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CENTRAL BANK INDEPENDENCE AND ECONOMIC GROWTH IN GHANA: DO INFLATION AND GDP PER CAPITA GROWTH RATES MATTER?

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ABSTRACT

The study analyzed data from the World Bank's World Development Indicators, Worldwide Governance Indicators, and Heritage Foundation's Monetary freedom index from 1996 to 2017 using the threshold regression method to determine if GDP per capita growth and inflation rates require total independence from the central bank of Ghana. From the analysis, it was observed that the impact of independence from the central bank is positively related to economic growth when the inflation threshold is less than 26.1% at a significance level of 5% with an elasticity coefficient of 0.07. On the other hand, when the inflation threshold is greater than or equal to 26.1% with an elasticity coefficient of 0.142 at a significance level of 1%, central bank independence (CBI) is positively related to economic growth. Nonetheless, the GDP per capita (PPP) growth rate witnessed a decline from 5.8% in 2017 to 4.1% in 2018 and 4.0 in 2019. The regression threshold was set at 5.8% or above to significantly impact economic growth when central bank independence is relatively improved. Furthermore, there is an inverse relationship between inflation variability, economic growth variability, and central bank independence. The responsibility of politicians is to persistently safeguard, protect and ensure the implementation of central bank independence over time.

Contribution/Originality: This study contributes to the existing literature by presenting fresh evidence regarding the threshold analysis of inflation and GDP per capita in central bank independence and economic growth nexus in Ghana. Moreover, the study on the backdrop of the political agency theory of central bank independence presents an empirical analysis.

1. INTRODUCTION

Central bank independence (CBI) is the total freedom to use monetary instruments to control an economy without interference from the sitting government. Moreover, an independent central bank cannot be influenced by an incumbent government in monetary policy management with regard to some restrictions (Behrooz, 2019). Sweden's Riksbank is the world's oldest central bank still in existence and dates back to 1668. Subsequently, in 1694, the Bank of England also emerged. Their roles and mandates to interact with financial market actors and their internal stakeholders based on management and decision-making procedures and relationship with the state brought about their emergence. During the last two decades, massive transformations have been witnessed in most central banks in their modus operandi with various reforms of how their operations should be governed (Crowe & Meade, 2007). Improvement in central bank independence is essential for institutions to effectively function and achieve price stability in an economy.

Moreover, a central bank could give further priority to lower inflation levels when it assumes a fully independent status. On the contrary, other factors could interfere or obstruct the objective to achieve price stability in countries where central banks are not independent. Perhaps, if the objectives of monetary policy interventions are not formulated and implemented by a central bank, then that institution has no objective independence (Eijffinger & Hoeberichts, 2002).

Seemingly, the argument regarding central bank independence revolves around monetary authorities' capability to enhance and ensure price stability. The concern surrounding this development is that incumbent governments may interfere in the operations of monetary authorities for budgetary support to fill fiscal deficits or try to fuel growth by executing expansionary policy far more than expected (Arnone & Romelli, 2013; Chu, Cozzi, Furukawa, & Liao, 2017). Generally, central bank independence is considerably effective in countries with a high inflation level and in more democratic countries. The more independent a central bank is, characterized by transparency, perhaps correlates with high regulatory quality. Ideally, a country's central bank's independence level varies regardless of its democratic dispensation or the regulatory setup. An independent central bank implements stimulating monetary policies, which, in turn, ensures low inflation without any political interference.

Most importantly, a more independent central bank is more predictable and propagates price stability, which leads to economic growth in the short and long runs. Theoretically, De Haan, Amtenbrink, & Eijffinger (1999) opined that an independent central bank has three distinguishing characteristics: (i) the ability to make decisions concerning extensive ranking and definition of monetary policy objectives, (ii) the obvious transparency of the institution's monetary policy, and (iii) the clarity of responsibility assumption in relation to monetary policy. Based on these dynamics, central banks perform the ultimate function in their respective countries' economic decision-making process (Goodman, 1991).

Many countries have recently resorted to their respective central banks for financial support due to the COVID-19 pandemic, which has crippled their economies. Ghana is no exception, and it has turned to the Bank of Ghana for financial support to recover from the economic downturn that the country has witnessed due to the pandemic. In view of the Heritage Foundation (2020) report, it is evident that the central bank of Ghana's independence index has deteriorated from 67.8 in 2013 to 63.8 in 2019, reflecting a 4-point decline in the previous index. In essence, it is understood that central bank independence is essential in developing countries to achieve higher economic growth and build a sustainable economy devoid of external pressures (Behrooz, 2019). Ideally, in a robust financial and banking environment where minimal government interference exists, financial institutions' regulation and supervision are restricted to fraud prevention and enforcement of contractual obligations. Arguably, there is a connection between central bank independence and financial system stability and freedom.

This connection stems from three notions. First, a greater level of independence of the central bank without political interference implies that the institution is less constrained and allows banks to act in a timely and more decisive manner with the ultimate aim of preventing financial distress or crisis. Second, policymaking with respect to financial stability has delinquency of time inconsistency. Invariably, financial instability depicts the characteristics of stringent and lenient policymakers. In times of financial instability, when policymakers are capable of gaining confidence from the market with their "strict" characteristic, then the policymakers can act leniently with a short-term motivation because the short-term costs may be minimal compared to long-term costs. Moreover, market participants are aware of policymakers' incentives in times of rational expectations and usually expect policymakers to be lenient. Third, limiting the interference of political actors on the central bank's policy eschews the issue of the financial crisis being used to defame an incumbent government for seeking power again (Klomp & De Haan, 2009). However, the central bank's level of independence and the architect of the financial system reliably impact a country's well-being to propel growth (Hermes & Lensink, 2000). Notably, this present study has identified a literature gap in Ghana's context regarding central bank independence and economic growth considering inflation and real GDP per capita thresholds, hence the motivation to carry out this study.

By employing threshold regression, ordinary least squares (OLS), and dynamic ordinary least squares (DOLS) methods, the study aims to assess the impact of the central bank's independence on Ghana's economic growth from 1996 to 2017. Second, we test the assumption that central bank independence guarantees anti-inflationary policy to reduce inflation level without political actors' interference. Moreover, the political agency theory of central bank independence infers that central bank independence reliably reduces or mitigates inflation and growth (output) variability (Gauti & Eric, 2004), hence the study intends to ascertain whether this assumption could be substantiated.

The study comprises five sections; section one consists of the introduction, section two outlines the related literature review, section three presents the study's data and methodology, section four presents the empirical findings, and section five concludes the study.

2. THEORETICAL UNDERPINNING

According to Friedman & Schwartz (1963), the concept of monetary policy functions with "long and variable lags." Hence, monetary policy is perhaps shepherded on the foundation of forecasts regarding the health of an economy. Undeniably, central banks of countries and regional economic blocs, such as the European Central Bank, the U.S. Federal Reserve, the Bank of Ghana, or the Bank of England, spend a large number of state resources for the purpose of forecasting. Nonetheless, these forecasts are termed to the public as the basic fundamental reason for monetary policy decisions.

Due to the failure of the formalized theories of central bank independence with the problem related to standard time inconsistency, Gauti & Eric (2004) proposed the political agency theory of central bank independence, as they pinpointed five key perspectives of their theory, which were consistent with their findings. Their theory was not built on the problem of dynamic inconsistency but considered existing criticisms of central bank independence (Blinder, 1998; McCallum, 1995; Posen, 1995; Vickers, 1998). The five key perspectives on which the political agency theory of central bank independence relies are as follows:

- On average, an independent central bank guarantees a lower level of inflation and its variability. This is as a result of the provision of more accurate forecasts that, in turn, mitigate policy errors because the central bank is capable of handling forecasting shocks because resources are specifically allocated for this reason.
- On average, an independent central bank is capable of producing lower output variability.
- The terms of office of central bank governors are very pertinent; the longer the tenure, the lower are the volatility of the output gap and the first two moments of inflation.
- Central bank independence should only happen in circumstances where the central bank's principal body has a longer job contract than elected politicians. This notion emanates from the assumption that society and politicians would gain an advantage when politicians set monetary policy. Moreover, the extent of corruption in a country depicts the level of independence of the central banks. However, a more corrupt country would have a less dependent central bank because a politician could benefit more from their office by extracting rent.

Based on this theory, this present study draws its theoretical backings to ascertain the extent to which central bank independence impacts economic growth by considering the inflation and real GDP growth rate thresholds and the variability of inflation and real GDP growth in Ghana's context. Ideally, the variability of inflation and real GDP growth seemingly correlate negatively with central bank independence (Alesina & Summers, 1993; Cukierman, Kalaitzidakis, Summers, & Webb, 1993; Eijjfinger & De Haan, 1996).

2.1. Related Literature Review

The study of central bank independence is not new. Most of the studies focused on the link between central bank independence and inflation, while a minority of them focused on the nexus between central bank independence

and economic growth. Empirically, many studies have observed a positive association between central bank independence and economic growth (Banaian & Luksetich, 2001; Cukierman et al., 1993; Demertzis & Hallett, 2007; Fischer, 1995; Loungani & Sheets, 1997). On the contrary, other scholars have argued that there is no substantial relationship between central bank independence and output growth (Akhand, 1998; Chortareas, Stasavage, & Sterne, 2001; Crosby, 1998; De Haan. & Kooi, 2000; Eijffinger, Schaling, & Hoeberichts, 1998; Grilli, Masciandaro, & Tabellini, 1991). In contrast, a different argument also exists, as some scholars have opined that the association between central bank independence is negative and significant (Ismihan & Ozkan, 2004; Wray, 2007). Their argument stems from the assumption that a more independent a central bank could impact the sacrifice ratio and lead to output loss and also lead to a higher inflation level. Athanasios (2009) observed an inverse association between central bank independence and inflation variability but could did not find a relationship between real GDP growth and central bank independence.

In a more recent study, Merter, Gönül, & Omer (2015) observed a positive relationship between central bank independence and economic growth with a regulatory role of financial freedom. Their study employed the use of the ARDL bound testing method and focused on EU member countries from 1995 to 2011. Also, they confirmed that the relationship between central bank independence and economic growth is both short run and long run. Behrooz (2019) also studied the relationship between central bank independence and economic growth in both developed and developing countries. He relied on 31 developed and developing countries in a panel study from 1970 to 2015 using a fixed effect regression method. He focused on the threshold of GDP per capita. In his observation, he concluded that central bank independence negatively impacts economic growth when GDP per capita is above the threshold of US$ 23,000, and when the threshold is below US$ 23,000, central bank independence positively impacts economic growth. This buttresses the assumption that central bank independence is very effective and relevant in developing countries to achieve sustainable growth.

Subsequently, Behrooz (2020) studied central bank independence and economic growth in 31 developed and developing countries but this time around with the focus on inflation threshold. From his findings, he emphasized that when inflation is below the threshold of 2.5% in developed countries, central bank independence negatively impacts economic growth, but when inflation is equal to or higher than 2.5%, then central bank independence and economic growth are positively associated. Furthermore, central bank independence positively impacts economic growth in developing countries when the inflation threshold is below or equal to 15.90%.

That notwithstanding, Adel (2020) observed the significance of anti-inflationary policy, thus central bank independence wrestles against inflation. He utilized 20 developed countries and 37 developing countries; the study spanned two periods 1997–2006 and 2007–2016. He concluded that countries with high inflation rates biased his findings until political and economic variables were introduced into the model to substantiate the theory that central bank independence decreases inflation levels.

Perhaps there is a significant impact of the threshold of inflation and GDP per capita on the development of a country or an economy; hence, this present study would like to examine the same in Ghana's context, as there are limited empirical studies in that regard.

3. DATA AND METHODOLOGY

3.1. Data

The study utilizes data sourced from the World Bank's World Development Indicators, Worldwide Governance Indicators, and Heritage Foundation (see details in Table 1). The data for the study span from 1996 to 2017 in time series. The dependent variable of the study is gross domestic product growth rate (economic growth), the independent variable is central bank independence as a proxy measure of the monetary freedom index, and the control variables are population growth, shadow economy, government effectiveness, and corruption control.

Indicators	Description/Reference	Source
GDP GROWTH	Gross domestic product annual growth rate (Behrooz, 2019; Behrooz, 2020; Merter et al., 2015)	World Development Indicators
CBI	Central bank independence – monetary freedom index. This is measured with scores of 0–100 (Behrooz, 2019; Behrooz, 2020; Merter et al., 2015)	Heritage Foundation - Economic Freedom Index
POP_GWTH	Population growth rate (annual) (Behrooz, 2019)	World Development Indicators
GOVT_EFF	Government effectiveness (Behrooz, 2019)	Worldwide Governance Indicators
SHADOW	Shadow economy – the difference between gross national expenditure and gross national income (Behrooz, 2020)	World Development Indicators
GDP_CAP	Gross domestic product per capita (PPP growth rate) (Behrooz, 2020)	World Development Indicators
COR	Corruption control (Behrooz, 2020)	Worldwide Governance Indicators

3.2. Methodology

The study employed threshold regression, ordinary least squares, and dynamic ordinary least squares methods for the data analysis to assess the threshold of the inflation rate and GDP per capita growth in which central bank independence becomes critical. Furthermore, central bank independence on the variability of inflation and growth (output) is the second objective of the study. This study follows the studies of Behrooz (2019) and Behrooz (2020) as he studied the impact of central bank independence on economic growth in a panel of 31 developed and developing countries. According to Behrooz (2020), many regressions with diverse combinations of the proposed model's regulatory variables below have been estimated to yield the most consistent results.

First, a unit root test is performed to ascertain the data's stationarity status to reject the null hypothesis that there is no evidence of unit root. Subsequently, after confirming the data's stationarity status, the correlation matrix is computed to check for collinearity and multicollinearity of the exogenous variables against the endogenous variable and find the correlation among them. Afterward, a cointegration test is performed to unravel the long-run relationship among the selected variables, most importantly, between the endogenous variable and the exogenous variables, to achieve a reliable outcome of the regression analysis. To perform the regression analysis to meet the study objectives, we employed a threshold regression method to ascertain the threshold effects of inflation and GDP per capita where central bank independence effectively functions. Subsequently, the ordinary least squares regression method is used to observe the impact of central bank independence on inflation and economic growth (output) variability. Due to the problem of serial autocorrelation, heteroskedasticity, and endogeneity that might arise in the regression analysis by using the OLS method, the DOLS method is employed to carry out robustness check for statistical inference.

3.3. Model Specification

The econometric model constructed for the study can be calculated as:

$$GDP\ Growth_t = \beta_0 + \beta_1\ GOVEFF_t + \beta_2\ POPGROWTH_t + \beta_3\ SHDW_t + \beta_4\ COR_t + \theta_1\ CBI_t\ (INF_t < \gamma) + \theta_2\ CBI_t\ (INF_t \geq \gamma) + \mu + \varepsilon_t$$

(1)

$$GDP\ Growth_t = \beta_0 + \beta_1\ GOVEFF_t + \beta_2\ POPGROWTH_t + \beta_3\ SHDW_t + \theta_1\ CBI_t\ (GDP\ CAP_t < \gamma) + \theta_2\ CBI_t\ (GDP\ CAP_t \geq \gamma) + \mu + \varepsilon_t$$ (2)

$$VGDPGrowth_t = \beta_0 + \beta_1\,CBI_t + \varepsilon_t \qquad (3)$$

$$VInflation_t = \beta_0 + \beta_1\,CBI_t + \varepsilon_t \qquad (4)$$

Components of Equations 1 to 4 can be explained as follows:

GDP growth = the GDP (PPP) growth rate.

GDP CAP = the GDP per capita (PPP).

CBI = central bank independence (monetary freedom index).

POPGROWTH = population growth rate.

SHDW = shadow economy as a percentage of GDP.

COR = corruption control.

GOVEFF = government effectiveness.

INF = inflation rate.

u = individual effect, e = disturbance term.

t = time period (1996–2017).

β, θ, and γ are the parameters to be estimated.

β_0 = intercept.

$\geq$ = greater or equal to threshold effect.

$<$ = less than threshold effect.

VGDPGrowth = variability of real GDP growth, thus standard deviation from the population.

VInflation = variability of inflation, thus standard deviation from the population.

4. EMPIRICAL FINDINGS

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the study's variables, in which the mean, median, standard deviation, minimum and maximum values of the variables are detailed. The results of the Jarque–Bera test to examine the normality in the data series distribution can also be found. In that regard, it is evident that the data is not in normal distribution, as the Jarque–Bera test confirms that the majority of the variables could not produce a probability of more than 5%. Regarding the mean, the GDP growth during the sample period grew at an annual rate of 5.731%; central bank independence had an average index of 60.226 annually, which is somewhat above the average index score; the inflation rate stood at an average of 18.512% annually; GDP per capita grew at an annual average rate of 2.915%; and the shadow economy had a growth rate of 18.954% annually. With reference to corruption control, the average score for the sample period was -0.160, which depicts a weak performance. Government effectiveness was also weak, with an average score of -0.079 for the sample period. That notwithstanding, it is evident that the government has not liberated independent state institutions' activities to enable them to provide public goods to citizens.

	GDP GRWTH	CBI	GDPCAP	INF	GOVEFF	COR	POPG	SHDW
Mean	5.731	60.226	2.915	18.512	-0.079	-0.160	2.472	18.954
Median	5.096	63.000	2.432	15.171	-0.098	-0.158	2.505	18.865
Maximum	14.198	67.800	11.478	70.817	0.160	0.039	2.619	50.304
Minimum	2.178	31.200	-3.839	6.868	-0.281	-0.367	2.198	-11.309
Std. Dev.	2.574	9.838	2.861	13.530	0.117	0.127	0.130	13.786
Skewness	1.578	-2.290	0.737	2.783	0.329	-0.057	-0.611	0.152
Kurtosis	6.130	7.284	5.627	11.034	2.448	1.740	2.270	3.243
Jarque–Bera	18.934	37.691	8.694	91.556	0.706	1.533	1.943	0.146
Prob.	0.000	0.000	0.013	0.000	0.702	0.464	0.378	0.930
Obs.	23	23	23	23	23	23	23	23

4.2. Unit Root Tests

The unit root test checks for stationarity among the study's data series to eliminate spurious regression. However, Levin, Lin & Chu, Im, Pesaran & Shin, ADF–Fisher, and PP–Fisher tests were employed to ascertain the data series stationarity status to enable us to continue with other necessary pre-tests. The results of the tests can be found in Table 3. From the table, it is evident that only the Levin, Lin & Chu test could not substantiate the data series' stationarity status at level. Furthermore, the tests were performed at the first difference, and the tests confirmed the stationarity of the data series at a 1% significance level for all four tests. In spite of this, the null hypothesis that posits that there is evidence of unit root in the data series is rejected.

Table-3. Group unit root test.

Level Form			Cross-sections	
Method	Statistic	Prob.**		Obs.
Levin, Lin & Chu t*	1.527	0.937	8	168
Im, Pesaran & Shin W-stat	-3.261***	0.001	8	168
ADF–Fisher Chi-square	41.087***	0.001	8	168
PP–Fisher Chi-square	66.409***	0.000	8	176
First Difference			Cross-sections	
Method	Statistic	Prob.**		Obs.
Levin, Lin & Chu t*	-4.452***	0.000	8	162
Im, Pesaran & Shin W-stat	-8.473***	0.000	8	162
ADF–Fisher Chi-square	95.264***	0.000	8	162
PP–Fisher Chi-square	343.004***	0.000	8	168

Note: *** indicates 1% significance level, ** indicates 5% significance level.

4.3. Correlation Matrix

The computation of the correlation matrix reveals two dynamics of the variables; thus, a correlation between the independent and the dependent variables and a multicollinearity problem should be in case the coefficients of more than two independent variables are above +/-0.80 against the dependent variable. No multicollinearity was witnessed, as the independent and control variables had coefficients of 0.292, 0.242, 0.194, 0.065, and 0.275, respectively (see Table 4). All of them fall below +/-0.80, therefore, there is no problem with multicollinearity. Moreover, central bank independence, government effectiveness, corruption control, population growth, and shadow economy positively correlate with economic growth, but their correlation is insignificant. On the other hand, inflation negatively correlates with economic growth but is insignificant, while gross domestic product per capita highly correlates with economic growth. Most importantly, it can be reported that inflation has a negative and significant correlation with central bank independence.

Table-4. Correlation matrix.

Probability	GDP Growth	CBI	GDPCAP	INF	GOVTEFF	COR	POP	SHDW
GDP Growth	1							
CBI	0.292	1						
GDPCAP	0.709***	0.240	1					
INF	-0.349	-0.714***	-0.406**	1				
GOVEFF	0.194	-0.209	0.0484	0.144	1			
COR	0.242	0.056	0.124	0.076	0.660***	1		
POP_GWTH	0.065	-0.311	0.031	0.188	0.486**	0.194	1	
SHDW	0.275	0.114	0.411**	-0.347	0.240	0.054	0.491**	1

Note: *** indicates 1% significance level, ** indicates 5% significance level. GDPGROWTH = economic growth, CBI = central bank independence, GDPCAP = GDP per capita PPP, INF = inflation rate, GOVEFF = government effectiveness, COR = corruption control, POPGWTH = population growth, SHDW = shadow economy.

4.4. Cointegration Test

The test for cointegration exhibits the long-run relationship between endogenous (dependent) and exogenous (independent) variables. Consequently, when the cointegration test results reveal significance, then it is assumed that the null hypothesis that stipulates that the instruments or variables to be used are not cointegrated is rejected at 5%, or below the significance level. With reference to Table 5, both model 1 and 2 constructed for the study reported that the variables are cointegrated from 0 to, at most, 2 for model 1, and 0 to, at most, 5 for model 2 for both the trace and max eigen tests.

Table-5. Cointegration test.

Model 1				
Hypothesized	**Trace**		**Max Eigen**	
No. of C.E. (s)	Statistic	Prob.**	Statistic	Prob.**
None *	148.811***	0.000	60.108***	0.000
At most 1 *	88.702***	0.001	35.416**	0.033
At most 2 *	53.286**	0.014	31.403**	0.015
At most 3	21.883	0.305	10.118	0.733
At most 4	11.765	0.169	8.201	0.359
At most 5	3.564	0.059	3.564	0.059
Model 2				
Hypothesized	**Trace**		**Max Eigen**	
No. of C.E. (s)	Statistic	Prob.**	Statistic	
None *	197.260***	0.000	81.871***	0.000
At most 1 *	115.389***	0.000	56.918***	0.000
At most 2 *	58.471**	0.004	24.346	0.123
At most 3 *	34.126**	0.015	16.747	0.184
At most 4 *	17.378**	0.026	12.464	0.094
At most 5 *	4.914**	0.027	4.914**	0.027

Note: *** indicates 1% significance level, ** indicates 5% significance level.

4.5. Threshold Regression Analysis Results

From the analysis, it was observed that the impact of central bank independence is positively related to economic growth when the inflation threshold is less than 26.1% at a significance level of 5% with an elasticity coefficient of 0.07. On the other hand, when the inflation threshold is greater than or equal to 26.1% with an elasticity coefficient of 0.142 at a significance level of 1% (see Table 6), central bank independence is positively related to economic growth. Relatively, a 100-point improvement in central bank independence could increase economic growth by 7% when the inflation rate is below 26.1% annually and 10.2% when the inflation rate is equal to or greater than 26.1% annually. Regulating control positively interrelates with central bank independence to positively impact economic growth. These findings substantiate this theoretical preposition from the political agency theory of central bank independence, even though the results reported an insignificant coefficient.

Furthermore, the threshold of gross domestic product per capita (PPP) was considered to ascertain the threshold at which central bank independence matters. Based on that analysis, it was observed that when the threshold of GDP per capita growth rate is 5.8%, central bank independence positively impacts economic growth. Therefore, a 100-point improvement in central bank independence could increase economic growth by 10.7% at a 5% significance level (see Table 7).

Table-6. Regression analysis: Inflation threshold (model 1).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Impact of CBI when inflation threshold is < 26.1%				
CBI	0.070**	0.019	3.703	0.002
Impact of CBI when inflation threshold is ≥ 26.1%				
CBI	0.142***	0.030	4.784	0.000
Non-Threshold Variables				
GDPCAP	0.934***	0.063	14.808	0.000
COR	1.361	1.223	1.112	0.281
SHDW	0.005	0.013	0.379	0.710
Constant	-1.455	1.333	-1.091	0.290
Model fitness				
R-squared	0.942			
Adjusted R-squared	0.925			
F-statistic	54.946***			
Prob(F-statistic)	0.000			
Observation	23			
Breusch–Godfrey Serial Correlation LM Test:				
F-statistic	0.079	Prob.		0.925
Obs*R-squared	0.239	Prob.		0.888
Heteroskedasticity Test: Breusch–Pagan–Godfrey				
F-statistic	0.655	Prob.		0.662
Obs*R-squared	3.714	Prob.		0.591

Note: *** indicates 1% significance level, ** indicates 5% significance level. GDPGROWTH = economic growth, CBI = central bank independence, GDPCAP = GDP per capita PPP, INF = inflation rate, GOVEFF = government effectiveness, COR = corruption control, POPGWTH = population growth, SHDW = shadow economy.

In contrast, central bank independence is essential for economic growth and sustainable economic development. The findings showed that the central bank's total independence could highly propagate growth with sound monetary policies. More so, it was observed that the independence is relative to a specific threshold of GDP per capita and inflation growth rates. With reference to Ghana's economic statistics (International Monetary Fund, 2020) in relation to inflation and GDP per capita growth rates, inflation rates were 9.4% in 2018, 7.9% in 2019, and the projected figure for 2020 was 9.9%. In place of that, the inflation rates fall far below the threshold value of 26.1%, which stipulates that when inflation is below that threshold, a 100-point improvement in central bank independence could increase economic growth by 7%. To account for central bank independence, it can be reported that the index deteriorated in 2019 at 63.4 out of 100 compared to the index for 2013, which was 67.8 out of 100. Conversely, it can be reported that this development can be related to the fall in growth of the economy, which grew by 8.1% in 2017, but the growth declined in 2018 and 2019 by 6.3% and 6.1%, respectively. On the other hand, the GDP per capita (PPP) growth rate had declined from 5.8% in 2017 to 4.1% in 2018 and to 4.0 in 2019. The regression threshold was pegged at 5.8% or above to significantly impact economic growth when central bank independence is relatively improved. In model 1, where the inflation threshold was considered, the R^2 of the model was 0.942. This posits that the exogenous variables explained a 94.2% variation of the endogenous variable (economic growth), and, in model 2, the exogenous variables explained a 70.2% ($R^2 = 0.702$) variation of the endogenous variable (economic growth).

The model employed for the study depicts statistical significance and goodness of fit as the diagnostic tests performed to check for model fitness (f-statistic p-value < 0.05), heteroskedasticity (p-value > 0.05), and serial

autocorrelation (p-value > 0.05) for stability all proved reliable and valid (see Tables 6 & 7). Hence, the study can reliably infer the outcome of the regression analysis.

Table-7. Regression analysis: Real GDP per capita threshold (model 2).

Variable	Coefficient	Std. Error	t–Statistic	Prob.
Impact of CBI when GDP CAP threshold is < 5.8%				
CBI	0.027	0.040	0.687	0.501
Impact of CBI when GDP CAP threshold is ≥ 5.8%				
CBI	0.107**	0.039	2.743	0.014
Non-Threshold Variables				
POP_GWTH	3.583	3.698	0.969	0.346
GOVT_EFF	–0.537	3.507	–0.153	0.880
SHADOW	0.035	0.030	1.179	0.255
Constant	-6.393	9.941	–0.643	0.529
Model fitness				
R-squared	0.702			
Adjusted R-squared	0.615			
F-statistic	8.019***			
Prob(F-statistic)	0.000			
Breusch–Godfrey Serial Correlation LM Test:				
F-statistic	0.296	Prob.		0.748
Obs*R-squared	0.873	Prob.		0.646
Heteroskedasticity Test: Breusch–Pagan–Godfrey				
Obs*R-squared	6.099	Prob.		0.297
Scaled explained SS	4.371	Prob.		0.497

Note: *** indicates 1% significance level, ** indicates 5% significance level. GDPGROWTH = economic growth, CBI = central bank independence, GDPCAP = GDP per capita PPP, INF = inflation rate, GOVEFF = government effectiveness, COR = corruption control, POPGWTH = population growth, SHDW = shadow economy.

4.6. Inflation and Growth Variability Analysis

Table 8 presents the analysis results of the impact of central bank independence on the variability of inflation and economic growth. The analysis shows that central bank independence reliably reduces the variability of inflation and economic growth simultaneously. Hence, the monetary authority's total independence could reduce the variability in inflation and the economy that might arise due to interference from political actors or the incumbent government.

Table-8. CBI and variability of inflation and growth.

	OLS		Robustness check – DOLS	
Dependent Variable	**VGDPGrowth**	**Vinflation**	**VGDPGrowth**	**Vinflation**
CBI	–0.137**	–0.186***	–0.453**	–0.250**
	(–3.064)	(–5.108)	(–3.241)	(–2.854)
Constant	16.431***	15.971***	36.384***	19.827**
	(6.032)	(7.180)	(4.135	(3.597)
R-squared	0.309	0.554	0.512	0.598
Adjusted R-squared	0.276	0.533	0.452	0.491
F-statistics	9.388**	26.094***		
Hansen Test (Lc statistics)			0.033	0.039
Prob.			> 0.2	> 0.2
Observations	23	23	20	20

Note: *** indicates 1% significance level, ** indicates 5% significance level. VGDPGROWTH = variability in economic growth, CBI = central bank independence, VInflation = variability in inflation rate. T-statistics are in parentheses. Hansen Test = Hansen instability test, which implies that the null hypothesis should be accepted at a p-value > 0.05.

However, with elasticity coefficients of –0.137 and –0.453, a 100-point percentage increase in the independence of the central bank or total independence could relatively reduce the variability of economic growth by 13.7% and 45.3%, respectively. With respect to inflation variability, a 100-point percentage increase in central bank

independence could relatively reduce inflation variability by 18.6% and 25.0%, respectively. This finding is consistent with the studies of Athanasios (2009) and Gauti & Eric (2004).

These findings also support the political agency theory of central bank independence, as both the main regression method (OLS) and the robustness check method (DOLS) confirm an inverse relationship between central bank independence and the variability of inflation and real GDP growth, respectively.

5. CONCLUSION

With the objective of assessing the impact of central bank independence on Ghana's economic growth, the study focused on the thresholds of inflation and real gross domestic product per capita rates. Ironically, the present study is a time series study from 1996 to 2017. The study found that central bank independence is essential for economic growth in Ghana. Most importantly, the inflation rate and real gross domestic product per capita are essential factors to consider when the government wants to achieve maximum growth. Empirically, this study found that central bank independence and economic growth are positively and significantly related. Their linkage is directly proportionate, so an increase or improvement in central bank independence could substantially increase economic growth. However, the deterioration of central bank independence could heavily affect or cause a decline in economic growth. Despite this, the government should seek financial support from the central bank to protect growth. However, it would be prudent for the government to channel such funds into social safety net programs, broad-based fiscal support, investment in public health and education, and investment in infrastructure to support the economy sustainably. Notably, fiscal discipline is essential in times like this. Afterward, central bank independence must be ensured to sustain the economy. These findings support the studies by Behrooz (2019), Behrooz (2020) and Merter et al. (2015) and perhaps substantiate the political agency theory of central bank independence. It is evident that when inflation levels are high, the central bank's total independence could ensure a decrease, and corruption control reliably promotes more profound central bank independence. Moreover, there is an inverse relationship between central bank independence and the variability of inflation and economic growth (Athanasios, 2009; Gauti & Eric, 2004).

The responsibility of politicians should be to safeguard, protect and ensure the implementation of central bank independence over time, and perhaps the requirement of government and politicians is to understand and explain the ultimate reasons regarding the delegation of power and authority to an independent monetary body to ensure the welfare of present and future generations (Lorenzo, 2007).

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