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Government Expenditure and Economic Growth Nexus in Ghana

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Abstract

Purpose: Economic growth is widely regarded as a crucial indicator of economic advancement within a nation, as it has significant implications for the provision of state benefits, the improvement of living standards, and the generation of employment opportunities. The present study employed a time series analysis spanning from 1983 to 2018, focusing on Ghana, in order to comprehensively examine the diverse impact of both aggregate and disaggregated government expenditure and debt on the country's economic growth.

Methodology: The study conducted initial examinations, including unit root tests, cointegration tests, and correlation matrices, to determine the statistical reliability and validity of the data series for the research. The long-run parameters were estimated using the two-stage least square regression method, the autoregressive distributed lag method, and the threshold regression method.

Findings: Based on our research, it has been determined that government expenditure exerts a positive and statistically significant influence on overall economic growth. However, when examining the disaggregated effects, it becomes evident that consumption expenditure has a positive and significant impact on economic growth, whereas capital expenditure has a negative effect on economic growth.

Unique Contribution to Theory, Practice and Policy (Recommendations): In relation to the prevailing economic conditions characterised by periods of prosperity or recession, it is evident that the government should prioritise its attention towards external debt rather than domestic debt during times of economic expansion. Moreover, during periods of economic downturn, it is imperative for the government to prioritise foreign direct investment as a means of financing its budget, rather than relying on debt.

Keywords: *Government Expenditure; Economic Growth; Government Debt; Foreign Direct Investment; Consumption Expenditure; Capital Expenditure.*

1. Introduction

Government interference in the macroeconomic outlook has sparked a lot of debate across countries. As a result, governments use a variety of methods to help stimulate the economy. Government expenditures have traditionally been used to stimulate economic growth as part of fiscal policy (Lahirushan & GunasekLahirara, 2015; Xinying et al., 2019, Buthelezi, 2023). As a measure of economic progress within a country, economic growth is seen as a goal most countries expect because of its effect on state benefits, raising living standards, and employment levels. Nevertheless, with the current economic crisis occurring around the world due to government intervention, it is essential to examine it to ascertain if government spending is still a determinant of economic growth.

In recent times, the private sector has been touted as the engine of growth due to its efficiency. In essence, most Ghana policies have factored in the private sector to mitigate budget deficits and allocate resources to enhance the development of the economy (Nketiah-Amponsah, 2009; Vitenu-Sackey, 2023, 2021, 2020b; Nguyen & Bui, 2022). In a contemporary market like Ghana, it is still important for the government to increase its economic activities through budget funding. We tend to seek answers to this all-important question because numerous policymakers are divided on the right path of government expenditure effects, whether positive or negative, on economic growth (Nketiah-Amponsah, 2009; Buthelezi, 2023; Javed & Husain, 2022; Han et al., 2023).

Extensive research has been conducted to examine the correlation between government expenditure and economic growth. The findings of these studies suggest that there exists an inverse relationship between the two variables when the debt threshold surpasses a certain level (Azam & Khan, 2020; Eberhardt & Presbitero, 2015; Gómez-Puig & Sosvilla-Rivero, 2015; Mitze & Matz, 2015; Woo & Kumar, 2015). This perspective posits that government debt exerts a detrimental influence on economic growth through its impact on private savings and investments, total factor productivity, and capital accumulation. Many governments engage in excessive spending beyond their budgetary limits, resulting in a negative impact on economic growth (Yang et al., 2023). According to Fischer (1993), it was argued that the deficit's significant threshold should be 1.5% of the Gross Domestic Product (GDP). The debt ceiling holds significant importance within the framework of government spending and long-term economic growth. This is due to the fact that governments resort to borrowing in order to sustain their budget deficits and meet various expenditures (Adam & Bevan, 2005; Azam & Khan, 2020; Coccia, 2017; Woo & Kumar, 2015). That notwithstanding, the reduction in government expenditure or increase in taxes has been pinpointed to impact the social security programmes of the middle class (Feldstein, 2019). On the contrary, Azam and Khan (2020) and Baharumshah et al., (2017) opined that cutting down deficits at a certain threshold necessitates the burgeoning of economic growth and guarantees long-term sustainability.

Based on what we found, no study has attempted to critically evaluate the various consequences of government spending on economic growth, taking into account both the starting point and the current economic status, especially in Ghana. We intend to apply some econometric techniques that have not been used to empirically study the Ghanaian context phenomenon, such as threshold regression and two-stage least square methods. Our study, on the other hand, aims to give new information on the varied effects of government spending and government debt on Ghana's economic growth in order to help the government and policymakers make better decisions. Moreover, to contribute to the unending academic discussion on the subject matter, precisely ascertaining the validity of Wagner's Law (Wagner & Weber, 1977) and Keynesian theory (Keynes, 1936) in our sample is crucial. The endogenous growth literature explores the relationship between government expenditure and the rate of economic growth as measured by gross domestic product (GDP). Research on endogenous growth models has demonstrated the possibility of a reversed U-shaped relationship (Arawatari et al., 2023).

2.1 Literature review

According to the findings of Arawatari et al. (2023), when considering a significant presence of high-ability business owners, the association between the ratio of government expenditure to GDP and the rate of economic growth can be represented by a curve that follows an inverted U-shape, with a flat peak. The plateau of the curve suggests that variations in government expenditures have a constrained influence on economic growth.

Extensive scholarly inquiry has been conducted to examine the impact of government expenditure on economic growth in Ghana; however, the findings have yielded inconclusive outcomes. In their study, Anning et al. (2017) employed a vector error correction model to analyse the correlation between government expenditures and the economic growth of Ghana. This analysis was conducted by employing a granger causality test. Based on the researchers' findings, it can be inferred that there exists a distinct causal relationship between government spending and economic growth. It is suggested that the government should engage in self-liquidating infrastructural investment through the allocation of public funds in order to effectively stimulate economic growth in both the short and long term. The study encompassed the time period from 1980 to 2015.

Contrarily, as asserted by Singh et al. (2019), the impact of government capital spending on the economy is found to be insignificant both in the short-term and long-term. However, it is important to note that in the short term, economic growth is significantly and positively influenced by consumption expenditure. The present study utilised the Autoregressive Distributed Lag (ARDL) model, incorporating data spanning from 1991 to 2015. Additionally, the findings of this study indicate that it is advisable for the government to effectively allocate resources towards sectors that have the potential to generate greater output.

In a separate investigation, Gatsi et al. (2019) discovered no substantiation of a causal relationship between government expenditure and economic expansion within their research. Therefore, they

reject the assumption of Wegner's Law hypothesis and instead accord the Keynesian view. In this regard, they contend that the government's expenditure trajectory has been inconsistent with economic growth, and perhaps the government's expenditure is exogenous rather than endogenous. Fiscal imbalances have adverse effects on the macroeconomic climate of a country. Numerous studies conducted from 1990 to 2016 revealed that economic growth and government expenditure have a positive relationship with each other. Optimising government spending is characterised by a crowding-in effect with economic growth (Afonso & Leal, 2020; Alshammary et al., 2020). In a similar vein, the study conducted by Abotsi (2021) utilised a panel comprising 95 countries to examine the correlation between fiscal policy and investment over the period spanning from 1970 to 2008. The outcome of the study suggests that government expenditure and economic growth are intertwined. Increasing interest rates could exacerbate private investment, which could affect the level of consumption in a country. The link between public sector expenditure and economic growth has remained pertinent over the course of several decades and remains a subject of contention among policymakers and scholars. In their study, Poku et al. (2022) conducted an analysis on the relationship between government expenditure and economic growth in Ghana. The researchers utilised data spanning from 1970 to 2016 and employed the ARDL econometric estimation technique to investigate this impact. The empirical evidence suggests that there exists a positive correlation between government expenditure and short-term economic growth. The findings additionally demonstrate that Gross Capital Formation and Foreign Direct Investment exhibit a noteworthy positive association with economic growth, both in the short-term and long-term.

Owing to the arguments elaborated above, we firmly understand that the relationship between government expenditure and economic growth, considering the intervening role of government debt, is heterogeneous, hence requiring thorough investigation with heterogeneous techniques.

3. Methodology and Data

The data utilised in our study was sourced from esteemed institutions including the Bank of Ghana, the World Bank, and the International Monetary Fund. The time frame considered for analysis spanned from 1983 to 2018. In this study, the dependent variable is economic growth, which is used as a proxy for Gross National Product (GNP). The independent variables encompass the combined and segmented sums of government expenditure, encompassing both domestic and foreign indebtedness. In this study, we will investigate the critical juncture at which government expenditure starts to impact economic development through threshold regression analysis. Specifically, we will analyse the aggregate government debt as well as the disaggregated debt by country and external sources. An additional variable is employed to exert control over various other variables, including foreign direct investment (FDI), fluctuations in interest rates, measures related to structural adjustments, and changes in currency values.

The present study employed econometric methodologies to estimate the varied impacts of government expenditure on economic growth. In the context of our linear and threshold analyses, we examine the collective and individual impact of government debt. In order to initiate our analysis, we initially conduct preliminary examinations including unit root tests, cointegration tests, and correlation matrices prior to proceeding with our estimations of long-run parameters. The unit root test is conducted in order to assess the presence of stationarity in the data series, thereby mitigating the risk of spurious estimates subsequent to the regression analysis. Hence, according to the assumption of the unit root test, it can be inferred that the variables under investigation exhibit non-stationarity when subjected to unit root analysis. After verifying the stationarity of the variables, a cointegration test is conducted to determine the long-term equilibrium of the chosen variables. Nevertheless, when considering a significance level of 5% or lower, it is anticipated that the null hypothesis of unit root and cointegration will be rejected.

Once stationarity and cointegration have been established, a correlation matrix is employed to evaluate the relationship between the dependent and independent variables, as well as to identify potential signs of multicollinearity. Multicollinearity refers to the condition wherein there exist multiple independent variables that exhibit correlation coefficients exceeding the threshold of -/+0.70 (Ding & Vitenu-Sackey, 2021; Ding et al., 2021; Jiang Hongli & Vitenu-Sackey, 2019; J. Hongli & Vitenu-Sackey, 2020; Vitenu-Sackey, 2020; Vitenu-Sackey & Barfi, 2021; Vitenu-Sackey & HongLi, 2019). Subsequently, we conduct long-run estimations employing four different regression methods: two-stage least squares regression, autoregressive distributed lag regression, threshold regression, and Markov switching regression. The utilisation of threshold regression would allow for the verification of the specific level of government at which government expenditure exerts an influence on economic growth.

3.1 Empirical and econometric model

We proposed the model below for our empirical analysis on the backdrop of Mbanyele (2019) study and the theoretical underpinning. Therefore, the empirical and econometric models for our study are as follows:

GDP = f (GVTEXP, GOVTDEBT, INFL, INTRATE, FDI) (1)

We assumed that economic growth is a function of government expenditure, government debt, inflation, interest rate, and foreign direct investment; hence, the equation (1).

Subsequently, we estimated our econometric model as follows on a log-log basis:

$$GDP_t = \beta_0 + \beta_1 GVTEXP \binom{CONEXP}{CAPEXP}_t + \beta_2 FDI_t + \beta_3 INFL_t + \beta_4 INTRATE_t + \beta_5 GVTDEBT \binom{DOMDEBT}{EXTDEBT}_t + X_t + \varepsilon_t \quad (2)$$

To begin, we estimated the above model using the two-stage least squares method. We employed the two-stage least squares method to circumvent the model's expected reverse causality and omitted variable bias. We then utilised a threshold regression method to determine the point at which government spending and economic growth are linked. In a typical system, exogenous variables serve as instruments for endogenous variables when the instrumented value for the endogenous variables is present in an equation that also includes the exogenous variable. Every exogenous variable is present in every equation that involves an endogenous variable. In simultaneous systems, it is essential to include all exogenous variables as instruments for each endogenous variable in order to maximise efficiency (Baltagi, 2011).

Subsequently, we used the threshold regression method to assess the regime-specific effects. The threshold regression method extends linear regression by allowing estimated coefficients of parameters to vary across states or regions (Tong, 1983). Nonetheless, the threshold regression method can capture unexpected asymmetries or breaks observed throughout business cycles in most macroeconomic time series (Tong, 1990). Moreover, it is assumed to be a better alternative than the linear models (Tong, 2012; Hansen, 2011). It uses conditional least squares in estimating the parameters by minimising the sums of square residuals (SSR) to compute the threshold value for all the tentative thresholds (Hansen, 1997; 2000). We assumed that GDP booms and busts are caused by macroeconomic stability, so we look at government spending, inflation, interest rates, and foreign direct investment. Moreover, the thresholds of government debt explicitly influenced macroeconomic stability. The equation below represents the threshold regression method:

$$GDP_t = \beta_0 + \beta_1 FDI_t + \beta_2 INFL_t + \beta_3 INTRATE_t + X_t + \theta_1 GVTEXP \left(\frac{CONEXP}{CAPEXP}\right)_t \left(GVTDEBT \left(\frac{DOMDEBT}{EXTDEBT}\right)_t < \gamma\right) + \theta_2 GVTEXP \left(\frac{CONEXP}{CAPEXP}\right)_t \left(GVTDEBT \left(\frac{DOMDEBT}{EXTDEBT}\right)_t \geq \gamma\right) + \mu + \varepsilon_t \quad (3)$$

In equations (2) and (3), β_0 denotes the intercept, β_1 to β_3, θ, and γ denote the parameters of foreign direct investment, inflation and interest rate, X represents the control variables (structural adjustment policy, drought, and currency change), $\leq \geq$ represents the thresholds, u represents the individual effects, ε represents the error term, and t stands for the period of the study (1983 to 2018).

For robustness check, we employed the autoregressive distributed lag regression (ARDL) method. According to Pesaran et al. (2001) and Narayan (2005), the ARDL has the statistical power to resolve the issue of endogeneity in a model and can also be used to estimate the parameter coefficients of small samples. Moreover, the ARDL estimates cointegrated models irrespective of their order of integration either at I(0) or I(1).

4. Results and Discussion

4.1 Summary statistics

Table 1 summarises the variables' statistics. From the table, we can report the mean value of aggregate government expenditure, consumption expenditure, and capital expenditure as US$ 9.5 billion (standard deviation = US$ 3.156 billion), GHC 7.919 billion (standard deviation = 0.384), and GHC 1.585 billion (standard deviation = GHC 3.185 billion), respectively. On the other hand, we observed a mean value of US$ 23.431 billion (standard deviation = US$ 2.027 billion) for the gross domestic product, thus, economic growth. The mean value for aggregate and disaggregate government debt are GHC 23.142 billion (standard deviation = GHC 0.550 billion), GHC 10.452 billion (domestic debt, standard deviation = GHC 3.161 billion), GHC 12.69 billion (external debt, standard deviation = GHC 2.843 billion), correspondingly. Table 1 highlights the details on other variables. Moreover, the Jacque-Bera tests for variables confirm the normality of their distribution.

Table 1 Summary statistics

	GVTDEBT (GHC'B)	DOMDEBT (GHC'B)	EXTDEBT (GHC'B)	GVTEXP (US$'B)	CAPEXP (GHC'B)	CONEXP (GHC'B)	GDP (US$'B)	CPI CPI	FDI (US$B)	INTRATE (%)
Mean	23.142	10.452	12.69	9.5	1.585	7.919	23.431	57.497	1.044	23.694
Median	4.917	0.901	2.784	0.869	0.267	0.600	18.723	24.594	0.142	22.500
Maximum	173.068	86.899	86.169	58.196	7.678	53.458	53.791	255.104	3.485	45.000
Minimum	0.0079	0.0029	0.005	0.0015	0.0017	0.0013	8.345	0.357	0.002	12.500
Std. Dev.	0.550	3.161	2.843	3.156	3.185	0.384	2.027	2.447	2.681	3.408
Skewness	0.248	-0.252	-0.320	-0.190	-0.457	0.204	-0.386	-0.221	-0.418	-0.169
Kurtosis	1.898	1.876	2.097	1.874	1.951	1.867	1.838	1.849	2.293	1.700
Jarque-Bera	2.193	2.275	1.840	2.119	2.901	2.175	2.920	2.279	1.796	2.705
Probability	0.334	0.321	0.399	0.347	0.234	0.337	0.232	0.320	0.407	0.259
Observations	36	36	36	36	36	36	36	36	36	36

4.2 Pre-tests

The study used unit root tests to assess the data series' stationarity, with results showing the null hypothesis rejected at significance levels of 1% and 5%. The cointegration test revealed cointegration among variables, with the trace test and Max-Eigen test showing evidence of

cointegration within the range of zero to five. The results suggest a stable equilibrium between the dependent and independent variables in the long run. The correlation matrix shows a strong correlation between GDP and interest rate, but the outcome indicated no multicollinearity in the proposed models. All independent variables showed positive correlation except interest rate, and aggregate government, domestic, and external debt showed insignificant correlation with economic growth. Pre-tests results are displayed in the Table 2 for unit root test, Table 3 for cointegration test, and Table 4 for correlation matrix.

Summary

LEVEL

Method	**Statistic**	**Prob.****	**Significance**
Null: unit root			
LLC	-6.6459	0.000	***
Null: unit root			
IPS	-2.4387	0.007	**
ADF	51.5036	0.000	***
PP	72.768	0.000	***

Note: *** represents 1% significance level, ** represents 5% significance level. Maddala et al. (1999), Levin et al. (2002), and Im et al. (2003).

Table 3 Cointegration test

Johansen Combined Cointegration Test							
Hypothesised Number of CE(s)	**Trace Stat.**	**P-value**	**Sig.**	**Hypothesised Number of CE**	**(Max-Eigen) Stat.**	**P value**	**Sig.**
None *	517.17	0.000	***	None *	105.6022	0.000	***
At M 1 *	411.568	0.000	***	At M 1 *	95.65705	0.000	***
At M 2 *	315.911	0.000	***	At M 2 *	83.38654	0.000	***
At M 3 *	232.524	0.000	***	At M 3 *	67.75615	0.000	**
At M 4 *	164.768	0.000	***	At M 4 *	45.45094	0.039	**
At M 5 *	119.317	0.000	***	At M 5 *	38.64207	0.046	**
At M 6 *	80.6752	0.001	***	At M 6	28.43803	0.132	
At M 7 *	52.2372	0.005	**	At M 7	20.46853	0.217	
At M 8 *	31.7687	0.008	**	At M 8	16.83489	0.113	
At M 9 *	14.9338	0.019	**	At M 9 *	14.93378	0.019	**

Note: *** denote 1% significance level, ** denote 5% significance level. M=Most

Table 4 Correlation matrix

Correlation										
Probability	**GDP**	**GVTDEBT**	**GVTEXP**	**LNCONEXP**	**CAPEXP**	**DOMDEBT**	**EXTDEBT**	**FDI**	**INFL**	**INTRATE**
GDP	1									
GVTDEBT	0.253	1								
GVTEXP	0.296*	0.992***	1							
LNCONEXP	0.291*	0.991***	0.999***	1						
CAPEXP	0.315*	0.984***	0.994***	0.990***	1					
DOMDEBT	0.260	0.984***	0.988***	0.988***	0.978***	1				
EXTDEBT	0.240	0.997***	0.982***	0.981***	0.976***	0.971***	1			
FDI	0.285*	0.940***	0.959***	0.960***	0.951***	0.947***	0.924***	1		
INFL	0.289*	0.990***	0.996***	0.994***	0.996***	0.986***	0.982***	0.946***	1	
INTRATE	-0.364**	-0.184	-0.281*	-0.289*	-0.253	-0.278	-0.130	-0.269	-0.258	1

4.3 Results from the two-stage least square regression method

The results of our two-stage least squares regression analysis, as presented in Table 5, demonstrate a significant and positive impact on economic growth. An empirical analysis reveals that a

marginal increase of 1% in government spending is associated with a corresponding increase of 0.387% in economic growth. Through further analysis of the various components of government expenditure, we have identified a significant positive relationship between consumption spending and economic growth. Based on the findings of the study, it has been determined that the act of consuming goods and services has the potential to contribute to economic growth by approximately 0.244 and 0.239 percentage points, respectively. These results hold statistical significance at the 1% level.

Nevertheless, it seems that the allocation of capital investment expenditure has a noteworthy adverse impact on the overall economic growth. Based on the results obtained, it can be inferred that there is a statistically significant relationship between increases in capital spending and economic growth. Specifically, the findings indicate that at the 5% and 1% significance levels, capital spending has a respective effect of 0.152 percent and 0.140 percent on economic growth. Contrary to the belief that foreign direct investment has a negative impact on economic growth, our analysis reveals that government spending has a positive influence on economic growth. Therefore, the impact of inflation on economic growth can be either advantageous or disadvantageous, contingent upon the level of government expenditure within a given fiscal year. Empirical evidence has demonstrated that an increase in inflation has adverse effects on economic growth. Disaggregating expenditures, on the other hand, revealed that inflation boosted growth; hence, consumption and investment had distinct growth implications. Apart from drought, structural adjustment policy, and currency shift, in our additional control trials, no other factor had a beneficial effect on economic growth.

Table 5 Long-run parameter estimation with 2SLS

Dependent Variable = GDP	**Model 1**	**Model 2**	**Model 3**	**Model 4**
GVTEXP	0.387***			
	(6.366)			
CONEXP		0.244***		0.239***
		(6.718)		(8.194)
CAPEXP			-0.152**	-0.140***
			(-2.414)	(-4.067)
FDI	-0.043**	-0.039**	-0.012	-0.031**
	(-2.153)	(-2.031)	(-0.415)	(-2.005)
INTRATE	-0.013	0.004	0.073	0.040
	(-0.243)	(0.080)	(0.960)	(0.965)
INFL	-0.317***	0.190***	0.435***	0.393***
	(-3.716)	(10.799)	(4.583)	(7.564)
CURCHANGE	0.162**	0.210**	0.342***	0.193***
	(2.481)	(3.517)	(4.194)	(4.007)
STADJPOLICY	-0.002	-0.026	0.027	-0.010
	(-0.105)	(-1.389)	(0.975)	(-0.643)
DGT	0.038	0.044	-0.056	0.004
	(0.890)	(1.077)	(-0.908)	(0.112)
C	22.889***	18.776***	23.122***	18.740***
	(79.664)	(26.030)	(57.160)	(32.393)
R-sq	0.989	0.989	0.977	0.993
Adj. R-sq	0.986	0.986	0.971	0.991
J-stat(Prob.)	28(0.32)	28(0.31)	28(0.31)	27(0.34)
F-statistic	350.112***	373.970***	170.811***	510.930***
Breusch-Godfrey Serial Correlation LM Test				
F-statistic	1.778	1.956	9.555	0.824
Prob. F	0.166	0.162	0.071	0.450
Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	2.142	0.620	2.960	0.990
Prob. F	0.071	0.735	0.067	0.465
Instruments	9	9	9	10

Note: *** represents 1% significance level, ** represents 5% significance level, * represents 10% significance level.

In order to evaluate the efficacy of the models, we obtained r-squared values of 0.989, 0.989, 0.977, and 0.993, indicating that the exogenous variables or regressors accounted for approximately 98.9 percent, 98.9 percent, 97.7 percent, and 99.3 percent of the variations observed in the endogenous (dependent) variable. In addition, the results of the Breusch-Godfrey Serial Correlation LM Test and Heteroskedasticity Test indicate that there is no evidence of serial correlation or autocorrelation, as the p-values obtained are greater than 0.05.

4.5 Results from threshold regression method

4.5.1 Aggregate effect of government expenditure on economic growth with an emphasis on aggregate and disaggregate effects of government debt

In the threshold estimations, two threshold levels were determined, and the outcomes are presented in Table 6. We examined the impact of aggregate government spending when the government debt threshold rises by less than 9.495 percent per year and found that a percentage point surge in aggregate government expenditure might have a 0.120 percent positive and substantial influence on economic growth. Furthermore, the country should lower interest rates in order to greatly boost economic growth. At a 5% significance level, a 1% drop in interest rates might escalate to 0.050% growth in the economy. A one-percentage-point increase in total government spending may raise economic growth by 0.320 percent if the national debt is more than or equal to 9.495 percent. The country's FDI inflows and interest rates should be considerably reduced in this regard. An increase in foreign direct investment of one percentage point when total government expenditure positively promotes economic growth may have a 0.055 percent negative impact on economic growth at a significance threshold of one percent. The positive effects of overall government spending on economic growth can be further bolstered by lowering interest rates. 0.136 percent of a percentage point drop in interest rates could improve economic growth at a 1% significance level.

Table 6 Threshold regression analysis: Aggregate effect of government expenditure on economic growth considered the threshold effects of aggregate and disaggregated public debt

	Impact of Gvtexp when Govdebt threshold < 9.495	**Impact of Gvtexp when Domdebt threshold < 8.218**	**Impact of Gvtexp when Extdebt threshold < 8.876**
GVTEXP	0.120***	0.120***	0.125***
	(4.250)	(4.264)	(4.50)
FDI	0.005	0.004	0.005
	(0.469)	(0.650)	(0.735)
INTRATE	-0.050**	-0.050**	-0.050**
	(-2.602)	(-2.743)	(-2.602)
INFL	0.007	0.015	0.007
	(0.190)	(0.406)	(0.190)
	Impact of Gvtexp when Govdebt threshold ≥ 9.495	Impact of Gvtexp when Domdebt threshold ≥ 8.218	Impact of Gvtexp when Extdebt threshold ≥ 8.876
GVTEXP	0.320***	0.262***	0.320***
	(8.198)	(6.399)	(8.198)
FDI	-0.055***	0.070*	-0.055***
	(-7.277)	(1.939)	(-7.277)
INTRATE	-0.136***	-0.135***	-0.136***
	(-3.907)	(-4.125)	(-3.907)
INFL	-0.023	0.076	-0.023
	(-0.321)	(1.100)	(-0.321)
Non-Threshold Variables			
CURCHANGE	0.018	-2.640***	0.018
	(0.748)	(-3.779)	(0.748)
STADJPOLICY	0.008	0.009	0.008
	(1.338)	(1.470)	(1.338)
DGT	0.008	0.007	0.008
	(0.572)	(0.506)	(0.572)
C	22.859***	22.886***	22.859***
	(246.085)	(256.246)	(246.085)
R-squared	0.999	0.999	0.999
Adjusted R-squared	0.998	0.999	0.999
Model fitness			
F-statistic	2246.138***	2471.663***	2246.138***
Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.680	0.434	1.680
Prob. F	0.209	0.654	0.209
Heteroskedasticity Test: ARCH			
F-stat	1.348	2.691	1.348
Prob. F	0.254	0.110	0.254
Ramsey Reset Test			
F-statistic	0.053	0.070	0.053
Prob. F	0.020	0.040	0.020

Note: *** represents 1% significance level, ** represents 5% significance level, * represents 10% significance level.

After considering the threshold levels of aggregate government debt, specifically focusing on domestic debt, our analysis reveals that a one percentage point increase in aggregate government expenditure is associated with a 0.120% increase in economic growth. This relationship holds true when the domestic debt threshold is below 8.218 percent, with a significance level of 1%. Meanwhile, to ensure that favourable impact, interest rates should be cut. A percentage point fall in interest rates, for example, may boost economic growth by 0.050 percent. When the domestic debt threshold exceeds or equals 8.218 percent, increasing government spending and foreign direct investment could significantly boost economic growth while lowering interest rates. Notably, a 0.135 percent reduction in interest rates might enhance economic growth by 0.135 percent. At the 1% and 5% significance levels, a percentage point increase in foreign direct investment might boost economic progress by 0.070 percent.

When the external debt threshold is lower than 8.876 percent, a percentage point rise in aggregate government expenditure can improve economic growth by 0.125 percent while significantly lowering interest rates, according to our research. Yet, a drop in interest rates of a percentage point at a significance level of 5 percent might boost economic growth by 0.050 percent. An increase in total government spending of one percentage point might raise economic growth by 0.320 percent while simultaneously lowering foreign direct investment and interest rates if the external debt threshold is over or equal to 8.876 percent of GDP. When the threshold for external debt is greater than or equal to 8.876 percent, foreign direct investment and interest rates could boost economic growth by 0.055 and 0.136 percent, respectively, with a 1% significance level.

4.5.2 Disaggregate effects of government expenditure on economic growth with an emphasis on disaggregate effects of government debt

Additionally, the results in Table 7 indicate that after accounting for the threshold effects of disaggregate public debt, government expenditure on economic growth has a disaggregated effect. When interest rates are cut and the threshold for domestic debt is less than 8.218 percent, consumption expenditure has a favourable effect on economic growth. When interest rates are cut by 0.037 percent at a 1% significance level, consumption spending may increase by 0.100 percent in economic growth. Economic growth could be lowered by 0.037 percent at the 5% level if interest rates are increased by one percentage point. Increased consumer spending and FDI could promote economic growth if domestic debt increases by more than or equal to 8.218 percent, even if interest rates are cut. At the 1% and 5% significance levels, consumer spending and foreign direct investment can boost economic growth by 0.224 percent and 0.089 percent, respectively. Even so, when interest rates are sufficiently decreased, capital spending, FDI, and inflation all have a progressive and meaningful effect on economic development in nations with domestic debt growth of less than 7.509 percent.

The impact of domestic debt on economic growth is minimal, while capital investment does have a significant effect. Based on the statistical analysis conducted at a significance level of 0.054 percent, it is observed that a marginal increase of 0.019 percent in foreign direct investment or a 0.091 percent increase in inflation can potentially lead to a positive impact on economic growth. Conversely, an upward adjustment in interest rates is associated with a decline of 0.075 percent in economic growth. When the level of domestic debt reaches or surpasses 7.509 percent but remains below 10.464 percent, the impact of investment in capital

Table 7 Threshold regression analysis: Disaggregate effects of government expenditure on economic growth considered the threshold effects of disaggregate public debt

	Impact of Conexp when Domdebt threshold < 8.218	**Impact of Conexp when Extdebt threshold < 8.876**	**Impact of Capexp when Domdebt threshold < 7.509**	**Impact of Capexp when Extdebt threshold < 8.218**
CONEXP	0.100***	0.103***		
	(4.266)	(3.997)		
CAPEXP			0.054**	0.042
			(2.429)	(1.384)
FDI	0.003	0.004	0.019**	0.019*
	(0.368)	(0.481)	(2.449)	(1.875)
INTRATE	-0.037**	-0.036*	-0.075**	-0.064**
	(-2.035)	(-1.810)	(-3.239)	(-2.074)
INFL	0.047	0.042	0.091**	0.108**
	(1.568)	(1.287)	(2.577)	(2.235)
	Impact of Conexp when Domdebt threshold ≥ 8.218	Impact of Conexp when Extdebt threshold ≥ 8.876	Impact of Capexp when Domdebt threshold ≥ 10.464	Impact of Capexp when Extdebt threshold ≥ 8.218
CONEXP	0.224***	0.273***		
	(6.719)	(8.080)		
CAPEXP			-0.101	-0.033
			(-0.978)	(-0.266)
FDI	0.089**	-0.041***	0.133**	-0.011
	(6.719)	(-5.666)	(3.288)	(-0.337)
INTRATE	-0.122***	-0.121**	-0.005	-0.003
	(-3.841)	(-3.424)	(-0.044)	(-0.029)
INFL	0.088	-0.002	0.209**	0.393***
	(1.363)	(-0.032)	(3.379)	(7.610)
Impact of Capexp when 7.509 <= DOMDEBT threshold < 10.464				
CAPEXP			0.178*	
			(1.782)	
FDI			-0.025	
			(-1.342)	
INTRATE			-0.220***	
			(-3.823)	
INFL			0.577***	
			(4.251)	
Non-Threshold Variables				
CURCHANGE	-2.808***	0.027	-0.042	0.067**
	(-4.180)	(1.083)	(-1.285)	(1.984)
STADJPOLICY	0.012**	0.011*	-0.405***	0.009
	(2.004)	(1.800)	(-5.242)	(0.906)
DGT	0.0003	0.001	0.007	0.005
	(0.030)	(0.094)	(0.461)	(0.218)
C	22.943***	22.916***	22.982***	22.948***
	(268.490)	(245.899)	(231.533)	(165.917)
R-squared	0.999	0.999	0.999	0.998
Adjusted R-squared	0.999	0.999	0.998	0.997
Model fitness				
F-statistic	2594.165***	2149.352***	1487.393***	965.718***
Breusch-Godfrey Serial Correlation LM Test				
F-stat	0.176	1.293	2.109	1.248
Prob. F	0.840	0.295	0.150	0.307
Heteroskedasticity Test: ARCH				
F-statistic	0.928	2.793	0.317	0.394
Prob. F	0.343	0.104	0.577	0.535
Ramsey Reset Test				
F-statistic	3.756	0.223	5.366	0.008
Prob. F	0.045	0.042	0.032	0.026

Note: *** denote 1% significance level, ** denote 5% significance level, * denote 10% significance level

resources and inflation on economic growth is found to be both positive and statistically significant. Conversely, interest rates exert a deleterious impact on the economy. The potential increase in economic growth is estimated to be 0.178 percent and 0.57 percent, correspondingly, in the event of a 10% rise in capital spending and a 5% increase in inflation. In order to stimulate investment and inflation, it is advisable to concurrently decrease loan rates. An increase of one percentage point in interest rates is anticipated to have an adverse impact on economic growth, resulting in a decrease of approximately 0.222 percent.

The relationship between foreign direct investment (FDI) and inflation, and their impact on economic growth, is contingent upon the threshold for domestic debt growth. Specifically, when the rate of domestic debt growth reaches or exceeds 10.464 percent, FDI and inflation contribute positively to economic growth. However, it is worth noting that capital expenditure does not exhibit any discernible effect in this context. As a result, increased capital spending is unlikely to have a large impact on the economy. For instance, a 5% increase in FDI and a 5% increase in inflation may result in 0.133 and 0.209 percent increases in economic growth, respectively. According to our analysis, it has been observed that a decrease in interest rates can lead to a modest enhancement in economic growth, specifically by 0.103 percent. However, this positive impact is contingent upon the debt-to-GDP ratio being below 8.876 percent. At a significance level of 10%, it has been observed that a marginal increase of one percentage point in interest rates is associated with a reduction in economic growth by approximately 0.036 percent. When the level of external debt reaches or exceeds 8.876 percent, with a significance level of 1%, there is evidence to suggest that a 0.273 percent increase in consumption expenditure could have a positive impact on economic development. In contrast, it is imperative to significantly decrease foreign direct investment (FDI) and interest rates. In addition to the aforementioned, it is observed that a rise of one percentage point in either foreign direct investment or interest rates would result in a reduction of economic growth by 0.041 percent and 0.112 percent, correspondingly. These findings hold statistical significance at the 1 percent and 5 percent levels for the respective variables. We discovered that when foreign debt is smaller than 8.218 percent of total economic debt outstanding, capital spending has no effect on economic development. Despite negative interest rates, FDI and inflation have a large and beneficial effect on economic development. When external debt equals or exceeds 8.218 percent of GDP, capital expenditures, foreign direct investment, and interest rates all have a negligible effect on economic development. On the other hand, inflation has a beneficial effect on economic growth.

On the other hand, our models produced substantial findings, validating the regression results' statistical credibility. Perhaps the models' exogenous variables explained approximately 99.9%, 99.9%, 99.9%, and 99.8% of the variation in the endogenous variable. The Breusch-Godfrey Serial Correlation LM Test and Heteroskedasticity Test confirmed that models with p-values greater than

0.05 lacked serial correlation and heteroscedasticity. Ramsey Reset Test, on the other hand, proved the models' stability for p-values less than 0.05.

4.6 Simultaneous effects of aggregate and disaggregate government expenditure and debt on economic growth.

Table 8 Simultaneous effects of aggregate and disaggregate government expenditure and debt on economic growth

Dep var = GDP	1 =GVT EXP	2 = CONEXP	3=CAPEXP
GDP(-1)	-0.390(-2.550)	0.680**(3.984)	-0.081(-0.310)
GDP(-2)	0.284(2.685)	-0.648*(-2.470)	0.490(2.384)
GDP(-3)	0.132(0.931)	-0.904**(-3.282)	0.272(1.001)
GDP(-4)	0.489**(7.127)	0.756**(3.661)	0.532*(3.596)
GVTEXP	-0.078*(-3.538)		
GVTEXP(-1)	0.167**(7.497)		
GVTEXP(-2)	0.033(1.047)		
GVTEXP(-3)	0.068**(5.140)		
GVTEXP(-4)	0.119**(9.554)		
CONEXP		0.128*(5.861)	
CONEXP(-1)		0.041**(2.037)	
CONEXP(-2)		0.049**(2.832)	
CONEXP(-3)		0.104**(5.237)	
CONEXP(-4)		0.084**(4.558)	
CAPEXP			0.012(0.505)
CAPEXP(-1)			0.086**(4.265)
CAPEXP(-2)			-0.024(-0.888)
CAPEXP(-3)			-0.009(-0.331)
CAPEXP(-4)			0.080(2.379)
FDI	-0.014(-3.126)	-0.028**(-3.943)	-0.022(-1.724)
FDI(-1)	-0.001(-0.409)	-0.018(-1.855)	0.018(1.819)
FDI(-2)	0.035**(8.691)	0.013*(2.100)	0.035*(3.202)
FDI(-3)	0.017*(3.456)	-0.011(-1.321)	0.018(2.356)
FDI(-4)	0.047**(6.598)		0.014(0.315)
INFL	0.042(1.444)	0.118*(2.150)	0.189*(3.324)
INFL(-1)	-0.238*(-2.922)	-0.175*(2.102)	-0.589*(-3.368)
INFL(-2)	-0.177*(3.986)	0.041(0.548)	0.269(2.159)
INFL(-3)	0.057(1.857)	0.165*(2.265)	0.019(0.166)
INFL(-4)	-0.073(-3.424)		-0.185*(-3.138)
INTRATE	-0.063*(-4.685)	-0.126**(-4.247)	-0.150(-5.115)
INTRATE(-1)	-0.182**(-10.704)	0.006(0.249)	-0.103(-2.467)
INTRATE(-2)	-0.044(-2.542)	0.008(0.374)	0.03(0.664)
INTRATE(-3)	-0.012(-1.021)	-0.082**(-3.030)	-0.081(-1.870)
INTRATE(-4)	0.124**(5.429)		0.127*(3.741)
DOMDEBT	-0.009(-1.163)	0.016(1.434)	0.026(1.870)
EXTDEBT	-0.042*(-4.017)	0.021(1.720)	-0.072(-1.875)
STADJPOLICY	-0.011*(-3.444)	-0.033**(-4.687)	-0.023(-2.678)
CURCHANGE	-0.065**(-6.739)	-0.063**(-2.882)	-0.076*(-2.996)
DGT	-0.039**(-5.901)	0.014(1.208)	-0.063(-2.186)
C	10.318**(4.409)	18.948**(5.992)	-4.938(-2.441)
R-squared	0.999	0.999	0.999
Adj. R-squared	0.999	0.999	0.999
F-statistic	24391.25***	5384.067***	5589.937***
Durbin-Watson stat	2.0668	2.165	2.430
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-stat(Prob.)	3.104(0.273)	1.311(0.415)	2.956(0.284)
Breusch-Godfrey Serial Correlation LM Test:			
F-stat(Prob.)	5.979(0.090)	5.079(0.089)	5.479(0.910)
Ramsey RESET Test			
F-stat(Prob.)	0.153(0.762)	1.170(0.340)	43.700(0.096)
Selected Model: ARDL	(4, 4, 4, 4, 4)	(4, 4, 3, 3, 3)	(4, 4, 4, 4, 4)

Note: *** represents 1% significance level, ** represents 5% significance level, * represents 10% significance level. T-stats are in the parentheses.

In Section 4.6, the Autoregressive Distributed Lag (ARDL) approach was employed to mitigate the problem of autocorrelation, thereby ensuring unbiased estimates and findings. Table 8 presents a summary of the long-run estimates obtained through the utilisation of the ARDL regression methodology. Through the utilisation of a linear model, a more comprehensive comprehension of the correlation between government expenditure and economic growth was attained. In contrast to the impact of inflation and interest rates, it can be observed that government spending in the form of foreign direct investment has played a significant role in fostering economic growth. According to this argument, an augmentation in government expenditure has the potential to yield economic growth in both the short and long run. The expansion of foreign direct investment (FDI) is advisable in response to a decrease in interest rates, inflation, and external debt. The results of our study suggest that the level of consumption expenditure significantly influences the economic growth of Ghana, irrespective of the presence of other macroeconomic factors. The threshold regression results presented in our study are supported by the autoregressive distributed lag (ARDL) findings, which are detailed in the preceding section.

4.6.4 Models comparison

The study uses multiple econometric models to analyze the impact of government spending on economic growth. Two-stage least squares models show that government expenditures on consumption and capital negatively affect economic growth, contradicting the ARDL's findings that previous economic expansion has a positive impact. However, future aggregate spending is expected to have a negative effect, especially when considering both foreign and domestic debts. Capital expenditure's impact on economic expansion is insignificant. The study concludes that foreign direct investment significantly enhances economic growth, with the significance varying depending on domestic and external debt.

5. Conclusion

The study examines the impact of government spending and debt on Ghana's economic growth from 1983-2018. Results show government expenditure stimulates growth, with consumption expenditure positively affecting it, while capital expenditure negatively impacts it. The study suggests prioritizing external debt management during growth and foreign direct investment during downturns. Corroborating the findings of Afonso and Leal (2020), Afonso & Jalles (2015), Alshammary et al. (2020), Anning et al. (2017), Mbanyele (2019), Singh et al. (2019), Swamy (2020), and Zhao et al. (2020). Mbanyele (2019), Azam and Khan (2020), Ouedraogo and Sawadogo (2020), Owusu (2021), and Wisniewski and Jackson (2021)

The study found that domestic and external debt thresholds impact capital and consumption expenditure. Increased consumption expenditure can boost economic growth when domestic debt thresholds are less than 8.218%, and external debt thresholds are less than 8.876% per annum.

Practical Implication

Concerning the prospective heterogeneity among our findings concerning the methods used, the results are robust for policy direction, and therefore, we propose that government expenditure should be prioritized for consumption expenditure to achieve significant economic growth. External debts are more reliable for funding budget deficits. However, domestic funding is not a practical option for capital expenditure. Foreign direct investment supports government expenditure, suggesting the government should seek reliable foreign investment and public-private partnerships. Foreign direct investment contributes to economic progress during periods of expansion and contraction, suggesting the government should prioritize FDI while containing inflation through interest rate hikes. Boosting government spending effectiveness is crucial for fostering strong, resilient, and long-term economic growth.

Data Availability Statement

The data that support the findings of this study are openly available in Mendeley data at http://dx.doi.org/10.17632/n43jnf2rbh.1.

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