CENTRAL BANK INDEPENDENCE AND ECONOMIC GROWTH OF GHANA: WHAT INFLATION AND GDP PER CAPITA GROWTH RATES MATTER?

Guoping Ding
Prince Asare Vitenu-Sackey

"Jiangsu University, School of Finance and Economics, Jiangsu Province, P. R. China.
Email: psvi@jusu.edu

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 to determine the GDP per capita growth and inflation rates require total independence of the central bank of Ghana with threshold regression method. Per 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%, central bank independence 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, respectively. Evidently, the regression threshold was pegged 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 earnest responsibility of politicians is to persistently safeguard, protect and ensure the implementation of central bank independence over time; perhaps the able requirement of government and politicians is to understand and explain ultimate reasons regarding the entrustment of power and authority to an independent monetary body to see to the well-being of forthcoming generations and present ones as well.

Contribution/Originality: This study contributes to the existing literature but presents fresh evidence regarding the threshold analysis of inflation and GDP per capita in the 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 empirical analysis.

1. INTRODUCTION

Central bank independence is the total freedom of using 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 set of restrictions (Behrooz, 2019). Sweden’s Riksbank is the world’s oldest central bank still existing dated back to 1668. Subsequently, in 1694, the Bank of England also emerged. Their role and mandate to interact with financial markets actors and their internal stakeholders based on management and decision-making procedures and relationship with the state brought about their emergence. For about two decades now, 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).
Lately, it is accustomed that improvement in central bank independence in utmost regard is very pertinent for institutional quality to function to 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 on central bank independence spins around monetary authorities' capability to enhance and ensure price stability. Essentially, the argument surrounding this development fears that incumbent governments may interfere in the operations of monetary authorities for budgetary support to fill in fiscal deficits or may try to fuel growth by executing enormous expansionary policy far more than expected (Arnone & Romelli, 2013; Chu, Cozzi, Furukawa, & Liao, 2017). Generally, central bank independence (CBI) is considerably effective in countries with a high inflation level and more democratic countries. The more independent a central bank is characterized by transparency perhaps correlates with high regulatory quality. Ideally, the country's central bank's independence level is varied 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 run. Theoretically, De Haan, Amtenbrink, and Eijffinger (1999) opined that an independent central bank has three distinguishing characteristics thus (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, the 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 from economic fortunes. With no exception, Ghana has resorted to the Bank of Ghana for financial support to recover from the economic turndown 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 4 points decline in the previous index. In essence, it is understood that central bank independence is very pertinent 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. Firstly, the greater the level of independence of the central bank without political interferences implies that the institution is less constrained to allow banks to act timely and in a more decisive manner with the ultimate aim of preventing financial distress or crisis. Secondly, 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 "tough" characteristic, then the policymakers can act leniently with a short-term motivation; perhaps the short-term costs will be minimal as compared to the other.

Moreover, market participants are aware of policymakers' incentives in times of rational expectations and usually expect policymakers to be lenient. Thirdly, 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 gross domestic product per capita thresholds, hence the motivation to embark on this study. Perhaps, there are sparse studies in the nexus of central bank independence with regards to Ghana.

By employing threshold regression, ordinary least square (OLS), and dynamic ordinary least square (DOLS) methods, the study aims to assess central bank independence's impact on Ghana's economic growth from 1996 to 2017. Secondly, to 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; thus, section one consists of the introduction, section two outlines 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 the prolific scholar (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 about 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 and 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 as monetary policy is delegated to it.
- On average, an independent central bank is capable of producing lower output variability.
- The terms of office of central bank governors are very pertinent; hence 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 be advantageous when politicians are setting 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 rates threshold 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; Eijffinger & De Haan, 1996).

2.1. Related Literature Review

The study of central bank independence (CBI) is not new; perhaps there have been enormous studies but has been strengthened by an increasing number of studies. Moreover, most of the studies were established on the link between central bank independence (CBI) and inflation, while a minority of them focused on the nexus between central bank independence and economic growth. Empirically, scores of literature have observed a positive association between central bank independence and economic growth in past studies (Banaian & Luksetich, 2001; Cukierman et al., 1993; Demertzis & Hallett, 2007; Fischer, 1995; Loungani & Sheets, 1997). On the contrary, other scholars argued that there is no substantial relationship between central bank independence (CBI) 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 opined that the association between central bank independence is negative and significant (Ismihan & Ozkan, 2004; Wray, 2007). Their argument stems from the assumption that the more independent a central bank could impact the sacrifice ratio and lead to output loss and lead to a higher inflation level. Athanasios (2009) observed an inverse association between central bank independence and inflation variability but could not found a relationship between real GDP growth and central bank independence.

In recent studies, Merter, Gönil, and Omer (2015) observed a positive relationship between central bank independence and economic growth with a regulatory role of financial freedom. Their study focused on E.U. member countries, and he employed the use of the ARDL bound testing method from 1995 to 2011. Also, they confirmed that the relationship between central bank independence and economic growth is in 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 1970-2015 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. Still, 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 pertinent 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 (CBI) 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 (CBI) to wrestle against inflation. He utilized 20 developed countries and 37 developing countries; the study spanned over 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 constructed to substantiate the theory that central bank independence (CBI) 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 would like to delve into Ghana's context as there is a limited empirical study in that regard.
3. DATA AND METHODOLOGY

3.1. Data

The study utilizes data sourced from 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 the central bank independence (CBI) as a proxy measure of monetary freedom index and the control variables are population growth, shadow economy, government effectiveness, and corruption control.

Table 1. Variable description and data source.

| 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. It is measured on 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 square, and dynamic ordinary least square method for the data analysis due to the study's objective to assess the threshold of the inflation rate and GDP per capita growth in which central bank independence becomes very pertinent and critical. Furthermore, central bank independence on the variability of inflation and growth (output) is also considered the second objective. This study follows the study of Behrooz (2019); 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.

Firstly, 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 out 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 be able to infer the outcome of regression analysis reliably. To able to perform the regression analysis to meet the study objectives, we employed a threshold regression method to aid our objective of ascertaining the threshold effects of inflation and GDP per capita where central bank independence effectively function. Subsequently, the ordinary least square regression method is used to observe the impact of central bank independence (CBI) 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 ordinary least square (OLS) method, the dynamic ordinary least square method is employed to robust check for statistical inference.
3.3. Model Specification

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

\[ GDP\ Growth_t = \beta_0 + \beta_1 \text{GOVEFF}_t + \beta_2 \text{POPGROWTH}_t + \beta_3 \text{SHDW}_t + \beta_4 \text{COR}_t + \theta_1 \text{CBI}_t (\text{INF}_t < \gamma) + \theta_2 \text{CBI}_t (\text{INF}_t \geq \gamma) + \mu + \epsilon_t \]

(1)

\[ GDP\ Growth_t = \beta_0 + \beta_1 \text{GOVEFF}_t + \beta_2 \text{POPGROWTH}_t + \beta_3 \text{SHDW}_t + \theta_1 \text{CBI}_t (\text{GDP\ CAP}_t < \gamma) + \theta_2 \text{CBI}_t (\text{GDP\ CAP}_t \geq \gamma) + \mu + \epsilon_t \]

(2)

\[ V\text{GDPGrowth}_t = \beta_0 + \beta_1 \text{CBI}_t + \epsilon_t \]

(3)

\[ V\text{Inflation}_t = \beta_0 + \beta_1 \text{CBI}_t + \epsilon_t \]

(4)

Where from Equation 1 to 4 can be explained as follows:

\( GDP\ growth = \) the GDP (PPP) growth rate.

\( GDP\ CAP = \) the GDP per capita (PPP).

\( \text{CBI} = \) Central Bank Independence (Monetary freedom index).

\( \text{POPGROWTH} = \) population growth rate.

\( \text{SHDW} = \) shadow economy in percentage of GDP.

\( \text{COR} = \) Corruption control.

\( \text{GOVEFF} = \) government effectiveness.

\( \text{INF} = \) inflation rate.

\( u = \) individual effect, \( \epsilon = \) disturbance term.

\( t = \) Time period (1996 – 2017).

\( \beta, \theta, \) and \( \gamma \) are the “parameters to be estimated”.

\( \beta_0 = \) intercept.

\( \geq = \) greater or equal to threshold effect.

\( < = \) less than threshold effect.

\( V\text{GDPGrowth} = \) Variability of Real GDP growth thus standard deviation from the population.

\( V\text{Inflation} = \) 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. The mean, median, standard deviation, minimum and maximum values of the variables are depicted in the table. However, the Jarque-Bera tests 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 the majority of the variables could not produce a probability of more than 5%. In an account of the mean, it can be reported that 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 somewhat above average index score, the inflation rate stood at an average rate 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 weak performance in that regard. Government effectiveness was also weak per the average score for the sample period, thus -0.079. That notwithstanding, it is evident that the government has not liberated independent state institutions’ activities to provide public goods to the citizenry.

4.2. Unit Root Tests

The unit root test's assumption is to check for stationarity among the study's data series to eschew spurious regression. However, Levin, Lin & Chu, Im, Pesaran and Shin, ADF-Fisher, and PP-Fisher tests were employed to ascertain the data series's stationarity status to go on further to perform other necessary pre-tests. The results of the tests can be found in Table 3. From the table, it is evident that only Levin Lin & Chu test could not substantiate the data series's stationarity status at level form. 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 significantly rejected.

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. Obviously, no multicollinearity was witnessed as the independent, and the control variables had coefficients of 0.292, 0.242, 0.194, 0.065, and 0.275 (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 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   |          |     |     |      |
| GOVTEFF     | 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      | -0.511| 0.051 | 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, GOVTEFF = Government Effectiveness, COR = Corruption Control, POPGROWTH = Population Growth, SHDW = Shadow Economy.

4.4. Cointegration Test

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 significance level. With reference to Table 5, both the two models, thus model 1 and 2 constructed for the study, reported that the variables are cointegrated from none to at most 2 for model 1 and none to at most 5 for model 2 for both 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 * | 115.380*** | 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

Per 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, 100 points 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. Controlling 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. In furtherance, the threshold of gross domestic product per capita (PPP) was considered to ascertain the threshold in 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, but it is significant when the threshold is greater than 5.8%. Therefore, 100 points of improvement in central bank independence could increase economic growth by 10.7% at a 5% significance level (see Table 7).

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| Impact of CBI when inflation threshold < 26.1% | 0.070** | 0.019 | 3.703 | 0.002 |
| Impact of CBI when inflation threshold ≥ 26.1% | 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

| F-statistic | Prob. | 0.925 |
| R-squared | 0.942 |
| Adjusted R-squared | 0.925 |
| F-statistic | 54.946*** |
| Prob(F-statistic) | 0.000 |
| Observation | 23 |

Breusch-Godfrey Serial Correlation L.M. Test:

| F-statistic | Prob. | 0.925 |
| R-squared | 0.942 |
| Adjusted R-squared | 0.925 |
| F-statistic | 54.946*** |
| Prob(F-statistic) | 0.000 |
| Observation | 23 |

Heteroskedasticity Test: Breusch-Pagan-Godfrey

| F-statistic | Prob. | 0.662 |
| R-squared | 0.655 |
| Adjusted R-squared | 0.655 |
| F-statistic | 3.714 |
| Prob(F-statistic) | 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, POPGWITH = Population Growth, SHDW = Shadow Economy.

In contrast, central bank independence is essential in 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 independent 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 of 2018 were 9.4%, 2019 was 7.9%, 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, 100 points 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 as compared to the index for 2013, thus 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 at 8.1% in 2017 but declined in growth in 2018 and 2019 at 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 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 R² of the model was 0.942. This posits that the exogenous variables explained a 94.2% variation of the endogenous variable.
(Economic growth). Moreover, in model 2, the exogenous variables explained 70.2% ($R^2 = 0.702$) variation of the endogenous variable (Economic growth).

The model employed for the study depicts statistical significance and goodness to fit as the diagnostic tests performed to check for model fitness ($t$-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 Table 6 & 7). Hence, the study can reliably infer the outcome of the regression analysis.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| Impact of CBI when GDP CAP threshold < 5.8% | CBI | 0.027 | 0.040 | 0.687 | 0.501 |
| Impact of CBI when GDP CAP threshold ≥ 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 | 0.615 | 8.019*** | 0.000 |
| | Adjusted R-squared | 0.296 | 0.873 | 0.046 |
| F-statistic | 0.299 | 0.748 |
| Prob(F-statistic) | 0.748 |
| Breusch-Godfrey Serial Correlation L.M. Test: F-statistic | 0.296 | Prob. | 0.046 |
| Obs*R-squared | 0.299 | Prob. | 0.046 |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey | 0.296 | Prob. | 0.046 |
| Obs*R-squared | 0.299 | Prob. | 0.046 |
| Scaled explained SS | 4.371 | 0.497 |

| Dependent Variable | OLS | Robust check - DOLS |
|-------------------|-----|---------------------|
| CBI               | VDGDPGrowth | VDGDPGrowth |
| Constant          | -0.137** | -0.186*** | -0.453*** |
|                   | (-3.064) | (-5.108) | (-3.241) |
| R-squared         | 0.509 | 0.554 | 0.512 | 0.598 |
| Adjusted R-squared | 0.276 | 0.533 | 0.452 | 0.491 |
| F-statistics      | 9.388** | 26.094*** | 36.384*** |
| Hansen Test (Lc statistics) | 0.033 | 0.039 |
| Prob.             | > 0.2 | > 0.2 | > 0.2 |
| Observations      | 23 | 23 | 20 | 20 |

Note: *** indicates 1% significance level, ** indicates 5% significance level. VDGDPGROWTH = Variability in Economic growth, CBI = Central Bank Independence, VDGDPGROWTH = 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 to examine 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.
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 and Eric (2004).

These findings support the political agency theory of central bank independence as both the main regression method (OLS) and the robust check method (DOLS) confirm an inverse relationship between central bank independence and 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 hammered on the threshold 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 eminent 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 present study found that central bank independence and economic growth are positively and significantly related; hence their linkage is directly proportionate; thus, an increase or improvement in central bank independence could substantially increase economic growth. However, the deterioration of central bank independence could heavily affect or declining economic growth. Despite this, it is for the government to seek financial support from the central bank to cushion growth. However, it will 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 an investment in infrastructure that would support the economy sustainably. Notably, fiscal discipline is essential in times like this. Afterward, central bank independence must be ensured to sustain the economy. The findings support the studies from Behrooz (2019); Behrooz (2020); 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 downward 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 earnest responsibility of politicians is to persistently safeguard, protect and ensure the implementation of central bank independence over time; perhaps the able requirement of government and politicians is to understand and explain ultimate reasons regarding the delegation of power and authority to an independent monetary body to see to the welfare of future generations and present ones as well (Lorenzo, 2007).

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