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THE EFFECT OF INTEREST RATE SPREAD ON ECONOMIC GROWTH: GHANA'S PERSPECTIVE

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ABSTRACT: *The purpose of the study was to investigate the effect of interest rate spread on economic growth using annual time series data from 1975 to 2018. The study used the Engel-granger two-step procedure which uses the OLS technique to establish both the long-run and short-run relationships between interest rate spread and economic growth. The study established that interest rate spread is a statistically important determinant of economic growth but it has a negative impact in the long-run. Also, the result shows that labour force, capital stock, and exports affect economic growth in Ghana positively both in the long-run and short-run. However, government expenditure appeared not to be a statistically significant factor in determining economic growth in Ghana. Policy actions that ensure macroeconomic stability should be embarked upon to achieve stability and sustainable growth of the economy. Export promotion, investment opportunities as well as producing active labour force should be given a priority.*

KEYWORDS: interest rate spread, economic growth, sustainable growth, government expenses, Ghana

INTRODUCTION

Before the financial sector reforms, interest rates were controlled and monitored not by the market but by the Bank of Ghana and a variety of controls were also imposed on the asset allocations of the banks (Brownbridge & Gockel, 1996; Kamasa, Mochiah, Doku, & Forson,

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2020) . The Bank of Ghana, the main agent for the implementation of monetary policies and the head of the financial system of Ghana, operated financially repressive policies with ceilings on interest rates, high reserve requirements, restriction on market entry and quantity control of credit allocation (Odhiambo, 2018). These policies were necessitated because of the fact that, market imperfections and the nature of the financial system inherited from the colonial era made it difficult for the desired level of investment to be achieved (Steel, Aryeetey, Hettige, & Nissanke, 1997), hence the need for government intervention in the financial market. Among the motivated objectives of the intervention was to maintain interest rate low and stable (Maiti, Esson, & Vuković, 2020; Quartey & Afful-Mensah, 2014).

The imposed restrictions served to undermine private sector confidence in the system as a whole. There was therefore the need to institute financial sector reforms. During the financial sector reforms interest rates were deregulated (Dadzie & Ferrari, 2019; Osei-Assibey & Baah-Boateng, 2012). This move was in part to encourage competition among the banks. The financial sector reforms started with the partial liberalization of interest rates in 1987 and the removal of sectoral credit ceilings in the ensuing year.

Interest rate is a vital variable in the financial system. On a number of levels interest rates are important. On an individual level, high interest rates deter one from embarking on an investment because the financing cost would be extremely high. On the other hand, high interest rates could motivate one to save because one can earn more interest income (Claessens, Coleman, & Donnelly, 2018). High interest rates might cause a company to postpone an investment such as purchasing a new machinery to expand operations (Lee & Shin, 2018), thus thwarting the effort to create more jobs to foster economic growth.

The ease at which individuals, corporations, and entrepreneurs in a country get access to funds contributes largely to the level of investment, productivity and economic growth. Investors need money to acquire the factors of production in the form of land, machinery and equipment, labour as well as technology. The money is often received from the financial institutions in the form of loans. These loans have an associated cost termed as interest. The level of the interest plays a key role in the decisions of investors (Guenther, Johan, & Schweizer, 2018).

Altavilla, Boucinha, and Peydró (2018) argue that interest rate spread, reflects the level of efficiency of the financial sector, as a result of a competitive climate. The interest rate spread as used in this research work is the difference between the average lending rate and the average deposit rate. The lending rates charged by Ghanaian banks are extremely high whereas interests on deposits are quite low as compared to other African countries (Ampofo, 2020).

Despite the achievement of some degree of macroeconomic stability and the continuous decline in the monetary policy rate in recent times, interest rates generally remain obstinately high (Kwakye, 2010). The interest rate spread accounts for the major source of income that ensures

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the continuous survival of financial intermediaries, however, the extent of the spread differs across countries. According to Borio, Gambacorta, and Hofmann (2017) interest rate spread (IRS) in developing countries, including Ghana is significantly larger than in industrialized countries generally. This has been associated with high operational cost, high risk of default and high inflation rate. Obeng and Sakyi (2017a) and Bawumia, Belnye, and Ofori, (2005) opine that interest rate spreads within the Ghanaian banking sector are among the highest in Africa. In 2019, the interest rate spread for Botswana, Kenya, Mauritius, Namibia, Nigeria and South Africa were 4.8%, 4.9%, 4.7%, 4.2%, 6.5% and 3.1% (WDI, 2020) respectively whereas Bank of Ghana's banking sector report (2020) puts Ghana's interest rate spread at 11.8% for the same year.

To enhance and sustain high economic growth, an essential requirement is for governments to provide appropriate environment needed for the flow of savings into productive investments. This will depend on the provision of adequate support to financial institutions to enable them generate sufficient and quality investment resources. Mujeri and Younus (2009), note that an efficient financial system plays dual important roles; firstly, it transfers capital from savers to investors, and secondly, it directs loanable funds to productive and profitable investments, and enhances growth by pooling risks and facilitating transactions.

The quantum of savings that financial institutions are able to mobilize from the surplus unit largely determines the level of financial support that can be given to investors (Jacob & Innocent, 2019). According to Ouma, Odongo, and Were (2017), low or negative interest rates discourage savings mobilization and the channeling of the mobilized savings through the financial system. This negatively affects the quantity and quality of investment and hence economic growth. In a similar vein, high lending rates dissuade investors from contracting loans to boost their business activities.

Plethora of research have been conducted on interest rate spread (Döpke, Fritsche, & Pierdzioch, 2017; Gust, Herbst, López-Salido, & Smith, 2017) and particularly in Ghana (see Anthony et al., 2008; Fumey & Dokub, 2016: Obeng & Sakyi, 2016; Osei, 2016; Jalloh & Guevera, 2017; Musah et al., 2018: Akoto, 2021;). However, a careful review of these literature reveals that majority of these studies (e.g., Anthony et al., 2008; Churchill, et al., 2014; Obeng & Sakyi, 2016; Osei, 2016; Fumey & Dokub, 2016;) concentrated on the determinants of interest rate spread at the expense of the impact on the economy. The very few that focused on the effects (see Musah et al., 2018, Mensah & Abor, 2014 etc.) also focused on the impact of interest rate spread on commercial banks with virtually no emphasis on the impact on the overall economic growth. It is against this backdrop that the study seeks to explore the effect of interest rate spread on economic growth in Ghana both in the short and long-run. Moreover, this study examines the effect of interest rate spread on economic growth alongside with export, workforce, capital and government spending. The study seeks to answer the research question: Does the level of the

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interest rate spread have significant effect on economic growth in Ghana? Within the context of interest rate spread and economic growth, the study seeks to test the following hypotheses:

H_{01}: There is no long-run relationship among economic growth, interest rate spread, exports, labour force, capital, and government expenditure.
H_{02} : There is no short-run relationship among economic growth, interest rate spread, exports, labour force, capital, and government expenditure.

The study brings valuable contributions to both literature and practice. First, the study contributes to literature on interest rate spread, factors that negatively affects the spread. It brings to light the adverse repercussions on the economy in both short and long term horizons. Second, the study provides empirical evidence on how interest rate spread affects economic growth in Ghana. Finally, it gives practitioners and policymakers insight into the extent to which interest rate spread affect the economic growth of Ghana.

After justifying the significance of the study, the remaining sections are arranged as follows: highlights of the literature review, the methodology, presentation of findings, discussion of results, theoretical and managerial implications and limitations and direction for future research.

EMPIRICAL LITERATURE REVIEW

Interest rate spread is the margin between average deposit rate and lending rate of banks. The level of interest rate spread is an important policy variable because Banks are the main sources of business funding in Ghana (Hammond, Berko & Amissah, 2020). It demonstrates how efficient banks perform their intermediation role of savings mobilization and allocation (Grenade, 2007). The financial institution plays a key role in development of a national economy because it functions as a medium of collecting and mobilizing savings and extend credit for various investment activities in the economy (Owusu-Antwi, Banerjee, & Antwi, 2017)

Owusu-Antwi, Banerjee, and Antwi (2017) examined the interest rate spread on banks profitability in Ghana employing average annual observation data from1992–2015 involving 28 commercial banks. They used ordinary least square to estimate the regression coefficients. The study concluded that bank-specific factors contribute significantly in the determination of interest rate spreads in the Ghana's banking sector. The study also revealed that some macroeconomic variables such as inflation was found to be significant and also GDP growth rate was insignificant.

In a study by Tarus and Manyala (2018) to investigate the determinants of bank interest rate spread in Sub-Saharan African countries drawing data from a pool of 20 Sub-Saharan African countries for a period of ten years covering 2003–2012. They found out that inflation has a negative and significant effect on interest rate spread, whereas costs of operation costs and bank concentration have a positive and significant effect on interest rate spread

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The results of a study carried out by Jalloh and Guevera (2017) to investigate the relationship between financial deepening, interest rate spread and economic growth drawing data from Sub-Sahara African (SSA) countries, reveal that whilst financial deepening positively impacts growth, interest rate spread negatively affects growth in countries that were involved in the study. Similarly, Obeng and Sakyi (2017b) examined macroeconomic determinants of interest rate spreads in Ghana spanning 1980-2013. For the estimation, the researchers employed autoregressive distributed lag bounds test approach to cointegration and the error correction model They highlight that exchange rate volatility, fiscal deficit, economic growth, and public sector borrowing from commercial banks, increase interest rate spreads in Ghana
Quadan (2004), argues that a more efficient banking system (low spread) benefits the real economy by allowing their expected returns for savers with a financial surplus, a lower borrowing cost for investing in new projects that need external finance. Low interest rate means a lower opportunity cost of money. This spurs consumption and eventually investment, which will, in turn, lead to faster overall economic activity.

In the view of Ndungu & Ugugi, (2000), if banking sector's interest rate spread is large, it discourages potential savers due to low returns on deposits and thus limiting financing for potential borrowers, thus slowing down economic growth.

Leimbach, Kriegler, Roming, and Schwanitz (2017) opine that one of the major factors behind poor economic growth of developing countries is high interest rate spread. Ghana as a developing country has generally a wide gap between interest rate on borrowings and that on savings.

METHODOLOGY

The study examines the effect of interest rate spread on economic growth in Ghana using annual data from 1975 to 2018. The choice of the data coverage was informed by data availability of the variables in the model. The study adopts the Engle-Granger Two step approach to cointegration. The variables in the study include: real GDP per capita, interest rate spread, labour force, capital stock, government expenditure and exports. The inclusion of these variables was based on existing literature on the topic, availability of data and economic theory.

Model Specification

Following the endogenous growth model in the form of a Cobb-Douglas production function, an algebraic representation of a simple endogenous growth model is formulated to capture the relationship between interest rate spread and economic growth as shown in equation (1).

$$Y_t = AK_t^{\alpha} L^{\beta}{}_t \qquad (1)$$

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Where *Y* denotes the aggregate output at time *t*, *K* is the aggregate capital stock at time *t*, L denotes labour stock at time t while *A* denotes total factor productivity (TFP). α and β are coefficients of elasticity for capital and labour respectively.

The TFP captures growth in output not accounted for by increase in physical input (capital) in the model. Given that TFP is endogenously determined, the endogenous growth literature argues that financial deepening affects growth not only through capital accumulation but also through the TFP channel. This channel, suggests that an efficient financial system affects growth by facilitating the adoption of modern technology to boost development of the knowledge and technology-intensive industries. According to Durlauf, Johnson and Temple (2005), there are a large number of potential variables that affect TFP. The study therefore examined the following variables of interest resulting in:

$$A = f(IRS, K, LAF, GEXP, EXPT) = IRS^{\beta_1} K^{\beta_2} LAF^{\beta_3} \mathrm{GEXP}^{\beta_4} \mathrm{EXPT}^{\beta_5} \qquad (2)$$

By substituting (2) into (1), we obtain;

$$Y_t = IRS_t^{\beta_1} K_t^{\beta_2} LAF_t^{\beta_3} GEXP_t^{\beta_4} \mathrm{EXPT}_t^{\beta_5} \qquad (3)$$

where *Y* is economic growth, *IRS* is interest rate spread, *K* is capital stock, *LAF* is labour force, *GEXP* is government expenditure, and EXPT is exports.

Empirical Model Specification

Consistent with the objectives of the study and in accordance with the literature, the study applied natural logarithm to equation (3) and estimated a log-linear model of the following form:

$$\ln Y_t = \beta_0 + \beta_1 IRS_t + \beta_2 \ln K_t + \beta_3 \ln LAF_t + \beta_4 \ln GEXP_t + \beta_5 \ln EXPT_t + \varepsilon_t \qquad (4)$$

where *ln* denotes natural logarithm, *Y*, *IRS*, *LAF*, *K* , *EXPT* and *GEXP* have been defined already. The coefficients β_1, β_2, β_3, β_4 and β_5 are the elasticities of the respective variables, β_0 is the drift components, *t* denotes time and ε is the error term. The following are expected $\beta_1 < 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$ and $\beta_5 > 0$

Estimation Procedures

Unit Root Test

The first step of the estimation process begins with examining the time series properties of the data series. The pattern and trend in the data are examined and the tests for stationarity and the order of integration are also considered. As with the case of time series data they are mostly non-stationary (integrated) at their levels. And ignoring this may lead to spurious regression results. In general terms, we specify economic models based on the assumption that the variables are stationary. After the model has been specified, the variables are then tested for unit root (stationarity) using the Augmented Dickey-Fuller (ADF) tests. Consequently, the first test to be conducted is to ascertain whether the variables are stationary or test the level of integration through the unit root tests. The simplest case of this comes from a random walk variable. This is a variable that assumes the same values as in the last period, modified by current shocks.

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$$y_t = y_{t-1} + \varepsilon_t \qquad (5)$$

ε_t are shocks to the system and are assumed to be white noise process.
In general, we write (5) as:

$$y_t = \alpha y_{t-1} + \varepsilon_t \qquad (6)$$

So that if α =1, it is a pure random walk variable. This is not a necessary requirement to have a random walk variable but we want the example to remain simple and tractable. The assumption that α =1, implies that y_t is an integrated process so that subtracting y_{t-1} from both sides of equation (6), yields:

$$\Delta y_t = y_t - y_{t-1} + \varepsilon_t \qquad (7)$$

That is we differentiate y_t. Now Δy_t is stationary. The error term is assumed to be a shock process, which is stochastic and can thus be regarded as a white noise process such that;

$$\left[\varepsilon_t = 0, Var(\varepsilon_t - \varepsilon_{t-1}) = E(\varepsilon_t^2) = \delta^2 \varepsilon_t\right].$$

Primarily, due to the spurious nature of regression results generated by non stationary variables, the ADF test is done to examine the stationary properties of the variables. The test for unit root is thus formulated as follows (Dickey-Fuller, DF Test) and is based on the estimation of:

$$\Delta y_t = \rho y_{t-1} + \varepsilon_t \qquad (8)$$

Thus α = (1+ρ) or α -1= ρ, hence, if $\rho < 0$, then in (9), α < 1. The Dickey-Fuller test consists of testing the negativity of ρ of the OLS regression in (8). That is, we test the following null hypothesis:

$H_o : \rho = 0$, which implies that α = 1 or α-1=0 (non-stationary)
$H_a : \rho < 0$, which implies that α - 1 < ρ < 0, α < 1 (stationary)
The following equations are used in accepting or rejecting the null hypothesis;

$$\Delta y_t = \rho y_{t-1} + \varepsilon_t \qquad (9)$$

$$\Delta y_t = \alpha_0 + \rho y_{t-1} + \varepsilon_t \qquad (10)$$

$$\Delta y_t = \alpha_0 + \rho y_{t-1} + \alpha_1 (t - t_m) + \varepsilon_t \qquad (11)$$

Where ρ is the values generated from the ADF test. Equation (9) has no drift, (10) has a drift and (11) has a drift and a stationary trend process. This is time trend subtracted from its mean (t_m). These three equations are supposed to give a value of ρ and it becomes more efficient as you move form (8) to (11). The equation for our ADF test can be stated as:

$$\Delta X_t = \alpha + \delta t + \rho X_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta X_{t-1} + e_{1t} \qquad (12)$$

Where X_t denotes the series at time t, Δ is the first difference operator, α, δ, ρ and λ are parameters to be estimated and e is the stochastic random disturbance term. Thus, the ADF test of the null hypothesis that a series contains unit root or is non-stationary against the alternative hypothesis of no unit root stationary can be stated as: $H_0 : \rho = 0$ and the alternative is $H_1 : \rho \neq 0$

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If the tau value is more negative than the critical values (or greater in absolute terms), we reject the null hypothesis and conclude that the series is stationary. Conversely, if the tau statistic is less negative than the critical values (or smaller in absolute terms), we fail to reject the null hypothesis and conclude that the series is non-stationary.

The ADF test is a test against the null hypothesis that there is a unit root of I(1) in the series. The augmentation involves the inclusion of lags of Δy_t and thus improves the statistical fit of the equation and ρ is more efficient now with the added information. The ADF test is used in this study to determine the order of integration of the variables. The use of the ADF is to prevent the possibility of a higher order autocorrelation in the error terms associated with the Dickey-Fuller (DF) Test, (Dickey & Fuller, 1979).

If the variables are not stationary, they would tend to correlate highly when a linear technique such as when (OLS) regression is applied. For data of such series the value of any given data would be determined largely by the value of the preceding data in the series. This autocorrelation must be controlled before inferences may be made about the correlation with other variables. Failure to control this would lead to spurious results. In spurious regression, the results suggest that there are statistically significant relationships among the variables of the model but the results cannot be used for any meaningful analysis or inferences.

Enders (2005) mentioned that the selection of an appropriate lag length is as important as determining which variables to be included in a VAR system. Though one possible means of achieving this is to allow for different lag length for all equations, it is common to use the same lag length for all equations since this preserves the symmetry of the system In other words, a model with a relatively large number of lags is most likely to produce residuals that approach a white noise process but might not be parsimonious.

On the other hand, a model with small value of the lag length is more likely to be parsimonious but might not produce residuals that are random enough to approach a white noise process. The above problem implies that there is the need to select an optimal lag length ρ^* for the VAR. The F-statistics approach to selecting the optimal lag length is considered inappropriate for this study on the basis that it is tedious to use and as well has the tendency to produce too large a model, at least some of the time (Stock & Watson, 2003). The study employs the information-based criteria for selection the optimal lag length for the model. These have the advantage of selecting an optimal lag length that ensures a parsimonious model, while at the same time ensuring that the errors approach a white noise process.

Stock and Watson (2003), contend that Akaike Information Criterion (AIC) provides a reasonable alternative to Bayesian Information Criterion (BIC) if one is concerned that the BIC might yield a model with too few lags. Based on this, the study used the two criteria to select a value for the optimal lag length ρ^*. Because time series is autocorrelated, the ADF test is usually used to take into account the white noise process based on the introduction of the lagged

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difference term. If the t-statistics from the stationary equation is greater than the critical values, we reject the assumption of non-stationarity (unit root) and otherwise.

Similarly, the study also applies the Phillips-Perron test of unit root as the ADF tests are unable to discriminate well between non-stationary and stationary series with a high degree of autocorrelation. The PP test has an advantage over the ADF test as it gives robust estimates when the series has serial correlation and time-dependent heteroscedasticity. For the PP test, we estimate the equation as below:

$$\Delta X_t = \alpha + \pi_{2x_{t-1}} + \varphi\left(t - \frac{T}{2}\right) + \sum_{i=1}^{m} \varphi_i \Delta X_{t-1} + e_{2t} \qquad (13)$$

Cointegration Test

Cointegration is a property possessed by some non-stationary time series data. In this concept, two variables are cointegrated when a linear combination of the two is stationary, even though each variable is non-stationary. In particular, if one considers two time series, *X* and *Y* that are non-stationary, conventionally one would expect that a linear combination of the two variables would also be non-stationary. In order to avoid the problem of non-stationarity it is necessary to make use of first (or higher) differentiated data. Such differencing, however, may result in a loss of low frequency information or long-run characteristics of the series data. However, Engle and Granger (1987) showed that, if there is an equilibrium relationship between such variables, then for this relationship to have any meaning, a linear combination of these variables, the disequilibrium error should fluctuate around zero i.e. should be stationary. Thus, two time-series integrated in the order *d* are said to be cointegrated if one unique linear combination of these series exists which is integrated in an order inferior to *(d-b)* with $b \geq 1$. After establishing that variables are stationary, it is necessary to determine whether or not there is any long-term relationship between them, this means testing the cointegration.

Engle-Granger Two step approach to cointegration

The notion of cointegration is important in analyzing the long-run equilibrium relationships between economic time series variables. In this study, we adopted two-step Engle-Granger (1987) approach to examine cointegration between the export and import series. To operationalize this, consider an ordinary least squares cointegration regression of equation 4 in the form:

$$\ln Y_t = \beta_0 + \beta_1 IRS_t + \beta_2 \ln k_t + \beta_3 \ln LAF_t + \beta_4 \ln GEXP_t + \beta_5 \ln EXPT_t + \varepsilon_t \qquad (14)$$

Moreover, the residual from this cointegration regression is defined by equation (15):

$$\hat{\varepsilon}_t = \ln Y_t - (\hat{\beta}_0 + \hat{\beta}_1 IRS_t + \hat{\beta}_2 \ln K_t + \hat{\beta}_3 \ln LAF + \hat{\beta}_4 \ln GEXP_t + \hat{\beta}_5 \ln EXPT_t) \qquad (15)$$

Where: β_i are the equilibrium parameters, β_0 is intercept and ε_t is the error term or the residual. Cointegration is examined by testing the stationarity of the error term in the same fashion as ADF unit root test but in this case, without trend term. The error equation here is defined as

$$\Delta\varepsilon_t = k\varepsilon_{t-1} + \sum_{k=1}^{n} \beta_k \Delta\varepsilon_{t-k} + v_t \qquad (16)$$

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The null hypothesis for this residual based test is that the error terms are non-stationary, and a rejection of this hypothesis indicates that there exists long run relationship between the series. The statistical inferences are based on MacKinnon (1991) critical values.

Long-run and Short-run Dynamics

Once cointegration is established, Ordinary Least Squares (OLS) is applied to the following equation to obtain the long run parameters.

$$\ln Y_t = \beta_0 + \beta_1 IRS_t + \beta_2 \ln K_t + \beta_3 \ln LAF_t + \beta_4 \ln GEXP_t + \beta_5 \ln EXPT_t + \varepsilon_t \qquad (17)$$

This is followed by the estimation of the short-run elasticities of the variables. By applying OLS on equation (18) the speed of adjustment to equilibrium will be determined.

$$\Delta \ln Y_t = \alpha_0 + \alpha_1 \Delta \ln IRS_t + \alpha_2 \Delta \ln K_t + \alpha_3 \Delta \ln LAF_t + \alpha_4 \Delta \ln GEXP_t + \alpha_5 \Delta \ln EXPT_t + \lambda ECT_{t-1} + \varepsilon_t \qquad (18)$$

Where the coefficients are the short-run dynamics while λ is the speed of adjustment to long-run equilibrium following a shock to the system and ECT_{t-1} is the error-correction term.

Engle and Granger (1987) argued that when variables are cointegrated, their dynamic relationship can be specified by an error correction representation in which an error correction term (ECT) computed from the long-run equation must be incorporated in order to capture both the short-run and long-run relationships. The error correction term indicates the speed of adjustment to long-run equilibrium in the dynamic model. In other words, its magnitude shows how quickly variables converge to equilibrium when they are disturbed. It is expected to be statistically significant with a negative sign. The negative sign implies that any shock that occurs in the short-run will be corrected in the long-run. The larger the coefficients of the error correction term in absolute terms, the faster the convergence to equilibrium.

Data Analysis

This study employed both descriptive and quantitative analysis. Charts such as graphs and tables were presented to aid in the descriptive analysis. A unit root test was carried out on all variables using Both Augmented Dickey–Fuller (ADF) and Philips-Perron tests to ascertain their order of integration in order to avoid the problem of spurious regression. Furthermore, the study adopted the Engle-Granger two-step approach (OLS) to cointegration to obtain both the long- run and short-run estimates of the main variables involved. All estimations were carried out using Eviews 5.0 package.

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics of the variables involved are presented in Table 4. It can be seen from Table 4 that all the variables have positive average values (means). The minimal deviation of the variables from their means as shown by the standard deviation gives indication of slow growth rate of these variables over the study period. All of the variables showed positive skeweness with the exception of Exports (LEXPT), Capital (K), and Government expenditure (LGEXP) which are negatively skewed. Table 4 also illustrates vividly that there are 44 observations used in the

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study. The Jarque-Bera statistic shows that the null hypothesis that the series are drawn from a normally distributed random process cannot be rejected for all the variables.

Table 4: Summary Statistics

	LRGDP	LK	LGEXP	LEXPT	LAF	IRS
Mean	6.552328	16.09907	15.94611	2.942052	15.83490	12.19318
Median	6.548063	16.51298	16.29477	2.995070	15.82800	9.125000
Maximum	6.899364	23.02955	22.20215	3.887777	16.45812	29.50000
Minimum	6.252247	9.485697	10.02127	1.205464	15.26906	4.500000
Std. Dev.	0.153117	4.506468	4.055354	0.597515	0.375245	7.545069
Skewness	0.190488	-0.022297	-0.035956	-0.878261	0.076790	0.651892
Kurtosis	2.523328	1.543446	1.627458	3.693654	1.676912	2.231899
Jarque-Bera	0.682657	3.893155	3.463247	6.538626	3.252606	4.198021
Probability	0.710826	0.142762	0.176997	0.038033	0.196655	0.122578
Sum	288.3024	708.3590	701.6288	129.4503	696.7357	536.5000
Observations	44	44	44	44	44	44

Note: Std. Dev. represents Standard Deviation while Sum Sq. Dev. represents Sum of Squared Deviation.
Source: computed by the author using E-views 5.0 Package

Unit Root Test

Before applying the Engel Granger two-step approach to cointegration, unit root test was conducted in order to investigate the stationarity properties of the data. The basic requirement of this approach to cointegration is that the series needs to be integrated of order one I (1). As a result, all the variables were examined by first inspecting their trends graphically. It was observed that all the variables appear to exhibit behaviours of non-stationary series. However, the plots of all the variables in their first differences show that the variables are stationar. Additionally, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were applied to all variables in levels and in first difference in order to formally establish their order of integration. In order to be sure of the order of integration of the variables, the test was conducted with intercept and time trend in the model. The optimal number of lags included in the test was based on automatic selection by Schwarz-Bayesian Criterion (SBC) and Akaike Information Criterion (AIC). The study used the P-values in the parenthesis to make the unit root decision, (that is, rejection or acceptance of the null hypothesis that the series contain unit root).

The results of ADF test for unit root with intercept and trend in the model for all the variables are presented in Table 5. The null hypothesis is that the series is non-stationary, or contains a unit root. The rejection of the null hypothesis for the test is based on the MacKinnon (1991) critical values as well as the probability values.

From the unit root test results in Table 5, it can be seen that the null hypothesis of the presence of unit root for all the variables in their levels cannot be rejected since the P-values of the ADF statistic are not statistically significant at any of three conventional levels of significance.

However, at first difference, all the variables are stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected because the P-values of the ADF statistic are statistically significant at 1 percent significant levels for all the variables.

Table 5: Results of Unit Root Test (with constant and Trend): ADF Test

Levels			First Difference			
Variables	ADF-Statistic	Lag	Variables	ADF-Statistic	Lag	*I(O)*
LRGDP	-0.0250[0.9954]	0	ΔLRGDP	-5.2260 [0.0006]***	0	*I*(1)
LK	-2.0186 [0.5749]	0	ΔLK	-6.5546[0.0000]***	0	*I*(1)
LGEXP	-2.1887[0.4835]	1	ΔLGEXP	-4.6390 [0.0031]***	0	*I*(1)
LEXPT	-2.2198 [0.4667]	1	ΔLEXPT	-4.9106 [0.0014]***	0	*I*(1)
LAF	-0.5989 [0.9726]	3	ΔLAF	-5.4493 [0.0005]***	1	*I*(1)
IRS	-3.1255 [0.1144]	3	ΔIRS	-9.4069 [0.0000]***	0	*I*(1)

Note: *** indicate the rejection of the null hypothesis of non stationary at 1% significance level.
Δ denotes first difference, and *I(O)* is the order of integration. The values in parenthesis are the P-values.
Source: Computed by the author using E-views 5.0 Package

Moreover, the results of PP test for unit root with intercept and time trend in the model for all the variables are also presented in Table 6. The unit root test results in Table 3 show that the series are non-stationary at levels. This is because the P-values of the PP statistic are not statistically significant at any of the conventional levels of significance. However, at first difference, all the variables are stationary since the null hypothesis of the presence of unit root (non-stationary) is rejected at 1 percent significant level for all the series. It can be seen that the PP unit root test results in Table 6 are in line with the results obtained from the ADF test in Table 5, suggesting that all the variables are integrated of order one, I(1)

Table 6: Unit Root Test (with intercept and trend): PP Test

Levels			First Difference			
Variables	PP-Statistic	Bwd	Variables	PP-Statistic	Bwd	*I(O)*
LRGDP	-0.025[0.9954]	0	ΔLRGDP	-5.202[0.0006]***	5	*I*(1)
LK	-2.009[0.5798]	2	ΔLK	-6.5550[0.000]***	1	*I*(1)
LGEXP	-2.449[0.3508]	4	ΔLGEXP	-4.735[0.0023]***	4	*I*(1)
LEXPT	1.8121[0.6815]	1	ΔLEXPT	4.8657[0.0016]***	4	*I*(1)
LAF	-3.0918[0.121]	4	ΔLAF	-6.449[0.0000]***	2	*I*(1)
IRS	-2.744[0.2252]	3	ΔIRS	-9.072[0.0000]***	2	*I*(1)

Note: *** indicate the rejection of the null hypothesis of non stationary at 1% significance level. Δ denotes first difference, Bwd is the Band Width, and *I(O)* is the order of integration. The values in parenthesis are the P-values.

Source: Computed by the author using E-views 5.0 Package

It is therefore clear from both the unit test results discussed above that all the variables are integrated of order one I(1). Since the test results have confirmed the absence of I(0) or I(2) variables, Engel Granger methodology (OLS) is now used for the estimation.

Engel Granger Two Step Cointegration Test

To check for cointegration among economic growth, interest rate spread, capital, exports, government expenditure, and labour force, the study used the two-step Engle-Granger method, as mentioned earlier. In this method, the assumed cointegration equation is estimated using OLS (ordinary least square) and the residuals from the estimation are saved. According to Engle and Grange (1987), the variables would be cointegrated if the residuals saved from the equations are found to be stationary following ADF (Augmented Dickey-Fuller) unit root test. But in this regard special critical values (MacKinnon, 1991) are used as well as the probability values from this estimation. The unit test results on the residual saved from the OLS regression of equation 14 (Engle-Granger ADF cointegration test) is presented in table 7.

Table 7: Results of Engle-Granger ADF cointegration test

Variable	T-statistic	P-Value
Residual	-2.919330	[0.0514]*
	Critical Values	
1%	-3.592462	
5%	-2.931404	
10%	-2.603944	

Source: Computed by the author using E-views 5.0

From the conitegration test results in Table 7, the null hypothesis of the residual containing unit root (no cointegration) is rejected at 10 percent significant level. This is because the t-statistic value of 2.919330 in absolute terms is greater than the critical value of 2.603944 in absolute terms at 10 percent significant level. This is further confirmed by the P-value of 0.0514 which is significant at 10 percent significant level. Thus, there exist a long-run relationship among economic growth, interest rate spread, exports, capital, government expenditure, and labour force.

Results of the Long Run Relationship

Since economic growth, interest rate spread, exports, government expenditure, capital stock, and labour force are cointegrated, the long-run parameters using OLS are estimated and the results are presented in the Table 8.

Table 8: Estimated Long-Run Coefficients using OLS

Dependent Variable: LRGDP				
Regressor	Coefficient	Standard Error	T-Ratio	P-values
Constant	-36.60471	8.041330	-4.552072	[0.0001]***
LK	0.183030	0.090366	2.025423	[0.0499]**
LEXPT	0.194681	0.046211	4.212899	[0.0001]***
LGEXP	0.063845	0.104951	0.608332	[0.5466]
LAF	2.945355	0.558776	5.271087	[0.0000]***
IRS	-0.007417	0.004124	-1.798614	[0.0800]*
R-Squared	0.617740	Adjusted R-Squared	0.56744	
S.E. of Regression	0.100704	Prob (F-Statistic)		[0.0000]
Mean of Dependent Variable	6.552328	S.D. of Dependent Variable	0.153117	
Residual Sum of Squares	0.385367	Log likelihood	41.79718	
Akaike Info. Criterion	-1.627145	Schwarz Bayesian Criterion	-1.383846	
DW-statistic	1.739119			

Note: ***, **and * denote significance level at 1%, 5% and 10% respectively
Source: Computed by the author using E-views 5.0

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The results in Table 8 indicate that all the parameter estimates have their a priori signs and are statistically significant with the exception of government expenditure. Specifically, interest rate spread had a negative effect on economic growth while exports, capital stock, labour force, and government expenditure had positive effects on economic growth. However, government expenditure as mentioned earlier was not statistically significant.

Results of the Short Run Dynamic Model

Once the long-run cointegrating model has been estimated, the next step is to model the short-run dynamic parameters using OLS. Thus, the lagged value of all level variables (a linear combination is denoted by the error-correction term, ECM_{t-1}) is retained in the model.

Tables 9 present the results of the estimated error-correction model of economic growth model for Ghana. Consistent with the long-run results, the short-run results also indicate that all the parameter estimates have their a priori signs and are statistically significant with the exception of government expenditure. Moreover, interest rate spread had a negative effect on economic growth while exports, capital stock, labour force, and government expenditure had positive effects on economic growth. However, government expenditure as mentioned earlier was not statistically significant which is consistent with the long –run results.

The results in Table 9 also show the expected negative sign of error correction term lagged on period (ECM_{t-1}) and it is significant at 1 percent significant level. This confirms the existence of the cointegration relationship among the variables in the models yet again. The ECM stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance. The coefficient of the ECM is around -0.37 which suggests that a deviation from the long-run equilibrium subsequent to a short-run shock is corrected by about 37% at the end of each year.

Table 9: Estimated Short-Run Error Correction Model using OLS

Dependent Variable: ΔLRGDP				
Regressor	Coefficient	Standard Error	T-Ratio	P-values
Constant	-33.3698	6.7815	4.9207	[0.000]***
ΔLK	0.012806	0.0054070	2.3684	[0.021]**
ΔLEXPT	0.14806	0.049188	3.0101	[0.004]***
ΔLGEXP	0.10497	0.15874	0.66130	[0.511]
ΔLAF	1.4052	0.42394	3.3146	[0.002]***
ΔIRS	-0.0048579	0.0025849	-1.8793	[0.065]*
ECM_{t-1}	-0.371778	0.127351	-2.9193	[0.0057]***

Note: ***, ** and * denote significance level at 1%, 5% and 10% respectively.
Source: Computed by the author using Eviews 5 .0

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Model Diagnostics and Stability Tests

In order to check for the estimated model, the significance of the variables and other diagnostic tests such ad serial correlation, functional form, normality; heteroskedasticity and structural stability of the model are considered. As shown in Table 10, the model generally passes all diagnostic tests in the first stage.

Table 10: Model Diagnostics

Diagnostics	Test Statistic
Residual Serial correlation LM	0.73942 [.390]
Functional Form (Chi-sq)	0.0086267 [0.926]
Normality (Chi-sq)	0.80388 [0.669]
Heteroscedasticity (Chi-sq)	0.3413 [0.371]

Source: Computed by the author using Eviews 5.0

The diagnostic test in Table 10 shows that there is no evidence of autocorrelation and the model passes the normality and the test proved that the error is normally distributed. Additionally, the model passes the white test for heteroskedasticity as well as the RESET test for correct specification of the model.

DISCUSSION

From Table 8, it is seen that capital (Gross fixed capital formation as a ratio of GDP) is statistically significant at 5 percent significant level has a positive effect on economic growth both in the short-run and long-run in Ghana. It thus follows that a 1 percent increase in investment increases real GDP per capita (economic growth) by approximately 0.18 percent and 0.12 percent in long run and short-run respectively. The positive and statistically significant results of gross fixed capital formation to GDP (investment) confirm the theoretical postulation that capital stock contributes positively to growth of the economy (real GDP per capita).

Thus, the strong association between investment (capital stock) as a share of GDP and long term economic growth performance is well established. This result validates the neoclassical growth theory (Hunt, 2007) and is consistent with the empirical findings by Schmidt-Hebbel and Solimano (1996). Economic theory holds that higher rates of savings and investments are important determinants of the long-run growth rate. The suggestion behind Solow's (1956) framework is that higher investments and savings rates lead to more accumulated capital per worker and hence this results in an increase in economic growth, but at decreasing rate. Under endogenous growth theories that emphasize the broader concepts of capital (Rebelo, 1991), economic growth and investment tend to move together. The four Asian Tigers (South Korea, Hong Kong, Taiwan and Singapore), the most successful countries during the past thirty years in achieving rapid and sustained economic growth, is a good example. These countries have been able to maintain rates of GDP expansion in the order of 7-8 percent, supported by rates of gross fixed capital formation of about 30 percent of GDP; high growth and high investment have thus moved in tandem (Schmidt-Hebbel & Solimano, 1996). As mentioned in Sala-i-Martin (2002), countries that invest more tend to grow faster than those countries that invest less. This is confirmed by the positive and statistically significant effect of the ratio of investment to GDP. The positive and significant impact is consistent with the findings by Kargbo and Adamu (2010) for Sierra Leone as well as Bashiru (2011) for Ghana.

Furthermore, exports exerted a positive impact on economic growth and its coefficient is statistically significant at 1 percent significance level both in the long-run and the short-run. The coefficient value of 0.194681 indicates that if the country increases her exports by 1 percent, real GDP per capita (economic growth) will increase by about 0.19 percent and 0.15 percent in the long-run and short-run respectively. This result means that exports has a positive impact on economic growth in Ghana.

This result is consistent with the theoretical expectation of the classical views on the role of trade in the macro economy. According to Feder (1982), exports contribute to economic growth in a variety of ways - greater capacity utilization, economies of scale, incentives for technological improvement and pressure of foreign competition, leading to more efficient management. Thus, marginal factor productivities are expected to be higher in export industries than in non-export industries. The cross-sectional analyses by Feder (1982) and Ram (1987) confirm this productivity differential for developing countries, although the differential coefficients in Feder (1982) for developed countries are insignificant.

The result is also consistent with other empirical studies such as Yanikkaya (2003) and Wacziarg (2001). The results obtained goes to suggest that the trade liberalization adopted as part of the economic reform programme in 1983 in Ghana has helped open up the economy and had raised economic growth. This emphasizes the fact that trade enhances competition and efficiency as well as transfer of technology and knowledge and hence growth.

Moreover, consistent with the expectation, the coefficient of labour force is statistically significant at 1 percent significant level in both the long-run amd short-run. The coefficients were positive in sign in both of the two periods. The coefficient value of 2.945355 and 1.4052 indicate that a 1 percentage point increases in labour force will increase economic growth by approximately 3 percent and 1.4 percent in the long-run and short-run respectively. This means that labour force (people aged between 15-65 years) positively affect economic growth in the Ghanaian economy.

Again, the coefficient of the interest rate spread is negative in sign and is statistically significant at 10 percent significant level for the two periods. The coefficient indicates that, when interest rate spread increases by 1 percent, real per capita income (economic growth) will decrease by approximately 0.01 percent and 0.004 in the long-run and short-run respectively in Ghana. This means that, interest rate spread has a detrimental negative impact on economic growth in Ghana. This confirms the analysis by Centre for Policy Analysis (CEPA, 2006) that narrowing of the wider spread not only promotes consumer spending but enhances the entrepreneurship drive of the economy and its subsequent growth. Kwakye (2010) affirms that high interest rates reduce

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the incentive to invest and thereby slow down not only industrial growth but also economic growth. This result is also consistent with the outcome of the study by Adebiyi and Obasa, (2004) who empirically investigated the impact of interest rates and other macroeconomic factors on manufacturing performance in Nigeria using cointegration and Error Correction Mechanism (ECM) technique. Their results proved that interest rate spread has a negative but significant relationship with index of manufacturing production. They established that a one percent rise in the interest rate spread decreases index of manufacturing production by three percent. The empirical research by Albu (2010) who examined the correlation in Interest rate – Investment ratio in GDP – annual GDP growth rate buttressed the results. Also in line with this result is Crowley (2007), when he examined interest rate spread in English speaking African counties. Crowley observes that higher spreads negatively impact growth in the long-run.

Finally, although the coefficient of government expenditure is positive in sign as expected, it is not statistically significant in the long-run and short-run as well. This means that government expenditure do not have any significant effect on economic growth in Ghana based on the findings in this study. The R-square value of 0.61 indicates that, all the variables together explain 61 percent of the variations in real GDP per capita.

CONCLUSION

The study employed annual time series data from 1975-2018 and the Engel-granger two step procedure which use the OLS technique to establish the effect of interest rate spread on economic growth in Ghana. The study used real per capita income to measure economic growth and as well serves as the dependent variable. The independent variables included interest rate spread, capital stock, labour force, exports, and government expenditure.

Thus, this study in line with the empirical literature has shown that interest rate spread is statistically important determinants of economic growth but have a negative impact, both in the long-run and in the short-run.

Bank of Ghana should introduce refinance facility and market stabilization funds to help reduce interest rate volatility and IRS. Policy actions that ensure macroeconomic stability should be embarked upon to achieve stability and sustainable growth of the economy. Stability of key prices, including the exchange rate, commodity prices and interest rates, is crucial.

Limitations of the Study

The main limitation of the study came from the OLS technique used for the estimation is the least approach in regression estimation which comes with it so many disadvantages. Though it does not render the findings invalid.

Direction for future research

It is worthy to note that, the study only examined the relationship between interest rate spread and economic growth in Ghana in which case both the long-run and short-run relationships were

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established. The long-run and short-run results disclosed a negative impact of interest rate spread on economic growth suggesting that high interest rate spread is inimical to economic growth.

The study has implications for further research into other macroeconomic variables that influence Ghana stock economic growth. The study has revealed that government expenditure does not even affect economic growth in the case of Ghana. This gives a direction into a more vigorous study by choosing a more sophisticated econometric technique to analyze its effect on economic growth.

Moreover, instead of using the ordinary least square method to estimate the regression model which was stated earlier that it comes with its so many disadvantages, further research could consider other regression methods such as Autoregressive Distributed Lag (ARDL) models and Vector Auto regression (VAR) for estimation procedure.

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