

# Determinants of Domestic Credit to the Private Sector in Ghana: Application of Vector Auto-Regressive Method

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**Abstract**— The private sector is said to be the engine of economic growth for a country, especially, for developing economies. Ghana, discovering crude oil in commercial quantities in 2007 coupled with its new lower-middle income status in 2010, has become the focus for many investors. Meanwhile, the private sector of Ghana has suffered crowding out due to stiff competition from the public sector for the meager funds available in the domestic banks for their activities. This study aims at investigating the factors that influence domestic credit to the private sector in Ghana. The study used panel data spanning the period from 1961 to 2016. The results from the use of Johansen cointegration and vector auto-regression show that, though there is no long-run association among the variables, there exist significant short-run relationship between domestic credit to the private sector, broad money and gross capital formation. Further diagnostic tests showed that gross capital formation Granger-causes both domestic credit to the private sector and broad money, and domestic credit to the private sector Granger-causes broad money. The study concluded that money supply and gross capital formation are necessary factors to address in the quest for developing the financial strength of domestic banks in providing credit facilities to the private sector for economic growth. The findings will help policy makers in Ghana to take informed decisions when tackling economic growth issues.

**Keywords**— private sector credit; domestic credit; broad money; gross capital formation

## I. INTRODUCTION

The private sector of Ghana is the source of income for many households in Ghana. By definition, “The private sector is the part of the economy that is run by individuals and companies for profit and is not state controlled” [1].

The main players in the private sector are partnerships, sole proprietorships, small and mid-sized (SME) businesses, large corporations and trade unions. These entities operate across all sectors of the economy, contributes massively to the growth of the economy and employs majority of the citizenry.

The private sector of Ghana accounts for about 85.6% of the total number of persons engaged by non-household establishments [2]. The report further indicated that, of the 3,383,206 employees engaged by all establishments, 48.2% are employed by sole proprietorship businesses and 10.8% by companies limited by guarantee. In addition, the report stated that Ghanaians own majority of the private sector businesses, with only 2.8% being foreign-owned. The above statistics suggest that government involvement in developing and assisting the private sector will be a step in the direction of improving the lives of Ghanaians, hence meeting the sustainable development goal one (SDG1) [3]. Another factor that makes the private sector very important is the fact that 60.3% of people employed by the sector are males who have families that depend on them. In addition, majority of the private sector engagements are in agriculture, industry and services sectors, which have the highest contribution to gross domestic product (GDP).

Moreover, government activities and programs are towards projects that are private sector driven. In 2016, the government of Ghana launched the “Made in Ghana” policy. The 2017 budget of the new government also included many policy proposals and initiatives geared towards the private sector, these include a strengthened focus on local content, a new National Industrial Revitalization Program with a stimulus package for industry, and a National Entrepreneurship and Innovation Plan (NEIP) [4]. Other government initiatives meant for private sector participation include, the “One Village, One Dam (1V1D)” and “One District, One Factory (1D1F)” proposals to promote industrialization from the ground up [5]. The success of these programs depends mainly on how stakeholders are able to surmount accompanying challenges.

Issues with credit has been the main challenge that has bedeviled the private sector of Ghana for years. Most private sector operators have severe information opacity coupled with relatively low financial backbone, which decreases their credit worthiness and make them non-attractive to the banks, hence,

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increasing the cost of credit and worsening the scarcity of funds from banks to finance projects. Another excuse that banks give in support of their inability to give credit to private businesses is the high non-performing loans (NPL) on their books. Meanwhile, the private sector depends heavily on loans for their activities and bank efficiency has been shown to be highly impacted by private sector credit, particularly, SME credits. According to [6], bank credit guarantee to SMEs is directly proportional to profit efficiency of the bank and inversely varies with cost efficiency of the bank [7]. posit that banks play central role in the economic development of a nation and went on to support the argument that a bank's success or failure depends on how well it is able to manage its credit to customers. Studies have further shown that private sector credit and domestic credit are the main banking indicators for measuring financial development [8]. Moreover, established that financial development plays a major role in economic growth, and credit market based financial systems contribute more to economic growth than stock Market based financial development [9]. However, existing studies have shown that the contribution to growth by stock markets in low-income countries has been abysmal. Meanwhile, banks have a significant positive impact on capital accumulation, though, the converse is true for high-income economies [10]. Other studies such as find that finance continues to display a positive effect on growth until it gets to a critical threshold, after which the positive effect disappears [11]. Some researchers also argue that the relationship that exists between financial and economic growth is dependent on the level of financial development and may vary accordingly.

In recent times, artificial intelligence (AI) is making a massive impact in the field of managing the risk that banks are exposed to when they lend to the customers. [7] developed a neural network for credit administrators to use in checking the eligibility of loan applicants [12]. On the other hand, used fuzzy expert systems to design bank customer credit scoring database to identify potential credit defaulters. Furthermore, compared the strength and accuracy of the AI techniques used in checking customer credit worthiness and found that the neural network model outperforms the other techniques [13]. Meanwhile, in a very recent study, illustrated the ability of the neural network model and the linear regression model to accurately predict the credit worthiness of a loan applicant [14]. Their results showed that both methods have similar efficiency, rather, the difference lies in the type of application and the attribute.

Another motivation for this study is the fact that banking crisis has become a topical issue around the globe after the 2008 credit crunch, and the need to study the underlying factors of credit has become very necessary. Studies have shown that credit growth is a strong determinant of banking crisis. Meanwhile, further research has proven that credit growth generated by domestic savings has less negative impact than that generated by foreign borrowing, and this has been seen to be more dangerous in countries without capital account restrictions [15]. Also, found that private sector credit is a significant predictor of systemic financial risk [16].

The underlying theory for this investigation is the debt Laffer curve theory, which states that there is a non-linear

association between debt and economic growth. The theory postulates that domestic debt initially accelerates economic growth by providing resources for budget deficit financing. However, as debt stock rises, the economy experiences debt overhang, which results in decline economic growth. The theory blames this downward trend on high debt servicing costs, which reduces public resources for productive investment and brings about reduction in private sector credit, as the private sector is crowded out. Further, debt issuance may result in interest rate hikes, hence, resulting in high cost of borrowing for household consumption and capital accumulation.

In terms of empirical evidence, most studies have investigated the direct impact of domestic debt on economic growth. For instance, used ARDL bound testing approach to cointegration for Saudi Arabia, and found long-run and short-run relationship existing between GDP and private sector credit [17], meanwhile the elasticity of the short-run relationship was found to be greater than for the short-run relation [18], applied regression and correlation analysis to euro area data to investigate the inter-relations between domestic credit growth and international capital flows spanning the period 1993 - 2008 and found a strong association between the two variables, but found no relation between domestic credit growth and net equity inflows. The same pattern replicated when they extended the sample to 54 advanced and emerging economies. In a similar study, [15] applied probabilistic and logit modeling to data from 35 European countries to investigate if credit growth is itself the cause of a banking/financial crisis. Their study revealed that the marginal impact of increasing private sector debt level is dependent on the external debt position of an economy. Moreover, the marginal impact of a rise in debt was insignificant when there is a balanced current account; however, the marginal effect increases significantly in the case of an economy running a huge current account deficit. The work of [19] unveiled a significant long-run relationship between domestic banks' equity, credit growth and non-performing loan upon applying a restricted vector error correction model (VECM) to Belize data from 1997 to 2016. In the discussion paper of [20] to identify and evaluate the long-run determinants of bank credit to the private sector of Albania, they employed VECM approach based on demand and supply indicators and found that adjustment mechanisms exist that brings bank credit back to equilibrium. Furthermore, their results showed that there exists significant positive relationship between lending and economic growth. In addition, they established that lesser cost of lending, a decrease in the rate of government borrowing from the domestic market, and a use of a more quantitative approach to bank credit would result in further lending opportunities. Their work further established that exchange rate picks up some demand valuation and consumption smoothing effects.

In relation to Africa, domestic credit to the private sector is found to have a non-linear relationship with economic growth; unveiled this when he applied systems GMM to study panel data on 21 sub-Saharan African countries from 1985 to 2010 [21]. Mbate's results also revealed that domestic debt crowds out private sector credit, which may deter capital accumulation

and private sector growth. Many other country specific analysis of private sector credit exists in literature, many of which are on Nigeria. In a study to examine the effect of domestic credit on economic growth [22], applied ordinary least square (OLS) regression and multivariate cointegration technique to annual time series Nigerian data from 1980 to 2013. Their study revealed that both credit to the private sector and credit to the public sector have significant positive correlation with GDP in the short-run, meanwhile, the long-run relation is very weak. In a similar study [23], applied OLS regression and cointegration to quarterly time series data spanning 2000:Q1 to 2014:Q4 and found that there exists a statistically significant positive effect of private sector credit on economic output. Unlike [22], they included other variables such as total government expenditure, nominal exchange rate and prime lending rate in their study. Moreover [24], applied the technique of cointegration and error correction model and found both long-run and short-run relationships between monetary policy and private sector credit. In another breadth [25], applied reduced Vector Auto-Regression (VAR) to monthly time series Nigerian data from 2000:M1 to 2013:M5 and established a positive association between private sector credit, broad money and GDP.

This study employs Johansen cointegration and VAR to investigate the factors that influence DCPS of Ghana. The study used 56 years annual data spanning a period from 1961 to 2016. Most recent literatures on domestic credit to the private sector has considered private sector credit as endogenous variable, to investigate how it affects financial development and economic growth. Findings from these studies have shown how credit has been a major driver of economic growth. This study intends to broaden the scope by investigating the factors that affect credit to the private sector. Furthermore, the study includes gross capital formation, which is an underlying factor that influences all sectors of the economy in order to bring completeness.

This paper is bringing into the literature new knowledge not yet explored by researchers in this topic. The first contribution is the fact that, though some studies have been done on credit to the private sector in Africa and for that matter Ghana, the concentration has always been on how credit impacts on either GDP growth or financial development. To the best of our knowledge based on existing literature, there is little or no work done on finding the factors that influence domestic credit to the private sector, more especially, in Africa and other developing countries. This makes this study a novelty. Also, gross capital formation, net official development assistance and general government final consumption expenditure, which are all underlying variables that may negatively or positively influence economic growth, have been left out of all the studies, making their findings incomplete.

The rest of the study is structured as follows: section 3 explains techniques and methods employed in gathering and analyzing all the data gathered. Section 4 then comes with results and discussions, and finally, section 5 concludes the study and outlines recommendations for further studies and recommendations for policy initiatives.

## II. RESEARCH METHODOLOGY

To analyze the determinants of domestic credit to the private sector of Ghana, the paper suggests the following model:

$$DCPS = f(GCEXP, GDI, M2, ODA, GNE) \quad (1)$$

where, DCPS represents domestic credit to private sector, GDI is gross capital formation, GCEXP is general government final consumption expenditure, M2 is broad money, ODA is net official development assistance and GNE is gross national expenditure. All the variables are ratio of gross domestic product, except net official development assistance, which is a percentage of gross national income.

This study uses Granger-causality test in VAR framework to study causal relationship among the variables. The process starts by first reducing the data to bring out some of its characteristic features, which are not legible at a glance; followed by diagnostic tests to check for stationarity of the time series using Augmented Dickey-Fuller (ADF) test equations as described in subsection 3.2 below. The next step is to check for the lag length to be included in the model by employing various lag length selection criteria. After which we shall employ the Johansen cointegration test to investigate the presence of long-run relationships among the variables. Followed by unrestricted cointegration rank test (Trace and Max-eigenvalue) is applied followed by Granger-causality tests in VAR to establish which variables have causal effect on others. The analysis ends with discussions on the models obtained from the process.

### A. Data Analysis

EViews 9 package and Microsoft Excel are used to analyze secondary data on the variables from 1961 to 2016 retrieved from the World Bank's World Development Indicator (WDI) database.

### B. Augmented Dickey-Fuller (ADF) Test

A stationary series can be defined as a series with a constant mean, constant variance and constant auto-covariances for each lag. The presence of unit roots in series may pose autocorrelation problems, which may lead to spurious regression estimation. The ADF test proposed by [26-28] is used to test for the presence of unit roots in each of the series. The basic aim of the ADF test is to examine the null hypothesis  $H_0 : \Phi = 0$  against the alternative  $H_1 : \Phi < 0$  in

$$y_t = \Phi y_{t-1} + u_t \quad (2)$$

where,  $y_t$  is the given series and  $u_t$  is a white noise disturbance term with mean zero and variance zero, i.e., the hypothesis are  $H_0$ : Series contains unit root; against  $H_1$ : Series is stationary. Alternatively, for ease of computation and interpretation, equation (2) is transformed to

$$\Delta y_t = \psi y_{t-1} + u_t \quad (3)$$

where  $\Delta y_t = y_{t+1} - y_t$  and  $\psi = \Phi - 1$  and the hypothesis becomes

$$H_0 : \psi = 0 \text{ versus } H_1 : \psi < 0$$

C. Johansen Cointegration Test

Ref. [29] represented the possibility that a linear least square regression of two or more non-stationary variables may be stationary. According to them, the original non-stationary vector of time series data ( $y_t$ ) are said to be co-integrated if each element of the vector achieves stationarity after differencing, but a linear combination  $\beta' y_t$  is already stationary. The VAR based co-integration test using Johansen’s approach [30] is described below.

The set of six variables under consideration are integrated of order one and may be cointegrated. A VAR with k lags containing these variables is set up as:

$$y_t = \sum_{i=1}^k \beta_i y_{t-i} + u_t \tag{4}$$

In order to use the Johansen test, the equation (4) above is converted into a vector error correction model (VECM) of the form:

$$\Delta y_t = \Pi y_{t-k} + \sum_{i=1}^{k-1} \Gamma_i \Delta y_{t-i} + u_t$$

TABLE I. DESCRIPTIVE STATISTICS RESULT

	DCPS	GCEXP	GDI	GNE	M2	ODA
MEAN	8.6882	12.1951	16.7882	108.1734	23.0060	5.9714
MEDIAN	7.5742	11.6452	17.4972	107.7906	22.0781	4.5590
MAXIMUM	20.4446	20.8880	31.7848	125.2731	34.2000	16.3384
MINIMUM	1.5423	5.8613	3.3776	94.49378	11.3050	0.2315
STD. DEV.	5.1834	3.0533	7.5243	7.168767	6.2026	4.0386
SKEWNESS	0.5753	0.8453	-0.0237	0.280018	0.1337	0.7146
KURTOSIS	2.2766	3.9414	1.9058	2.284663	2.1319	2.4106
JARQUE-BERA	4.3101	8.7368	2.7986	1.925809	1.9253	5.5771
PROBABILITY	0.0159	0.0027	0.0468	0.021782	0.0319	0.0415
SUM	486.5410	682.9241	940.1398	6057.7130	1288.336	334.397
SUM SQ. DEV.	1477.710	512.7557	3113.8090	2826.517	2115.965	897.064
OBSERVATIONS	56	56	56	56	56	56

M2: Broad Money; DCPS: Domestic Credit to Private Sector; GCEXP: General Government Final Consumption Expenditure; GDI: Gross Capital Formation; GNE: Gross National Expenditure; ODA: Net Official Development Assistance

On average, the DCPS is 8.690 for the 56-year period, while the averages for GCEXP, GDI, GNE, M2 and ODA are respectively 12.195, 16.788, 108.173, 23.006 and 5.971. GNE has the highest average and ODA has the least. The median also shows similar figures to the means, since, they both measure central tendencies. GNE records the highest maximum value of 125.27, while ODA has the least value of 16.34. The standard deviation figures of all the six series are in single digits, which indicates that the data sets do not deviate significantly from their respective means. This is evident in the Jarque-Bera values, which indicates that all the six series have significant normal distribution at 5% level of significance. The measures of skewness and kurtosis indicates

the extent to which the distributions of the data series deviate from symmetry and the peakedness of their frequency polygons respectively. Hence, the small measures of skewness and kurtosis values further confirms the closeness of the data sets to normality, though they are slightly leptokurtic.

The trends in the series used in the study are in Figure 1 below. All the six graphs exhibit the presence of trend and intercept. They also show steadily increasing trend, meanwhile, GNE and ODA show sharp decline from 2005. Generally, there is a trough in all six series during the period from 1966 to 1982, which marks the period of political unrest in the history of Ghana.

with  $t = 1, 2, 3, 4, 5, 6$

where  $\Pi = \left( \sum_{i=1}^k \beta_i \right) - I_6$  and  $\Gamma_i = \left( \sum_{j=1}^i \beta_j \right) - I_6$

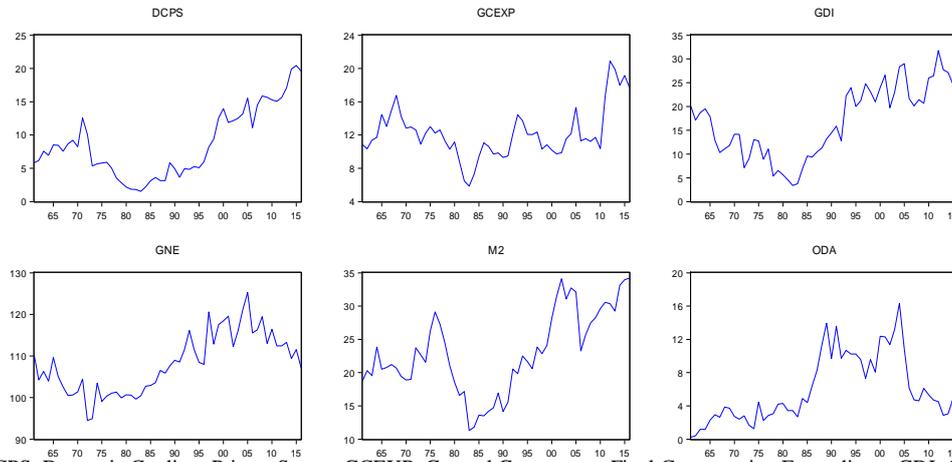
This VAR contains 6 variables in first differenced form on the left hand side, and  $k - 1$  lags of the dependent variables (differences) in the right hand side, each with  $\Gamma$  coefficient matrix attached to it.

D. Granger Causality test

Granger-causality test examines the direction of causal relationship (if any) between the variables, since cointegration does not guarantee causality. Economic theories have firmly established the existence of causal relations in at least one direction. A myriad of studies have been done in this regard, [29, 31-34], concluded that the variable X is said to granger-cause variable Y if using the past values of both Y and X gives a better forecasting result of Y than depending only on variable Y. Sample F-test is applied to examine causality in the variables. A significant F-statistic implies that lagged changes in a variable  $j$  Granger-cause changes in variable  $i$ .

III. RESULTS AND ANALYSIS

Table 1 below contains descriptive statistics that brings out some of the characteristic features of the six series that are not obvious in the raw data.



M2: Broad Money; DCPS: Domestic Credit to Private Sector; GCEXP: General Government Final Consumption Expenditure; GDI: Gross Capital Formation; GNE: Gross National Expenditure; ODA: Net Official Development Assistance

Fig. 1. Line Graphs of Series 1961 – 2016

A. Stationarity Test

To tackle the autocorrelation problem among the series, which may result in spurious regression, we use the Augmented Dickey-Fuller (ADF) test proposed by [26] to test for the presence of unit roots in each of the series.

The models excluded from the analysis are the models of no intercept and no trend because the line graphs in Figure 1 above suggests that the series have intercept and/or trend. The hypothesis for the ADF test: Each of the six series is non-stationary. The results of the ADF test are in Table 2 below.

From the results in table 2, we tested for stationarity in the dataset for the two models considered, thus, the model that includes intercept only and the one that includes both intercept

and trend. In both cases, the test statistic is less negative than the critical value in each case that we run the test on the level data; hence, the null hypothesis of the presence of a unit root in the level data series cannot be rejected. Meanwhile, when we run the test on the first differenced data series, we found the test statistic to be more negative than the corresponding critical values at 5% level of significance, hence the null hypothesis of the presence of a unit root in the first differenced datasets is rejected. Therefore, we conclude that the data series are all nonstationary at level, but stationary after first differencing. Hence, all the data series used in this study are integrated of order one (i.e., they are I(1)). We therefore, proceed to the next step to find the number of lags to include in our VAR model.

TABLE II. AUGMENTED DICKEY-FULLER TEST

INCLUDE IN TEST EQUATION: VARIABLES	INTERCEPT		INTERCEPT & TREND	
	LEVEL	1 <sup>ST</sup> DIFFERENCE	LEVEL	1 <sup>ST</sup> DIFFERENCE
M2	-1.133	-7.501*	-1.804	-7.510*
DCPS	-0.260	-7.943*	-1.303	-6.768*
GCEXP	-1.894	-6.816*	-2.107	-5.458*
GDI	-1.551	-6.950*	-2.799	-7.022*
GNE	-1.091	-7.980*	-3.474***	-7.897*
ODA	-2.083	-8.662*	-1.785	-8.779*

\*represents significant at 1% level of significance; \*\* represents significant at 5% level of significance; \*\*\* represents significant at 10% level of significance.

M2: Broad Money; DCPS: Domestic Credit to Private Sector; GCEXP: General Government Final Consumption Expenditure; GDI: Gross Capital Formation; GNE: Gross National Expenditure; ODA: Net Official Development Assistance.

B. Lag length Selection

The optimal lags required in the co-integration test were chosen using the most common traditional information criteria, being the Akaike Information Criteria (AIC), Schwarz Criterion (SC) and Hannan & Quinn’s (HQ) proposed by [35], [36] and [37] respectively. The results are shown in Table 3 below. From the results in table 3 above, all the three criteria have selected one lag to be included in the model, which is consistent with financial theories for the selection of lag lengths.

TABLE III. LAG LENGTH SELECTION CRITERIA

LAG	AIC	SC	HQ
0	32.045	32.270	32.131
1	26.420*	27.996*	27.024*
2	27.036	29.963	28.158
3	27.142	31.420	28.782
4	27.110	32.739	29.268

\*represents significant at 1% level of significance; \*\* represents significant at 5% level of significance; \*\*\* represents significant at 10% level of significance. M2: Broad Money; DCPS: Domestic Credit to Private Sector; GCEXP: General Government Final Consumption Expenditure; GDI: Gross Capital Formation; GNE: Gross National Expenditure; ODA: Net Official Development Assistance.

C. Johansen Cointegration Test

From table 4 below, the trace statistic for all three hypotheses are greater than their corresponding critical values, and the probability values are also greater than 0.05, which indicate the acceptance of all three hypotheses at 5% level of significance, to yield the conclusion that there is no

cointegration among the variables at 5% significance level. In addition, the max-eigenvalue test results show similar results. Hence, we conclude that there is no long-run relationship between the variables. Therefore, we estimate unrestricted VAR models in the next section.

TABLE IV. UNRESTRICTED COINTEGRATION RANK TEST (TRACE)

HYPOTHESIZED NO. OF CE(S)	TRACE STATISTIC	0.05 CRITICAL VALUE	PROB.**	MAX-EIGEN STATISTIC	0.05 CRITICAL VALUE	PROB.**
NONE	91.579	95.754	0.094	35.862	40.078	0.138
AT MOST 1	55.717	69.819	0.389	21.760	33.877	0.626
AT MOST 2	33.957	47.856	0.504	15.447	27.584	0.712

Trace test indicates no cointegration at the 5% level of significance.  
 \*denotes rejection of the hypothesis at the 5% level  
 \*\*MacKinnon-Haug-Michelis (1999) p-values

Max-eigenvalue test shows there is cointegration at the 5% level of significance  
 \*indicates rejection of the hypothesis at the 5% level.  
 \*\*MacKinnon-Haug-Michelis (1999) p-values

M2: Broad Money; DCPS: Domestic Credit to Private Sector; GCEXP: General Government Final Consumption Expenditure; GDI: Gross Capital Formation; GNE: Gross National Expenditure; ODA: Net Official Development Assistance

The three hypotheses being tested are as follows;:

- H<sub>1</sub>: There is no cointegration among the variables;
- H<sub>2</sub>: There is at most 1 cointegration equation;
- H<sub>3</sub>: There are at most 2 cointegration equations;

D. Unrestricted VAR Model Estimation

We obtained the following VAR models for the variables by applying the least squares method:

$$M2_t = 0.670M2_{t-1} + 0.302DCPS_{t-1} + 0.236GDI_{t-1} \tag{6}$$

$$DCPS_t = 0.906DCPS_{t-1} + 0.212GDI_{t-1} \tag{7}$$

$$GCEXP_t = 0.590GCEXP_{t-1} - 0.164GNE_{t-1} + 18.839 \tag{8}$$

$$GNE_t = 0.413GNE_{t-1} - 0.582GCEXP_{t-1} + 0.550ODA_{t-1} + 75.355 \tag{9}$$

TABLE V. GRANGER-CAUSALITY TEST RESULTS

VARIABLES	M2	DCPS	GCEXP	GDI	GNE	ODA
M2		0.367 (0.548)	2.242 (0.140)	0.044 (0.834)	0.239 (0.627)	1.994 (0.164)
DCPS	9.835 (0.003)**		2.737 (0.104)	0.218 (0.642)	0.059 (0.809)	1.142 (0.290)
GCEXP	0.252 (0.618)	0.047 (0.830)		1.116 (0.296)	1.654 (0.204)	2.757 (0.103)
GDI	9.110 (0.004)**	8.425 (0.005)**	3.496 (0.067)		0.806 (0.373)	1.110 (0.297)
GNE	3.481 (0.068)	1.949 (0.169)	0.374 (0.543)	0.965 (0.331)		0.064 (0.802)
ODA	0.270 (0.606)	0.324 (0.572)	0.006 (0.941)	2.777 (0.102)	10.629 (0.002)**	

\*\*represents significant at 5% level of significance.

M2: Broad Money; DCPS: Domestic Credit to Private Sector; GCEXP: General Government Final Consumption Expenditure; GDI: Gross Capital Formation; GNE: Gross National Expenditure; ODA: Net Official Development Assistance

### E. Granger-causality Test

We employ the granger-causality test to investigate the causal relationships that exist among the variables; table 5 contains the results of the test.

From Table 5, test results show that at 5% level of significance, there exists unidirectional causality from DCPS to M2, GDI to M2, GDI to DCPS and ODA to GNE. These results indicate that using the past values of both DCPS and M2 gives a better forecast of M2 than depending on only M2. Also, depending on past values of both GDI and M2, it will yield better forecast values of M2 than depending on only M2 values. Furthermore, past values of both GDI and DCPS produces better DCPS estimates than only DCPS values. Finally, using past values of both ODA and GNE forecasts GNE better than depending on only GNE values.

From the analysis, the estimated model (7) is the best model for the forecasting of DCPS values.

### IV. CONCLUSION

The goal of this study is to analyze the factors that influence domestic credit to the private sector in Ghana. The study used annual time series data from 1961 to 2016, which represents 56 data points. We used VAR method for time series data in the analysis. We defined all the six variables as endogenous variables.

Our results show that, although there are no long-run associations between the variables, domestic credit to the private sector of Ghana is found to have significant positive relationships with both broad money and gross capital formation. The results of granger-causality test show that changes in both domestic credits to private sector and gross capital formation may cause changes in money supply; changes in gross capital formation may also cause changes in domestic credit to private sector. Furthermore, changes in net official development assistance may cause changes in gross national expenditure.

In conclusion, the study found that, though there is no long-run relationships between the variables, there exist a significant short-run positive relationship between domestic credit to the private sector of Ghana and gross capital formation.

These findings imply that for government to succeed in the quest to develop the country through the private sector dependent programs rolled out, say, “one village one dam”, “one district one factory”, etc., it will require the strengthening of the private sector. Which can be achieved by not only making credit available and accessible to the private sector, but most importantly, focusing on the underlying factor(s) that influence domestic credit to the private sector, which by this study, is the gross capital formation.

Policy makers are therefore advised to formulate and implement strategies that will increase investments in areas that will inure to additions to the fixed assets of the economy, say, construction of roads, airports, railways, hospitals, schools, etc.; plant, equipment and machinery purchases; land improvement; and so on. Moreover, government must put in

place checks and balances to monitor net changes in the level of inventory. Finally, government is advised to introduce policies that will bring about effective and judicious utilization of borrowed funds to achieve the stated objectives of investment which are development, productivity and economic growth.

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