there exists a_unidirectional causality if only $\{\delta_{11}, \delta_{12}, ..., \delta_{1k}\} \neq 0$) and $\{\psi_{21}, \psi_{22}, ..., \psi_{2k}\} \neq 0$ in equation (7a) and (7b) and bi-directional causality if both $\{\delta_{11}, \delta_{12}, ..., \delta_{1k}\} \neq 0$ and $\{\psi_{21}, \psi_{22}, ..., \psi_{2k}\} \neq 0$ in the two equations, respectively.

4. RESULTS AND DISCUSSION

Before applying the unit root tests the logarithm of variables are taken because log variables give us elasticises and reduce the impact of outliers and smoothes out the time series (Maddala, 1992). A necessary but not sufficient condition for cointegration is a test for unit root. Hence, prior to conducting the long run estimation among variables concerned, we examined the time series characteristics of the data using ADF test and PP test to all the variables in levels and in first difference. The results of ADF test summarized in Table 1 shows show that the null hypothesis of the presence of a unit root is rejected for all the variable of study when they are transformed into their first differences. That is, the variables are stationary and integrated of order one, i.e., I(1). Thus, if the variables are *I*(1), then Johansen cointegration test is used to find out whether there exist a long-run relationship between the variables or not. The linear combination of *I*(1) variables will be stationary if variables are cointegrated (Vuranok, 2009).

TABLE 1: UNIT ROOTS TEST RESULTS WITHOUT TREND

Variables	ADF Statistics		PP Statistics		Inference
	Level	Difference	Level	Difference	
$\ln RGDPY$	0.1666	-3.901**	0.8733	-3.794**	I(1)
$\ln PBC$	-2.609	-3.708**	0.2098	-3.688**	I(1)

Note: *ADF: Augmented Dickey Fuller Test; PP: Phillips-Perron Test; I (1): Integrated of order one; **: Indicates Statistical Significance at 1% significance level, and other notations are defined earlier*

Since it has been determined that the variables under study are integrated of order one, then the Johansen cointegration test is performed to see whether there exists a long-run equilibrium relationship among the variables included in the model. The testing hypothesis is the null of non-cointegration against the alternative of existence of cointegration. It is well known that Johansen's cointegration tests are very sensitive to the choice of lag length. Given this type of asymmetric lag structure in the VAR, we have computed the information criteria statistics for every possible combination of lag lengths in order to determine the lag structure of the VAR. The lag structure that generates the minimum AIC is selected as the optimal lag structure (see Annex 1). As can be seen from Annex 1, the AIC suggest that the optimal lag length should be 7 $(p = 7)$ as opposed to lag 2 as suggested by LR, SC, and HQ information criteria (see Appendix 1).

The results of the Johansen's Cointegration test are shown in Table 2. The cointegration vector of the model of Ethiopia has rank $r < n(n = 2)$. The process of estimating the rank r is related with the assessment of eigenvalues, which are the following for Ethiopia:

$$\hat{\lambda}_1 = 0.655168, \hat{\lambda}_2 = 0.16018$$

The table also indicates that the critical values for the trace statistic defined by equation (7a) are 15.7 for $H_0 : r = 0$, and 9.2 for $H_0 : r \leq 1$, while critical values for the maximum eigenvalue test statistic defined by equation (7b) are 20.0 for $H_0 : r = 0$ and 9.2 for $H_0 : r \leq 1$ both at the significance level 5%.

TABLE2: THE JOHANSEN COINTEGRATION TEST BETWEEN LRGDPY, AND LPBC (VAR=7)

Testing hypothesis	Country: Ethiopia			
	Johansen Test Statistics			
	λ_{trace}	Critical value (5%)	$\lambda_{\max}$	Critical value (5%)
$H_0 : r = 0 \quad \& \quad r = 1$	40.9**	15.7	35.14**	20.0
$H_0 : r \leq 1 \quad \& \quad r = 2$	5.761	9.2	5.761	9.2

Note: *r indicates the number of cointegrating relationships; CV: Critical values. **: Indicates Statistical significance at 1%.*

The Trace test indicates the existence of one cointegrating equations at 1% level of significance. Moreover, the maximum eigenvalue test makes the confirmation of this result and hence the two variables included in the study – real GDP per capita and domestic bank credit to the private sector to GDP ratio have long-run or equilibrium relationship among them. Thus, the number of statistically significant cointegration vectors for Ethiopia is equal to one and the estimated cointegration relationship is:

$$\ln RGDPY = 8.7020 + 0.74469 \ln PBC$$

t-prob. [0.0001]*** [0.0000]***

The estimated equation shows that an increase in bank credit to the private sector boosts real GDP per capita income significantly in the long-run (see Appendix 2 for the computation of the t-probability). Moreover, the magnitude of the estimated coefficients is quite large indicating that bank credit strongly determines the magnitude of real economic growth in the long-run. The existence of a cointegrating relationship between bank credit and economic growth for Ethiopia suggests that there must be causality between these variables in at least one direction in the long-run.

The error-correction model with the computed t-values of the regression coefficients is reported in Table 3. The dynamic specification of the model allows the deletion of the insignificant variables, while the error correction term is retained. The results reveal that the coefficient of bank credit to the private sector is significant in affecting real GDP per capita income growth. From the short-run supply elasticity of bank credit in Table 3 we can see that a short-run increase of bank lending to the private sector by 1 percent induces an increase in economic growth by about 0.08 percent in Ethiopia. However, unlike in the long-run, the magnitude of private bank credit coefficient is quite small and insignificant indicating that bank credit partially determines the magnitude of real economic growth in the short-run. Likewise, the estimated coefficient of the saved residual from the Johansen cointegration estimation (ECT_{t-1}) was statistically significant and has a negative sign and its magnitude is not greater than unity, which confirms that there is not any problem in the long-run equilibrium relation between the independent and dependent variable at 5% level of significance, but its relatively value about (-0.04) for Ethiopia. The speed of adjustment implies that 3.8 percent of the disturbance in the short-run will be corrected each year.

TABLE 3: VECTOR ERROR CORRECTION MODEL

Dependent variable: $\Delta \ln RGDPY$
Sample: 1971/72 – 2010/11
Adjusted Sample: 1978/79 – 2010/11

Independent variables	Coefficient	Std.Error	t-value	t-prob
Constant	-0.029017	0.027746	-1.046	0.3043
$\Delta \ln RGDP_{t-1}$	0.35741	0.162290	2.202	0.0358
$\Delta \ln PBC_{t-4}$	0.07977	0.07552	1.060	0.3000
ECT_{t-1}	-0.03805	0.104143	-2.737	0.0105

R^2 =0.165779 F(3,28)=5.5316 [0.0020] \sigma 0.0609442 DW = 1.73
RSS = 0.103997616 for 4 variables and 32 observations

Model Diagnosis Tests

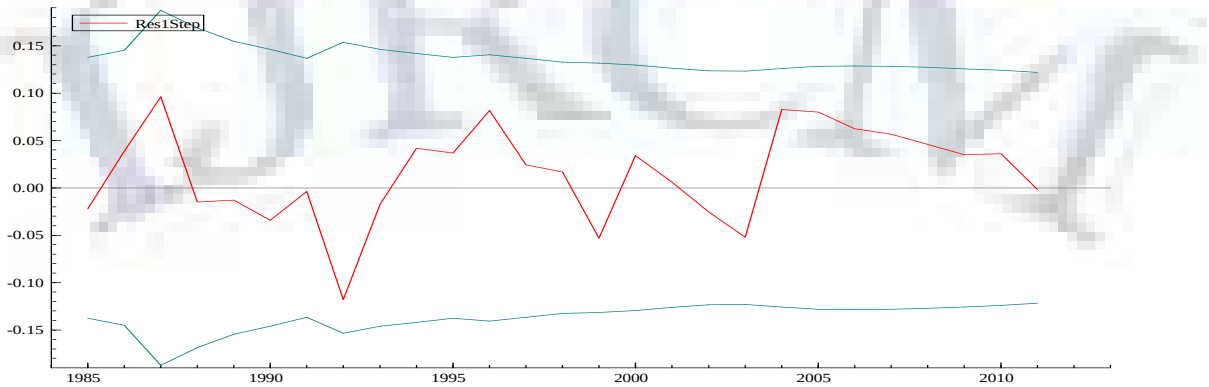
AR 1-2 test: F(2,26) = 1.8777 [0.1731]
ARCH 1-1 test: F(1,26) = 0.16164 [0.6909]
Normality test: Chi^2(2) = 4.5128 [0.1047]
hetero test: F(6,21) = 0.28506 [0.9375]
hetero-X test: F(9,18) = 0.27026 [0.9750]
RESET test: F(1,27) = 0.032086 [0.8592]

Note: Δ *denotes the first differences of the variables;* R^2*: Coefficient of multiple determinations adjusted for the degrees of freedom (df); DW: Durbin-Watson statistic*

The coefficient of determination (R^2), indicate that about 16 percent of the real GDP per capita is explained by credit to the private sector included in the regression. The overall significance, F-test, also established all variables are jointly significantly different from zero at 1% significance level. Moreover, the bivariate system diagnostic test of the residuals (shown in the lower block of Table 3) also indicates the VECM have the desirable property of OLS. For instance, the LM test for serial autocorrelation does not provide any indication of the presence of serial correlation in the residual of real per capita income function. The result of hetroscedasticity test of the residuals also does not show evidence for autoregressive conditional hetroscedastic errors. This indeed is not surprising, since hetroscedasticity is not much problem in time series (Green, 1997).The Jarqu-Bera tests of skewness and kurtosis of the residuals revealed normality implying the absence of outliers in the data. The REST test provides no indication that the functional form of the VECM is inappropriate.

In order to strengthen our analysis, the stability of the parameters in real GDP per capita income model was examined by applying the cumulative sum of squares (CUSUMQ) plots from a one-step recursive residuals graphical plot estimation of the model (see Figure 1). The figure indicates that the null hypothesis of parameter stability cannot be rejected since the plot bounds within the 95% critical boundaries. This test indicates stability in the coefficients over the sample period at 5% level of significance.

FIGURE 1: PARAMETER STABILITY TEST: DIAGNOSTIC 1-STEP RESIDUALS +/- 2ND SE (CUSUM SQ)



In order to proceed to the Granger causality test and find the direction of causation between these two variables in the environment of VAR we used the lag length 7 as determined by Akaike Information Criteria (AIC). Table 4 presents the pairwise Granger-Causality test based on equation (7a) and (7b). The results show that the null hypothesis that private bank credit does not Granger cause real GDP is rejected at 1% level significance. However, the null hypothesis that real GDP does not Granger cause private bank credit cannot be rejected. The implication is that there is a unidirectional causal relationship between bank credit and economic growth with the direction from bank credit to economic growth for Ethiopia. The infers is that the growth of bank credit to the private sector

influences real GDP per capita growth in Ethiopia, but the reverse is not necessarily true. In other words, we can argue that economic growth in Ethiopia is caused by the expansion and improvement in financial sector in the long-run. Hence, the result that bank credit 'leads' economic growth in Ethiopia is consistent with the finance-led growth (or supply-leading) hypothesis previous studies by Odhiambo (2007) for Tanzania, Abu-Bader and Abu Qarn (2008) for Egypt, and Esso (2010) for Ghana, Guinea, Liberia and Mali.

TABLE 4: LONG-RUN GRANGER CAUSALITY TEST RESULTS

Pairwise Granger Causality Tests				
Date: 30/07/12 Time: 2:16				
Sample: 1978/79 – 2010/11				
Lags: 7				
Null Hypothesis:	Obs	F-Statistic	Probability	Decision
$\ln PBC$ does not Granger Cause $\ln RGDPY$	33	5.0229	0.0025	Reject
$\ln RGDPY$ does not Granger Cause $\ln PBC$		1.6043	0.1961	Accept

*Note: *The critical values of F for (8,32) degrees of freedom at 1%, and 5% and 10% levels of significance are 3.6353, and 2.9499 respectively.*

5. CONCLUSION AND POLICY IMPLICATIONS

In this study we investigate the long-run dynamics between bank credit and economic growth in Ethiopia using annual time series data over the period from 1971/72-2010/11. The estimation process starts with examining stationarity property of the underlying time series data. The unit root test has been applied for the same. The dynamic interactions between the variables are investigated using the concept of Granger causality after testing for cointegration using the Johansen techniques to detect whether there is long-run relationship between bank credit and economic growth or not.

The estimated results confirmed that bank credit to the private sector to nominal GDP and real GDP per capita are non-stationary at the level data but found stationary at the first differences. Hence, they are integrated of order one. The empirical results from the Johansen cointegration test suggest the existence of a stable long-run relationship between bank credit and economic growth. Moreover, bank credit has a significant positive impact on economic growth in the long-run. However, the estimated coefficients are small in magnitude in the short run, suggesting that the relationship between bank credit and economic growth is rather weak in the short-run. Finally, the Granger Casualty analysis in the VAR framework suggests that there is a unidirectional causal relationship between bank credit to the private sector and economic growth with direction run from bank credit to economic growth in Ethiopia. Thus, it can be inferred that bank credit to the private sector has a direct positive effect in long-run economic growth of Ethiopia. This conclusion is consistent with the 'finance - led' growth (or supply - leading) hypothesis previously obtained by Odhiambo (2007) for Tanzania, Abu-Bader and Abu Qarn (2008) for Egypt, and Esso (2010) for Ghana, Guinea, Liberia and Mali.

The policy implication of our result is that bank credit to the private sector is an important policy variable to accelerate economic growth. Hence, the government should undertake essential measures to strengthen the long run relationship between bank credit to the private sector and economic growth. These measures include among others minimizing government intervention in the financial systems, increasing the status of financial institutions, and strengthen banking and financial governance. The lack of same not only affects the finance-growth nexus but also overall socio-economic development in the country.

The robustness of this study, however, is delimited by the inter-play of human capital, liquid liabilities of banks, and macro-economic factors such as the rate of investment, inflation, government final consumption, and openness to trade. Hence, the scope for further empirical research is to include more variables in the VAR model aiming at examining the relationship between bank credit and economic growth in Ethiopia. More importantly, further study should focus on the transmission mechanism through which bank credit affects long-run economic growth. Moreover, more light should be shed on the comparative analysis of empirical results for the pre-reform and post-reform periods using quarterly data in order to draw lesson how financial liberalization measures promote rapid and sustainable economic growth in Ethiopia.

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APPENDIX

APPENDIX 1: LAG SELECTION CRITERIA

Lags	LogL	LR	AIC	SC	HQ
1	80.5227156	191.199921	-3.82168	-3.56575	-3.72985
2	89.6596168	197.498945	-4.19261	-3.76167	-4.03928
3	88.21422	193.215671	-4.01158	-3.40204	-3.79669
4	88.0530615	190.216636	-3.89184	-3.10008	-3.61549
5	88.4462606	187.771958	-3.79693	-2.81928	-3.45945
6	92.5512023	189.039023	-3.91478	-2.74756	-3.51672
7	102.788119	196.438062	-4.41140	-3.05094	-3.95365

Source: Authors computation

APPENDIX 2: FURTHER OUTPUT OF THE JOHANSEN COINTEGRATION TEST (VAR=7)

	standardized \beta' eigenvectors			**standardized \alpha coefficients**	
Variables	$\ln RGDPY$	$\ln PBC$	Constant	$\ln RGDPY$	$\ln PBC$
$\ln RGDPY$	1.0000	-0.74469	-8.7020	-0.43256	-0.050690
$\ln PBC$	8.1680	1.0000	-59.853	0.34832	-0.010322
Test of significance of beta coefficients					
General restriction:	LR test of restrictions, rank=1:Chi^2(1)				
&3=0;	28.472 [0.0000]**				
&4=0;	15.487 [0.0001] **				

Source: Authors computation

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Looking forward an appropriate consideration.

With sincere regards

Thanking you profoundly

Academically yours

Sd/-

Co-ordinator

ABOUT THE JOURNAL

In this age of Commerce, Economics, Computer, I.T. & Management and cut throat competition, a group of intellectuals felt the need to have some platform, where young and budding managers and academicians could express their views and discuss the problems among their peers. This journal was conceived with this noble intention in view. This journal has been introduced to give an opportunity for expressing refined and innovative ideas in this field. It is our humble endeavour to provide a springboard to the upcoming specialists and give a chance to know about the latest in the sphere of research and knowledge. We have taken a small step and we hope that with the active co-operation of like-minded scholars, we shall be able to serve the society with our humble efforts.

Our Other Journals