



ISSN: 0975-833X

RESEARCH ARTICLE

FINANCIAL DEEPENING AND ECONOMIC GROWTH IN GHANA: (A CO-INTEGRATION ANALYSIS)

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ARTICLE INFO

Article History:

Received 07th October, 2015

Received in revised form

18th November, 2015

Accepted 22nd December, 2015

Published online 31st January, 2016

Key words:

Cointegration, Financial Deepening,
Economic Growth, Ghana.

ABSTRACT

Ghana in 1986, as part of Structural Adjustment Program (SAP) implemented Financial Sector Adjustment Program (FINSAP), the financial sector reform programme was followed up with the Financial Sector Strategic Plan (FINSSP) in 2003. It became imperative to explore with the indices to find out whether these reforms have facilitated economic growth in Ghana. The main objective of the study was to investigate the significance of financial deepening on economic growth. The study developed an index for financial deepening following Abiad *et al.* (2010) and Bawumia (2010). The study adopted the Johansson Co-integration regression procedures with evidence suggesting financial deepening has a significant impact on economic growth, and also there is bi-directional causality between the official exchange rate and credit to the private sector for investment. This study therefore recommended policies should place emphasis on removal of any unnecessary restriction in the financial sector and deepening the reforms to promote economic growth.

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Citation: Samuel Kwaku Adjei, 2016. "Financial Deepening and Economic Growth in Ghana: (A Co-Integration Analysis)", *International Journal of Current Research*, 8, (01), 25736-25743.

INTRODUCTION

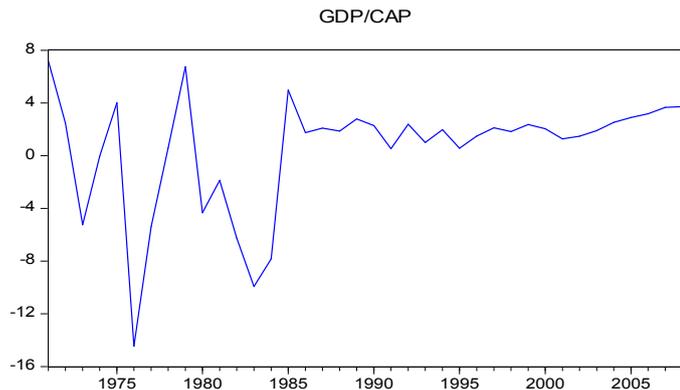
Financial Deepening measures the extent to which the financial sector and institution of a country are able to meet the financial needs of the economy with increased provision of financial services where wider choice of services are geared to all levels of society (Bawumia, 2010). The financial sector in Ghana has seen a significant change under various programmes adopted in the sector in Ghana from the pre-1998 reform period. The liberalization of the financial sector under Financial Sector Adjustment Programme (FINSAP) in 1988 resulted in an increase in the number of banks and non-banking financial institution in the economy with a significant increase in the private sector participation. The usual indicators of financial deepening include ratio of money supply to GDP (M2/GDP or M2+/GDP), the currency money supply ratio, and credit to the private sector as a share of GDP. Though there have been many reforms of the financial sector in Ghana there still remain a number of challenges in the financial sector; and these include, synchronization of the payment system, complex foreign exchange regime, inefficiencies in financial intermediation, crowding out of the private sector by government in the credit market, cash dominated payment system, high nominal interest rate spreads, large unbanked public, high level of uncertainties

and risks and other regulation passed under Financial Sector Strategic Plan (FINSSP), which are yet to realize its potential. The presence of these challenges in the economy irrespective of the reforms over the years will affect the private investment and impede the output levels of the economy though Ghana is touted to have achieved a remarkable financial liberalization over these years. The main aim of the study is to investigate the dynamic effect of financial deepening and its impact on sustainable economic growth and development in Ghana. Using trend analysis, the study discusses the impact of financial deepening on economic growth. In doing this, we placed emphasis on financial deepening, indicators such as broad money supply, private sector deposits to banks, credit to the private sector and the exchange rate. As shown in Figure 1, GDP per capita growth rate in Ghana has not generally shown an upward trend actually, and exhibited sharp fluctuating trend over the period under study particularly 1973-1985 and virtually taking a level trend 1985-2005. In spite of the fluctuations, GDP/capita growth rate averaged at 0.48 as the annual growth rate between 1971 and 2008, with a highest rate of 7.17 annual percentage growth from 1971 to 2008, notwithstanding the significant annual growth rate registered, there was a consistent reduction in Per capita GDP annual figures from 7.14 percent to -14.4 percent which was the lowest recorded during the period under study.

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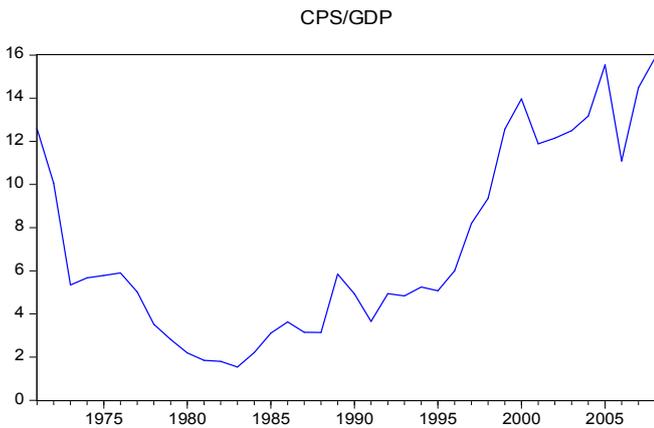
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As shown in Figure 2, credit to the private sector growth rate in Ghana has generally shown an upward trend like all the other indices; with fluctuating trend over time within the period under study. In spite of the fluctuations, credit to the private sector growth rate averaged at 7.12 percent as an annual growth rate between 1971 and 2008, with a highest rate of 15.88 annual percentage growth point from the same period, Notwithstanding the significant annual growth rate registered in credit to the private sector, there was a consistent reduction in the annual figures from the highest 15.88 percent to 1.54 percent which was the lowest recorded during the period under study.



Source: Author's estimates using data from World Bank WDI Database.

Figure 1. Trend Of Per Capital GDP Growth (1971-2009)



Source: Author's Calculations using data from World Bank WDI Database

Figure 2. Trend Exhibited in Credit to the Private Sector (1971-2008)

Literature Review

Various studies have shown that there is a strong and positive relationship between the financial sector and economic development. According to Porter (1966), the level of financial institution development is the best indicator of general economic development. Furthermore, Goldsmith (1969) contends that financial institution development is of prime importance for real development because the financial superstructure in the form of both primary and secondary securities accelerates economic growth and improves economic performance to the extent that it facilitates the migration of funds to the best user. A major determinant of the financial deepening in the economy is market determination of

the real interest rate and credit to the private sector for investment. A large body of empirical research supports the view that development of the financial system contributes to economic growth (Rajan and Zingales, 2003). Empirical evidence consistently emphasizes the nexus between finance and growth, though the issue of direction of causality is more difficult to determine. At the cross-country level, evidence indicates that various measures of financial development (including assets of the financial intermediaries, liquid liabilities of financial institutions, domestic credit to private sector, stock and bond market capitalization) are robustly and positively related to economic growth (King and Levine, 1993; Levine and Zervos, 1998). Other studies establish a positive relationship between financial development and growth at the industry level (Rajan and Zingales, 1998). Even the recent endogenous growth literature, building on 'learning by doing' processes, assigns a special role to finance (Aghion and Hewitt, 1998 and 2005).

The works of McKinnon (1973) and Shaw (1973) highlighted the adverse effects of "financial repression" on economic development. The theory of financial liberalization advocates the freeing up of financial markets to reverse the detrimental effects of financial repression. Financial repression is a regime consisting of the imposition of interest-rate ceilings, directed credit allocation policies, high reserve requirements, foreign exchange regulations, and heavy taxation of the financial sector. McKinnon (1973) and Shaw (1973) both argue that financial repression exerts a negative effect on saving, investment and the rate of economic growth. McKinnon's model stipulates that the higher the real rate of interest, the more willing the investor to accumulate real money balances before investing, while Shaw argues that the accumulation of financial capital is caused by higher real interest, mainly through an increase in the extent of financial intermediation. Both models argue that the removal of ceilings on deposits results in positive real interest rates, which increases saving, that is, the availability of funds for investment.

MATERIALS AND METHODS

Model Estimation Strategy

The study made use of annual time series data for the period 1971 – 2008 obtained mainly from the World Bank (World Development Indicators) and the Bank of Ghana Statistics. The estimation of models specified in the methodology. According to Ndebbio (2004), the effect of growth on these financial deepening variables can be derived from the aggregate production function specified below; The growth function is specified as follows:

$$Y=Af(K,L) \dots\dots\dots(1)$$

where:

Y = output; A = efficient parameter; and K and L are capital and labour employed, respectively.

In terms of growth rate, we have Equation (1) rewritten as:

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + \alpha_k \frac{\Delta K}{K} + \alpha_L \frac{\Delta L}{L} \dots\dots\dots(2)$$

But

$$\Delta K = I = \text{Investment} \dots\dots\dots(2^1)$$

Equation (1) can also be expressed as

$$\frac{\Delta Y}{Y} = YK \Delta K + YL \Delta L + YA \Delta A \dots\dots\dots (2^2)$$

Or equivalently we can have

$$\frac{\Delta Y}{Y} = (YK) * (\frac{\Delta K}{K}) + (YL/Y) * (\Delta L/L) + (YA * A/Y) * (\frac{\Delta A}{A}) \dots\dots\dots(3)$$

But

$$A = A(\text{FIND}, \text{FV})e^{at} \dots\dots\dots (4)$$

Where:

FIND = variable representing financial deepening Vector, as specified by Bawumia (2010)

FV = other explanatory variables such as exchange rate etc.

If we assume that the level of FD/Y and FV/Y affects the growth rate of efficiency, then equation can be appropriately written as

$$A = A_0 e^{1[\alpha_0 + \alpha_1 (\frac{FD}{Y}) + \alpha_2 (\frac{FV}{Y})]} \dots\dots\dots (5)$$

Following the rule

$\delta(X, Y) = Y * \delta X + X * \delta Y$, equation (5) can be rewritten as

$$\Delta A = [A \text{FIND} \Delta \text{FIND} + A \text{FV} \Delta \text{FV}] e^{at} + A(\text{FIND}, \text{FV}) a e^{at} \dots\dots(6)$$

Dividing equation 5 by A, will yield

$$\frac{\Delta A}{A} = (A \text{FIND} / Y) * (\Delta \text{FIND} / \text{FIND}) + (A \text{FV} / Y) * (\Delta \text{FV} / \text{FV}) + a \dots\dots\dots(7)$$

Then putting together equations (3) and (7) gives us an equation that is close to the one we intend to estimate, thus:

$$\frac{\Delta Y}{Y} = \alpha_0 + \alpha_1 (\frac{I}{Y}) + \alpha_2 (\frac{\Delta L}{L}) + \alpha_3 (\frac{\Delta \text{FIND}}{\text{FIND}}) + \alpha_4 (\frac{\Delta \text{FV}}{\text{FV}}) + \epsilon \dots\dots\dots (8)$$

For our purpose, variables representing other explanatory variables besides financial deepening (FIND) will be the exchange rate.

Rewriting Equation (8) and relating FD and FV, as the case may be, we have

$$\frac{\Delta Y}{Y} = \alpha_0 + \alpha_1 (\frac{I}{Y}) + \alpha_2 (\frac{\Delta L}{L}) + \alpha_3 (\frac{\Delta \text{FIND}}{\text{FIND}}) + \alpha_4 \text{EXCH} + \epsilon \dots\dots\dots (9)$$

This growth equation will have such explanatory variables as broad money supply as a percentage of GDP, Bank deposits as a percentage of GDP, Credit to the private sector as a percentage of GDP and the exchange rate which were used as

indicators for the degree of financial intermediation in the economy.

Model Specification

$$\text{GDPG} = f(\text{M2/GDP}, \text{BD/GDP}, \text{CPS/GDP}, \text{REXCH}) \dots\dots\dots(10)$$

Where:

M2/GDP= Broad money supply to GDP ratio

BD/GDP= Banks deposits to GDP ratio

CPS/GDP= Credit to the private sector ratio

OEXCH = Real exchange rate

The estimable econometric model in log-linear form can be formulated as;

$$\text{LnGDP} = \beta_0 + \beta_1 \text{LnM2/GDP}_t + \beta_2 \text{LnBDGDP}_t + \beta_3 \text{LnCPS/GDP}_t + \beta_4 \text{LnEXCH}_t + \epsilon_t \dots\dots\dots(11)$$

Equation (11) above represents the long run equilibrium relationship. (where $\beta_i = 1$ to 4) represents the elasticity coefficients, ϵ is the error term, t is time and Ln denotes natural logarithm. All the variables to be examined are in natural logarithm. The choice of the log-linear model was based on the premise that log transformation allows the regression model to estimate the percentage change in the dependent variable resulting from the percentage changes in the independent variables (Stock and Watson, 2007). The transformation also helps reduce the problem of heteroskedasticity in that it reduces the scale in which the variables are measured from a tenfold to a twofold, creating uniformity in measurement of variables (Gujarati, 1995).

The coefficient of both $\beta_1 - \beta_3$ are expected to be signed positive, indicating that if financial deepening improves in the economy, GDP growth rate should improve, all things being equal. Real exchange rate is the price of one currency in terms of another. The exchange rate is the real effective exchange rate from WDI. It is an index of the weighted-average foreign exchange value of the Ghanaian Cedis against foreign currencies of the major trading partners. The real exchange rate appreciation reduces exports since domestic exports become less competitive, ie, more expensive on the foreign market; Conversely, real exchange rate depreciation tends to increase exports volumes since domestic goods are now relatively cheaper, therefore the signing of β_4 is indeterminate apriori (Marrewijk, 2000). Arize et al. (2008) suggest that the multivariate analysis may lead to a precise analysis in order to capture the long run and short run relationships between the variables. Therefore, in order to capture these issues, the study applied both cointegration analysis and error correction model.

Unit Root Test

The study began the analysis by estimating the unit root test proposed by Dickey (1976), Fuller (1976). The well-known Augmented Dickey Fuller tests use a parametric autoregression to approximate the ARMA structure of the errors in the test regression. This helped to check the stationarity of the data,

otherwise ordinary least square may generate spurious results. The study used the Augmented Dickey-Fuller (ADF) test developed by [Dickey and Fuller \(1981\)](#) to find the unit root problem in data, which is an indication for non-stationarity of data.

The ADF test is based on the following general equation:

$$(1-L)Y_t = \alpha_0 + \mu Y_{t-1} + \sum_{i=1}^k \beta_i (1-L)Y_{t-i} + \epsilon_t \dots (12)$$

Where, L is a lag operator, t denotes time trend, and ϵ_t is a white noise error term. Y_t denotes the variables for which study is testing unit root problem. Y_{t-i} are the lagged values of variables of our study. β_i are the coefficients of lagged values of Y_{t-i} to capture the optimum lag length (k), k ensures that there is no correlation between error term and regressors of this equation. The equation is only with constant (α) and includes also time trend Y_t afterward along with the constant. ADF test checks the statistical significance of μ , if μ has statistically zero value then Y_t has unit root problem and is non-stationary. If μ is not statistically zero then there is not a problem of unit root and Y_t is stationary over time. Appropriate selection of lag order gives the reliable results of the analysis. On the other hand, if the selection of the lag order is not appropriate, then the results of the study will be biased and the residual can be serially correlated. In this paper, Schwartz Information Criterion (SIC) test was used to overcome the problem of the lag order which removes arbitrariness in choosing the maximum lag length in the test.

Co-integration Test

After the selection of the lag orders and the stationarity test of the variables, the co-integration of the variables is checked. [Johansen \(1991\)](#) co-integration test was conducted in order to check whether the selected variables were co-integrated following ([Khan, Sattar and Rehman, 2012](#)), estimation of co-integration equation. The test is based on the following equation of the VAR model.

$$X_t = \delta_1 X_{t-1} + \delta_2 X_{t-2} + \dots + \delta_k X_{t-k} + \epsilon \dots (13)$$

Where X_t is the vector of non-stationary I (1) variables; $\delta_1, \delta_2, \delta_k$ are the parameters; ϵ is the vector of random errors which is distributed with zero mean and Ω variance matrix. [Rehman et al. \(2012\)](#) further specified the model as follows:

$$\Delta X_t = \theta X_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta X_{t-i} + \epsilon_t \dots (14)$$

Where,

$$\theta = \sum_{i=1}^p \lambda_i \delta_i - I \dots (15)$$

And

$$\lambda = \sum_{j=1}^p \lambda_j \delta_j \dots (16)$$

The Granger representation theorem asserts that if the coefficient matrix θ has reduced rank $r < x$, there exists $x \times r$ matrix ω and Ω each with rank r such that $\theta = \omega \Omega'$ and $\Omega' X_t$ is stationary. r is the number of cointegrating relations (the

cointegration rank) and each column of Ω is the co-integrating vector. The elements of ω are known as the adjustment parameters in the vector error correction model. Johansen's method is to estimate θ matrix in an unrestricted form, the test whether we can reject the restrictions implied by the reduced rank of θ . The Johansen test put forward two likelihood ratio tests namely; the trace test and the maximum eigenvalue test. The trace test tests the null hypothesis of R co-integrating vectors against the alternative hypothesis of n co-integrating vectors.

The test statistic is given by the following equation;

$$J_{trace} = -T \ln \sum_{i=r+1}^n (1 - \lambda_i^2) \dots (17)$$

The maximum eigenvalue tests the null hypothesis of r co-integrating vectors against the alternative hypothesis of co-integrating vectors. The test statistic for the maximum eigenvalue test is computed by the following formula:

$$J_{max} = -T \ln (1 - \lambda_{r+1}^2) \dots (18)$$

The sample size and λ_i^2 is the i^{th} largest conical correlation. None of the tests above follows the chi-square distribution but rather a different distribution tabulated by [Johansen and Juselius \(1990\)](#). Co-integration as multivariate technique occurs between two or more time series variables, if one or more linear combinations of different non-stationary time series produce stationary time series ([Engle and Granger, 1987](#)). The long run relationship, as a statistical measure, means the variables move together over time so that short term disturbances from the long term trend will be corrected. A lack of co-integration suggests that such variable have no long run equilibrium relationship and in principle, they can wander arbitrarily far away from each other ([Dickey et al., 1991](#)).

Granger Causality Test

Granger proposed the causality testing 1969 to test whether one economic variable can help forecast another economic variable ([Granger, 1969](#)). Granger causality test is used to examine whether the past value of a variable series X , will help to predict the value of another variable series at present, Y ; taking into account the past value of the Y ([Granger, \(1988\)](#)). Specifically, Granger causality from X to Y is established when the coefficients of the lagged difference of X are found to be jointly statistically significant and therefore help explain and predict Y , over and above what the lagged differences of Y can predict ([Yaqiong Li, Lihong Huang](#)). Since the variables are non-stationary, integrated at order 1, but not co-integrated, the appropriate model for testing the Granger Causality will be a VAR model using first difference forms of the variables in the following form as suggested by [Granger \(1980, 1986, and 2000\)](#) and [Ben-Zion et al. \(1996\)](#)

$$\Delta Y_t = \theta_0 + \sum_{i=1}^n \theta_{1i} \Delta Y_{t-i} + \sum_{j=1}^m \theta_{2j} \Delta X_{t-i} + \Psi_{1j} \epsilon_{t-1} + \mu_t \dots (19)$$

$$\Delta X_t = \delta_0 + \sum_{i=1}^n \delta_{1i} \Delta X_{t-i} + \sum_{j=1}^m \delta_{2j} \Delta Y_{t-j} + \Psi_{2i} \epsilon_{t-1} + v_t \dots (20)$$

Where Y_t represent exports and X_t the explanatory variables respectively n and m are the optimal lag. μ_t and v_t are the error terms. In the Granger Causality test regression equations above; X does not Granger cause Y , if parameters on the lagged differences on X in equation (19) are jointly zero and Y does not Granger cause X if parameters on the lagged differences on Y in equation (20) are jointly zero. These form the null hypothesis;

$$1) H_0 : \theta_{21} = \theta_{22} = \theta_{24} \dots \dots \dots \theta_{2m} = 0, X \text{ does not Granger cause } Y, \dots \dots \dots (21)$$

This implies that any of the explanatory variables does not Granger cause exports

$$2) H_0 : \delta_{21} = \delta_{22} = \delta_{23} \dots \dots \dots \delta_{2m} = 0, Y \text{ does not Granger Cause } X \dots \dots \dots (22)$$

The results of the test are interpreted as follows:

The rejection of the first hypothesis implies X Granger cause Y , rejection of the second hypothesis implies Y Granger Cause X , concurrent rejection of the two hypotheses indicates bidirectional causality, acceptance of both indicates there is no causal relationship between X and Y , if the first hypothesis is accepted and the second rejected, there is a unidirectional causality from the X variable to the Y variable, and if the first hypothesis is rejected and the second accepted, then causality runs unidirectional from Y to X .

stationary (no unit root). Table 1 presents the results of the unit root test. The test includes both constant and constant with trend at the levels and also constant and with trend at the first difference. At the level (constant only) all the variables were non-stationary. The variables were then tested again by adding trend. With the addition of the trend still none was found to be stationary. At the first difference without trend and with trend all the variables were found to be stationary at 1% level of significance with exception of the exchange rate which was found to be significant at 10% significant level. The results therefore show that the variables are log level non-stationary and therefore exhibit unit root.

They however achieved stationary after first differencing; all these series are stationary around a deterministic trend. This therefore implies that the series are integrated of order one $I(1)$, as all series achieve stationarity after first differencing. Now that it has been established that all the variables are integrated of order one, the study advanced to test for co-integration based on Johansen and Juselius (1990). Co integration allows for the testing of the long-run equilibrium relationships (cointegration) among the series. At the 5% level of significance, both the trace and maximum eigenvalue tests indicate two co-integrating equation (CE) among the variables. Table 2 and 3 present the Johansen Co-integration test (both the trace and the Max-Eigen value test) results for all the variables (per capita GDP, M2/GDP, banks deposits/GDP, credit to the private sector as a percentage of GDP and the Exchange rate) in the study.

Table 1. Results of unit root test

Estimates	level		First difference	
	Constant	Constant And Trend	Constant	Constant And Trend
<i>LnGDP/CAP</i>	-4.454535	-5.317771	-7.537927***	-7.257805***
<i>LnM2/GDP</i>	-1.425445	-1.587116	-5.770056***	-5.682551***
<i>LnBD/GDP</i>	1.109209	-0.454766	-4.205586***	-3.881832*
<i>LnCPS/GDP</i>	-0.680491	3.192147	-5.945284***	-6.746058***
<i>LnEXCH</i>	0.131612	-1.366191	-2.941329*	-3.320185

Note: ***, **, * denotes the rejection of the null hypothesis of unit root at the 10%, 5% and 1% significance levels respectively. The critical values for the ADF tests statistics are -3.159, -3.46 and -4.076 at the 10%, 5% and 1% significance levels respectively.

RESULTS AND DISCUSSION

Augmented Dickey-Fuller Test for Unit Root

The time series features of the variables were investigated to determine the order of integration of the choice variables. The existence of unit root in a variable implies non-stationary and estimations based on non-stationary variables are very likely to lead to the production of spurious results (Granger, 1969). Non-stationarity is very common to most time series variables and in order to avoid spurious results from the regression models estimated, the test for stationary of variables was conducted. The study applied the Augmented Dickey-Fuller (ADF) test introduced by Dickey and Fuller (1979) to perform the unit root test by estimating equation (12). The ADF test involves testing the null hypothesis of nonstationarity (presence of unit root) against the alternative hypothesis of

Table 2. Johanson Co-integration Rank Test (Trace)

Hypothesized	Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.647968	86.92363	69.81889	0.0012
At most 1 *	0.477105	49.33846	47.85613	0.0360
At most 2	0.401358	25.99694	29.79707	0.1288
At most 3	0.183766	7.525676	15.49471	0.5174
At most 4	0.005974	0.215703	3.841466	0.6423

Note: Trace test indicates 2 cointegratingeqn(s) at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level and **MacKinnon-Haug-Michelis (1999) p-values

From the estimation above, it could be observed that the trace statistic of 86.92363 > the critical value of 69.81889 for the first equation, and again, 49.33846 is greater than 47.85613, for the second equation and very significant p-values, indicate

the existence of co-integration and leads to the rejection of no co-integration hypothesis. From the first equation, it could be observed that the Max-Eigen statistic, 37.58517, is greater than the critical value of 33.87687 which was stat-sig at 0.05% significant level, given the P-value of 0.0172, indicating the presence of co integration. However the second equation was not stat-sig in the Max-Eigen value test.

Table 3. Johanson Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized	Max-Eigen	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.647968	37.58517	33.87687	0.0172
At most 1	0.477105	23.34152	27.58434	0.1594
At most 2	0.401358	18.47127	21.13162	0.1132
At most 3	0.183766	7.309973	14.26460	0.4531
At most 4	0.005974	0.215703	3.841466	0.6423

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values

Since the results from the Johansson cointegration test indicate strong evidence of co integration relationship among the series, the study can present the long-run equilibrium relationships among the variables consistently without generating any spurious relationships results.

Table 4. Result of the long-run relationship (VEC Model)

Dependent Variable: LnGDP/CAP			
Variables	Coefficients	Std errors	T- statistics
<i>LnM2/GDP</i>	0.653481	0.65406	019991
<i>LnBD/GDP</i>	2.830776***	1.02307	2.7669
<i>LnCPS/GDP</i>	3.428708***	0.55742	6.1510
<i>LnOEXCH</i>	28.77233***	7.88790	3.6477

Note: *, **, ***, denotes the rejection of the null hypothesis of unit root at the 10%, 5% and 1% significance levels respectively.

As shown in Table 4 above, almost all the estimated coefficients have their expected signs and were significant in the models estimated. However, M2/GDP not significant in both co integration equations estimated. From the table it can be observed that the coefficient of M2/GDP, 0.653481 was positively signed as expected, implying that a unit increase in the broad money supply will increase per capital GDP, in the economy by approximately 0.63 in the long-run. This finding supports the finding of Ndebbio (2004) study conducted in Nigeria on the topic, "evaluating the nexus between financial deepening and stock market in Nigeria" "though the findings in this was not statistically significant at % 5 significant level, given the t-statistic value of 019991, and t-critical of 1.960. In the table above, again it could be observed that banks deposits were positively related to per capita GDP growth and this was statistically significant given the t-statistic of 2.7669 and t-critical of 1.960. The coefficient of 2.830776, implies that 1% increase in the bank's deposits will lead to about 2.80% increase in per capita GDP growth in Ghana. This finding corroborates that of Abimbola (2013) studies with data from some selected African countries and concluded that financial deepening promotes savings and per capita growth in Africa. Again, the findings supports the loanable fund theory, where an increase in savings rate increases funds for firms to access

for investment and increase output levels in the economy. Credit to the private sector has positive relation with per capita GDP growth and this is consistent with theory, this confirms the accelerator principle in Ghana.

The result thus confirms the financial liberalization thesis championed mostly by McKinnon (1973) and Shaw (1973), which argues that liberalizing the financial sector with respect to interest rate deregulation, increase in bank competition; among others enhance private investment growth. The accelerator principle postulated that increase in national income is associated with increase in investment since underlying it is the assumption that there is a fixed relationship between the level of output and the desired capital stock in the economy where firms are able to have access to investment funds as against competition with Government for funds on the credit market. The coefficient of 3.428708 implies that a unit increase in the credit to private sector will increase per capita GDP growth by 3.428708 units, and this was very significant.

Real exchange rate also has the sign and is statistically significant at 5% significant level, its coefficient value of 28.77233, implies that the appreciation of the cedi by 1 unit will increase per capita GDP by 28.8 units. This finding is consistent with economic theory of exchange rate appreciation when fixed capital formation of firms is mostly determined by ruling prices on the international market; an appreciation of the cedi will make imports for capital goods cheaper, this dynamics feeds into firms investment decisions and hence increase output levels in the economy. Empirical studies like Goldberg (1993) who found that a real depreciation of the U.S. dollar was likely to generate reduction in their investment activities. (Aghion and Hewitt 1998) also found similar result where exchange rate depreciation negatively affected private investment in Kenya. The result suggests that exchange rate depreciation will increase the real cost of purchasing imported capital goods. This tends to reduce the profitability of the private sector and consequently cause investment and aggregate output to fall by the same margin.

Granger Causality Test

The existence of a long run relationship between the variables gives way for testing the causality between them; specifically between financial sector reform and private sector investment as well as financial sector reform and GDP per capita. Taking into account that the residuals derived from the Granger Causality test may be sensitive to the selection of the lag length, the Schwarz information criterion (SIC) following VAR lag selection. The F-statistics and probability values constructed under the null hypothesis of non-causality are reported in Table 5. Equation (19) and (20) are estimated below;

From Table 5, the null hypothesis that M2/GDP does not Granger Cause GDP/CAP is not rejected given the probability value of 0.4547 > 0.05. Also the null hypothesis that GDP/CAP does not Granger Cause M2/GDP is not rejected given the probability value of 0.3432 > 0.05. The implication here is that neither the past values of M2/GDP nor GDP/CAP cause or predict the current values of GDP/CAP and M2/GDP

respectively. Also, the null hypothesis that BD/GDP does not Granger Cause GDP/CAP is not rejected given the probability value of 0.4405 which is greater than 0.05. Again, the null hypothesis; GDP/CAP does not Granger Cause BD/GDP is not rejected since its probability value is 0.0991 greater than 0.05. The implication here is that the past values of bank deposits do help to predict the current values of GDP per capita, neither does the past values of GDP per capita helps to predict the current values of banks deposits in the economy.

Table 5. Pair wise Granger Causality Tests

Null Hypothesis	Obs	F-Statistic	Prob.
M2/GDP does not Granger Cause GDP/CAP	37	0.57193	0.4547
GDP/CAP does not Granger Cause M2/GDP		0.92408	0.3432
BD/GDP does not Granger Cause GDP/CAP	37	0.60929	0.4405
GDP/CAP does not Granger Cause BD/GDP		2.87437	0.0991
CPS/GDP does not Granger Cause GDP/CAP	37	1.75473	0.1941
GDP/CAP does not Granger Cause CPS/GDP		0.05949	0.8088
OEXCHR does not Granger Cause GDP/CAP	37	2.69284	0.1100
GDP/CAP does not Granger Cause OEXCHR		0.15939	0.6922
BD/GDP does not Granger Cause M2/GDP	37	0.00163	0.9680
M2/GDP does not Granger Cause BD/GDP		0.01916	0.8907
CPS/GDP does not Granger Cause M2/GDP	37	11.192**	0.0020
M2/GDP does not Granger Cause CPS/GDP		0.28045	0.5998
OEXCHR does not Granger Cause M2/GDP	37	0.41789	0.5223
M2/GDP does not Granger Cause OEXCHR		0.47210	0.4967
CPS/GDP does not Granger Cause BD/GDP	37	6.46758*	0.0157
BD/GDP does not Granger Cause CPS/GDP		1.27487	0.2668
OEXCHR does not Granger Cause BD/GDP	37	8.12662*	0.0074
BD/GDP does not Granger Cause OEXCHR		0.37595	0.5439
OEXCHR does not Granger Cause CPS/GDP	37	8.92469*	0.0052
CPS/GDP does not Granger Cause OEXCHR		7.38470*	0.0103

***(**)* denotes rejection of the null hypothesis at 1%, (5%) and 10% respectively

It is also evident from Table above that the null hypothesis that CPS/GDP does not Granger Cause GDP/CAP is not rejected since the probability value is as high as 0.1941 > 0.05. Also the null hypothesis that GDP/CAP does not Granger Cause CPS/GDP is not rejected since its probability value is as high as 0.8088. The implication here is that neither the past values of CPS/GDP nor GDP/CAP cause or predict the current values of GDP/CAP and CPS/CAP respectively. The null hypothesis that OEXCHR does not Granger Cause GDP/CAP is not rejected given the probability value of 0.1100 > 0.05. Also the null hypothesis that GDP/CAP does not Granger Cause OEXCHR is not rejected since the probability value is as high as 0.6922. It implication is that the past values of the official exchange rate cannot predict the current values of the per capital GDP ; much the same way, the past values of the per capita GDP will not be able to predict the current values of the official exchange rate. From Table 5, the null hypothesis that CPS/GDP does not Granger Cause M2/GDP is rejected given the probability value of 0.0020 < 0.05. However, the null hypothesis that M2/GDP does not Granger Cause CPS/GDP is not rejected given the probability value of 0.5998 > 0.05. The implication here is that, there is unidirectional causality running from CPS/GDP to M2/GDP with no feedback effect. The null hypothesis that OEXCHR does not Granger Cause M2/GDP is not rejected given the probability value of 0.5223 > 0.05. Also the null hypothesis that M2/GDP does not Granger Cause OEXCHR is not rejected given the probability value as 0.4967. It implication is that the past values of the official exchange rate cannot predict the current values of the per capital M2/GDP; much the same way, the past values of the broad money supply will not be able to predict the current

values of the official exchange rate. Again, from the Table5 the null hypothesis that CPS/GDP does not Granger Cause BD/GDP is rejected given the probability value of 0.0157 < 0.05.

However, the null hypothesis that BD/GDP does not Granger Cause CPS/GDP is not rejected given the probability value of 0.2668 > 0.05. The implication here is that, there is unidirectional causality running from credit to the private sector to banks deposit with no feedback effect. The null hypothesis that OEXCHR does not Granger Cause CPS/GDP is rejected given the probability value of 0.0052 < 0.05 much the same way, the null hypothesis that CPS/GDP does not Granger Cause OEXCHR is not rejected given the probability value of 0.0103 < 0.05. The implication here is that, there is bi-directional causality running from official exchange rate to the credit to the private sector with feedback effect; here, the past values of the official exchange rate will help predict the current values of credit to the private sector and vice versa.

Conclusion and Policy Recommendation

It became evidenced from the study that broad money has positive relationship with economic growth even though it was not significant. This implies broad money supply improves GDP per capita which was proxied for growth in this study, and so any attempt to repress broad money supply will stifle growth and reduce income levels in the economy and bring a deteriorating effect on the standards of living in the economy as a whole. It is therefore, recommended that maintaining reasonably level of broad money could is necessary for growth. The monetary transmission mechanism in the economy where an increase in the money supply reduce the interest rate, a reduction in the interest rate also reduces the cost of investment, increase in investment will in the long run increase output in the economy and improve the living standards as a whole in the Ghanaian economy.

Again, banks deposit rate restrictions will reduce the availability of loan able funds and can increase the user cost of capital unnecessarily, this in the long run reduce investment and output levels in the economy and per capita incomes. This study recommends that banks deposit rate by be improved by competitive financial market paying reasonable rates on savings for individuals attracting excess funds for deposit in the banking system accessible to firm for investments. The evidence of government competing with the private sector for credit could stifle growth, since treasury bills offer high rate in the open market crowding out the private sector investment. In the economy of Ghana (Esi *et al.*, 2014). The official regulation of the exchange rate or putting exchange rate restriction in the economy will may keep it over and above or way below the market rate create a misleading impression about the balance of payment position affecting economic growth. This study have revealed that exchange rage appreciation or stability improves the growth indices of the economy, as most productive firms import majority of their capital for (machinery, and raw material) production. The depreciation of the cedi will adversely affect investment of firms and reduce growth rate of the economy. Any attempt to repress the exchange rate can create a disequilibrium condition and put the economy into disarray. The study therefore

concludes financial deepening is very necessary for economic growth hence measures to attract long term finance, reduce high cost of financial intermediation and ensure financial stability in the domestic economy of Ghana stands to accelerate economic growth.

REFERENCES

- Abiad, A., Detragiache, E. and Tressel, T. 2010. A New Database of Financial Reforms. *IMF. Staff Papers* Vol. 57: 281-302.
- Abiad, A., Oomes, N. and Ueda, K. 2008. The quality effect: Does financial liberalisation improve the allocation of capital? *Journal of Development Economics*, vol. 87, pp. 270 – 282.
- Aghion, K.B. and Hewitt O. 1998. Modelling the Long-Run Determinants of Domestic Private Investment in Nigeria. *Asian Social Science*, Vol. 8, No. 13.
- Bank of Ghana 2009. Financial Stability Reports: Monetary Policy Committee Statistical Releases, 2002 – 2009.
- Bawumia, M. 2010. *Monetary Policy and Financial Sector Reform in Africa, Ghana's Experience*. Combent Impressions Ghana Ltd.
- Ben-zion, E. 1996. Financial liberalization in LDCs: A review of experiences. *World Bank Economics and Finance Division*, Washington, D.C.
- David, A. D. 1991. A Primer on Cointegration with Application to Money and Income. *Journal of Monetary Economics*, 52(7): 573–572.
- Dickey, D. A. and Wayne, A. F. 1979. Distribution of The Estimators for Autoregressive Time Series With a Unit Root; *Journal of American Statistical Association*
- Eshun, M. E. 2014. The Financial Determinants of Private Investment in Ghana. *International Journal of Financial Economics*, Volume 3(1).
- Goldberg, E. 1993. "How financial markets affect long-run growth: A cross country Study" WorldBank Working Paper Series 843, Washington, D.C
- Goldsmith, R.W. 1969. *Financial Structure and Development*. New Haven: National Bureau of Economic Research.
- Johansen, S and Juselius, K. 1990. Maximum Likelihood Estimation and Inferences on Cointegration with Application to the Demand for Money. *Oxford Bulletin of Economics Statistics*, volume 52.
- Johansen, S. 1995. Likelihood Based Inferences in Cointegration Vectors Autoregressive Models, Oxford University Press Inc. New York.
- John, E. and Udo, Ndebbio 2004. Financial deepening, economic growth and development Evidence from selected sub-Saharan African countries, African Economic Research consortium.
- Khan, R.E.A., Satter, R. and Rehman, H. 2012. Effectiveness of Exchange Rate In Pakistan, Causality Analysis, *Pakistan Journal of Commerce*, Volume 6(1).
- King, R.G. and Levine, R. 1993a. "Finance, entrepreneurship and growth: Theory and evidence". *Journal of Monetary Economics*, 32(3): 513–542.
- King, R.G. and Levine, R. 1993b. "Finance and growth: Schumpeter might be right" *Quarterly Journal of Economics*, 108(3): 717–38.
- Kiyotaki, N and John, M. 2004. "Inside Money and Liquidity." *Quarterly Journal of Economics*, 408(3): 317–38.
- Kiyotaki, N. and John, M. 2002. "Evil is the Root of All Money." *American Economic Review Papers and Proceedings*, 92, 62–66.
- Levine, R. and Zervos, S. 1996. "Stock market development and long-run growth" *The World Economic Review*, 110(2): 323–340.
- McKinnon, R.I. 1973. *Money and Capital in Economic Development*. Washington, D.C.:
- Meltzer, A.H. 1969. "Money, intermediation and growth". *Journal of Economic Literature*, VII.
- Montiel, P.J. 1995. "Financial policies and economic growth: Theory, evidence, and country-specific experience from sub-Saharan Africa". AERC Special Paper (April 1995).
- Rajah, Raghuram and Luigi, Zingales 2003. *Saving Capitalism from Capitalists: Unleashing The Power of Financial Market to Create Wealth and Spread Opportunity*; New York Crown Business.
- Robert F. Engel and Granger, C. W.J. Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica*, Volume 55.
- Stock, W. and Watson M. 1989. Interpreting the Evidence on Money-Income Causality; *Journal of Econometrics*.
