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Research article

MACROECONOMIC IMPLICATIONS OF HIGH IMPORT DEMAND IN GHANA

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Abstract

The study investigates the short and long run relationship between economic growth and external trade in Ghana using series of econometric techniques. The empirical results established robust positive dual causality between import-economic growth, export-economic growth and import-export trade in both the short and long run. The direction of effect was much stronger from economic growth, followed by import demand and export trade. This suggests that economic growth significantly drives the growth in both import and export trades. Besides the direct link between import-economic growth, import demand indirectly influence economic growth via export promotion (trade) driven mainly by the importation of capital and intermediate goods for the extractive sector, which suggests an import-led growth (ILG) strategy in Ghana. In particular, imports of capital and intermediate goods were found to boost economic growth, while consumption goods imports tend to impede economic growth. In addition, shocks to import demand exacerbate pressures on domestic currency, albeit slowly, which in turn generates inflationary episodes alongside subdued economic growth. Consequently, the study supports macroeconomic policies that target imports of quality (capital and intermediate) goods to facilitate long term economic growth. Also, deliberate tariffs and non-tariff measures aimed at restraining the importation of consumption goods, while promoting the production of import-competing goods, particularly those that can be supported by favourable domestic conditions and raw materials, is recommended.

Keywords: Economic Growth, Import Demand, Johansen Cointegration, Bound Testing Cointegration, Impulse Response, Variance Decomposition, Granger Causality, Choleski Decomposition and Ghana.

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Introduction

The relations between international trade and economic growth have gained considerable interest in the development and growth literature. The main focus by most researchers has been on export-led growth (ELG) and import-led growth (ILG). The former suggests that economic growth could be driven primarily by growth in export, while the latter emphasized the importance of imports to economic growth. Accordingly, different growth strategies have been pursued along these lines in many emerging and developing economies. Until recently, developing economies (including Ghana) focused on export-led growth strategies and pursued policies that sought to restrict imports. High level of imports was perceived as a transfer of growth enhancing resources and employment opportunities from the domestic economy to the country's trading partners. Import restriction took several forms including outright ban on the importation of specific products, imposition of high tariff on selected imports and deliberate promotion of the production import-competing goods and services. However, trade liberalization and globalization policies pursued in recent times in many developing economies (including Ghana) have fused both ELG and ILG growth strategies in these economies. This development could be due to the realization that import demand is an essential source of breaking the tailback of economic development and promote economic growth (Chen, 2009).

Although neoclassical models, espoused by Solow (1956) among others, did not explicitly emphasize the role of import to economic growth, studies (including Grossman and Helpman, 1991; Thangavelu and Rajaguru, 2004) have indicated that importation of intermediate and capital goods (such as machine and equipment) boosts labour productivity over time as workers acquire the knowledge to unwrap the new embodied technology. Also, new endogenous growth models emphasized, among others, imports as a channel for long run economic growth because it provides domestic firms with access to needed intermediate and foreign technology (see; Coe and Helpman 1995; Lawrence and Weinstein, 1999). In particular, Lawrence et al (1999) argue that growth in imports can serve as a medium of transfer of growth-enhancing R&D knowledge from developed to developing economies.

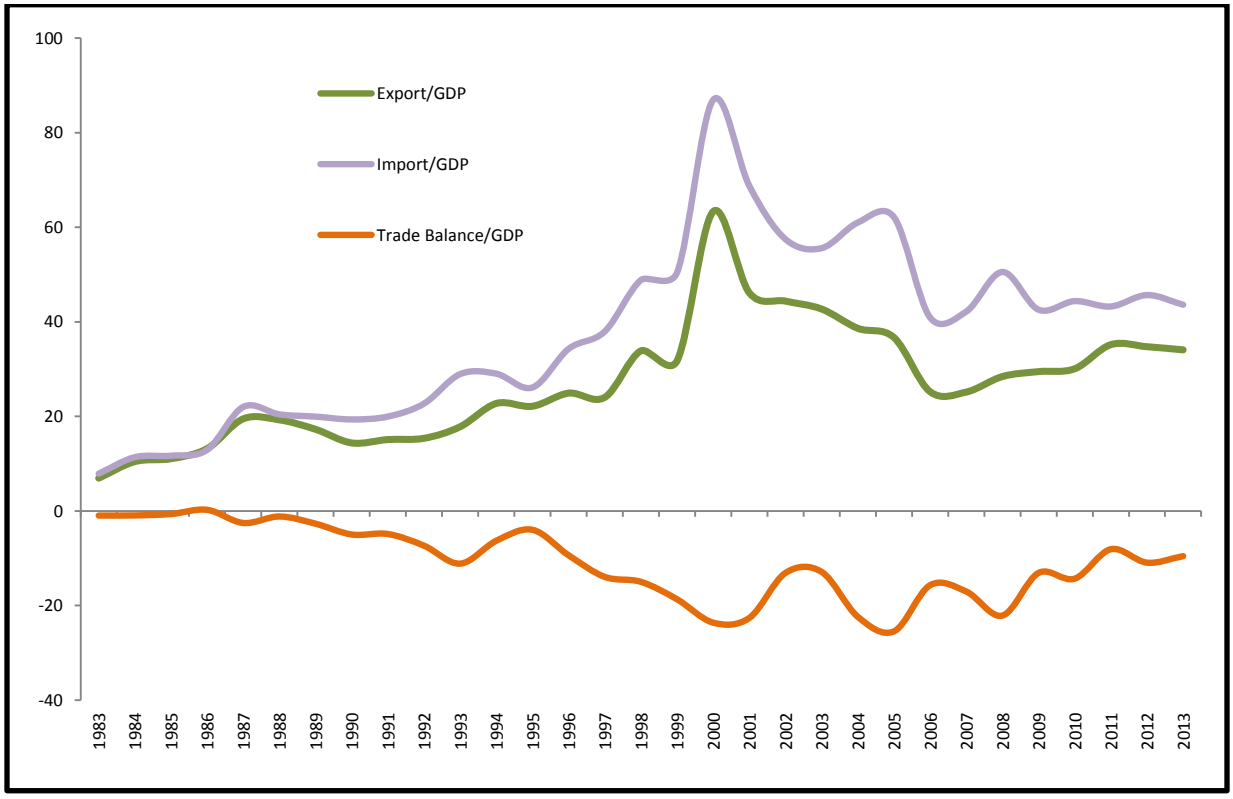
Other studies have also suggested a two-way causal relationship between economic growth and imports (Grossman et al, 1991; Dutta and Ahmed, 2004; Ghazali and Loganathan, 2011; Mishra, 2012). In particular, Grossman et al (1991) noted a feedback effect in their models of North South trade. Dutta et al (2004) also found Indian import-demand to be largely explained by economic (real GDP) growth. However, Humpage (2000) found the direction of causality to run predominantly from economic growth to import and not the other way, while Taghavi et al (2012) found a negative long run effect of import on economic growth.

Although the above deliberations suggest the persistence of some ambiguities about the true impact on imports on economic growth, Chen (2009) stressed that the research on the relationship between import and economic growth remains critical, especially for developing economies including Ghana.

1.1 Motivation: Stylize Facts about Imports and Economic Growth Dynamics in Ghana

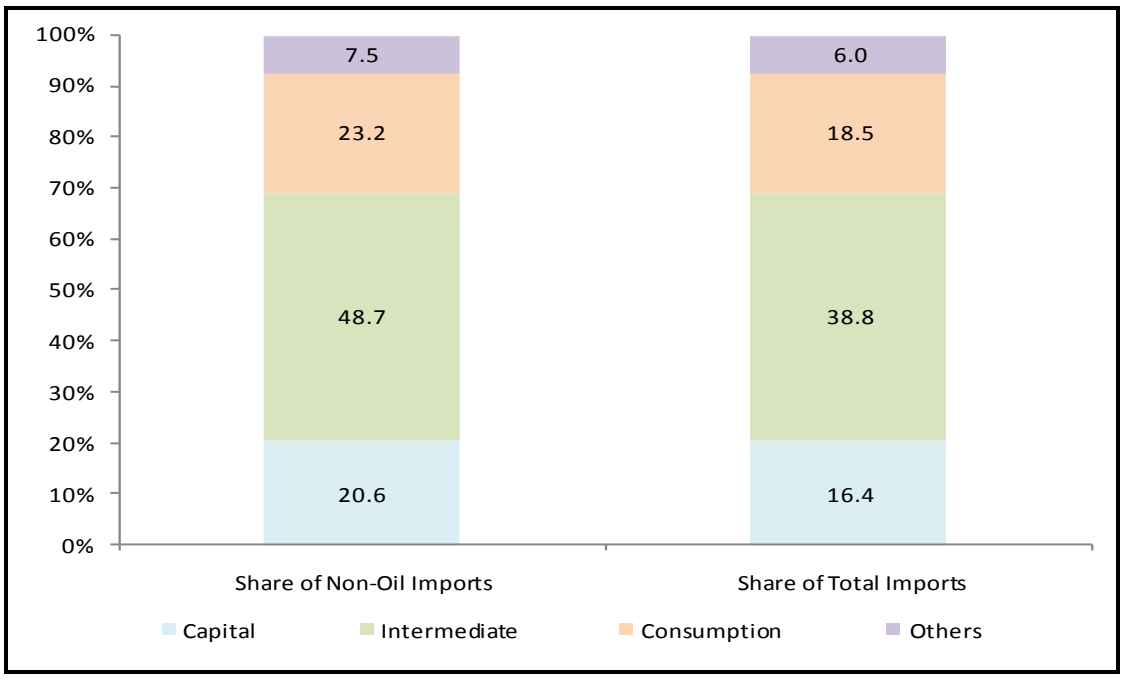
With the exception of 1986, the Ghanaian economy has been saddled with persistent trade deficits over the last three decades (figure 1). Ghana's exports earnings has continuously lagged behind its import expenditures, with the average trade deficit of US$1.5 billion (10.8% of GDP) and mean growth rates in imports and exports of 13.5% and 12.9% respectively. The higher trade deficit has been accompanied by large and persistent fiscal deficits as well as significant exchange rate depreciations posing great challenges to monetary policy implementation.

Figure 1: Total Values of Ghana's External Trade (US$' Million)



Ghana's exports sector is narrow and comprises a few primary products such as gold, cocoa beans and product, crude oil (which commenced in 2011), timber and timber products and non-traditional exports that are highly susceptible to the vagaries of the international commodity price developments. However, the main import items include non-oil and oil imports with respective average shares of 80% and 20%. Based on the Broad Economic Classification, the largest share of non-oil imports is intermediate goods, constituting about 49 percent share (or 39% of total imports) in Ghana for the review period. This is followed by consumption goods with a share of 23%, capital goods (21%) and others goods (8%) (See figure 2 below). Therefore, in terms of quality of imports, intermediate and capital goods constitute about 70 percent of total non-oil imports and 45 percent of total imports in Ghana. This indicates that quality imports constitute less than half of total imports in Ghana.

Figure 2: Respective Shares of Non-Oil Imports Components (2005-2013)



Prominent among the top non-oil imports are motor vehicle for transport of persons and goods, rice, wheat and meslin, self-propelled bulldozers, cement clinkers, sugar, poultry cuts and offal, palm oil and its fractions and polyethylene. The fact that consumption goods such as sugar, rice, poultry cuts and offal are in the list of top non-oil imports has raised concerns in policy circles as it is argued that these items could be produced domestically.

Another area of concern has been the changing pattern of origin of Ghana's imports. In recent years, the direction of import trade has changed remarkably in favour of Asian (especially China). The prominence in Asian imports has however generated some macroeconomic problems as the financial transactions are mainly cash-based, due to lack of electronic financial platform between Ghanaian banks and their Asian counterparts. This has consequently exacerbated the pressure on the domestic currency as demand for US dollar cash by importers has heightened.

Since Ghana's import demand appear to be inelastic, it is has become practically impossible, at least in the short run, for the domestic economy to control the level of imports. As a result, the economy ends up spending more when exchange rate depreciates, causing the trade balance to worsen in the short run, a process known as the 'J Curve' effect. Consequently, depreciating domestic currency increases the cost of imports as traders now require more of the domestic currency to import the same quantity of goods/services. The higher cost of import is then passed on to consumers in the form of higher prices, resulting in higher inflation which poses challenges for effective implementation of the inflation targeting monetary framework by the central bank.

As exhibited in figure 3 below, economic growth and import demand move in tandem, while exchange rate depreciation appears to be negatively linked with both imports demand and economic growth but positively linked

with trade deficit. On the other hand, as shown in figure 4, the development in exchange rate is positively associated with inflation and interest rate hikes by the Central Bank. Consequently, the nominal (or real) exchange rate plays a dual role in the transmission mechanism between the external sector and the domestic economy as it turns to transmit external vulnerabilities into the domestic economy and vice versa. This implies that developments in imports (or external trade) have serious repercussions on the economy.

Table 3: Dynamics in Imports, Trade Deficit, Fiscal Deficit, Nominal Exchange Rate and Real GDP Growth (%)

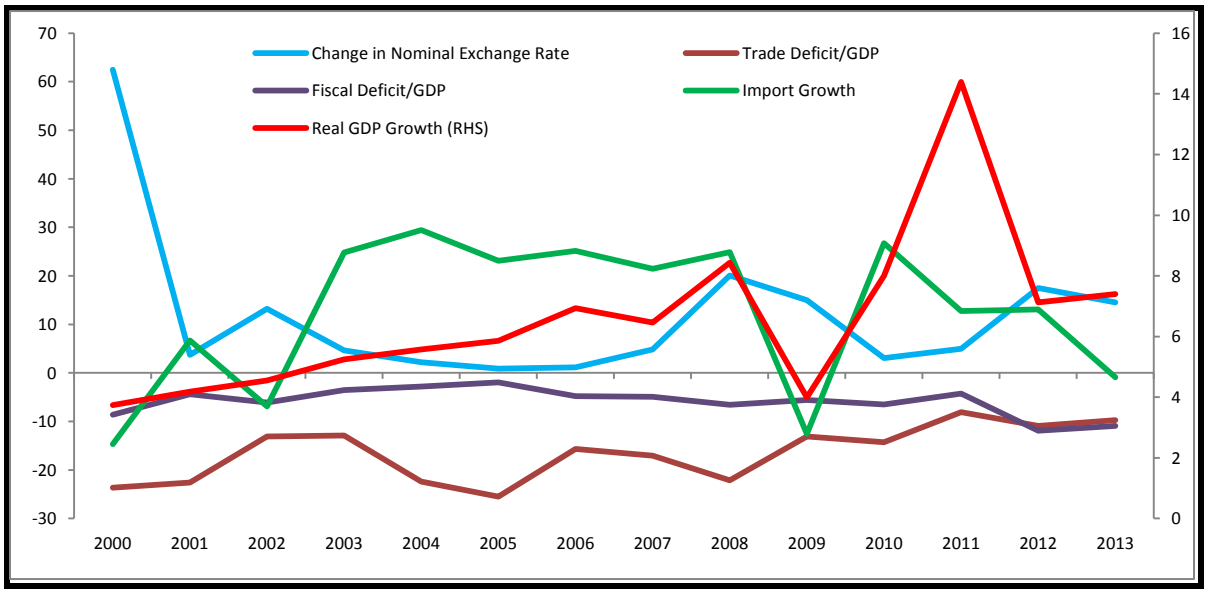
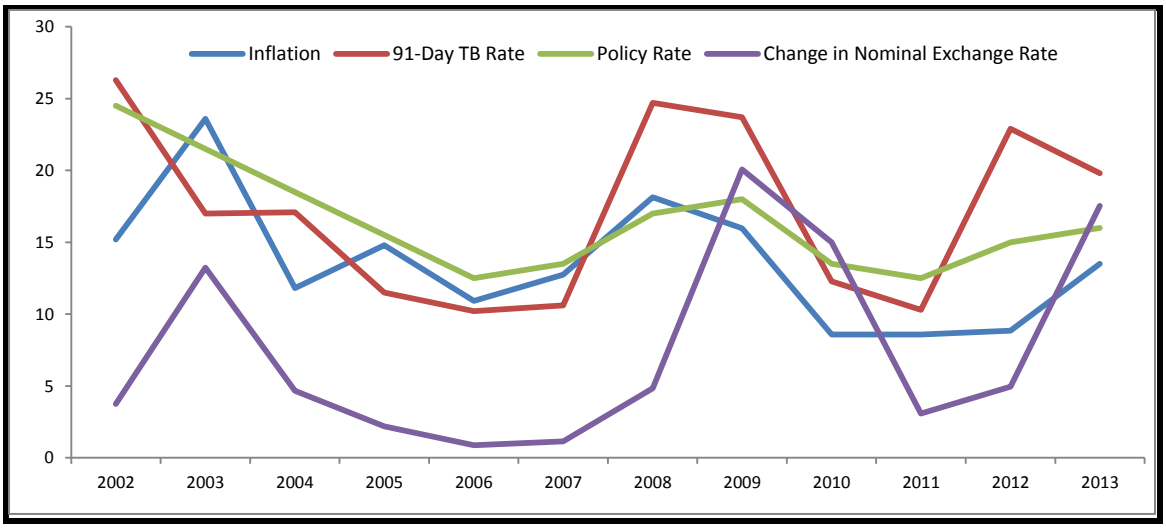


Table 4: Developments in Nominal Exchange Rate, Inflation and Interest Rate (%)



Against this background, the fundamental questions that arise include:

- What is the dynamic relation between economic growth and imports demand?
- Specifically, which category of import demand positively or adversely affects economic growth?

- Is Ghana pursuing export-led or import-led growth strategy?
- What are the monetary policy implications of higher import demand in Ghana?
- Is the transmission mechanism of the external sector developments to domestic economy strong or weak in the case of Ghana?

Notwithstanding the macroeconomic implications of high import demand, the empirical literature on Ghana remains inadequate (with the exception of Osei, 2012) in providing answers to the above fundamental questions. The overall objective of this paper therefore is to provide an empirical test on the short and long run causal relationships between economic growth and imports demand in Ghana. The specific aim of this study however is to;

- Examine the link between economic growth and external trade, by decomposing import into its BEC components.
- Thoroughly investigate the causal relationship between export and import trade as an attempt to detect the growth strategy pursued in Ghana.
- Examine the effect of import demand on inflation and real exchange rate in Ghana to ascertain the impact of the former on the effective implementation of monetary policy by the Bank of Ghana.

The focus is on Ghana due to the fact that Ghana has experienced volatility in economic growth with persistent larger current account deficits and unstable currency for over two decades. This study also differs from the previous studies because it does not only analyze the link between total import demand and economic growth, but also incorporates the analysis that decompose imports into its BEC categories of capital goods, intermediate (raw material) goods, consumption goods and other goods imports. Thus, this study offers a thorough empirical investigation into the connection between import demand and economic growth in Ghana which is missing in the previous studies. In addition to the economic growth implication of import demand, the study also assesses the monetary policy consequence of the latter, regarding inflation and real exchange depreciation using (structural) impulse response function from a VAR framework.

The rest of the study is organized as follows: Section 2 presents a selective literature on the relationship between economic growth and external trade (specifically import demand), Section 3 provides the data and methodology, Section 4 deliberates on the empirical results while the final Section presents the conclusion and policy recommendation.

1.0 Literature Review of Imports-Economic Growth Nexus

The literature is replete of the debate on the main drivers of economic growth. The theory of economic growth is very broad and could be reviewed in three paradigms. The first view originates from the classical economists (from Adam Smith to at least Marshall) who considered economic growth as endogenous and dependent on economic factors particularly savings, efficiency and depreciation. This view was summarized in a simple equation by Harrod-Domar until Solow (1956), Denison (1962) and Cass (1965) offered an alternative neoclassical growth model that showed economic growth as an exogenous variable in the long term. Here, the setting of output depends on a Cobb-Douglas production function of volume of labour, capital employed with their fixed return in proportion to scale and

the type of technology used. The introduction of exogenous rate of technological change allows for an exogenously determined rate of economic growth. According the neoclassical growth model, there is no relationship between economic policies and long term growth but the best way to boost production level is to increase investment. Consequently, factors such as savings, institutional framework (example government consumption expenditure), etc are classified as having minor influence of long term economic development (Kogid et al, 2011).

However, many economists were dissatisfied with the failure of the neoclassical growth models in answering some critical questions about the economic growth in the 1980s. Some doubted the reasonableness of this assumption that technological advances are exogenous, while others also disagreed with the long term economic growth exogenous assumption. The new growth theory including Lucas (1988) endogenous growth model focuses mainly on technological change, the role of government, trade policy and human capital development as the determinants of economic growth (Piazolo, 1996). This has ignited research interest in area of trade liberalization and/or openness and long term economic growth (see, Romer, 1990; Grossman et al., 1991; Reivera-Batiz and Romer, 1991). Indeed, this has reflected export-led growth (ELG) argument in the literature which often emphasized export to be the main determinant of the production and employment growth of an economy (see, Ramos, 2001). In particular, it highlighted the fact that foreign exchange receipts from exports growth allow the importation of capital goods which in turn increase the production potential of an economy (Balassa, 1978; Bhagwati, 1988; Edwards, 1998).

The alternative to ELG in the literature is the imports-led growth (ILG) which suggests that economic growth could be driven primarily by growth in imports (see, Lawrence and Weinstein, 1999; Liu, 2002). Indeed, the literature has accentuated the interests of developing economies in the importation of high quality goods such as capital and intermediates goods to bolstering strong economic growth by enhancing labour productivity via knowledge accumulation in the long term. Accordingly, Lawrence et al (1999), Mazumdar (2000) and Veeramani (2008) argue that growth in imports can serve as a medium of transfer of growth-enhancing foreign R&D knowledge from developed to developing economies. Although the existing literature has vigorously debated the ILG, there still seems to be some controversies in the empirical outcomes.

Empirical studies (including Bhagwati, 1988; Grossman et al, 1991; Kotan and Saygili, 1999; Ramos, 2001; Dutta et al., 2004; Ghazali et al., 2011) have suggested a two-way causal relationship between economic growth and imports. In particular, Grossman et al (1991) noted a feedback effect in their models of North South trade. Dutta et al (2004) also found Indian import-demand to be largely explained by economic (real GDP) growth. Similar results were obtained by Ghorbani and Motallebi (2009) on Iran and Kotan et al. (1999) on Turkey.

In their study, Baharumshah and Rashid (1999) also found imports of foreign technology as an important determinant of the long run growth in the fast growing Malaysian economy. However, Gulati (1978) found the effect of capital imports on economic growth of less developed economies to largely depend on the degree to which the growth is constrained by the lack of capital. Azgun and Sevinc (2010) however found import and foreign trade to play formidable role in economic development and growth of the small opened economies.

However, Humpage (2000) found the direction of causality to be from economic growth to import and not the reverse, while Taghavi et al (2012) found a negative long run effect of import on economic growth. Similarly, Tehranchain (2009) found a positive and direct effect of capital and intermediate goods imports on economic growth but a negative and indirect effect of consumption on economic growth in Iran.

In terms of methodology, Awokuse (2007) investigated the contribution of both export and import to economic growth in Bulgaria, Czech Republic and Poland using a neo-classical growth model and multivariate cointegrated VAR method. His study revealed a singular focus of many past studies on the role of export as the engine of growth may be misleading or at best incomplete. In support, Chen (2009) argues that import is an important means to break the bottleneck of economic development and promote economic growth.

Using Granger-causality test to investigate the link between exports, imports and economic growth in Poland for the period 1865-1998, Ramos (2001) found a bi-directional effect between export-output growth and import-output growth. Also, Asafe-Adjaye and Chakraborty (1999) used error correction models to investigate the long run relationship between real output, imports and export for inward oriented economies. They found indirect causality running from export through import to real output growth (see also Riezman et al, 1996).

Similarly, Ugur (2008) used impulse responses and variance decomposition functions from a multivariate VAR framework in investigating the relationship between import components and economic growth in Turkey for the period 1994 to 2005. The study found a bidirectional effect between output growth and investment (capital) goods and raw materials imports but a unidirectional relationship between output growth and consumption goods and other goods imports. Howard (2002) also used Granger causality and error correction modeling to explore the link between import, export and economic growth in Trinidad and Tobago. The study showed a unidirectional causality from export to economic growth, bidirectional causality between export and import, and a causality running from economic growth to import.

Although the literature seems inconclusive on the direction of impact between economic growth and imports, it clearly indicates that imports play crucial role in the economic growth process of developing economies.

3.0 Data and Methodology

This study used both annual and quarterly data spanning the 1980-2013 and 2000-2013respectively. The main dataset for this study were obtained from Bank of Ghana, Ministry of Finance and Ghana Statistical Service. The dataset principally included real GDP, values of exports and import as well as total government expenditure, bilateral real exchange rate, inflation (consumer price index), openness, merchandise trade balance. Furthermore, the import values were classified into oil and non-oil imports, while the latter was again decomposed into the BEC classifications of capital, intermediate, consumption and other non-oil imports. All the variables entered the model in its logarithmic form.

As a standard practice, the time series properties of the dataset were explored by using unit root test to consider the order of integration. Here, Augmented Dickey-Fuller tests were used which correct for higher order serial correction by adding lagged differenced term to the right hand side variables. The robustness of the ADF test was assessed by using non-linear Philip-Perron (PP) tests.

To examine the dynamic relationships between two or more variables while avoiding simultaneity bias, the study used the following VAR model which treats all variable as endogenous:

$$Z_t = \alpha_0 + \sum_{i=0}^{p} \beta_i Z_{t-i} + \varepsilon_t, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where Z are vector of endogenous variables. In the empirical analysis, the first model included the variable RGDP (real GDP), LEXP (real export) and LIMP (real Imports). The second model used RGDP, LEXP, LOILMP (oil imports) and LNIMP (non-oil imports), while the third model took into account RGDP, LEXP, LCAP (capital imports), LINTER (intermediate imports), LCONS (consumption imports) and LOTHERS (other imports).

In terms of econometric method, the paper used a battery of techniques to investigate the effects of imports' overdependence on economic growth prospects of Ghana in both long and short run analysis. Principal among the short run econometric techniques employed are impulse response function, variance decomposition and Pairwise Granger-Causality tests from an unrestricted vector autoregressive (VAR) model to examine the direction of influence. The VAR technique was employed as it avoids the problem of simultaneity bias by allowing dynamic relationships between variables.

Granger causality test determines whether or not the inclusion of past values of a variable improves the prediction of present values of another variable. In this approach, the VAR frameworks in (2) and (3) were used to explore the direction of causality between economic (real GDP) growth and external trade (import, exports and other variables), especially when the series are not cointegrated;

$$\Delta rgdp_t = \alpha_1 + \sum_{i=1}^{n} \lambda_i \, \Delta trade_{t-i} + \sum_{k=1}^{m} \psi_k \Delta rgdp_{t-k} + \varepsilon_t, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$\Delta trade_t = \alpha_2 + \sum_{i=1}^{n} \lambda_i \Delta trade_{t-i} + \sum_{k=1}^{m} \psi_k \Delta rgdp_{t-k} + v_t, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where $rgdp_t$ and $trade_t$ denote the real GDP growth and trade respectively. The interested parameters in equations (11a) and (11b) are λ_i and ψ_k, so causality is assessed based on their significance. Thus, there is Granger causality from import or export to real GDP growth if $\lambda_i \neq 0$ and $\psi_k = 0 \; for \; all \; i \; and \; k$. Similarly, there is causality from real GDP growth to import or export if $\lambda_i = 0$ and $\psi_k \neq 0 \; for \; all \; i \; and \; k$. The causality is said to be bi-directional if $\lambda_i \neq 0$ and $\psi_k \neq 0 \; for \; all \; i \; and \; k$. Finally, there is no link between Real GDP growth and import or export if $\lambda_i = 0$ and $\psi_k = 0 \; for \; all \; i \; and \; k$.

In addition, since a classical VAR model explains each variable by its own ***p*** past values and that of all other variables by the relation in equation (1) above, this study identified the impulse response function for the VAR. Here, one needed to impose some identification restrictions on the error. As a result, this study used the Choleski Decomposition that isolated the structural errors by recursive orthogonalization while ordering the variables according to the speed at which they react to shocks. To this end, variance decomposition (VDs) and impulse response functions (IRFs) were derived from the VARs (and structural VARs) estimations to ascertain the relative impact of external trade on economic (Real GDP) growth. Essentially, the impulse response functions displayed the response of each concerned in the linear system to a shock from the system variable while variance decomposition revealed the portion of the variance in the forecast error for each variable due to innovations to all variables in the system (Enders 1995).

The long run causal relationship between real GDP and trade data (especially imports) in this research is however tested by using series of empirical techniques such as multivariate error correction model (VECM) espoused by Johansen and Jesulius (1991), Autoregressive Distributed Lag Model (ARDL) espoused by Persaran and Shin (1997) and Persaran et al (2001)[1] and Granger 2-Step Methods. While the VECM model requires the variable to be non-stationary and cointegrated, the remaining two approaches are indifferent about the stationarity or otherwise of the variables.

Consequently, if real GDP and trade data are non-stationary and cointegrated, the dynamic causal relationships between the variables would be examined based on the following VECM equations:

$$lrgdp_t = \alpha_1 + \sum_{i=1}^{n} \omega_i \, ltrade_{t-i} + \sum_{k=1}^{m} \vartheta_k lrgdp_{t-k} + \alpha_2 \varepsilon_{t-1} + \mu_t, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$$ltrade_t = \beta_1 + \sum_{i=1}^{n} \varphi_i ltrade_{t-i} + \sum_{k=1}^{m} \theta_k lrgdp_{t-k} + \beta_2 \varepsilon_{t-1} + v_t, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where ε_{t-1} is error correction term or cointegration obtained from cointegration test. Long run relationship between real GDP growth and external trade is established if ε_{t-1} is negative (but below 1) and statistically significant. The direction of causality is also determined by signs and significance of ω_i and θ_k coefficients respectively.

For robustness of the VECM results and especially if the unit root test show a mixture of stationary and non-stationary variables, the ARDL cointegrating model in the following form would be employed;

$$\Delta LRGDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, \Delta LRGDP_{t-i} + \sum_{i=0}^{p} \beta_i \, \Delta LIMPORT_{t-i} + \sum_{i=0}^{p} \gamma_i \, \Delta C_{t-i} + \varphi_1 LRGDP_{t-1} + \varphi_2 LIMPORT_{t-1} + \varphi_3 C_{t-1} + v_t, \ldots\ldots (6)$$

[1] Persaran and Shin (2007) and Persaran et al (2001) proved that this model is always consistent irrespective of whether relevant variables are stationary or not. This method requires a minimum lag of one (p=1) with the lag length selected based on the information criterion.

Here, C denotes other variables including exports, real bilateral exchange rate and government expenditure. Persaran et al (2001) cointegration test makes use of the usual F-statistic and t-statistic. The null hypothesis that no long-run relationship exists among all variables is $H_0: \varphi_1 = \varphi_2 = \varphi_3 = 0$ against the alternative hypothesis of $H_1: \varphi_1 \neq \varphi_2 \neq \varphi_3 \neq 0$. Persaran et al (2001) cointegration test does not use the standard F-test and t-test. They provided two other set of critical values called a lower bound and upper bound. The lower bound assumes that the variables are purely ***I(0)***, while the upper bound assumes that variables are purely ***I(1)***. These asymptotic critical value bounds also depend on whether intercept and trend are considered. The following are the three possible outcomes;

1. If the computed Wald or F-statistic falls below the lower bound, then the null hypothesis is not rejected, and hence no cointegration relationship exists among the variables.
2. If the computed F-statistic exceeds the upper bound, then the null hypothesis is rejected. In this case, a conclusive decision results without needing to know the stationary properties of relevant variables.
3. However, if the computed f-statistic falls within these bounds, inference would be inconclusive and therefore, the knowledge of the cointegrating rank of the forcing (interested) variables is required to proceed further.

Further robust analysis was carried using Granger 2-Step cointegration method. As the method stipulates, real GDP growth is initially regressed on imports and other variables and the residual (error) terms are obtained. After that a second regression is estimated in first difference which also includes the lagged values of the generated error terms (in levels).

4.0 Empirical Results and Inference

4.1 Descriptive Statistics

Since 2000, the Economy of Ghana has recorded an average quarter-on-quarter real GDP growth of 1.9% alongside import and export growth rates of 2.9% and 3.2% respectively. As exhibited in table 1, highest quarterly growth rates in imports (66.9%) and exports (84.2%) are associated with much higher real GDP growth (27.8%). The opposite is also true, as declines in imports (-24.3%) and exports (-55.0%) are linked with lower real GDP growth (19.6%). In terms of variability (measured by the standard deviation), export growth is the most volatile (28.6%) followed by imports growth (16.2%) and real GDP growth (14.6%). In addition, imports growth appears to be non-normally distributed while export and real GDP growth are normally distributed.

In particular, a positive but weaker correlation coefficient of 35% between total value of imports and real GDP growth (at 90% confidence interval) was detected, while total export-real GDP growth correlation coefficient of 45% appears to be robust (at 95% confident interval). This implies that higher growth in import is likely to have relatively lower impetus (if any) on economic growth than the same magnitude of growth in exports. Consequently, while the relatively higher volatility in export earnings is plausible, it is a major concern due to the fact that unfavourable international conditions would adversely affect foreign exchange earnings necessary to finance the relatively stable import demand, leading to high trade deficit and hence sluggish economic growth. Moreover, weak

correlation between economic growth and imports also raises concerns, as total imports have constituted, on average, 53.3% of Ghana's GDP since 2000.

Table 1: Statistical Summary of Imports, Exports and Non-Oil Real GDP Growth (%, 2000Q1-2013Q4)

	Quarter-On-Quarter Growth		
	Import Growth	**Export Growth**	**Real GDP Growth**
Mean	2.92	3.21	1.94
Median	2.83	-4.98	1.06
Maximum	66.94	84.16	27.82
Minimum	-24.28	-58.96	-19.56
Std. Dev.	16.23	28.57	14.62
Skewness	1.20	0.64	0.25
Kurtosis	6.02	3.28	1.98
Jarque-Bera	33.97	3.95	2.98
Probability	0.00	0.14	0.23
	Correlation Matrix		
Import Growth	1		
Export Growth	0.56*	1	
Real GDP Growth	0.35***	0.45**	1

Note: *, ** & * denote 1%, 5% & 10% significant levels respectively**

In line with total import and economic growth, higher growth rates in the components of non-oil imports are associated with rapid real GDP growth and the opposite is true, as reduction in the various components is also linked with subdued economic growth. Other goods imports appear to be most volatile component (measured by the standard deviation), followed by capital good, consumption goods and the intermediate goods imports.

Table 2: Descriptive Statistics and Correlation matrices of real GDP and Components of Non-Oil Imports (%)

Summary of Growth Rates in Real GDP and Components of Non-Oil Import					
	Capital	**Intermediate**	**Consumption**	**Others**	**GDP Growth**
Mean	22.0	15.7	18.4	27.4	7.9
Median	19.9	17.3	11.7	15.4	7.0
Maximum	85.2	55.0	69.0	155.1	19.1
Minimum	-47.8	-26.6	-26.2	-51.3	0.3
Std. Dev.	32.0	24.4	25.2	57.1	4.2
Correlation matrix (Year-on-Year Changes)					
Capital	1				
Intermediate	0.80*	1			
Consumption	0.74*	0.75*	1		
Others	0.46**	0.22	0.27	1	
Real GDP Growth	0.67*	0.51*	0.48**	0.69*	1
Correlation matrix (Quarter-on-Quarter Changes)					
Capital	1				
Intermediate	0.45**	1			
Consumption	0.16	0.57*	1		
Others	0.20	-0.01	-0.15	1	
Real GDP Growth	0.01	0.29	0.56*	-0.06	1

Note: *, ** & *** denote 1%, 5% & 10% significant levels respectively; Period is 2000Q1-2013Q3

In sync, the correlation coefficients for economic growth and each component of non-oil imports are positive and statistically significant on year-on-year basis (see, the mid-portion of table 2). In line with the standard deviation, other goods imports have a highest correlation of 69% with economic growth. This is followed by capital goods-economic growth link of 67%, intermediate goods-economic growth link of 51% and consumption goods-economic growth link of 48%. However, the correlation between economic growth and the components of non-oil imports seems to be weak with the exception of consumption goods-economic growth link using quarter-on-quarter growth rates (see the last section of table 2). The weak quarter-on-quarter effects of capital, intermediate and other goods imports on economic growth appear to be plausible as their impact on the latter is expected to be delayed. Although the correlation analysis suggests a positive link between imports, exports and economic growth, it does not clearly show the direction of causality. Therefore, the subsequent sections thoroughly examine the direction of causality between imports and economic growth in Ghana using myriad of empirical methods.

4.2 ADF and PP Unit Root Tests and Optimal Lag Selection

As a pre-requisite, the key variables were subjected to unit root test to identify the order of integration and to assess the appropriateness of the empirical methods for this study. The results of the unit root tests based on ADF and PP are shown in table 3. Based on the ADF tests, GDP growth (LRGDP), export (LEXPORT), trade balance (LTRADE), government expenditure (LGCON) and bilateral real exchange rate (LRBRATE) are only stationary after first difference, I(1), while import (LIMPORT) and openness (OPNESS) are stationary with trend. This was however contradicted by the results from the PP test. All the variables were found to be stationary with trend from PP test, except LRBRATE which was I(1) while LGCON and LTRADE were found to be stationary with drift. Although not reported here, results from KPSS and Dickey-Fuller GLS (ERS) tests also confirmed the results from PP test.

Table 3: ADF and PP Unit Root Tests Results

ADF Test				
	Levels		First Difference	
	Constant	Trend & Constant	Constant	Trend & Constant
LRGDP	0.9999	0.9663	0.0091*	0.0058*
LEXPORT	0.9349	0.3731	0.0316**	0.0000*
LIMPORT	0.9458	0.0081*	0.0000*	0.0000*
LNIMPORT	0.9273	0.0493**	0.0000*	0.0000*
LOIMPORT	0.7041	0.0164**	0.0000*	0.0000*
LTRADE	0.5911	0.8307	0.0000*	0.0000*
OPENNESS	0.1037	0.0702***	0.0000*	0.0000*
LRBRATE	0.1207	0.7537	0.0001*	0.0000*
LGCON	0.1867	0.5140	0.0021*	0.0096*
PP Test				
LRGDP	0.5719	0.0000*	0.0000*	0.0000*
LEXPORT	0.6492	0.0060*	0.0000*	0.0000*
LIMPORT	0.9324	0.0095*	0.0000*	0.0000*
LNIMPORT	0.9444	0.0542***	0.0000*	0.0000*
LOIMPORT	0.5674	0.0194**	0.0000*	0.0000*
LTRADE	0.0092*	0.0001*	0.0001*	0.0000*
OPENNESS	0.1239	0.0883***	0.0000*	0.0001*
LRBRATE	0.6991	0.8623	0.0000*	0.0000*
LGCON	0.0000*	0.0002*	0.0000*	0.0000*

In view of the inconclusiveness of the tests for the stationarity of the data and the fact that the key variables become stationary only after including a constant and trend, results from a variety of estimation techniques were employed to investigate both the long and short run relationships between imports and economic growth.

Prior to the estimation techniques, appropriate lag length was investigated using lag selection criteria such as Final Prediction Error (FPE), Schwarz Criterion (SC), Akaike Information Criterion (AIC), sequential modified Likelihood Ratio (LR), and Hannan-Quinn criterion (HQ). The result is displayed in table 4. From table 4, the optimal lag length selected by all criteria is 4 for the multivariate VAR including LRGDP, LEXPORT and LIMPORT. Same lag length was selected when additional variable such as GCON and LRBRATE are included (although not reported here).

The selection was done in conjunction with the checks for stability, normality and autocorrelation properties of the VAR in levels. As shown in tables 5-6 and figure 5 below, the VAR satisfied all the diagnostics. Therefore, the VAR is suitable for further analysis as it is able to address the possible concerns about the non-stationarity of the variables as well as higher kurtosis or non-normality of the import growth series exhibited in the descriptive statistics.

VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-12.863140	NA	0.000374	0.622084	0.735721	0.665508
1	84.685190	179.795000	0.000012	-2.850400	-2.395852	-2.676704
2	114.072900	50.708170	0.000005	-3.649917	-2.854459	-3.345949
3	148.894000	55.986970	0.000002	-4.662511	-3.526143	-4.228272
4	187.968800	58.22898*	6.03e-07*	-5.841912*	-4.364634*	-5.277400*
5	195.786100	10.729740	0.000001	-5.795535	-3.977346	-5.100751
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Table 4: Lag Length Selection for RGDP, Export and Import

Table 5: VAR Residual Normality Tests

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 03/22/14 Time: 07:24
Sample: 2000Q1 2013Q4
Included observations: 52

Component	Skewness	Chi-sq	df	Prob.
1	-0.379308	1.246912	1	0.2641
2	0.207245	0.372238	1	0.5418
3	-0.270155	0.632525	1	0.4264
4	0.418438	1.517447	1	0.2180
Joint		3.769122	4	0.4382

Component	Kurtosis	Chi-sq	df	Prob.
1	3.218018	0.102986	1	0.7483
2	2.664038	0.244553	1	0.6209
3	4.459979	4.618333	1	0.0316
4	4.100916	2.626034	1	0.1051
Joint		7.591906	4	0.1077

Component	Jarque-Bera	df	Prob.
1	1.349898	2	0.5092
2	0.616790	2	0.7346
3	5.250858	2	0.0724
4	4.143481	2	0.1260
Joint	11.36103	8	0.1821

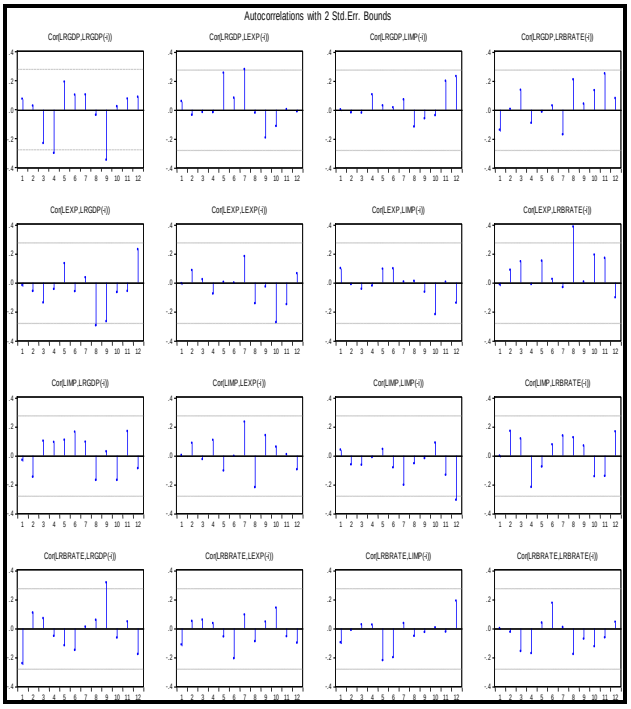
Table 6: VAR Stability Test

Roots of Characteristic Polynomial
Endogenous variables: LRGDP LEXP LIMP LRBRAT...
Exogenous variables: C
Lag specification: 1 4
Date: 03/22/14 Time: 07:26

Root	Modulus
0.994876	0.994876
0.002995 - 0.993886i	0.993891
0.002995 + 0.993886i	0.993891
0.881894 - 0.076731i	0.885226
0.881894 + 0.076731i	0.885226
-0.842068 - 0.060080i	0.844209
-0.842068 + 0.060080i	0.844209
0.671210 - 0.443314i	0.804394
0.671210 + 0.443314i	0.804394
-0.508640 - 0.555089i	0.752887
-0.508640 + 0.555089i	0.752887
0.053333 - 0.697118i	0.699155
0.053333 + 0.697118i	0.699155
0.489310 - 0.328276i	0.589228
0.489310 + 0.328276i	0.589228
-0.583922	0.583922

No root lies outside the unit circle.
VAR satisfies the stability condition.

Figure 5: VAR Autocorrelation Function



4.3 Pairwise Granger Causality Test

Pairwise Granger Causality test was used to determine the direction of effect between economic growth and trade, especially import**.** Although the optimal lag length is 4, the study estimated the causality from lag length 1 to 4, to assess the evolution of effect between the variables. The result of the causality test is shown in table 7 below.

Table 7: Results of Granger Causality Test

Null Hypothesis:	Lag 1	Lag 2	Lag 3	Lag 4
Export does not Granger Cause Economic Growth	6.516**	28.613*	2.699***	2.807**
Economic Growth does not Granger Cause Export	43.919*	19.871*	11.419*	4.048*
Import does not Granger Cause Economic Growth	24.626*	48.173*	1.491	0.967
Economic Growth does not Granger Cause Import	6.080**	3.225**	2.875**	2.743**
Import does not Granger Cause Export	25.799*	6.245*	5.228*	2.289***
Export does not Granger Cause Import	9.146*	2.492***	1.591	1.345
Capital Goods Imports do not Granger Cause Economic Growth	1.176	1.359	4.817*	1.205
Economic Growth does not Granger Cause Capital Goods Imports	2.505	2.806***	1.473	1.805
Consumption Goods Imports do not Granger Cause Economic Growth	1.954	4.189**	4.155**	2.784**
Economic Growth does not Granger Cause Consumption Goods Imports	0.003	9.852*	5.041*	3.218**
Intermediate Goods Imports do not Granger Cause Economic Growth	2.896***	0.986	2.932**	1.956
Economic Growth does not Granger Cause Intermediate Goods Imports	1.451	2.589***	1.052	1.643
Other Goods Imports do not Granger Cause Economic Growth	0.053	0.106	0.148	0.279
Economic Growth does not Granger Cause Other Goods Imports	0.001	0.099	0.063	0.057
Export does not Granger Cause Capital Goods Imports	8.709*	3.604**	3.715**	2.953**
Capital Goods Imports do not Granger Cause Export	12.928*	2.690***	1.551	1.076
Export does not Granger Cause Intermediate Goods Imports	4.997**	1.691	1.064	1.847
Intermediate Goods Imports do not Granger Cause Export	19.004*	5.365*	2.228***	1.565
Export does not Granger Cause Consumption Goods Imports	1.197	5.185*	2.351***	2.447***
Consumption Goods Imports do not Granger Cause Export	21.002*	6.872*	5.688*	3.275**
Export does not Granger Cause Other Goods Imports	5.462**	2.013	1.489	1.635
Other Goods Imports do not Granger Cause Export	6.191**	2.285	1.888	0.131

Note*:* *, ** & *** denote 1%, 5% & 10% significant levels respectively.

The result clearly shows a two-way causality between export-economic growth, import-economic growth (consistent with Ramos, 2001) and export-import (consistent with Howard, 2002). This implies that both import and export growth influence economic growth, which is also consistent with the findings of Awokuse (2007). In addition, all the components of non-oil imports had a dual causal relationship with economic growth and export trade, with the exception of other goods imports which had no significant causal link with economic growth. In view of the fact that the Pairwise Granger causality test does not establish the nature (sign) of impact, the subsequent sections provides

an in-depth analysis on the nature of influence between trade and economic growth in both the long run and short run.

4.4 Long Run Estimation Results: *VECM, ARDL and G2SM*

In view of the inconclusiveness of the results for the stationarity of the data, empirical results from three different econometric techniques are used establish the long run relationship between economic growth and imports. These included vector error correction model (VECM) preceded by Johansen's trace statistics for cointegration; autoregressive distributed lag (ARDL) and Granger 2-Step cointegration (G2SM) methods. In this case, the VECM technique was applied with the assumption that the series are all non-stationary, while ARDL and G2SM methods are indifferent about the stationarity or otherwise of the variables.

Prior to the VECM estimation, Johansen's cointegration test for assuming that all the variables, namely economic growth, export, imports, real exchange rate, inflation and government expenditure, are non-stationary, ***I(1),*** are reported in table 8. The empirical results based on trace statistics establish at least one linear combination among the variables.

Table 8: Johansen Cointegration Test

Trace Statistic: λ_{trace}				
Linear Deterministic Trend (LRGDP, LIMPORTS & LEXPORTS)				
Ho	H1	λ_{trace}	Critical Value	Prob. (α=0.05)
r=0*	r>0	64.73	42.92	0.0001
r≤1*	r>1	30.67	25.87	0.0116
r≤2	r>2	9.92	12.52	0.1308
Linear Deterministic Trend (LRGDP, LIMPORTS, LEXPORTS & LRBER)				
r=0*	r>0	73.93	47.86	0.0000
r≤1	r>1	29.38	29.80	0.0559
r≤2	r>2	5.77	15.49	0.7229
r≤3	r>3	0.21	3.84	0.6455
Linear Deterministic Trend (LRGDP, LIMPORTS, INF, LGOVT & LRBER)				
r=0*	r>0	116.12	88.80	0.0002
r≤1*	r>1	69.87	63.88	0.0144
r≤2	r>2	40.76	42.92	0.0808
r≤3	r>3	21.21	25.87	0.1708

*Note: * denotes rejection of the hypothesis at the 0.05 alpha level.*

Based on the estimated cointegration vector, the long run interrelationship between imports and economic growth was estimated using vector error correction model (VECM) and the results are displayed in table 9. To address the possible concerns about the stationarity of the time series, table 9 also reports the estimation results from both ARDL and Granger 2-step methods. In line with the results from the Trace statistics, the adjustment coefficients ***(ECM_{t-1})*** in both the VECM and G2SM models are significantly negative and below unity (1), while the computed F-statistics also exceeded their respective critical upper bounds in the ARDL models[2]. The complementary results robustly confirm the existence of a dual causality between import trade and economic growth in the long run, which corroborates the results from the Pairwise Granger causality test.

[2] In table 9, the computed F-statistics for the economic growth equations and import equation exceed their respective critical upper bounds at 1% and 10% significance level, indicating a rejection of the null hypothesis of no cointegration. This implies that the Pesaran et al (2001) bound test confirms that a level relationship exists among the relevant variables and hence corroborates the findings from the Johansen-Jesulius cointegration test using trace statistics.

On average, the error correction term ***(ECM_{t-1})*** for the economic growth equation (in both the VECM and G2SM models) indicates a long run response of economic growth to disequilibrium from total trade (or non-oil import) to be 42% (or 48%). On the other hand, the long run response of import demand to disequilibrium from both export and economic growth is averaged 52%. The relative higher response of import demand to deviations from the long run relationship with economic growth, suggests that activities in the domestic economy strongly influence import demand.

In terms of direction of impact, total import trade (or non-oil import) has a significant positive long run effect on economic growth, while a strong positive feedback effect from the economic growth to imports was also observed. Therefore, this study establishes bidirectional positive long run interactions between import demand and economic growth in Ghana which corroborates with the findings of Osei (2012). In addition, exports trade has a long run positive effect on both economic growth and import demand.

Table 9: Estimates of VECM, ARDL and G2SM

	Economic Growth Equation							Import Demand Equation		
	VECM				ARDL		G2SM	VECM	ARDL	G2SM
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Log Imports $_{t-1}$	***-0.087***	***-0.230***			***0.384***	***0.201***	***0.179***	1	-0.494	
	[-2.042]*	***[-3.178]****			***[3.412]****	***[1.641]***	***[3.298]****		[-3.478]*	
Log Non-Oil Imports $_{t-1}$			***-0.267***	***-0.095***						
			[-5.885]*	***[-2.160]****						
Log Exports $_{t-1}$	-0.046	-0.168	-0.169		0.162	0.307*	-0.083	-0.523	0.291*	0.462
	[-1.675]	[-2.332]**	[-3.469]*		[2.111]**	[3.655]*	[-1.365]	[-3.646]*	[2.799]*	[6.358]*
Log RGDP $_{t-1}$					-1.311	-1.382*		***-1.223***	***0.371***	***0.189***
					[-7.182]*	[-11.291]*		***[-3.679]****	***[1.752]******	***[1.246]***
Log RBER $_{t-1}$				-0.353		-0.453	0.175		-0.401	-0.285
				[-8.418]*		[-4.708]*	[2.109]**		[-2.368]**	[-1.341]
Inflation $_{t-1}$				0.008						
				[8.157]*						
Log Govt $_{t-1}$				-0.199		0.022	0.213			0.263
				[-7.393]*		[2.149]**	[5.211]*			[3.179]*
Interest Rate $_{t-1}$		0.006								
		[4.061]*								
Trend	-0.012									
	[-10.378]*									
Intercept	-7.340	-6.186	-5.622	-6.516	7.811	8.564	6.395	7.317	-1.763	0.027
			[-47.658]*		[7.013]*	[11.575]*	[48.024]*		[-1.241]	[0.025]
ECM $_{t-1}$	***-0.328***	***-0.328***	***-0.518***	***-0.459***			***-0.635***	***-0.520***		***-0.672***
	[-1.534]	***[-2.884]****	***[-5.644]****	***[-2.154]****			***[-3.762]****	***[-2.041]****		***[-4.640]****
F-statistic					***16.065***	***21.582***			***3.416***	
> Critical Upper Bound					***Yes (at 99%)***	***Yes (at 99%)***			***Yes (at 90%)***	

Note: *, ** &*** denotes 1%, 5% & 10% significance levels respectively. Excluding the ECM term, - =positive effect while +=negative effect in the VECM model.

In terms of magnitude, however, the results showed that import demand generally exerts a greater impact on economic growth than that of export trade in the long run. As exhibited in table 9, a 1% increase in total import demand, on average, leads to a 0.23% increase in economic growth in the long run, while the same magnitude of increase in total export trade increases economic growth by 0.17%. On the other hand, a 1% increase in economic growth also boosts total import demand by 0.59% in the long run. This also suggests that the positive link between economic growth and import demand is stronger from the former in the long run even though the import demand also drives economic growth more than export trade does.

All the controlled variables had the expected long run signs except real exchange rate which had mixed result. Both inflation and interest rate had negative signs, suggesting that rising inflation and/or interest rate slowdown economic growth in the long run. On the other hand, government expenditure had positive long run sign, indicating that government spending boosts economic growth in the longer term in Ghana.

Furthermore, the study decomposed total imports into its Broad Economic Classification (BEC) of capital, intermediate and consumption goods imports. As a result, the long run link between economic growth and the components of non-oil imports was examined to ascertain which of the components of non-oil imports that drive economic growth in Ghana. This was deem necessary as the literature is replete with the notion that quality goods imports turns to speed up economic growth and besides the Ghanaian literature on such analysis remains opaque. In this case, both Johansen VECM and Pesaran et al (2001) ARDL methods were applied and the estimation results are shown in table 10.

Similarly, in table 10, the computed F-statistics exceeded their respective critical upper bound at 99% confidence level in the ARDL models, while the error correction term $\boldsymbol{(ECM_{t-1})}$ in VECM model was also significantly negative and below unit. The results from both methods thus accept the alternative hypothesis of a stable long run relationship between non-oil imports components and economic growth, and hence reinforcing the earlier findings.

Both intermediate and capital goods imports have positive long run effect on economic growth, while consumption good imports turns to adversely affect long term economic growth in Ghana. This result supports the notion that imports of quality goods such as capital and intermediate (raw materials) goods immensely enhance economic activities of the domestic industries while consumption goods imports impede economic growth in the long term. This result also corroborates with the findings of Ugur (2008), among others. In terms of magnitude, however, percentage increase in the value of both intermediate and capital goods imports results in an average growth in real GDP by 0.51%, while a similar percentage increase in the value of consumption goods imports leads to 0.41% decline in economic growth in the long run. In addition, the results further reinforce a stronger role of import trade in Ghana's economic growth process compared to the impact from export trade.

Table 10: VECM and ARDL estimates for Economic Growth using Components of Non-Oil Imports

	VECM		ARDL 1		ARDL 2		ARDL 3	
Variable	**Coefficient**	**T-statistic**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
Intercept	-5.649		9.665	[0.000]*	-1.031	[0.023]**	-0.702	[0.070]***
Log Exports $_{t-1}$			0.218	[0.001]*				
Log Capital_Goods $_{t-1}$			0.069	[0.513]				
Log Capital_Goods $_{t-2}$			0.202	[0.056]***				
Log Capital_Goods $_{t-3}$			0.139	[0.084]***				
Log Consumption_Goods $_{t-1}$			0.170	[0.191]	-0.472	[0.148]	-0.167	[0.462]
Log Consumption_Goods $_{t-2}$			-0.413	[0.005]*				
Log Intermediate_Goods $_{t-1}$			0.280	[0.059]***				
Log Intermediate_&_Capital $_{t-1}$	-0.355	[-8.351]*			0.731	[0.021]**	0.429	[0.058]***
Log RGDP $_{t-1}$			-1.611	[0.000]*				
Openness $_{t-1}$	0.009	[2.897]**			-0.004	[0.574]	-0.005	[0.535]
Log Govt $_{t-1}$	-0.064	[-2.303]**			-0.180	[0.023]**	-0.179	[0.045]**
Log RBER $_{t-1}$	-0.425	[-7.440]*						
ΔLog RGDP $_{t-1}$			0.676	[0.000]*	-0.403	[0.004]*	-0.096	[0.461]
ΔLog Exports $_{t}$			0.143	[0.006]*				
ΔLog Consumption_Goods $_{t}$			0.234	[0.000]*	0.816	[0.000]*	0.570	[0.000]*
ΔLog Consumption_Goods $_{t-1}$					0.767	[0.001]*		
ΔLog Intermediate_Goods $_{t-1}$			-0.132	[0.076]***				
ΔLog Capital_Goods $_{t-3}$			-0.176	[0.004]*				
ΔLog Intermediate_&_Capital $_{t}$					-0.317	[0.126]		
ΔLog Intermediate_&_Capital $_{t-1}$					-0.576	[0.004]*	0.017	[0.903]
ΔOpenness $_{t}$					0.004	[0.634]	0.004	[0.658]
ΔLog Govt $_{t-1}$					0.300	[0.003]*	0.319	[0.004]*
ECM $_{t-1}$	**-0.474**	**[-2.052]****						
R-squared			0.89		0.65		0.49	
Sum squared resid			0.13		0.40		0.58	
Log likelihood			82.63		55.49		45.70	
F-statistic			22.51		7.04		4.78	
> Critical Upper Bound			***Yes (at 99% CI)***		***Yes (at 99% CI)***		***Yes (at 99% CI)***	

Note: The VECM shows the long run model for Real GDP Growth; + =negative effect and - =positive effect; also *, ** & *** denote 1%, 5% & 10% significance level respectively. ΔLog of Real GDP is the dependent variable for the ARDL models.

4.5 Dynamic Short Run Relationships

Although, the result in table 10 also suggests bidirectional relationship between imports and economic growth[3] in the short run, a thorough investigation of short run dynamic relationship between the interested variables is carried out using impulse response and variance decomposition functions based on estimated VAR models. The impulse response is a time paths of one or more variables as a function of a one-time shock to a given variable or sets of variables. Thus, it displays the response of each variable to its own shock and that of other variables in the linear system. The variance decomposition, on the other hand, reveals the portion of the variance in the forecast error for

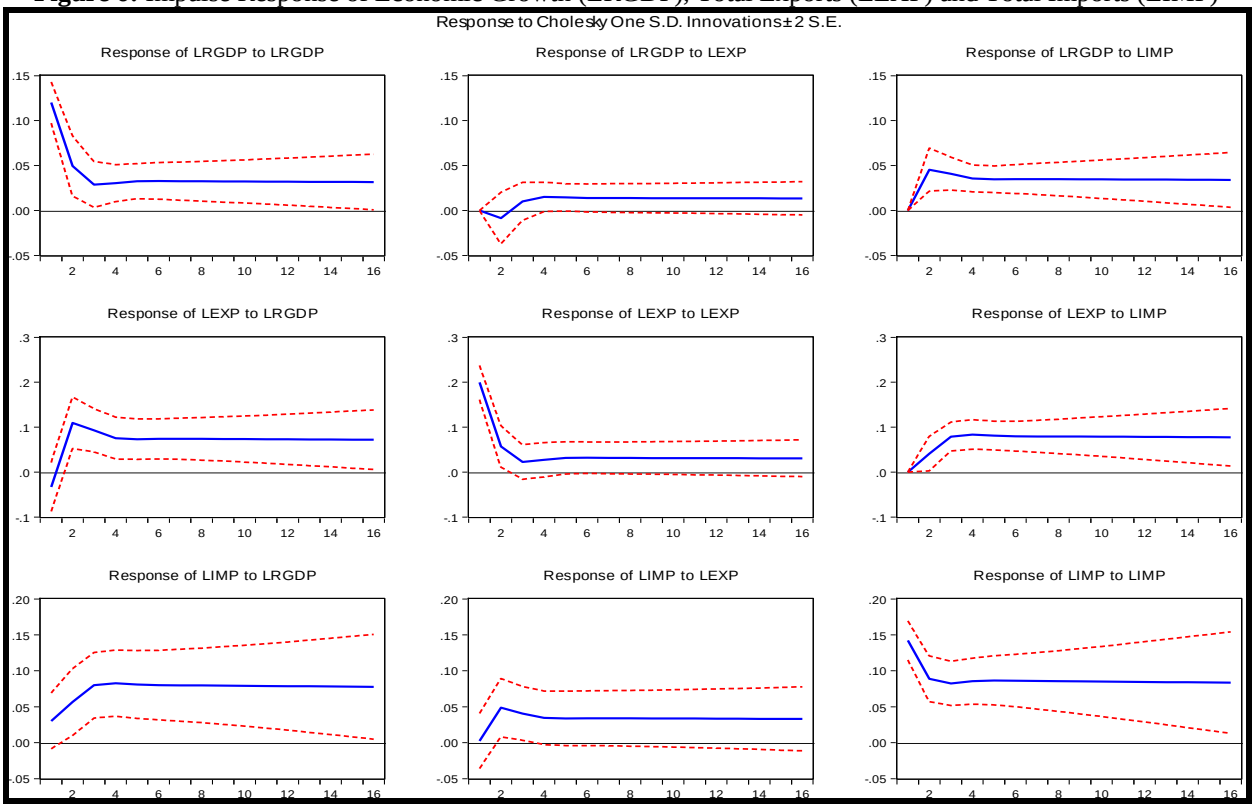
[3] The ARDL result suggests a negative short run effect of total imports on real GDP growth, while the Granger 2-step method exhibited a positive effect of the former on the latter.

each variable explained by each variable in the system (Enders 1995). The identification restriction imposed for these two methods is the Choleski decomposition.

Impulse Response Estimations

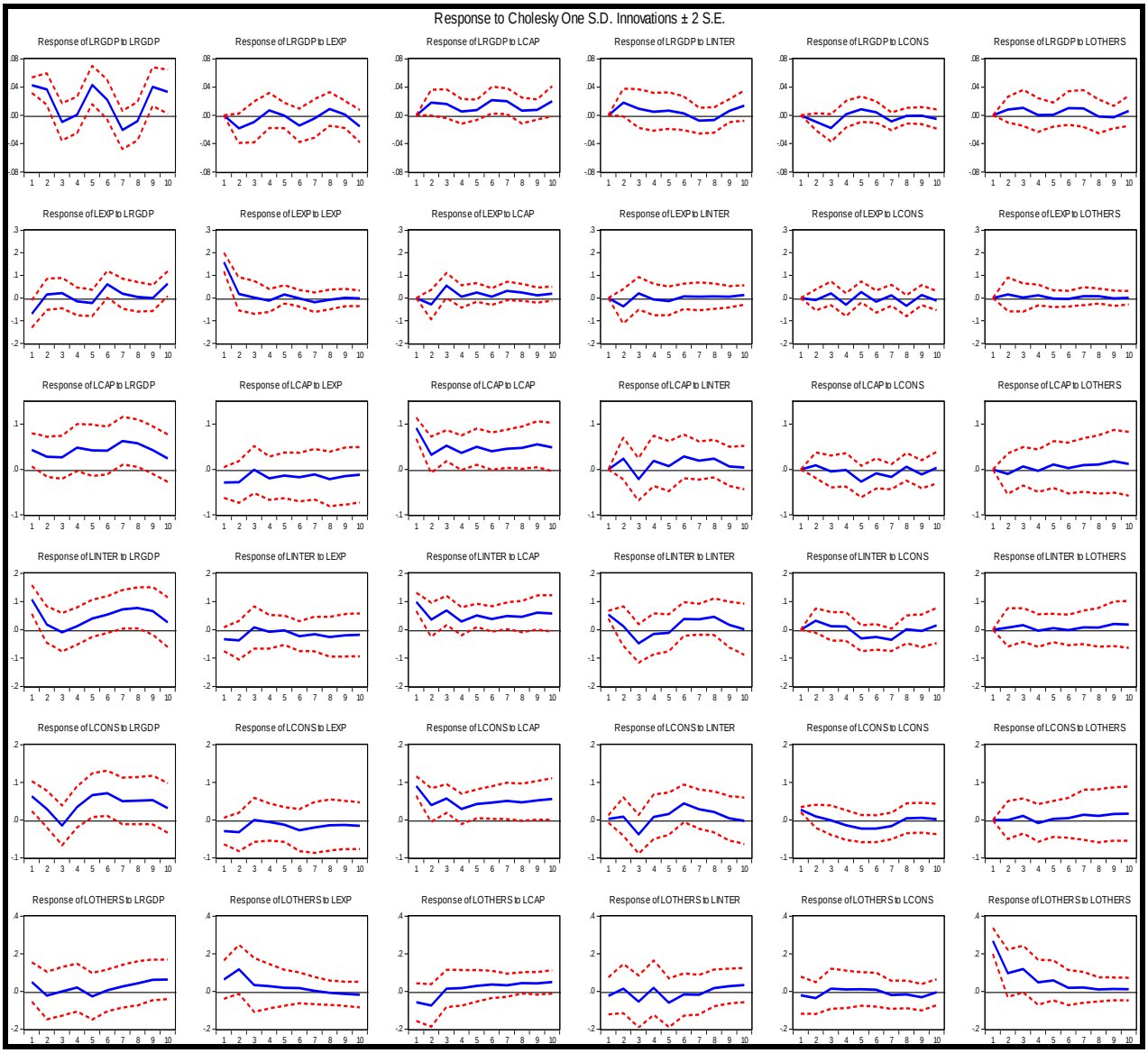
As shown in figure 6, the impulse response functions of economic growth and external trade due to innovations of each variable in the VAR framework yielded similar results and also confirm a dual relationship between economic growth and external trade (import and export) in the short run. As exhibited in the first rows of figure 6, innovations in total import demand and export growth have significant positive effect on economic growth. While the effects of total imports on economic growth are contemporaneous and also tend to persist throughout to 16 quarters, innovations from export significantly affect economic growth after 4th quarter but subside only after the 6th quarter. Similarly, shocks from economic growth and import demand also exert positive effect on total export (see the second row). In particular, the innovations to total imports have spontaneous positive effect on export trade and also linger throughout the 16 quarters. On the other hand, impulses from exports have significant effect on total import only felt after 2nd quarter but only tapers off in the 3rd quarter (see the third row). In the same vein, impulses from economic growth exert positive effect on export trade after 2nd quarter and also tend to linger throughout the 16 quarters. Consequently, the empirical impulse response function strongly lends to support to an import-led growth strategy in Ghana as total imports appears to spontaneously drive both economic growth and export trade in the short run.

Figure 6: Impulse Response of Economic Growth (LRGDP), Total Exports (LEXP) and Total Imports (LIMP)



Furthermore, in figure 7, the impulse response functions of economic growth and the various categories of non-oil imports indicate that shocks from both capital and intermediate goods exert positive effects on economic growth. However, shocks from consumption goods imports appear to negatively and significantly affect economic growth up to the 3rd period, which is consistent with the findings of Tehranchian (2009) on Iran.

Figure 7: Impulse Response Functions of Economic Growth, Export and Non-Oil Import Components



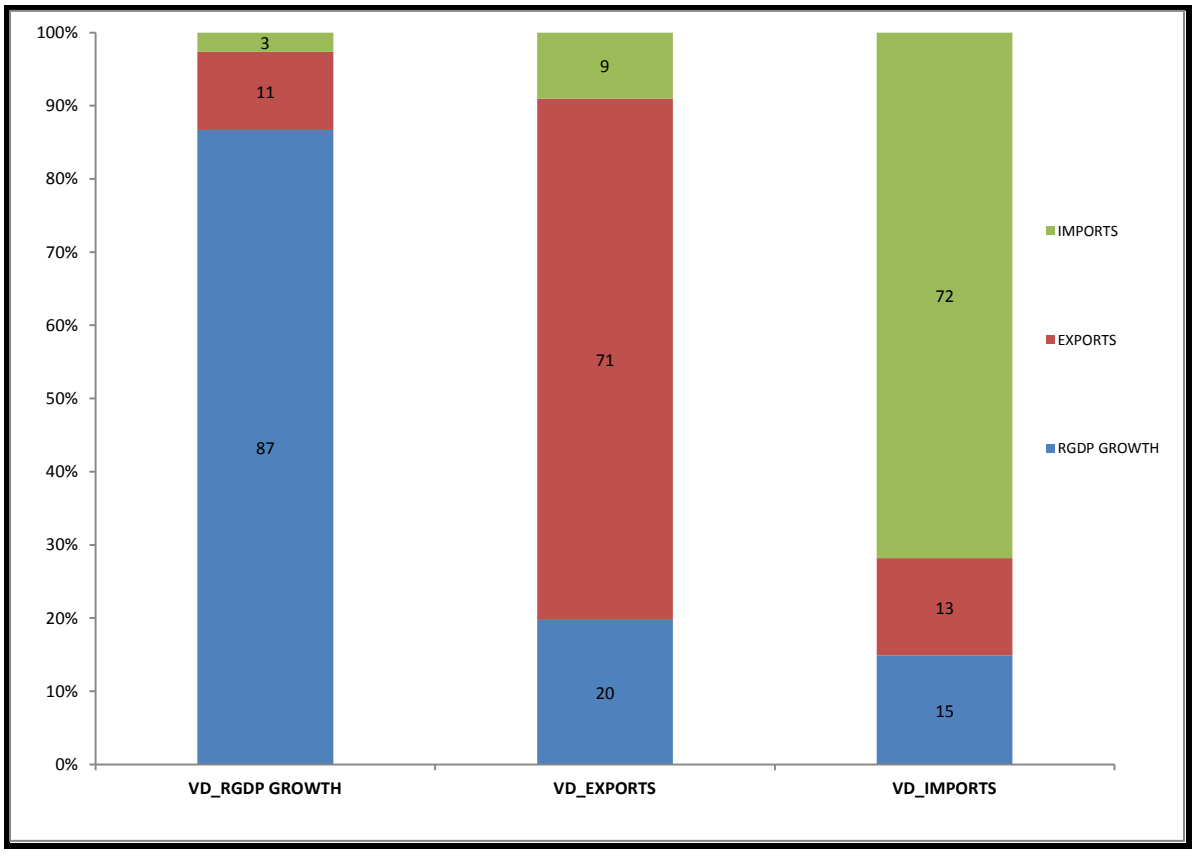
On the contrary, impulses from economic growth had spontaneous and significant positive effect on all the component of non-oil imports with the exception of other goods imports in Ghana. Consistent with the result from the Pairwise Granger causality test, the impulse response functions between economic growth and other goods imports are generally insignificant. Besides, innovations from capital goods imports positively and significantly

affect export trade after 3rd quarter (column 3 in row 2), while no significant impact was detected from the export trade to the components of non-oil imports. The positive impact of the capital goods imports on total exports is plausible as parts of these imports are machines and equipment used by the mining companies, lending support to the import-led growth strategy in Ghana.

Variance Decomposition Analysis

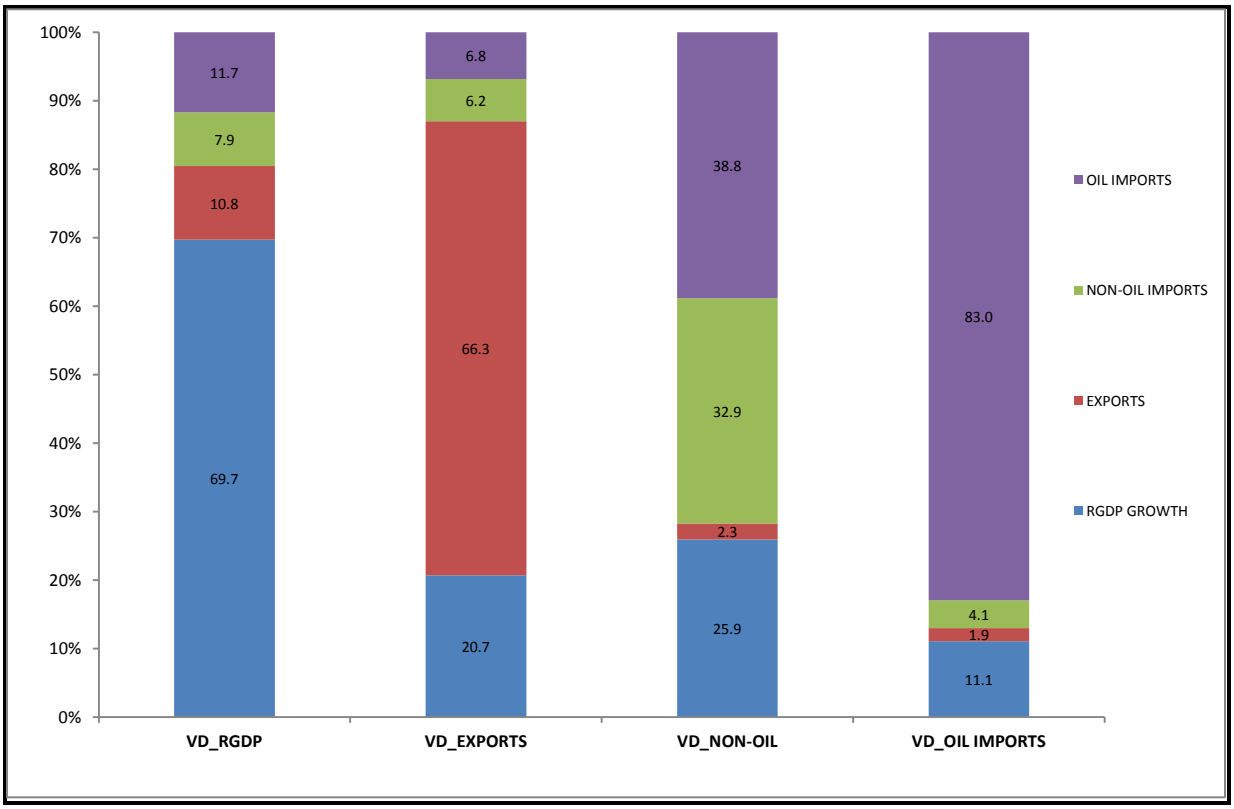
As noted earlier, variance decomposition provides a different method of showing the system dynamics as it give information about the relative importance on each random innovation to the variables in the VAR. Nevertheless, the results from the variance decomposition robustly confirm the dual causality obtained from the impulse response analysis and the Pairwise Granger causality test. As shown in figure 8-10, a shock to real GDP is largely explained by its own innovation, while the explanation from total export tends to be much higher than that of total import demand. On the contrary, the economic growth tends to offer relatively higher explanation to the variations in total exports and imports (see figure 8). In addition, the explanation to the variation in imports was relatively higher from exports than the opposite direction, which is a sign of export-oriented growth since according to this theory goods are imported to make exports.

Figure 8: Variance Decomposition (VD) of Economic Growth, Exports and Imports



Note: Average of 16 periods

Figure 9: Variance Decomposition of Economic Growth, Exports, Oil and Non-Oil Imports

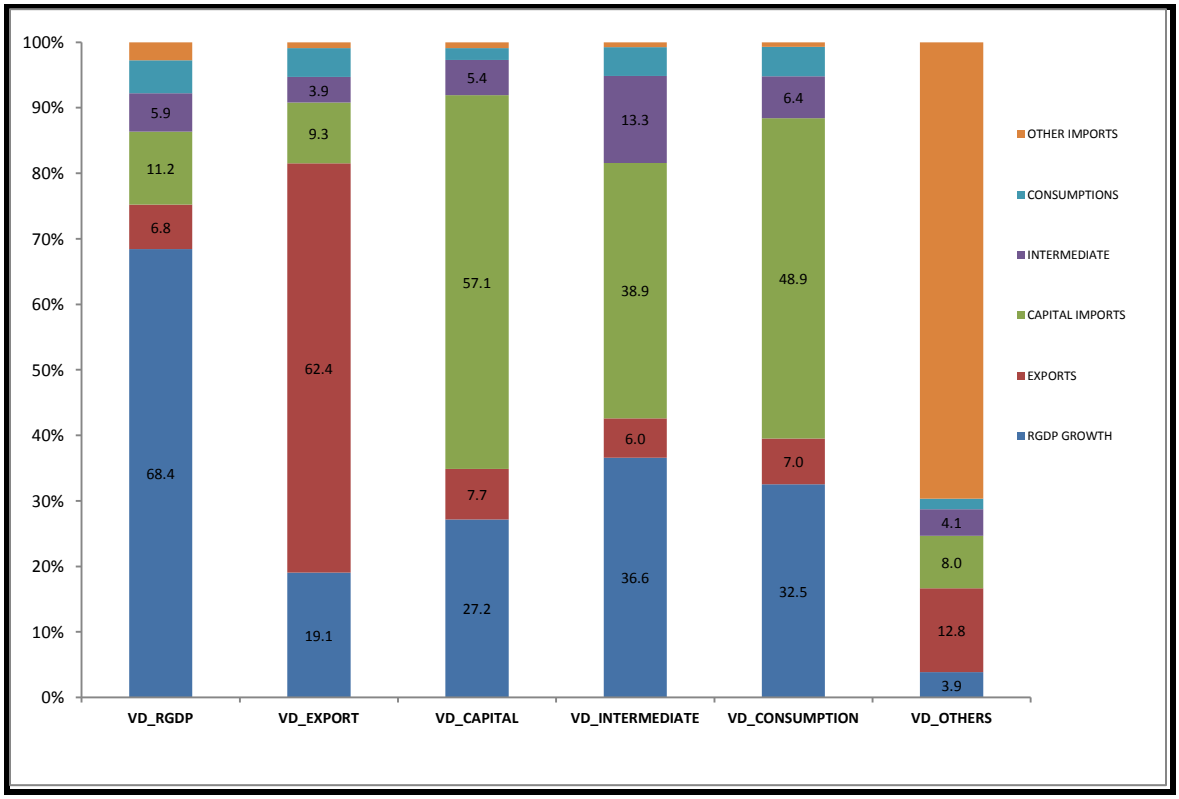


Note: Average of 16 periods

As shown in figure 9, the relative explanations to the volatilities in economic growth and oil imports are almost the same, while economic growth offers relatively higher explanation to the volatility in non-oil imports than the reverse explanation. This implies that volatility in real economic activities is explain much higher by oil imports than non-oil imports, which is consistent as most economic activities rely on energy supply.

Regarding the BEC categories of non-oil imports, similar variance decomposition results were obtained. As shown in figure 10 below, economic growth offer relatively higher explanation to the volatilities in the components of non-oil imports than the reverse. In particular, explanation of economic growth to the volatility in non-oil imports was much higher in intermediate goods, followed by consumption goods, capital goods and other goods imports. On the contrary, among the components of non-oil imports, capital goods imports had a relatively higher explanatory power to the volatility in economic growth, followed by intermediate goods, consumption goods and other goods imports. The order of explanatory power of non-oil imports' categories on economic growth is theoretically plausible as capital and intermediate (raw materials) goods are classified as quality imports that stimulate domestic economic activities. In particular, and consistent with the impulse response function, capital goods imports was found to be relatively higher explanation to the volatility in total exports than the reverse, reinforcing the import-led growth strategy in Ghana.

Figure 10: Variance Decomposition (VD) of Economic Growth, Exports and Non-Oil Import Components



Note: Average of 16 periods

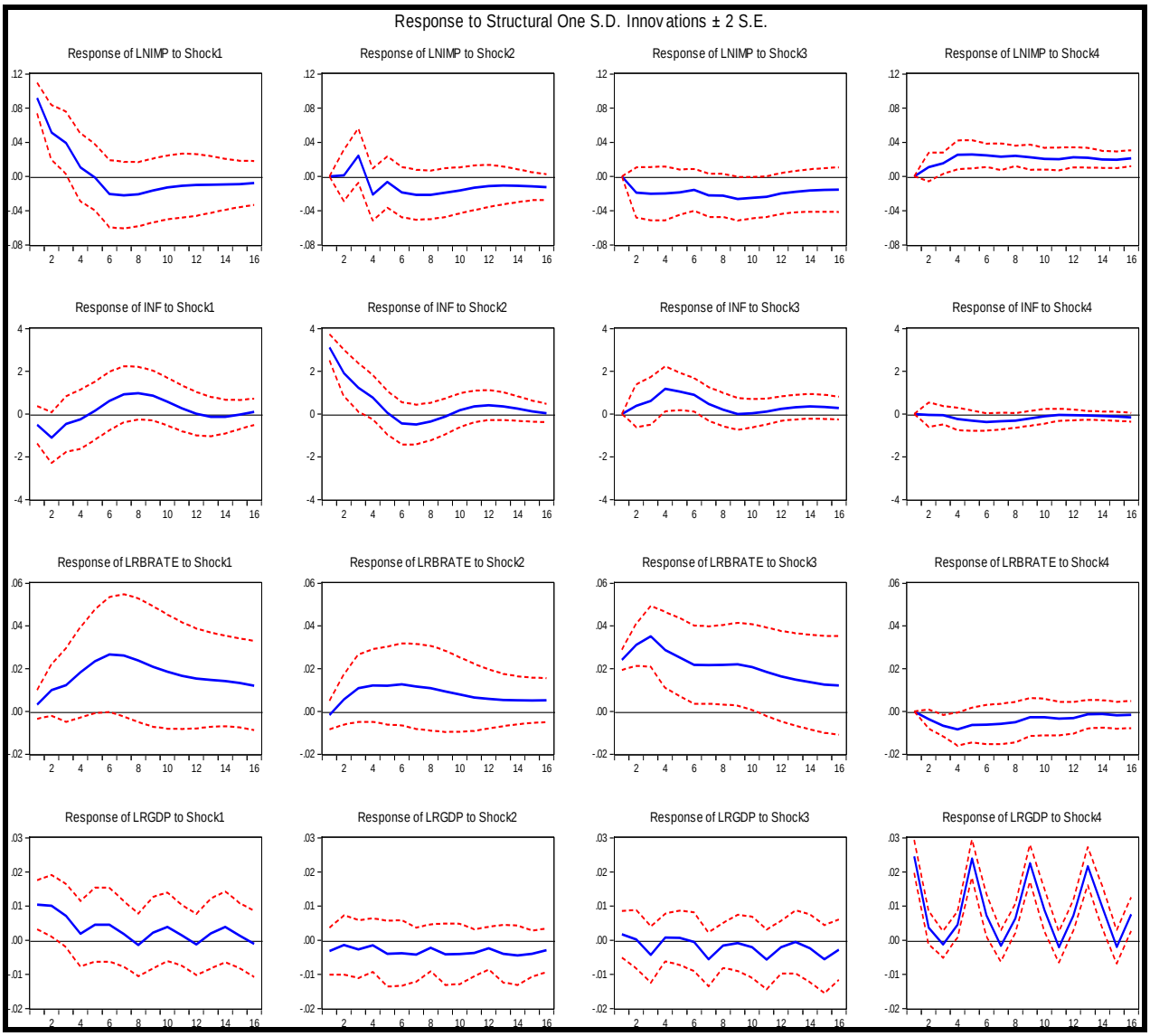
In synthesis, the study reveals that growth in imports and economic growth have a bidirectional relationship, consistent with the result from granger causality test and the impulse response functions, although direction from economic growth is dominant. That is, rapid import demands appear to be strongly driven by higher economic growth than the opposite direction in Ghana. Moreover, the variance decomposition also points to the fact that imports, especially capital goods, explains relatively higher variations in export trade, reaffirming an indirect effect of import demand on economic growth via export trade.

4.6 Structural Effects of Import Demand on Exchange Rate and Inflation

Although import trade tends to impact positively on economic growth and vice versa, the critical concern that remains unresolved is the effect of former on both real exchange rate and inflation in Ghana. To address this concern, this study employed structural impulse response function from a VAR framework, assuming Choleski decomposition as the identification restriction. The structural VAR assumed initial shock from non-oil import with the Choleski ordering of {LNIMP, LRBRATE, INF, LRGDP}, while the second SVAR assumes a shock from real exchange rate depreciation to examine its feedback effect on non-oil import using the ordering {LRBRATE, LNIMP, INF, LRGDP}. The third SVAR examines the effect of the interaction term for import demand and real exchange rate depreciation on inflation and economic growth by assuming the ordering of {LNIMP, LNIMPXR,

INF, LRBRATE, LRGDP} where LNIMPXR denotes an interaction term for non-oil import and real exchange rate depreciation. The estimation results of the structural impulse responses based on the above three Choleski orderings are shown in figure 11-12.

Figure 11: Structural Impulse Response Functions of Non-Oil Import, Real Exchange Rate, Inflation and Economic Growth



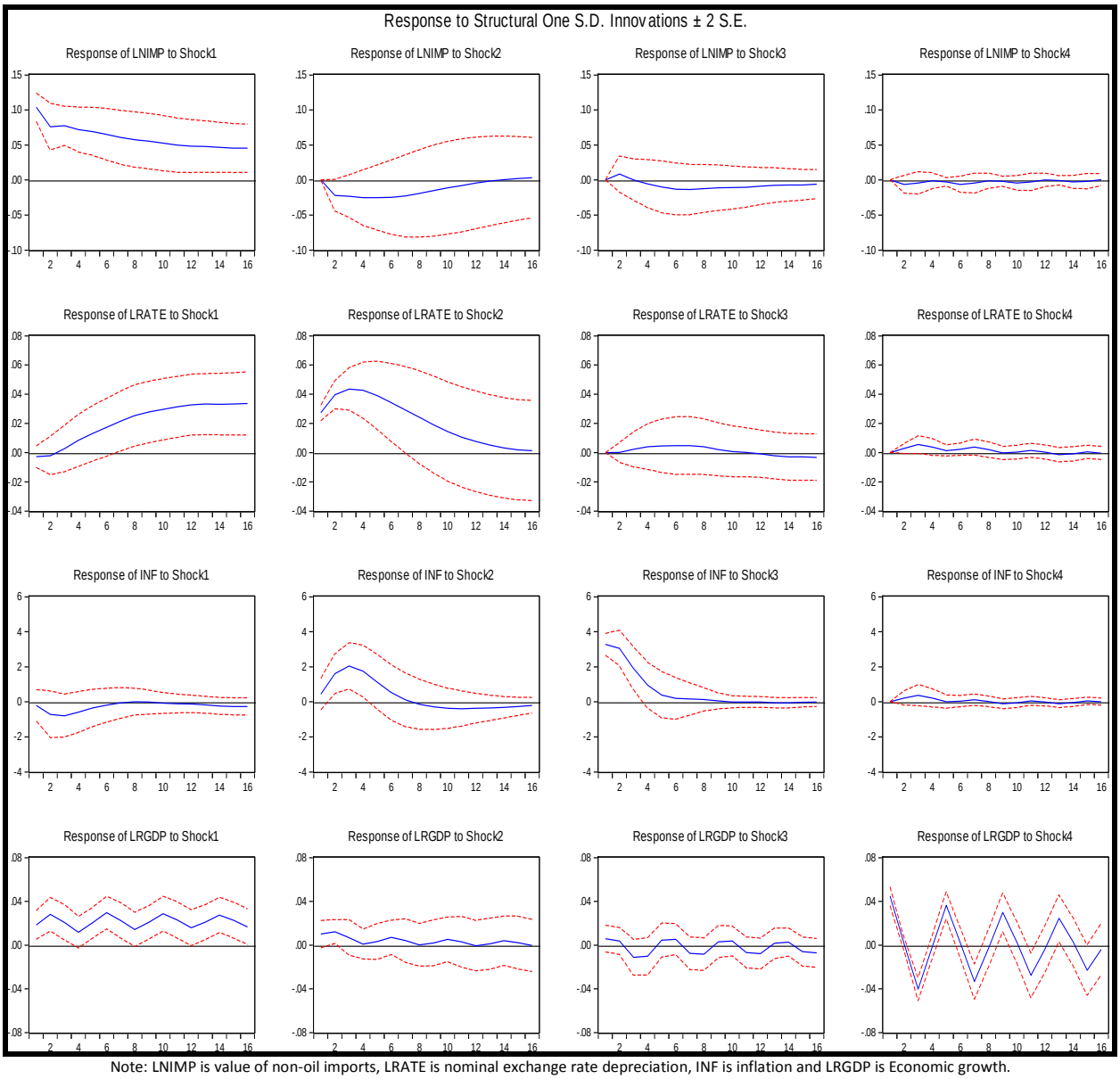
Note: LNIMP is value of non-oil imports, INF is inflation, LRBRATE is real exchange rate depreciation and LRGDP is Economic growth.

The empirical results show a dual positive and significant link between non-oil import demand and real (or nominal) exchange rate depreciation[4]. As shown in figures 11 to 12, innovations in import demand significantly destabilize

[4] As shown in figures 12-15, higher import demand causes real depreciation in the domestic currency (significantly during period 6). Impulse from the real exchange rate depreciation, on the other hand, exerts negative impact on import demand (and is significant during the period between 9-11 quarters). The delayed effect of the shock from real exchange rate depreciation to import demand attests to the inelasticity of import demand in Ghana. In addition, the empirical results show positive and significant dual causality between relative impulses of real exchange rate depreciation and inflation, although the transmission appears to be weak.

(or depreciate) the domestic currency after the 6th quarter and tapers off thereafter. No significant direct impact of innovations in import was noticed on inflation for the 16 quarters but the pass through was detected to be via exchange rate depreciation which affects inflation after 4th quarter and dies off after the 7th quarter. The empirical results suggest that the innovations from import demand (non-oil) affect domestic inflation only via exchange rate (either real or nominal), albeit at a much weaker pace.

Figure 12: Structural Impulse Response with the ordering of Import, Nominal Exchange Rate, Inflation and Growth

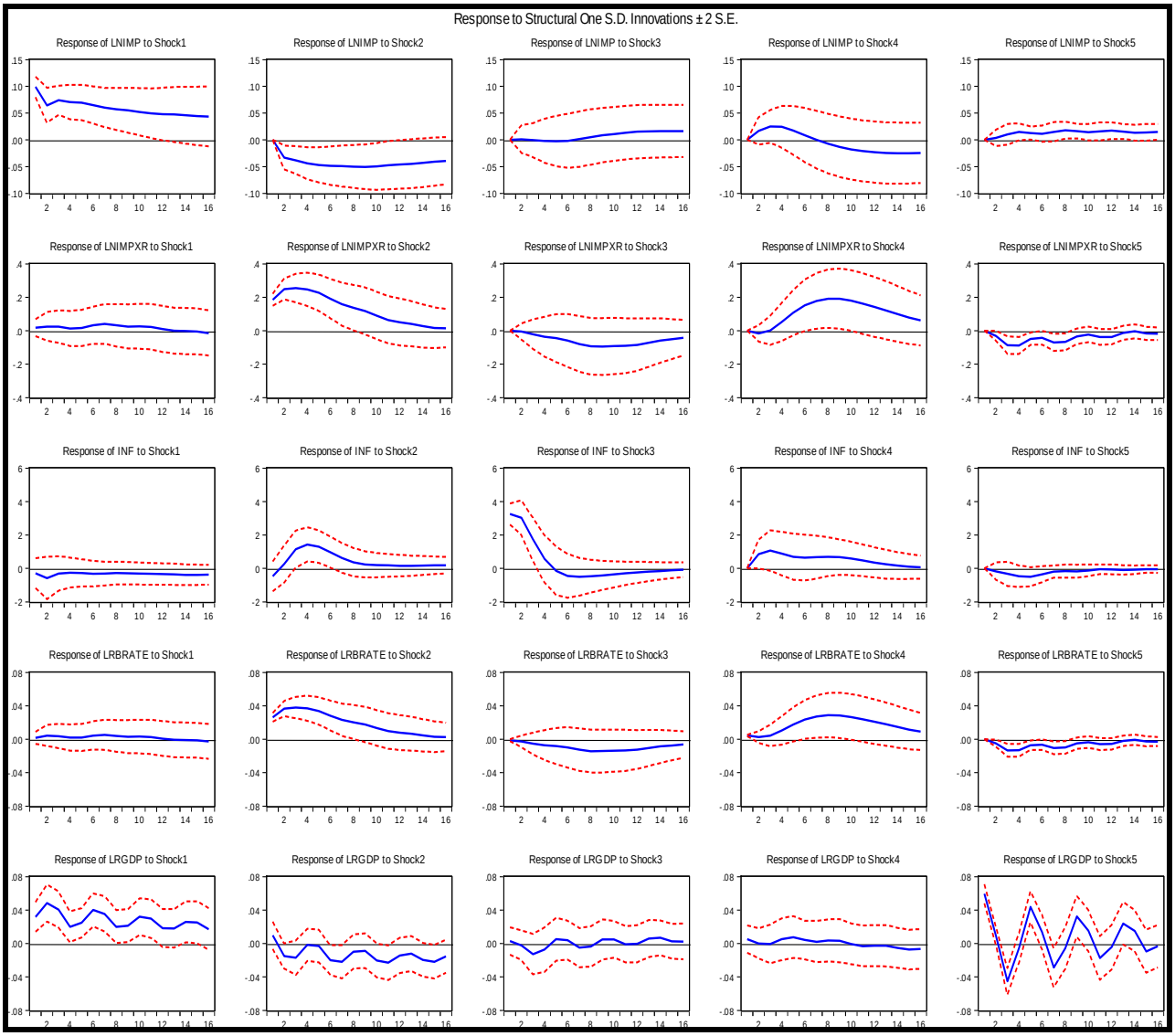


Note: LNIMP is value of non-oil imports, LRATE is nominal exchange rate depreciation, INF is inflation and LRGDP is Economic growth.

Similarly, the empirical results in figure 13 confirm that innovations from non-oil import significantly stimulate economic growth up to 12th quarter and then 15th quarter. However, impulse from the interaction between non-oil

import and real exchange rate depreciation has both significant inflationary effects (during the 3rd-6th quarters) and retard economic growth (during the 2nd, 6th & 7th, 10th and 15th quarters). The negative effect of high import-induced exchange rate depreciation on economic growth is plausible as the situation compels the central bank to resort to policy tightening, if it wants to be seen as credible by hiking the policy rate. This policy decision in turn potentially crowds-out private investments and hence slows down economic growth. The empirical results suggest that higher import demand accompanied by high real exchange rate depreciation adversely affect both the effective implementation of inflation targeting framework by the central bank and the long term economic growth prospect of Ghana.

Figure 13: Structural Impulse Response including Interaction between Non-oil imports and Real Exchange Rate Depreciation



Note: LNIMP is value of non-oil imports, LNIMPXR is interaction between non-oil imports and real exchange rate depreciation, INF is inflation, LRBRATE is real exchange rate depreciation, while LRGDP is Economic growth.

5.0 Conclusion and Policy Recommendations

This study explored the dynamic relationship between economic growth and external trade, with special focus on import demand in Ghana. In addition, it examined the monetary policy implication of high import demand by investigating the pass through effect of the interaction between exchange rate depreciation and non-oil import demand. Using quarterly dataset spanning 2000Q1 to 2013Q4, the study employed sequence of econometric techniques to investigate the long and short run dynamic relationships between import demand and economic growth in Ghana.

In sync, the myriad of empirical techniques revealed positive short and long run bi-directional relationships for import-economic growth, export-economic growth and import-export trade in Ghana. Although import demand stimulates economic growth, the reverse impact appears to be stronger, suggesting that economic growth significantly drives the growth in import demand in Ghana. In the same vein, the positive link between import demand and export trade tends to be persistent. In particular, the study strongly indicated that import demand does not only promote economic growth directly, but it also influences economic growth indirectly by facilitating exports through the importation of capital and intermediate goods, especially for the extraction sector. Besides, economic growth was found to be significantly influenced by import trade than export trade in the long run, indicating an import-led growth (ILG) strategy in Ghana. This result was corroborated by Granger causality test, impulse responses and variance decomposition methods.

In term of the component of non-oil imports, quality imports such as capital and intermediate goods were found to stimulate economic growth, while growth in consumption goods imports impede economic growth. However, no significant link between economic growth and other goods imports was found.

Regarding monetary policy implication of trade development, higher import demand tends to exacerbate pressures on the domestic currency, which in turn exerts some upward pressures on prices and hence, slows down economic growth. Although the pass through from import to nominal exchange rate appears to be sluggish (only significant after 6^{th} quarter), the transmission from nominal exchange rate depreciation to inflation was however found to be relatively faster (significant at 2^{nd} quarter). This notwithstanding, higher import demand alongside rapid exchange rate depreciation was found to have significant negative impact on economic growth in Ghana.

Due to monetary policy and economic growth implications of import demand, the study recommends macroeconomic policies that target imports of quality goods mostly capital and intermediate goods as well as new technologies that are urgently required to sustain long term economic growth. In addition, imports of some consumption goods should be restrained via import tariffs measures, while vigorously and deliberately pursuing policies that promote domestic production of import-competing goods, especially those can be supported by domestic weather and raw materials.

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