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Does Financial sector Development Cause Investment and Growth? Empirical Analysis of the case of Ghana

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Abstract

This article examines whether financial sector development has 'caused' economic growth and investment in Ghana between 1970 and 2007. As a proxy for financial sector development we use credit to private sector as per cent of GDP, bank liquid reserve – asset ratio and liquid liability as a per cent of GDP. We use GDP growth as a proxy for economic growth and real domestic investment for investment growth. The dynamic interactions between the growth of real Per capita Gross Domestic Product, real domestic investment and indicators of financial sector development are investigated using the concept of Granger Causality after testing for cointegration using Johansen techniques.
The empirical results obtained by the Johansen method suggest the existence of a stable long-run relationship between growth rate and financial sector development indicators identified in the study. The same is true for investment growth. However, with the exception of credit to private sector where the causality runs from economic growth only, we find bidirectional causality between economic growth and financial sector development indicators.

For investment growth, the causality runs from investment growth to financial sector indicators except between investment growth and Liquid liability where bidirectional causality recorded. The article establishes that, in an overall sense, economic and investment have 'caused' financial sector development in Ghana

JEL: C32, E22, F43, O11

Keywords: Economic growth, financial sector development, Cointegration, Granger-Causality.

1. Introduction

Ghana's financial sector has since 1983 gone through series of restructuring and transformation (Sowa, 2003). The comprehensive economic adjustment program including reforms in the financial sector in 1983, Financial Sector Adjustment Program (FINSAP)[1] in 1988, financial liberalization in 1990 and the introduction of Universal banking in 2003, all aimed at building market-oriented financial sector which will facilitate the transition to market economy to propel output. FINSAP did not bring only changes to banking sector but also the establishment of capital market. Toward the end of FINSAP-1 the need for divestiture of a host of state owned enterprise unavoidably necessitated the need for stock market in Ghana.

Though the financial sector adjustment programme (FINSAP) still seen as the cause of banking problems of the 1990s (Quartey,2005), the financial system that came out of the reforms are comparatively diversified in the array of services and progressively offers innovative new products.

As bank-intermediated debt finance increased, the need to transform the financial sector to market-based one became unavoidable. Interest rates were liberalised and central bank shifted slowly from direct monetary control to an indirect approach that make use of market-based

[1] The FINSAP were carried out in phases. FINSAP-1 covered the period 1988-1991; FINSAP-2 is from 1992-1995; and FINSAP-3 started in 1995. The major objectives of FINSAP-1 were: (1) to review the legal and regulatory environment and amend the existing Banking Acts and Laws; (2) restructuring the banking sector to make the banks viable and efficient; and (3) revitalize the financial sector by creating new institutions. FINSAP-2 and 3 were to continue with the restructuring of the financial sector (see Sowa, 2003 for detailed sequence)

policy tool. In line with that, Bank of Ghana restructured the minimum reserve requirements for banks, brought in new financial instruments, and opened market operations for liquidity management. As a complement, proper regulatory framework, bank supervision enforcement, and upgrade in the efficiency and profitability of banks, including replacement of non-performing assets (Quartey 1997).

Towards full liberalization, 'universal banking' was introduced by the Bank of Ghana in the first quarter of 2003, which permits banks to embark on commercial, development, investment or merchant banking with no need for separate licences.

This banking system allowed banks to expand operations to areas outside what their licence permit to undertake all type of banking. The development within the financial sector has also engineered foreign participation. In 2003 for example Société Générale acquired over 50 percent stake of SSB Bank, Union Bank of Nigeria's acquisition of 20 per cent equity stake in Home Finance Company and opening of local branch office by Citibank Group. Barclays in 2007 established first offshore banking in the West Africa in Ghana signifying major improvement in the financial sector.

The Ghana Stock Exchange was incorporated in July 1989 as a private company under the Ghana Companies' code, 1963(Act179). However, the status of the company was changed to a public company under the company's Code in April 1994. The Ghana Stock exchange was given recognition as an authorized stock exchange under the Stock Exchange Act of 1971.Trading on the floor of the exchange commenced on November 12, 1990. The number of listed companies increased to 13 (including one Government bond) in 1991; 19 in 1995 and currently stands at 33 and two corporate bonds (GSE Quarterly Report, June 2007). In October 2006, two and three year fixed rate Government of Ghana bonds were also listed .The increase in the number of listings has also reflected in market capitalization. The Ghana

stock market was voted sixth and best performing emerging market in 1993 and 1994 respectively. The GSE capital appreciated by 116% in 1993 and gained 124.3% in its index level in 1994 (GSE quarterly bulletin, March 1995). At the end of 2004, market capitalization stood at US$ 2,644 million. Annual turnover ratio just remains about 3.2% in 2004, from an all-time high of 6.5% in 1998. As of October 2006 the market capitalization of the Ghana Stock Exchange was about $11.5billion. The Exchange has two main indices: GSE All Share index and the Databank stock index (DSI). Three new indices comprising the SAS index (SASI), SAS Manufacturing index (SAS-MI) and the SAS Financial index (SAS-FI) have also been published Strategic African Securities Limited

In spite of structural and institutional constraints, the reform has been extensive and its benefits are large, visible, widely shared and reflected in the macroeconomic indicators: the M2 (money+ Quasi-liquid liability) as a percentage of GDP increased from 14.0% in 1990 to 36.8% in 2006 Similarly, Quasi-liquid liability as a percentage of GDP increased from 2.2% in 1983 to 16.8% in 2006 (Bank of Ghana, 2007)

The development in the financial sector has also occurred during a period when the economy has recorded substantial increase in growth. The GDP growth increased from -7.5% in 1982 to 6.2% in 2006; per capita income increased from -10.2% to 4.3% over the same period (World Development Indicators, October 2008).

These reforms have brought changes in Ghana's monetary indicators; and competition, efficiency and profitability in financial system. Economic growth has been positive since the start of the economic adjustment and consistent since 1990 especially from 2001 to 2006. So far, there seems to be some development in Ghana's financial sector, investment and economic growth accelerated, but the issue of whether the financial developments induced

the growth in the economic activities remains unanswered. Thus a substantial amount of research is required to provide a better understanding of the many relevant issues.

The paper seeks to make important contribution by filling the void in the academic literature on the role of financial sector development in stimulating growth and investment in the Ghanaian economy using cointegration technique and Granger causality test. The following hypotheses have been postulated to guide the study:

(i) *H_0: Long-term economic growth in Ghana is explained by development in the financial sector.*

(ii) *H_0: Long-term investment growth is explained by development in the financial sector*

To empirically examine long -run equilibrium relationship between indicators of financial sector development and economic growth in Ghana, this paper employs Johansen multivariate cointegration approach.

(iii)H_0: Short-run changes in economic growth is Granger-cause by the growth in the financial sector

(iv) Financial sector development Granger-Cause investment

To explore the short-run relationship between economic growth/investment and financial, we conduct pair-wise Granger-causality test base error correction model.

Our results indicate that financial sector development in general is good for economic growth especially in the short run. We also find that the need for develop financial system is necessitated by an increase in domestic investment.

The rest of the paper has been structured as follows. Section 2 provides review of the necessary literature, section 3 discusses the specification of the model. Section 4 introduces the empirical methodology and empirical results. Section 5 summarise the research findings

2. Previous Studies

Previous empirical studies on the theme present varying views. The first group we identified considers financial development as unimportant. They argue that economic growth increase

the demand for efficient financial intermediation (See for example; Robinson, 1952; Van Wijnbergen, 1983; and Stern, 1989). In support of this, Burkett and Dutt (1991) argue that investment in a financially liberalized economy could be lower than that in a repressed one due to expected fall in aggregate demand and output as a result of increase in interest rate which increases the marginal propensity to save. Others like McKinnon (1973); Shaw, (1973); Gurley and Shaw (1955, 1960, and 1967); King and Levine (1993a, 1993b), Odedokun (1996); Quartey (2005); and Yartey (2007) see financial development as a vital element of growth. For example, Quartey (2005) insist that development of Ghana's financial sector increase savings mobilization and economic growth. Most of the concerned literature in the latter has been based on neoclassical analysis that financial development raises savings mobilization and efficient allocation of resources to productive investment, both of which enhance productivity. For example Gurley and Shaw (1955, 1960, and 1967) emphasize the role of financial intermediaries in mobilizing and channelling savings to economic activities. McKinnon (1973) and Shaw (1973) stress the importance of financial liberalization and financial deepening on increasing savings, capital productivity and investment. Garcia and Liu (1999) identify reduction in information and transactions cost, improvement of the allocation of resources and increasing of savings mobilization as the channels through which financial intermediaries and market impact economic growth.

Singh (1997) noted that a well-developed financial market (e.g. stock market and bond market) influences economic activities by acting as a source of raising funds for investment; and increasing the quantity and quality of investments. Greenwood and Jovanovic (1990) also regarded financial institutions to have the capacity to obtain and examine information concerning the position of technology and to direct available investment funds into investment activities that yield the maximum return. Similarly Garcia and Liu (1999) highlight fund pooling, risk diversification, liquidity management, screening and monitoring

as a way through which financial sector ensure efficient allocation of resources and improve economic growth. Using VAR analysis, Xu (2000) found for 41 countries that, though financial development is important to GDP growth, it does not simply follow economic growth as portrayed. He cited domestic investment as channel through which development in the financial sector affects economic growth. Güryay, Şafakli and Tüzel (2007) found insignificant positive relationship between financial development and economic growth in Cyprus and the causality flow from economic growth to financial development using cointegration analysis. The table 8 below gives summary of empirical evidence on financial sector development and growth – emerging markets and transition countries.

Table 1: Empirical evidence on financial sector development and growth – emerging markets and transition countries

Author (year)	**Theoretical Framework**	**Research Method**	**Financial segments Included**	**Key findings**
Fink and Haiss (1999)	Production function style regression	cross-section analysis	bank sector stock market bond market	Positive relation between bank sector development and economic growth
Kar and Pentecost (2000)	Granger causality test	VECM	bank sector	With money to income ratio as a measure of financial development the direction of causality runs from financial development to economic growth. when the bank deposits, private credit and domestic credit ratios are used to proxy financial

				development, growth is found to lead financial development
Jaffe and Levonian (2001)	"Barro"-Regression	cross-section analysis	bank sector	Significant and positive relationship between bank sector development, bank sector reforms and economic Growth
Drakos (2002)	"Barro"-Regression	cross-section analysis and panel analysis	bank sector	Banking sector competition positive on economic growth. The higher the imperfections in market structure the lower real GDP growth.
Koivu (2002)	"Barro"-Regression	panel analysis	bank sector	Interest rate margin is significantly and negatively related to economic growth. conversely a rise in the amount of credit does not seem to accelerate economic growth
Platek (2002)	"Barro"-Regression	cross-section analysis	bank sector stock market	Bank sector development and stock market development has significantly and positive effect on economic growth
Mehl, and Winkler (2003)	Growth accounting regression	panel analysis	bank sector	Financial development is not growth-supportive when the institutional and legal framework given to market participants is not appropriate
Fink, Haiss and Vuksic (2004)	Growth accounting regression	cross-section analysis and panel	aggregate indicator (bank sector, stock market, bond	Both Bank sector development and bond markets stimulate growth in transition countries.

		analysis	market) bank sector stock market bond market	
Fink, Haiss and Mantler (2005)	Growth accounting regression	panel analysis	bank sector, stock and bond market	The financial sector induces positive growth effects but not with the same strength across countries. It is weaker in market economies comparing to transition countries. Financial sector development enhances economic growth in the short run rather that in the long run.
Chakraborty (2008)	Granger Causality test	VECM	Bank sector Stock market	The empirical results suggest the existence of a stable long-run relationship among stock market capitalization, bank credit and growth rate of real GDP

Source: Adopted from Fink, Haiss and Mantler (2005)

3. The Model

Financial sector development plays important role in increasing economic growth, through improvement in the capital accumulation (Ahmad and Malik, 2009). The impact of financial sector development on economic growth can be illustrated using Cobb–Douglas production function in which financial sector development is explicitly incorporated and assuming the production function has already been maximised for labour:

$$Y_t = Af(K_t, \mu) = A_t K_t^{\alpha}, \mu^{1-\alpha}, \quad \text{where } 0 < \alpha < 1 \qquad (1)$$

Y_t is real out put, A_t is the efficiency of production, K_t is aggregate capital stock, and μ is externality or spillover generated by the development in the financial sector.

Assuming that the capital stock depreciates at a rate of ρ per period, gross investment equals

$$I_t = K_{t+1} - (1-\rho)K_t \qquad (2)$$

Assuming also that the financial intermediaries responsible for transforming savings into investment (I) such that every fraction $,\phi,$ of each dollar saved is available for investment and $(1-\phi)$ is retained as a reward for the services supplied by financial intermediaries, then

$$\phi S_t = I_t \qquad (2)$$

Where I is investment and S is gross savings.

Pagano(1993) argues that the fraction , $(1-\phi)$, retain by financial intermediaries represent the spread between lending and borrowing rates charged by financial institutions, which depends on the financial market perfection/ imperfection. This implies that the financial sector plays important role in efficient allocation of capital into productive investments. The externality, μ, can be therefore represented by a Cobb-Douglas function of the form:

$$\mu = \{K_t, Z_t^{\delta}\}^{\gamma} \qquad (3)$$

Where Z_t is a vector of measures of financial sector development indicators. δ and γ are, respectively, the marginal and the inter-temporal elasticities of complementarity between efficient mobilisation/allocation of capital and financial development.

If we combine equation (1) and (3) we obtain;

$$Y_t = A_t K_t^{\alpha}, \{K_t, Z_t^{\delta}\}^{\gamma(1-\alpha)} \qquad (4)$$

Factoring and taking logarithm of equation (4) gives

$$\ln Y_t = \varphi + [\alpha + \gamma(1-\alpha)]\ln K_t + \delta\gamma(1-\alpha)\ln Z_t \qquad (5)$$

As equations (2) and (5) showed, increase in the level of financial sector development is expected to lead to more investment and higher economic growth. Following King and Levine(1993) and Levine *et al* (2000) , the domestic credit to private sector by financial intermediaries (banks and other financial intermediaries) to GDP, the ratio of liquid liabilities to GDP and Bank liquid reserves to bank assets ratio are employed as a proxy for the level of development of the financial sector.

Domestic Credit to private sector as a per cent of GDP measures the level of activity and efficiency of financial intermediaries. Levine *et al* (2000) argues that, financial system that channel credit to the private sector best evaluate managers of the private-own enterprises, investment projects, pool risk and ensures diversification than financial system that channel credit to state-owned enterprises. The ratio of liquid liabilities to GDP measures the financial depth; which includes deposit money banks assets, central bank assets and other financial institution asset. The reason behind the selection is that increase in the ratio of liquid liabilities to GDP signifies expansion in the financial sector. It is believe that expansion will reflect in the number who can access financial service. The last but not the least measure, Bank liquid reserves to bank assets ratio indicates the liquidity of the banking sector which dominates Ghana's financial sector.

In order to control for other determinants of the growth of the economy and investment we includes government final expenditure as percentage of GDP to ensure that the estimated coefficient captures the effect of financial sector development on growth of the economy and investment but not the influence of some other variable(s).

Hence, our estimated equations take the forms

$$y_t = \alpha + \beta_1 k_t + \beta_2 gov_t + \beta_3 dcps_t + \beta_4 llb_t + \beta_5 blr_t + \beta_6 D + \varepsilon_t \qquad (6)$$

And

$$i_t = \rho + \lambda_1 k_t + \lambda_2 gov_t + \lambda_3 dcps_t + \lambda_4 llb_t + \lambda_5 blr_t + \lambda_6 D + \varepsilon_t \quad (7)$$

Where the lower case letters denote logarithms of the variable entered the models, y is the logarithm of real GDP, i is the real domestic investment, $dcps$ is the domestic credit to private sector by financial intermediaries to GDP, llb is the ratio of liquid liabilities to GDP, blr is the bank liquid reserves to bank assets ratio, k is capital stock[2], gov is final government expenditure as a percentage of GDP, α is the drift, ε_t are white noise errors, D is dummy variable which takes the value one for the period after financial liberalisation and zero otherwise. We anticipate all coefficients to be positive.

The paper uses annual time series data from 1970 to 2007 obtained from Word Bank –World Development Indicator, online edition, October, 2008. Although a substantial portion of the literature uses panel studies, we depart from this and examine how the various indicators of financial sector development impact growth and investment. This will better inform policy makers with regards to which aspect to concentrate.

4. Empirical Analysis

(a) Estimation Technique

In order to examine the relationship between financial sector, investment and economic growth through time, we run the following time-series tests using annual data: cointegration tests to see the co-movement of variables in the long run and to select a vector error correction model (VECM) and causality tests to analyze the direction of causalities. We specifically use multivariate cointegration analysis of Johansen (1988, 1991,1995) for

[2] The estimates of K was generated using standard perpetual inventory model of the form: $K_t = K_{t-1} + I_t - \rho K_{t-1}$. Where K_{t-1} is the stock of capital at time $t-1$, I_t is the flow of gross domestic investment during period *t*, and ρ is the rate at which domestic investment depreciates in period $t-1$. In this study we assumed that capital depreciate at the same rate as inflation rate (see Akinlo, 2004)

this study. This technique has been widely used for testing the long-run relationships among variables in the academic literature so we briefly explain the methodological aspects directly relevant to this study and refer interested readers to the relevant literature[3] for detailed discussion and advantages of this method.

In estimating the cointegration we first consider whether each of the series is integrated of the same order. To do this we consider the standard Augmented Dickey-Fuller test and Phillips-Perrons unit root tests. The number of cointegration ranks (r) is tested with the maximum eigenvalue and trace test. The asymptotic critical values are given in Johansen (1991) and MacKinnon-Haug-Michelis (1999).

(b) Unit Root test

In order to test for the stationarity of the variable we apply ADF test and PP test to all the variables in levels and in first difference. The results of both tests presented in table 2 conclude that all the variables are I (1).

Table 2: Unit Root Test: ADF Test and PP-Test

Variable	ADF		PP		Order of integration
	Levels	1st Difference	Levels	1st Difference	
y	-2.2074[0.2065]	-7.1229[0.0000]***	-2.3003[0.1772]	-7.2740[0.0000]***	I(1)
dcps	-0.3828[0.9019]	-5.0460[0.0000]***	-0.5148[0.8770]	-5.1143[0.0002]***	I(1)
blr	-0.5447[0.8704]	-7.2361[0.0000]***	-0.7363[0.8253]	-7.1288[0.0000]***	I(1)
llb	-0.9182[0.7712]	-6.5000[0.0000]***	-1.0820[0.7126]	-6.4789[0.0000]***	I(1)
k	-1.4273[0.5581]	-3.1686[0.0303]***	-1.9032[0.3273]	-3.2302[0.0263]**	I(1)
i	-1.7199[0.4132]	-7.7904[0.0000]***	-1.6309[0.4571]	-9.0037[0.0000]***	I(1)
gov	-2.0503[0.2651]	-4.3265[0.0002]***	-2.2918[0.1798]	-4.1007[0.0029]***	I(1)

The evidence that all the variables are I(1) allow us to use the cointegration approach proposed by Johansen (1991,1995) for analysis. The automatic lag selection criteria are

[3] See, for example, Johansen (1991, 1995), Johansen and Juselius (1990) and Cheung and Ng (1998).

applied with AIC as leading indicator. AIC shows significance at lag 2, we then use lag 2 in our cointegration analysis.

Model 1

We estimated equation (6) using Johansen cointegration considering the variables $y, dcps, blr, llb, gov$ and k. The summary of the Johansen cointegration test is presented in table 3. Both the trace statistics and maximum eigen value statistics indicate the presence of four cointegrating relation. The estimated cointegration relationship is:

$$y_t = 21.306 - 0.800 * k_t + 0.250 * gov_t + 1.714 * dcps_t - 1.338 * blr_t + 1.405 * llb_t$$
$$\qquad\qquad [-5.140] \qquad [0.250] \qquad [7.798] \qquad [-7.828] \qquad [4.07164]$$

The estimated equation shows that increase in credit to the private sector and expansion in financial service due to an increase liquid liability boost real GDP growth while Bank liquid reserve is associated with decrease in GDP growth. This could be explained by the following reasons:

The financial sector of the Ghanaian economy before 1983 was dominated by the state owned financial institutions. The monopolistic nature of the entire system with regard to its operation and spread made government intervention easy. Asset allocations of the banks were imposed by Bank of Ghana. The control of sectoral credit directives made desired investment difficult to achieve. Interest regulation resulted negative saving rate discouraged individuals from holding savings account in bank. During the reform era, the banks and other financial institutions were forced to adopt risk management policies which compound already lack of access to credit by small scale entrepreneurs. The effect was a decrease in private investment and overall production in the economy.

The liberalisation of the financial sector which removed direct control, introduced money market tool of monetary control, establishment of capital market and issue of license to private investors to engage banking and other related business have increase competition in the sector. Access to credit has become easier than before to entrepreneurs. For example, the percentage of investment financed by loans increased from 5.5% in 1994 to 32.2% in 2006 (GIPC Quarterly Report, January 2007). This could be the reason for positive long-run equilibrium relationship and pro-growth nature of the banking and financial intermediaries.

Table 3: Johansen Cointegration Test Between $y, dcps, blr, llb, gov$ and k

Null Hypothesis	Trace Test statistics	0.05 Critical value	Max-Eigen statistics	0.05 Critical Value
$r = 0$ *	219.2718	117.7082	72.09928	44.49720
$r \leq 1$*	147.1725	88.80380	51.16681	38.33101
$r \leq 2$ *	96.00568	63.87610	42.84420	32.11832
$r \leq 3$ *	53.16148	42.91525	35.48301	25.82321
$r \leq 4$	17.67847	25.87211	12.67763	19.38704
$r \leq 5$	5.000841	12.51798	5.000841	12.51798

Note: * denotes rejection of the hypothesis at the 0.05 level. The null hypothesis for these two tests here is that the data generating processes under consideration are not cointegrated. Critical values for both trace (15.49) and maximum-eigenvalue (3.84) statistics at the 5% level are given by MacKinnon-Haugh-Michelis (1999).

Model II

Table 4 reports results on testing for cointegration in the financial development on real investment based on equation (7) using Johansen cointegration technique.

Table 4: Johansen Cointegration Test Between $y, dcps, blr, llb, gov$ and k

Null Hypothesis	Trace Test statistics	0.05 Critical value	Max-Eigen statistics	0.05 Critical Value
$r = 0$ *	165.9575	117.7082	51.15375	44.49720
$r \leq 1$*	114.8038	88.80380	47.88449	38.33101
$r \leq 2$	62.91927	63.87610	28.24340	32.11832
$r \leq 3$	38.67586	42.91525	19.17274	25.82321
$r \leq 4$	19.50313	25.87211	10.83095	19.38704
$r \leq 5$	8.672174	12.51798	8.672174	12.51798

Note: * denotes rejection of the hypothesis at the 0.05 level. The null hypothesis for these two tests here is that the data generating processes under consideration are not cointegrated. Critical values for both trace and maximum-eigenvalue statistics at the 5% level are given by MacKinnon-Haugh-Michelis (1999).

Both The trace test and max-eigenvalue test statistics indicate the presence of two cointegrating relation. The estimated cointegration relationship is:

$$i_t = 26.6424 - 1.353 * k_t + 2.671 * gov_t + 5.976 * dcps_t + 0.493 * blr + 6.240 * llb$$
$$[2.655] \qquad [1.761] \qquad [7.979] \qquad [1.296] \qquad [5.349]$$

The estimated equation suggests that the real rate of growth of investment is affected by the changes in expansion in the financial sector and private credit in the long run. The magnitudes of the estimated coefficients show that expansion in the financial sector and private credit contributes significantly to the growth of investment. The effect of private credit on investment is due to the deregulation of interest rate in the post liberalization period in Ghana which has increased the efficiency of allocation of credit to the industrial sector and, hence, increases in investment. The expansion in financial sector has increase and secure mobilisation of capital for investment by individuals.

(c) Granger-causality Tests

To examine the direction of the causal link between variables identified, pair-wise Granger-causality tests are performed. In the presence of cointegrating vectors Granger-causality test is conducted base on error correction model. The Granger-causality is based on the regressions of the following form:

$$\Delta Y_t = \sum_{i=1}^{n} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=1}^{n} \beta_{1i} \Delta X_{t-i} + \phi_{1i} \varepsilon_{t-1} + u_t \quad (8)$$

$$\Delta X_t = \sum_{i=1}^{n} \alpha_{2i} \Delta X_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta Y_{t-i} + \phi_{2i} \varepsilon_{t-1} + v_t \quad (9)$$

In the above Granger-causality regression equations (8) and (9), X does not Granger-cause Y, if β_{1i} parameters are jointly zero, and Y does not Granger-cause X, if β_{2i} parameters are jointly zero. These two statements form the null hypotheses;

1. H_0: β_{1i} =0, means X does not Granger-cause Y

2. H_0: β_{2i} =0, means Y does not Granger-cause X

The rejection of the first hypothesis means that X Granger-cause Y whereas that of 2 means Y Granger-Cause X. Simultaneous rejection of the two hypotheses indicates bidirectional causality. Table 5 presents Granger causality test performed on the economic growth, credit to private sector, capital stock, liquid liabilities, bank liquid reserves and government expenditure.

Table 5: Granger-Causality Test Results: Economic Growth

Null Hypothesis	Wald-Statistic	Prob.
Domestic credit to private sector does not Granger Cause Economic growth	0.80605	0.4558
Economic growth does not Granger Cause Domestic credit to private sector	2.9675**	0.0048

Bank liquid reserve does not Granger Cause Economic growth	3.95756**	0.0295
Economic growth does not Granger Cause Bank liquid reserve	6.73410**	0.0037
Government expenditure does not Granger Cause Economic growth	0.37910	0.6876
Economic growth does not Granger Cause government expenditure	1.31895	0.2820
Capital stock does not Granger Cause Economic growth	6.71652**	0.0038
Economic growth does not Granger Cause capital stock	0.93381	0.4038
Liquid liability does not Granger Cause Economic growth	2.75337*	0.0793
Economic growth does not Granger Cause Liquid liability	4.36694**	0.0213

* (**) denotes rejection of the hypothesis at 10% (5%) significance level

The results in table 5 fail to reject the null hypothesis of "domestic credit to private sector does not granger cause economic growth" but rejected the null hypothesis of "economic growth does not Granger cause domestic credit to private sector'. It has the implication that the causal relation run from economic growth to credit to the private sector but not the other way round. We also observed bidirectional causalities between bank liquid reserve and economic growth; and between liquid liabilities and economic growth.

Table 6 reports the test results for Granger causality based on investment. From the test result we fail to reject 'domestic credit to private sector does not Granger cause investment'. But we reject 'Investment Granger causes Domestic credit to private sector'; implying causality runs from domestic investment to domestic credit to private sector. Another interesting finding is that a bi-directional causal relationship exists between liquid liability and domestic investment. Furthermore, we fail to reject ' Bank liquid reserve does not Granger Cause investment, which has the implication that bank liquid reserve does not Granger Cause domestic investment but the vice versa. Another important observation is the unidirectional causality from capital stock to domestic investment. The implication of these findings is that; the expansion of the financial sector has increased formation of capital stock, which accrues to savers for their own investment.

Table 6: Granger-Causality Test Results: Economic Growth

Null Hypothesis	Wald-Statistic	Prob.
Domestic credit to private sector does not Granger Cause investment	1.3113	0.2842
Investment does not Granger Cause Domestic credit to private sector	3.393**	0.0465
Bank liquid reserve does not Granger Cause investment	1.614	0.2153
Investment does not Granger Cause Bank liquid reserve	7.419**	0.0023
Government expenditure does not Granger Cause investment	0.361	0.6997
Investment does not Granger Cause government expenditure	0.553	0.5805
Capital stock does not Granger Cause investment	8.773**	0.0010
Investment does not Granger Cause capital stock	0.838	0.4417
Liquid liability does not Granger Cause investment	3.695**	0.0364
Investment does not Granger Cause Liquid liability	2.565*	0.0931

* (**) denotes rejection of the hypothesis at 10% (5%) significance level

5. Conclusion

Using time-series data from 1970 to 2007, we address whether investment and economic growth in Ghana is driven by financial sector development. Applying the Johansen cointegration approach and Granger Causality test, we assess the short-run causal effect and long-run dynamics of credit to private sector, liquid liabilities and bank liquid reserve on the real GDP and real domestic investment of Ghana.

We find that real GDP experience short-run effects due to expansion in the financial sector but not the increase in credit to the private sector. For real domestic investment, the results suggest that investment does not simply fellow financial development and has little effect on it. Instead there is strong evidence that increase in domestic investments by other factors increase the demand for efficient and improved financial system. In the long run, we find

positive and statistical significant relationship between economic growth and financial sector development; and between real domestic investment and financial development.

Our analyses and the empirical findings have an important economic policy implication regarding the role of finance in accelerating growth in the Ghanaian economy. The findings imply that the expansion in the financial sector is important for economic growth and investment in Ghana. This is consistent with the findings of Quartey (2005), who findings stressed the positive role of savings mobilisation by the financial sector in the long-run growth in Ghana. However, in spite of the increase in credit to the private sector, it has failed to have a positive impact on growth and investment in the short-run. This may be due to one or combination of the following; high cost of credit (interest), low level of investment loans compared to consumer loans, inadequate credit to Small and Medium enterprises (SMEs) which dominate the Ghanaian economy due to stringent risk management measures adopted by financial intuitions, unfavourable investment environment (for example price volatility and lack of ready market) and lack of investment in the pro-growth sector of the economy. In light of theses possible causes, we propose the following policy recommendations for consideration;

- Establishment of financial institutions that are specialized in certain industries or certain types of lending. Specialised financial institution to support Medium and small enterprise. This can help small and medium size enterprises with their financing needs in cases where commercial banks that dominate the financial sector lend only to large and well established firms. And any ACT or LAW that establishes such institution must be enforced.
- The conventional financial institutional lending should be revised to make it conducive to micro-borrowers. Solidarity group lending, where group member

guarantees for each other should be encourage to allow the poor access credit at low cost without any form of traditional collateral.

- Finally, macroeconomic stability policies must be pursued to reduce the cost of borrowing and risk of price volatility.

The paper believes that policies regarding aim at making credit access to the micro-borrower and reduction of cost of borrowing must be look at for higher economic growth in Ghana.

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