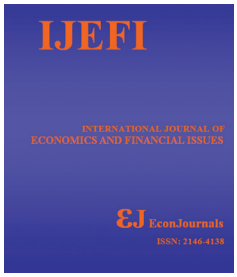


International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2024, 14(1), 154-163.

Fiscal Deficits and Inflation in Ghana

Solomon Hanson Obeng[1], Anselm Komla Abotsi[2]*

[1]Department of Economics Education, University of Education, Winneba, Ghana, [2]University of Education, Winneba, Ghana.
*Email: agrivetent@gmail.com

Received: 20 September 2023 **Accepted:** 04 January 2024 **DOI:** https://doi.org/10.32479/ijefi.15116

ABSTRACT

The Ghanaian economy has been faced with persistent fiscal deficits over the years and this affects other macroeconomic variables like inflation. This study therefore empirically examines the effect of fiscal deficit on inflation in Ghana. The study deployed a quantitative research design technique, the Autoregressive Distributed Lag (ARDL) cointegration test, and vector error correction models using annual data spanning 1976 to 2019 with 44 observations. Findings revealed that there is a significant and positive short and long-run relationship between fiscal deficits and inflation in Ghana, with unidirectional causality running from inflation to fiscal deficit. The study recommends that the Government of Ghana should endeavour to minimise and also finance fiscal deficits mostly through external sources and non-banking methods like the issuance of bonds at the foreign financial market since non-banking borrowing has low inflationary effects.

Keywords: Inflation, Fiscal Deficits, Money Supply, Exchange Rate, Government Expenditure
JEL Classifications: E10, E3, E31, E5, E62

1. INTRODUCTION

Inflation has been a key macroeconomic variable due to its impact on the economy. Inflation represents how much more costly the relevant set of goods and/or services has become over a certain period, most commonly a year (International Monetary Fund, 2018). To determine the rate of inflation, the cost of an identical market basket today is compared to the cost of an identical basket in the previous year or a base year. Totonchi (2011), asserted that the causes of inflation have probably led to one of the most significant macroeconomic debates in the field of economics. The debates differ in their hypotheses, mainly due to a range of conventional views about the appropriate measure to reduce inflation and also due to differences in economies (developed or underdeveloped). Inflation has been summarised into various theories - demand-pull theory, cost-push theory, monetary theory, and quite recently the structural theory of inflation. John Maynard Keynes and his associates emphasised the increase in aggregate demand as the main source of demand-pull inflation. The aggregate demand comprises investment, consumption, and government expenditure. Cost-push inflation is caused by an increase in wage which is engineered by unions and profit increases by employers. The monetarists led by Friedman (1968), emphasised the role money supply plays concerning inflationary pressures. They contend that "inflation is always and everywhere a monetary phenomenon that arises from a more rapid expansion in the quantity of money without a corresponding increase in total output." The structuralist theory of inflation was formalised by Sunkel (1958) in an attempt to study inflation in South America specifically Chile. This inflation occurs as a result of an attempt to achieve economic growth mostly in less developing countries (Totonchi, 2011).

However, the economic life of every country is dynamic, and the variables affecting inflation continue to assume different dimensions. The theoretical and empirical literature on inflation seems to suggest that the causes of inflation are multifaceted and time-specific, as well as dependent on the level of development of

a country (Acquah-Sam, 2017). Sargent and Wallace (1981) were the first to formalise the impact of monetary financing of a fiscal deficit on inflation. Since then, a lot of attention has increasingly been given to the role of fiscal factors in explaining the major causes of inflation. A well-established theory in macroeconomics is that governments running persistent fiscal deficits sooner or later have to finance those deficits with money creation, thus producing inflation. In as much as this theory does not neglect the importance of other mechanisms through which inflation can occur and become persistent, fiscal imbalances have remained key to most models. The fiscal view of inflation has been prominent, especially in the developing countries literature, which has long recorgnised that less efficient tax collection, political instability, and more limited access to external borrowing tend to lower the relative cost of seigniorage and increase dependence on inflation tax (Alesina and Drazen, 1991; Cukierman et al., 1992). Empirical evidence has shown that there is a long-run relationship between fiscal deficits and inflation (Ahmad, and Aworinde, 2019; Kaur, 2019; Nguyen, 2015). In Ghana, there have been high tendencies for spending in line with the desire to lay a foundation for economic take-off by expanding the social and economic infrastructure such as the provision of potable water, health facilities, improved road networks, educational and health facilities among others to meet the developmental deficits. In addition, poor expenditure management such as sole sourcing in the public procurement processes coupled with weak revenue forecasting capacity and generation has resulted in a situation where it had been almost consistently impossible to synchronize revenue and spending targets for a very long period. Over the years, Governments in Ghana have thrived unsuccessfully in maintaining a single-digit and stable inflation. Inflation rates for the periods of 1999–2003, 2004–2008, 2009–2013, and 2014–2019 averaged 22.40, 13.18, 11.50, and 12.91 respectively (World Bank, 2020). Knowing the importance of price stability in an economy and the subsequent influence on the success of businesses and the well-being of the citizenry, it is prudent to examine how fiscal deficits impact inflation.

Due to the COVID-19 pandemic, African countries increased borrowing to finance public health needs and to protect lives and livelihoods, which has led to higher debt levels (OECD/AUC/ATAF, 2021). Also, some governments introduced fiscal stimulus packages such as tax cuts to support businesses and individuals, which worsened their tax-to-GDP ratio. This has the potential to culminate in a monetised fiscal deficit. For instance, the tax-to-GDP ratio in Ghana decreased by 0.6% points from 14.1% in 2018 to 13.5% in 2019 (OECD/AUC/ATAF, 2021). Though there have been various attempts recently by various governments in Ghana through different legislations to mitigate the problem of a monetised deficit inflation relationship, due to possible structural weaknesses and political considerations, the purpose of these legislations have not been fulfilled. Some of these are the Public Financial Management Act (Act 921) in 2016 and the Fiscal Responsibility Act (Act 982) in 2018. In March 2020, the Finance Minister in addressing the parliament of Ghana on the Covid 19 and its impact on the Ghanaian economy, said "The country may see a fiscal deficit of 6.6% of revised GDP considering the fiscal measures being taken by the government (Ministry of Finance, 2020b). The corresponding primary balance is a deficit of 1.1% of rebased GDP. The resulting fiscal deficits as a percentage of GDP is more than the 5% threshold stipulated by the Fiscal Responsibility Act, 2018 (Act 982)" (Ministry of Finance, 2020a).

In an attempt to find the relationship between inflation and fiscal deficits in Ghana, Dadson (2015) established a positive and significant (10% level of significance) impact of fiscal deficits on inflation in the long run and a unidirectional causality running from fiscal deficits to inflation in Ghana while Adom, Zumah, Mubarik, Ntodi, and Darko, (2015) established an insignificant effect of fiscal deficit on inflation. However, since Dadson's study did not consider broad money supply and government expenditure, which are key determinants of inflation, the result showed an almost trifling impact (estimated coefficient is 0.0031) of fiscal deficits financed through the central bank on inflation during the period of study. Meanwhile, studies in Ghana have shown that money supply has a significant positive influence on inflation in both the long and short run (Adjei, 2018; Adu, and Marbuah, 2011). In addition, the equation of exchange concerning the Quantity Theory of Money (QTM) stipulates that an increase in money stock will lead to a proportionate increase in the price level in the long run. Empirically, a long-run relationship between broad money growth and inflation across a variety of countries and monetary regimes has also been established (Benati, 2005; Kaur, 2019; King, 2002; Nguyen, 2015). Regarding the view of neo-classical economists, an increase in government expenditure in the form of intervention has the potential to trigger high inflationary outcomes given the full-employment assumption (Olayungbo, 2013). In addition, excessive monetary expansion arising from government borrowing from the banking system to finance budget deficits generates strong inflationary pressures (Ahmad, 1970). In the literature, government expenditure has also been found to have an impact on inflation (Georgantopoulos and Tsamis, 2010). This study intends to use a more rigorous methodology while expanding the coverage to examine empirically the impact of fiscal deficits on inflation in Ghana while controlling for broad money supply and government expenditure. Specifically, the study seeks to examine the effect of fiscal deficits on inflation in Ghana, analyse the direction of causality between fiscal deficits and inflation in Ghana, and examine the effect of impulse (shocks) of fiscal deficits on inflation.

Using the Autoregressive Distributed Lag (ARDL) cointegration test and vector error correction model, the findings show there is a significant and positive short and long-run relationship between fiscal deficits and inflation in Ghana, with unidirectional causality running from inflation to fiscal deficit. The results of the impulse response function showed that an impulse (shock) in fiscal deficits has both negative and positive relationships in the short and the long run respectively. This paper continues with the theoretical and empirical literature review and the presentation of the methodology. This is followed by a presentation of the results and discussion and finally, the conclusion.

2. LITERATURE REVIEW

2.1. Monetary Inflation Theory

The debate on the effects of fiscal deficits on macroeconomic variables such as inflation has generated considerable interest

as well as controversy in the theoretical literature. According to Totonchi (2011), monetarism refers to the followers of Friedman who hold the view that "only money matters," and as such monetary policy is a more potent instrument than fiscal policy in economic stabilization. According to the monetarists, the money supply is the "dominant though not exclusive" determinant of both the level of output and prices in the short run and of the level of prices in the long run. The long-run level of output is not influenced by the money supply. The monetarist argued that inflation is caused by excessive monetary growth. That is to say that the rate of increase in the money stock is substantially more than the rate of growth of real output. This monetarist argument was earlier advanced by Friedman (1956; 1967; 1968). The classical theory of inflation attributes sustained price inflation to excessive growth in the quantity of money in circulation. For this reason, the classical theory is sometimes called the "quantity theory of money," even though it is a theory of inflation, not a theory of money. More specifically, the classical theory of inflation explains how the aggregate price level is determined through the interaction between money supply and money demand (Ireland, 2014). In its transaction's version, the QTM states that the value of all sales of goods must necessarily equal the value of all purchases:

$$M \cdot V = P \cdot T \quad (1)$$

M represents the supply of money, V is the velocity of money, P is the general price level and the volume of transactions is represented by T in real terms. Given the aggregate supply in the goods market, aggregate demand is expressed as follows:

$$AS = T \quad (2)$$

$$AD = (M \cdot V)/P \quad (3)$$

According to the production function, in the long run, T may be interpreted to represent the real output. In the goods market, equilibrium requires here that AD = AS, and hence,

$$T = (M \cdot V)/P \quad (4)$$

If one assumes, following the classical economists, that V and T are constant in the short run, the transactions equation (4) can be rewritten to yield a price equation for the economy as follows:

$$P = (M \cdot V)/T \quad (5)$$

Equation (5) states that both money supply and price level have the same effect that is if one doubles the other follows suit. That is, the general price level is solely an increasing function of money supply, or in other words, an excess supply in the money market causes an excess demand in the goods market ceteris paribus. It should be added that the relative version of the equation (5) can simply be interpreted as the inflation equation of the quantity theory of money:

$$\pi = (v - g) + m \quad (6)$$

where π, v, g, and m represent the percentage changes in P, V, T, and M, respectively. When v and g are assumed to be zero, then π = m. In its extreme interpretation, this simple classical or neoclassical relationship states that inflation is only a monetary phenomenon if one ignores the possible changes in V and T. Both the classical or neoclassical economies believe that the money supply should be reduced to fight against inflation.

2.2. The Fiscal Theory of the Price Level

The fiscal theory of the price level (FTPL) describes policy rules such that the price level is determined by government debt, the present and future tax and spending plans, with no direct reference to monetary policy. The fiscal theory of price level is explained by the velocity equation and the government budget constraint equation. The velocity equation defines the velocity of money in period t (V_t) as the ratio of nominal output (the price level P_t times real output Y_t) to nominal money balances (M_t):

$$V_t = \frac{P_t Y_t}{M_t} t = 0,1 \quad (7)$$

Before the introduction of the FTPL, equation (1) was seen as the primary determinant of the price level. For example, the quantity theory of money states that V_t is fixed and exogenous. In this case, the price level is proportional to the money supply. High prices arise because too much money is chasing too few goods, which is the heart of the monetarist doctrine. In a more sophisticated theory, velocity is itself affected by other macroeconomic variables, chief among them the nominal interest rate. Furthermore, in general, the price level needs to be determined jointly with M_t, Y_t, and V_t by computing the entire equilibrium path of the economy. The FTPL traces its roots to incompleteness in the monetarist view of the price level: often, the equilibrium price level cannot be uniquely determined, i.e., there are many paths of P_t that satisfies equation (1) as well as all the other equilibrium requirements (Kocherlakota and Phelan, 1999). This is especially true when monetary policy prescribes an exogenous interest rate. Sargent and Wallace (1975) show that the initial price level is then indeterminate, and subsequent inflation is subject to "sunspots," uncertainty driven by self-fulfilling expectations. In the simplest case, an interest rate peg determines the level of velocity (V_t), and real output and interest rates are independent of money and prices; equation (1) then pins down real money balances (M_t/P_t), but it does not specify whether those balances will be attained by high or low nominal money supply and prices (Bassetto, 2016). The FTPL determines prices from a different equation:

$$\frac{B_t}{P_t} = \text{Present value of primary fiscal surpluses as of time t, t} = 0,1, \quad (8)$$

Where B_t represents the nominal value of liabilities of government (debt and money) at the beginning of period t. The government budget constraint is represented in equation (8), in its present value form: the left-hand side represents real government liabilities, matched by assets on the right-hand side. In its simplest form, the FTPL assumes that the government commits to a fixed and exogenous present value of primary fiscal surpluses; this is a special case of what Leeper (1991) defines as an "active' fiscal policy and Woodford (1995) a "Non-Ricardian" fiscal regime. Given an initial condition for debt, B_0, a unique price level is

consistent with equation (8); the FTPL successfully chooses a distinct price level at time 0, even in the period of an interest rate peg, for which the monetarist view offered no prediction. The power of the FTPL is not limited to period 0; the possibility of sunspot equilibria is ruled out in all subsequent periods since again a unique level of prices is in line with a given present value of surpluses and inherited nominal debt from the past.

2.3. Theoretical and Empirical Links between Budget Deficits and Inflation

The effect of the government's budget deficits on inflation does not have a general and accurate answer. According to Akcay et al. (1996), the link between deficits to inflation is generally a difficult one to establish for several reasons. Empirically, studies that try to capture the connection between budget deficits and inflation are likely to produce results that are quite sensitive to the kind of model being used when one considers the number of possible versions that can be constructed intending to capture a given structure. Again, the link between money and inflation is itself a highly dynamic one for the following reasons: (i) high price levels will cause the velocity of circulation to increase and even an intact money supply will generate more inflation; (ii) an increase in inflation will reduce the available inflation tax base for the government and any effort by the government to collect a given inflation tax revenue will bring forth an increase in the tax (inflation) rate; (iii) inflation might cause budget deficits to increase (revenues to decrease) due to the Tanzi effect, and the pursuing monetization could lead to a rise in the inflation rate. In examining the consistency of fiscal deficits on certain macroeconomic variables in Ghana, Sowa (1994) posited that unsustainable fiscal policy would make the government miss some macroeconomic targets including inflation. Fiscal policy was consistent between 1985 and 1989. The rate of inflation was well within target in 1985. From 1986 to 1988, the government did not maintain consistent fiscal deficits, and the inflation targets in those years were not achieved. Irrespective of the mode of financing the deficits (either internal or external sources) inflationary pressures are likely to be generated (Ikhide, 1995).

Empirical studies on the causal relationship between fiscal deficits and inflation have been mixed as some show evidence of a positive relationship, while others show otherwise. Hondroyiannis and Papapetrou (1997) while assessing the direct and indirect effects of budget deficit on inflation in Greece for the period 1957-1993 realised that increasing fiscal deficits had no direct effect on inflation in Greece. In contrast, Darrat (2000) finds that higher budget deficits had a significant hand in Greece's inflationary process using an error correction mechanism for the same data set. (Fischer and Easterly, 2002) utilized the data set of 94 developing and developed countries from 1960 to 1995 and found that he link between fiscal deficits and inflation is highly significant in high-inflation countries during high-inflation episodes and weak in low-inflation countries and high-inflation countries during low-inflation episodes. Investigating the effect of budget deficit and how it's finance impact on inflation in Egypt, Helmy, (2008) employed Johansen co-integration analysis and vector error correction model (VECM), and used annual data from 1981 to 2006. The result depicted that budget deficit and its sources of financing have a major impact on inflation in Egypt (Helmy, 2008). Anfofum et al., (2015) examined the relationship between inflation and fiscal deficits in Nigeria spanning 42 years using annual time series data. The results found that fiscal deficits had a long-run equilibrium relationship with inflation. Dadson (2015) established a positive relationship between inflation and fiscal deficits in the long run and a unidirectional causality running from fiscal deficits to inflation in Ghana. Elsewhere, empirical studies have shown that fiscal deficits have a long and short run-run relationship with inflation (Ahmad and Aworinde, 2019; Kaur, 2019; Nguyen, 2015). However, key determinants of inflation namely broad money supply and government expenditure were not controlled for in Dodson's work, which this study believes may have affected the results. Dadson (2015) finds a percentage point increase (decrease) in budget deficit, keeping all other variables unchanged to lead to a corresponding increase (decrease) in the inflation rate by 0.0031183 at a 10% level of significance. While the result shows an almost trifling impact of fiscal deficits on inflation in Ghana, Adom, et al., (2015) established an insignificant effect of fiscal deficit on inflation. This study intends to control for these key determinants due to their importance when it comes to the causes of inflation to examine empirically the impact of fiscal deficits on inflation in Ghana. The current study also looks at the effect of an impulse on fiscal deficit and its effect on inflation in Ghana.

3. METHODOLOGY AND DATA

3.1. Data

The study uses annual data for all the variables under consideration from 1976 to 2019, with a sample size of 44 observations. The study employed yearly data on Inflation as the dependent variable with Fiscal Deficit, Government Consumption Expenditure, Broad Money Supply, Exchange Rate, and Gross Domestic Product (GDP) growth as the explanatory variables. The use of Gross Domestic Product (GDP) growth as an explanatory variable for inflation was adopted from the study by Acquah-Sam (2017) on Determinants of Inflation in Ghana. Government expenditure and the exchange rate were adopted from Tiwari and Darrat (2011). Fiscal deficit and broad money supply were adopted from the work of Ekanayake (2012). The data source for fiscal deficit, exchange rate, and GDP growth rate is from the World Development Indicators (WDI) Database of the World Bank. Inflation rate data was sourced from the Ghana Statistical Service (GSS), money supply data was sourced from the Bank of Ghana (BoG) and government expenditure data was sourced from the Ministry of Finance (MoF). The data spanned from 1976 to 2019. The duration was chosen due to data availability. To achieve the objective of the study, the following hypotheses were tested;

- Ho: There is no effect of budget deficits on inflation in Ghana
- Ho: There is no causality between budget deficits and inflation in Ghana
- Ho: There is no effect of innovations (shocks) of budget deficits on inflation in Ghana.

3.2. Estimation Procedures and Model Specification

In estimating the empirical relationship between fiscal deficit and inflation in Ghana, the linear time-series model was used

(Akcay et al., 1996; Catao and Terrones, 2003; Magbabeola and Adelokun, 2003). The authors regressed inflation against fiscal deficit with control variables. The model is adopted and modified in this study. The functional form of the inflation-fiscal deficit model is specified as:

$$INF_t = \alpha FD_t + \gamma X_t + U_t$$

Where INF_t is the inflation rate in year t, FD_t is the fiscal deficits in year t, X_t is a vector of controls (money supply [MS], exchange rate [ER], gross domestic product growth [GDP], and government expenditure [GEXP]), α and γ are parameters and U_t is the disturbance term. The variables are transformed to logarithm form for easy interpretation of regression coefficients and to reduce the influences of outliers in either the dependent variable or independent variables.

$$lnINF_t = \alpha_0 + \alpha_1 lnFD_t + \alpha_2 lnMS_t + \alpha_3 lnER_t + \alpha_4 lnGDP_t + \alpha_5 lnGEXP_t + U_t$$

The Augmented Dickey and Fuller (1979) and the Phillips and Perron (1988) unit root test are employed to test for the stationarity of the variables. The study used the Autoregressive Distributed Lag (ARDL) method or the Bounds testing approach by Pesaran and Shin (1999). The ARDL estimation cointegration technique is preferable when dealing with variables that are integrated of a different order, I(0), I(1), or a combination of both, relatively more efficient in the case of small and finite sample data sizes and robust when there is a single long-run relationship between the underlying variables (Nkoro and Uko, 2016). The ARDL bounds testing approach estimate the model by Ordinary Least Squares (OLS) to test for the existence of a long-run relationship among the variables (Inflation, Fiscal deficit, Money supply, Exchange rate, GDP, and Government expenditure) by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables. The lag length is chosen based on information criteria such as the Akaike Information Criterion (AIC). The AIC criteria is chosen because it does not require any subjective threshold setting. The short-run dynamic parameters were estimated using an Error Correction Model (ECM) associated with the long-run estimates. The short-run causal effect is represented by the F-statistic on the explanatory variables while the t-statistic on the coefficient of the lagged error-correction term represents the long-run causal relationship (Narayan and Smyth, 2006; Odhiambo, 2009).

The error correction model was estimated to describe the coefficients of short-run dynamics and also to estimate the error correction term that measures the speed of adjustment. In determining the direction of the relationships, Granger (1969) causality test was performed to examine the linear causation between the concerned variables. The Engle-Granger causality test was performed using the VAR framework to examine the relationship between fiscal deficit and inflation as well as the control variables and also to check the robustness of the results. The VAR methodology offered a powerful new analytical weapon –the Impulse Response Function (IRF). IRFs are used to track the responses of a system's variables to impulses of the system's shocks (Ronayne, 2011). This was employed to check how a shock on fiscal deficits will impact inflation.

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

The introductory analysis of the variables is shown in Table 1. This table shows the summary statistics of all variables used in this study. A careful study of the difference between the mean and the median is marginal indicating that the distribution is near normal.

The exchange rate is a relatively least dispersed series with a standard deviation of 1.44, while inflation is relatively highly dispersed with a standard deviation of 28.68. A higher standard deviation is an indication of greater volatility. Inflation is more volatile as compared to fiscal deficits as a percentage of GDP. All the variables are positively skewed. The other indicators descriptively show that the variables are good for estimation.

4.2. Unit Root Test Results

The results of the Unit Root Tests show that the null hypothesis of variables having a unit root is rejected for the variables LNINF, LNFD, LNM3, and LNGDP as per the test statistics for both the ADF and PP tests. Hence, these variables are stationary in levels I (0). The null hypothesis of the presence of unit root cannot be rejected for the log of government expenditure (LNGEX) and exchange rate (LNEXR) since the P-values of both the ADF and

Table 1: Descriptive statistics of the study

Descriptive	INF	FD_	MS	ER	GDP	GEXP
Mean	30.93961	7.104687	37.21056	0.958941	5.240451	3.33E+09
Median	20.77314	7.087754	38.18523	0.217981	4.819693	1.55E+08
Maximum	122.8714	15.07195	68.52987	5.700000	14.04712	2.29E+10
Minimum	7.126350	0.288638	13.30136	0.000115	0.471696	68800.00
SD	28.68972	3.664896	14.25148	1.441691	2.363072	6.54E+09
Skewness	2.014850	0.031772	0.095024	1.805239	1.253886	1.996907
Kurtosis	6.536593	2.177129	2.037278	5.358232	5.917048	5.550636
Jarque-Bera	52.70096	1.248782	1.765024	34.09415	27.12982	41.16988
Probability	0.000000	0.535587	0.413662	0.000000	0.000000	0.000000
Sum	1361.343	312.6062	1637.265	42.19342	230.5798	1.46E+11
Sum Sq. Dev.	35393.29	577.5529	8733.502	89.37435	240.1167	1.84E+21
Observations	44	44	44	44	44	44

Source: Computed by the authors, (2020)

the PP statistics are greater than any of the conventional levels of significance (1%, 5%, and 10%) (Table A1 at Appendix). At first difference, all the variables were stationary at a 1% significant level for both the ADF and the PP tests conducted (Table A2 in Appendix).

4.3. Results from Bounds Tests

From Table 2, the F-statistics value depicts that, there is a long-run relationship between inflation and the independent variables since the calculated F-statistics value is higher than the upper critical values (4.68) when the variables are integrated of order one I (1). The null hypothesis of no cointegration among the variables is rejected implying that there exists a long-run relationship between inflation and its determinants. With the inflation model showing the existence of cointegration, the study then estimated their long-run coefficients and the short-run dynamic relationship using the ARDL cointegration framework. The choice of an appropriate lag length is as necessary as determining the variables to be included in any structure of equations. The ARDL Bounds Test approach has a required maximum lag length of one (1). The Akaike Information Criteria (AIC) and Schwarz (Bayesian) Information Criteria (SIC) are the two common types of lag structures that can be employed. However, this study employed the Schwarz Bayesian Information Criterion (SIC) over the AIC because it is a consistent estimator.

4.4. Results of the Long-run Relationship (VECM)

From the results of the cointegration analysis, the long-run relationship among the variables was estimated using the ARDL framework and the results are presented in Table 3. The long-run results confirm the expected sign that fiscal deficit impacts positively on inflation in Ghana since the coefficient of fiscal deficit, in the long run, is positive and statistically significant at a 1% level of significance. The coefficient (0.50) shows that a percentage increase in the level of fiscal deficit will result in approximately a 0.50% increase in the rate of inflation in Ghana which is consistent with earlier studies (Ahmad and Aworinde, 2019; Dadson, 2015; Fischer and Easterly, 2002; Helmy, 2008; Kaur, 2019; Nguyen, 2015). The money supply is positively related to inflation in support of the expected sign but is not significant in the long run. The prior expectation of a negative relationship between GDP growth rate and inflation is confirmed in Table 3. The coefficient of GDP rate in the inflation model is negative and statistically significant at 1%. This result is consistent with the conclusion of Idris and Baker (2017) who obtained a negative relationship between GDP growth rate and inflation in Nigeria's economy. Studies by Bawumia and Abradu-Otoo (2003) and Ahiakpor (2014) also confirm this finding. As anticipated, the exchange rate coefficient is positively signed and significant at 1%.

This shows that currency depreciation raises inflation in Ghana. Government expenditure is negatively related to inflation in contrast with the expected sign of a positive but it's well established in the literature. A coefficient of −0.33 and statistically significant indicates that a 1% increase in government expenditure will lead to an approximately a 0.33% decrease in inflation. In assessing the empirical evidence of the nexus between public expenditure and inflation for the Mediterranean countries during the period 1970-2009, Magazzino (2011) established a negative relationship for the variables in the long run for France.

Table 2: Results from bounds tests

Dependent variable	SIC lag length	F-statistics	I (0)	I (1)	Outcome
INF	4	15.65783	3.41	4.68	Cointegration

Table 3: Long-run estimate based on ARDL approach

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFD	0.508102	0.137198	−4.962909	0.0004
LNMS	0.393118	0.202052	1.752182	0.1313
LNER	0.534755	0.082529	1.881030	0.0007
LNGDP	−1.794878	0.281828	−5.033443	0.0001
LNGEXP	−0.334051	0.072443	−4.644877	0.0054

Source: Computed by the authors (2020)

Table 4: Estimated short run analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.21085	1.156834	10.67562	0.0000
D (LNFD)	−0.115375	0.060437	−4.645381	0.0014
D (LNFD(-1))	0.297837	0.078278	5.087945	0.0002
D (LNFD(-2))	0.320108	0.072333	6.654828	0.0001
D (LNMS)	0.165476	0.087554	1.432763	0.1645
D (LNGDP)	−0.723061	0.096517	-0.763265	0.3225
D (LNGDP(-1))	1.219580	0.181343	6.725249	0.0000
D (LNGDP(-2))	1.181810	0.129207	9.146627	0.0000
D (LNGDP(-3))	0.453448	0.119286	3.801345	0.0010
D (LNGEXP)	−0.152453	0.281525	−0.897945	0.3810
D (LNGEXP(-1))	0.838664	0.280839	2.986277	0.0070
D (LNGEXP(-2))	1.646925	0.262871	6.932481	0.0000
D (LNGEXP(-3))	1.447781	0.284699	5.077649	0.0000
CointEq(-1)*	−1.101127	0.111372	−10.54893	0.0000
R-squared	0.976363			
Adjusted R-squared	0.712545			
S.E. of regression	0.372673			
Sum squared resid	1.833261			
Log-likelihood	2.735766			
F-statistic	13.92521			
Prob (F-statistic)	0.000000			

Source: Computed by the authors (2020)

Figure 1: Response of LNINF to LNFD innovation using Cholesky factors

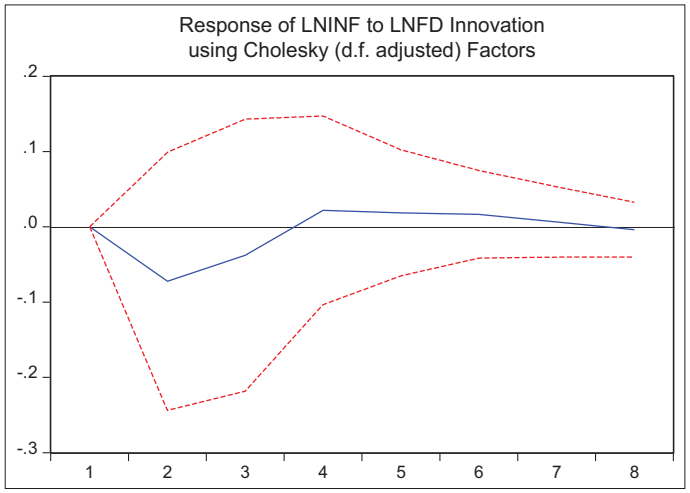


Figure 2: Model stability test

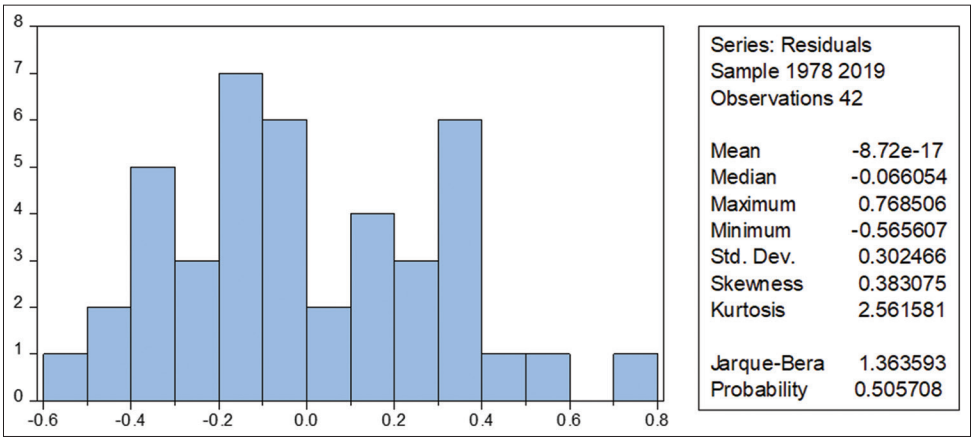
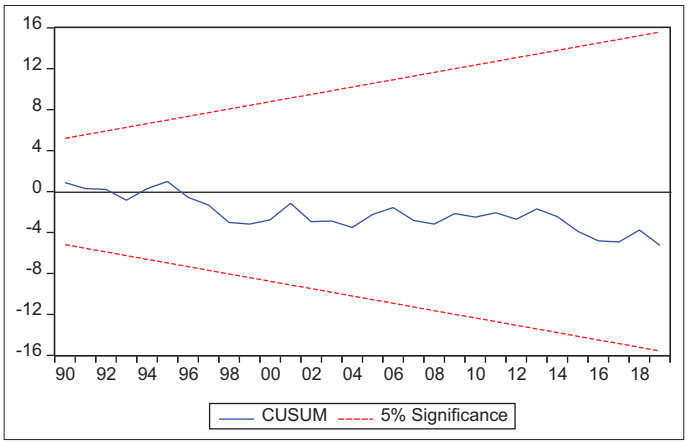


Figure 3: Cumulative sum (CUSUM)



4.5. Short-run Analysis

From the results in Table 4, the coefficient of the error correction term lagged one period (CointEq -1) is negative and significant at a 1% significance level indicating that fiscal deficit, money supply, exchange rate, GDP, and government expenditure are cointegrated. The coefficient of error correction term ECM (-1) in absolute term is 1.10. This means that about 110% of the deviation of the long-term inflation rate is corrected annually due to the adjustment from the short run to the long run. This suggests that approximately 110% of disequilibrium in the previous year's inflation is corrected in the current year. The coefficient of the error correction form in its absolute term suggests that the larger the coefficient the faster the variable equilibrates in the long run when there is a shock. Per the results, the speed of adjustment is very high.

The short-run result shows that the fiscal deficit is negatively signed but significant at 1%. The study by Ekanayake, (2012) confirms the inverse relationship between fiscal deficit and inflation. However, there is a positive relationship between the first lag of fiscal deficit and inflation with a coefficient of 0.29 at a 1% significance level consistent with the prior expectation. The results show that; a 1% increase (decrease) previous year's fiscal deficit will increase (decrease) inflation by approximately 3.0%. Money supply has shown to have a positive and weakly significant relationship at a 10% significance level. Earlier studies have also found money supply to have a positive significance on inflation (Kaur, 2019; Nguyen, 2015). Ofori-Frimpong (2017) in studying the relationship between money supply and inflation in Ghana, found a positive relationship among the variables. The gross domestic product shows a negative relationship with inflation in the short run just as in the long run but the short run is insignificant. The result shows a negative but statistically insignificant relationship between gross domestic product and inflation rate. The finding also reveals a negative but insignificant relationship between government expenditure and inflation rate in the short run.

The coefficient of determination (R^2) is 0.97 and this means that the independent variables explain 97% variations in the inflation rate. The adjusted R^2 suggests that the statistical fitness of the model to the data is satisfactory by 71%. Also, an F-statistics value of 13.92 suggests the joints significance of the regressors in the model indicating the model is good for both analysis and policy recommendations.

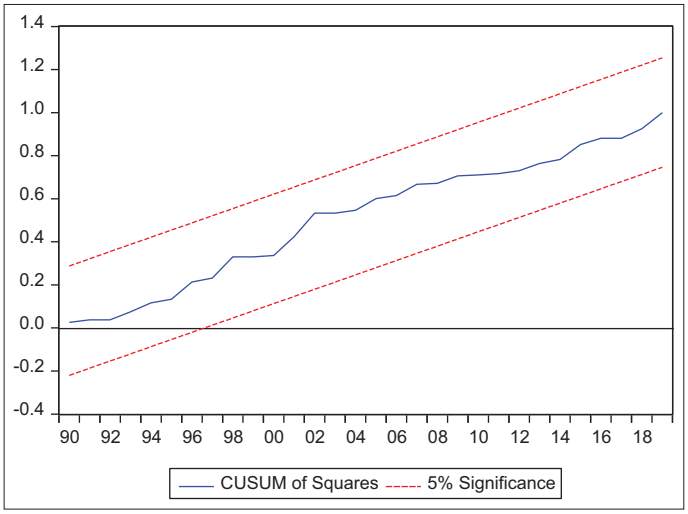
4.6. The Results of Impulse Response Functions

The impulse response function of VAR is to analyse the dynamic effects of the system when the model receives the impulse or shock. To display the response function clearly, Table A3 and Figure 1 (Appendix) are plotted to track the effects of a shock to a fiscal deficit on inflation using 8 years for the analysis. A shock in fiscal deficit in the short-run period had a negative relationship with inflation. Movement from the short run to the long run displayed a positive relationship (from the 4th year to the 8th year) between fiscal deficit and inflation. Per the outcome of the results, we can conclude that a shock to fiscal deficit has a positive effect on inflation in the short run but an inverse relationship in the long run. The result is consistent with that of Karras (1994).

4.7. Results of the Granger Causality Test

Granger causality is useful in determining the direction of the relationships. From Table 5, there is no evidence to reject the null hypothesis that fiscal deficit financing does not Granger cause inflation. However, the reverse is rejected at the 1% level of significance showing that it is inflation that causes fiscal deficit and not the other way around. There is therefore a unidirectional causality running from inflation to fiscal deficit. The finding is consistent with the results of Boariu (2007).

Figure 4: Cumulative sum of squares (CUSUM SQ)



Source: Computed by the authors

Table 5: Pairwise Granger causality test

Null Hypothesis	Obs	F-Statistic	Prob.
LNFD does not Granger Cause LNINF	42	0.42693	0.4005
LNINF does not Granger Cause LNFD	42	5.62793	0.0053

Source: Computed by the authors (2020)

4.8. Diagnostics

Statistical properties of the model were evaluated with a range of test statistics to validate the results to ensure that the model is normally distributed, not serially correlated, and also not heteroscedastic. The model is normally distributed based on the normality test conducted. The skewness has a value of 0.38 which is between −0.5 and 0.5. The kurtosis also has a value of 2.56 which is also a little above positive two (+2) and lastly the Jarque-Bera test shows that the data is normally distributed (coefficient of 0.50, $P > 0.05$). The result is displayed in Figure 2 (Appendix). Given the P-values of serial correlation and heteroscedasticity as 0.2539 and 0.5490 from Tables A4 and A5 respectively (Appendix), the result shows the absence of serial correlation and heteroscedastic. Hence, we fail to reject the null hypothesis of no serial correlation, correct functional form, normally distributed residuals, and homoscedasticity at a 5% level of significance. Finally, the Cumulative Sum (CUSUM) and the Cumulative Sum of Squares (CUSUM SQ) by (Brown et al., 1975) techniques were used to determine the stability of the short-run and long-run coefficients. Stability tests using the CUSUM and CUSUM SQ tests for the model generally suggested an absence of structural breaks. This can be confirmed in Figures 3 and 4 in the Appendix.

5. CONCLUSIONS AND RECOMMENDATION

The primary concern of the study was to examine and throw more light on the effects of fiscal deficits on inflation in Ghana over the period 1976 to 2019. The research concluded that fiscal deficits have a positive and significant influence on inflation rate in the long run. The gross domestic product variable had a negative association with the inflation rate in both the short and the long run which is consistent with many empirical works reviewed. Whilst GDP rate showed a significant relationship with the rate of inflation, in the long run, the short-run significance level showed otherwise. The study finds a unidirectional causality running from inflation to fiscal deficit. The results of the impulse response function showed that an impulse (shock) in fiscal deficits has both negative and positive relationships in the short and the long run respectively.

It is recommended that in periods of fiscal deficits in the economy, the government finance the deficits with less inflationary sources like the non-banking method. The study further recommends that to contain inflation in Ghana, fiscal deficit increases should be checked through the enforcement of legislation like the Fiscal Responsibility Act, Act 982 which pegs fiscal deficits to GDP ratio at 5% since the study suggests that it's rather an inflation that causes fiscal deficits but not the other way around. The need for the Bank of Ghana to continue financing deficit mostly through external sources and non-banking methods like the issuance of bonds at the foreign financial market should be encouraged as non-banking borrowing has low inflationary impacts even though it has an adverse effect on domestic debt sustainability.

REFERENCES

Acquah-Sam, E. (2017), Influencers of inflation in Ghana. European Scientific Journal, 13(7), 140.

Adjei, S.K. (2018), Inflation determinants - Milton Friedman's theory and the evidence from Ghana, 1965- 2012 (Using ARDL Framework). International Journal of Applied Economics, Finance and Accounting, 3(1), 21-36.

Adom, P.K., Zumah, F., Mubarik, A.W., Ntodi, A.B., Darko, C.N. (2015), Analysing inflation dynamics in Ghana. African Development Review, 27(1), 1-13.

Adu, G., Marbuah, G. (2011), Determinants of inflation in Ghana: An empirical investigation. South African Journal of Economics, 79(3), 251-269.

Ahiakpor, F. (2014), Rethinking about determinants of inflation in Ghana: Which econometric model tell the true Story. European Journal of Business and Management, 6(6), 78-86.

Ahmad, A.H., Aworinde, O.B. (2019), Are fiscal deficits inflationary in African countries? A new evidence from an asymmetric cointegration analysis. The North American Journal of Economics and Finance, 50, 100999.

Ahmad, N. (1970), Deficit Financing, Inflation and Capital Formation : The Ghanaian Experience 1960-65. United States: Weltforum Verlag.

Akcay, O.C., Alper, C. E., Ozmucur, S. (1996), Budget Deficit, Money Supply and Inflation: Evidence from Low and High Frequency Data for Turkey. Türkiye: Bogazici University, Department of Economics.

Alesina, A., Drazen, A. (1991), Why are stabilizations delayed? American Economic Review, 81(5), 1170-1188.

Anfofum, A.A., Yahaya, A.O., Suleman, T. (2015), Empirical investigation of fiscal deficits and inflation in Nigeria. International Journal of Fiscal Deficit and Inflation, 7, 1905.

Bassetto, M. (2016), Equilibrium and government commitment. Journal of Economic Theory, 124(1), 79-105.

Bawumia, M., Abradu-Otoo, P. (2003), Money Growth, Exchange Rate and Inflation in Ghana: An Error Correction Analysis. WP/BOG-2003/05.

Benati, L. (2005), Long-Run Evidence on Money Growth and Inflation. Bank of England Quarterly Bulletin, Autumn. Available from: https://

www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2005/long-run-evidence-on-money-growth-and-inflation.pdf
Boariu, A. (2007), Inflationary effects of budget deficit financing in contemporary economies. Analele Stiintifice Ale Universitatii "Alexandru Ioan Cuza" Din Iasi - Stiinte Economice (1954-2015), 54, 77-82.
Brown, R.L., Durbin, J., Evans, J.M. (1975), Techniques for testing the constancy of regression relationships over time. Journal of the Royal Statistical Society, Series B, 37, 149-162.
Catao, L., Terrones, M. (2003), Fiscal Deficits and Inflation: A New Look at the Emerging Market Evidence (Working Paper No.74/01).
Cukierman, A., Edwards, S., Tabellini, G. (1992), Seigniorage and political instability. The American Economic Review, 82, 537-555.
Dadson, Y.A. (2015), Examining the Effects of Fiscal Deficits on Inflation in Ghana [University of Ghana]. Available from: https://ugspace.ug.edu.gh
Darrat, A.F. (2000), Are budget deficits inflationary? A reconsideration of the evidence. Applied Economics Letters, 7(10), 633-636.
Dickey, D.A., Fuller, W.A. (1979), Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association, 74(366), 427-431.
Ekanayake, H.K.J. (2012), The Link Between Fiscal Deficit and Inflation: Do Public Sector Wages Matter? (ASARC Working Paper 2012/14). Available from: https://core.ac.uk/download/pdf/30678399.pdf
Fischer, S., Easterly, W. (2002), The economics of the government budget constraint. The World Bank Research Observer, 5(2), 127-142.
Friedman, M. (1956), Studies in quantity theory of money, Chicago: "The role of monetary policy." Journal of Political Economy, 69, 447-466.
Friedman, M. (1967), Money: Quantity theory. International Encyclopedia of the Social Sciences, 10, 432-446.
Friedman, M. (1968), The role of monetary policy. American Economic Review, 58(1), 1-17.
Georgantopoulos, A., Tsamis, A. (2010), The interrelationship between money supply, prices and government expenditures and economic growth: A causality analysis for the case of Cyprus. International Journal of Economic Sciences and Applied Research, 5(3), 115-128.
Ghana Statistical Service. (2020), Available from: https://www.statsghana.gov.gh
Granger, C.W.J. (1969), Investigating causal relations by econometric models and crossspectral methods. Econometrica, 37(3), 424-438.
Helmy, O. (2008), The Impact of Budget Deficit on Inflation in Egypt (ECES Working Paper No.141).
Hondroyiannis, G., Papapetrou, E. (1997), Cointegration, causality and the government budget-inflation. Relationship in Greece. Applied Economics Letters, 1, 204-206.
Idris, M., Baker, R. (2017), The relationship between inflation and economic growth in Nigeria: A conceptual approach. Asian Journal of Arts and Social Sciences, 3(1), 1-15.
Ikhide, S.I. (1995), Must a fiscal deficit be inflationary in a developing African country? Journal of Economic Management, 2(1), 20-34.
International Monetary Fund. (2018), World Economic Outlook: Cyclical Upswing, Structural Change. Washington, DC: International Monetary Fund (IMF).
Ireland, P.N. (2014), The macroeconomic effects of interest on reserves. Macroeconomic Dynamics, 18, 1271-1312.
Karras, G. (1994), Macroeconomic effects of budget deficits: Further international evidence. Journal of International Money and Finance, 13(2), 190-210.
Kaur, G. (2019), Inflation and fiscal deficit in India: An ARDL approach. Global Business Review, 22(6), 1553-1573.
King, M. (2002), No Money, No Inflation-the Role of Money in the Economy. Bank of England Quarterly Bulletin: Summer. p. 162-177. Available from: https://www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2002/no-money-no-inflation-the-role-of-money-in-the-economy.pdf
Kocherlakota, N., Phelan, C. (1999), Explaining the fiscal theory of the price level. Federal Reserve Bank of Minneapolis Quarterly Review, 23(4), 14-23.
Leeper, E.M. (1991), Equilibria under 'active' and 'passive' monetary and fiscal policies. Journal of Monetary Economics, 27, 129-147.
Magazzino, C. (2011), The Nexus between Public Expenditure and Inflation in the Mediterranean Countries. Available from: https://mpra.ub.uni-muenchen.de/28493/1/magazzino-the_nexus_between_public_expenditure_and_inflation_in_the_mediterranean_countriespdf
Magbabeola, N., Adelokun, O. (2003), Macro econometric analysis is inflation in west African second monetary zone: A cross-country study. West African Financial and Economic Review, 1(1), 95-123.
Ministry of Finance. (2020a), Annual Budget Statement. New Delhi: Ministry of Finance.
Ministry of Finance. (2020b), Report on Impact of COVID 19 in Ghana. New Delhi: Ministry of Finance.
Narayan, P.K., Smyth, R. (2006), Female labour force participation, fertility and infant mortality in Australia: Some empirical evidence from Granger causality tests. Applied Economics, 38, 563-572.
Nguyen, V.B. (2015), Effects of fiscal deficit and money M2 supply on inflation: Evidence from selected economies of Asia. Journal of Economics, Finance and Administrative Science, 20, 49-53.
Nkoro, E., Uko, A.K. (2016), Autoregressive distributed lag (ARDL) co-integration technique: Application and interpretation. Journal of Statistical and Econometric Methods, 5(4), 63-91.
Odhiambo, N.M. (2009), Finance-growth-poverty nexus in south Africa. The Journal of Socio-Economic, 38(2), 320-325.
OECD/AUC/ATAF. (2021), Revenue Statistics in Africa 2021. Washington, DC: OECD Publishing.
Ofori-Frimpong, K. (2017), The impact of money supply on inflation, a case of Ghana. Imperial Journal of Interdisciplinary Research (IJIR), 3(1), 2312-2318.
Olayungbo, D.O. (2013), Government spending and inflation in Nigeria: An asymmetry causality test. International Journal of Humanities and Management Sciences, 1(4), 236-241.
Pesaran, M.H., Shin, Y. (1999), Bounds testing approaches to the analysis of level relationships. Journal of Applied Economics, 16, 289-326.
Phillips, P.C.B., Perron, P. (1988), Testing for unit roots in time series regression. Biometrika, 75, 335-346.
Ronayne, D. (2011), Which Impulse Response Function? (Economic Research Paper No. 971).
Sargent, T.J., Wallace, N. (1975), "Rational" expectations, the optimal monetary instrument, and the optimal money supply rule. Journal of Political Economy, 83(2), 241-254.
Sargent, T.J., Wallace, N. (1981), Some unpleasant monetarist arithmetic. Federal Reserve Bank of Minneapolis Quarterly Review, 5(3), 1-17.
Sowa, N.K. (1994), Fiscal deficits, output growth and inflation targets in Ghana. World Development, 22(8), 1105-1117.
Sunkel, O. (1958), National development policy and external dependence in Latin America. The Journal of Development Studies, 6(1), 23-48.
Tiwari, A.K., and Darrat, A.F. (2011), Fiscal deficit and inflation: An empirical analysis for India. The Romanian Economic Journal, 14(42), 131-158.
Totonchi, J. (2011), Macroeconomic Theories of Inflation. Vol. 4. 2011 International Conference on Economics and Finance Research IPEDR.
Woodford, M. (1995), A frictionless view of U.S. inflation. NBER Macroeconomics Annual, 13, 390-418.
World Bank. (2020), World Development Indicators. Washington, DC: World Bank. Available from: http://www.worldbank.org/data

APPENDIX

Table A1: Results of unit root test with intercept and trend (ADF and PP) at level

Variables	ADF				PP			
	t- Statistics	Lag	Prob.	I (d)	t- Statistics	BW	Prob.	I (d)
LNINF	−5.551114	0	0.0002	I (0)	−5.475104	4	0.0003	I (0)
LNFD	−5.271647	0	0.0005	I (0)	−5.208506	3	0.0006	I (0)
LNM3	−7.148676	0	0.0000	I (0)	−8.821051	10	0.0000	I (0)
LNEXR	−1.766404	1	0.7030	I (0)	−1.021301	1	0.9302	I (0)
LNGDP	−5.019367	0	0.0010	I (0)	−4.936942	3	0.0013	I (0)
LNGEX	−1.122830	0	0.9132	I (0)	−0.949406	2	0.9404	I (0)

D shows the first difference, I (d) is the order of integration and BW is the band width.
Source: Computed by the authors (2020)

Table A2: Results of unit root test with intercept and trend (ADF and PP) at first difference

Variables	ADF				PP			
	t- Statistics	Lag	Prob.	I (d)	t- Statistics	BW	Prob.	I (d)
DLINF	−9.465190	0	0.0000	I (1)	−22.73192	20	0.0000	I (1)
DLNFD	−6.765799	2	0.0000	I (1)	−18.65398	21	0.0000	I (1)
DLNM3	−8.562112	1	0.0000	I (1)	−38.51382	41	0.0000	I (1)
DLNEXR	−4.792651	1	0.0021	I (1)	−4.361882	9	0.0064	I (1)
DLNGDP	−7.860583	1	0.0000	I (1)	−25.32183	41	0.0000	I (1)
DLNGEX	−7.226774	0	0.0000	I (1)	−7.226774	0	0.0000	I (1)

D denotes the first difference, I (d) is the order of integration and BW is the band width.
Source: Computed by the authors (2020)

Table A3: Impulse response function

Period	
1	−0.000000
2	−0.072429
3	−0.037784
4	0.021816
5	0.018453
6	0.016543
7	0.006357
8	−0.003853

Source: Computed by the authors, 2020

Table A4: Breusch-godfrey serial correlation LM test

F-statistic	1.440182	Prob. F (2,28)	0.2539
Obs*R-squared	3.917546	Prob. Chi-square (2)	0.1410

Source: Computed by the authors (2020)

Table A5: Heteroskedasticity test: Breusch-Pagan-Godfrey

F-statistic	0.902750	Prob. F (11,30)	0.5490
Obs*R-squared	10.44498	Prob. Chi-square (11)	0.4909
Scaled explained SS	4.160888	Prob. Chi-square (11)	0.9650

Source: Computed by the authors (2020)