Import Demand and Economic Growth Analysis in Ghana

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Abstract

The study has revealed that import trade plays a significant role in Ghana's economic growth. The trend analysis of volume of imports, quality of imports and import elasticities over the study period suggests that import trade contributes to economic growth as evidenced by increased imports of intermediate and capital goods. The normalized equation from the Johansen Co-integration methodology established a long-run relationship between imports trade, income, foreign reserves, exchange rate and domestic price. The study recommends the use of import tariffs and nontariff measures as policy instruments to influence import of raw materials in the medium to long-term. Such trade policies should aim at optimization of import structure towards economic growth and development.

Keywords: Keywords: Import Demand, Growth, Elasticities, Co-integration, Granger Causality, Impulse Response**.**

1.0 Introduction

The Classical and Neo-Classical economists believed that participation in international trade could be a strong positive force for economic development. There are some related

reasons that can be analyzed to support this argument. One approach to development is to concentrate on producing exports. Promoting exports could directly lead to economic development either through encouraging production of goods for export or allowing accumulation of foreign exchange which enables importation of capital inputs. Moreover, such trade may promote diffusion of knowledge and further enhance efficiency of input utilization by industries. In view of this debate, international trade can be described as an "engine of growth". (See Hogendorn, 1996, Cyper & Dietz, 1997).

There are various standard methods that have been tested in detecting the relationship between trade and economic growth, and the results vary accordingly. Although there are some disagreements among economists, some empirical works suggest that there is a strong positive relationship between trade and growth. This study specifically looks at the relationship between imports and economic growth in Ghana. Most of the empirical studies concentrate on exports extensively, thus ignoring completely the role of imports in economic growth in the analysis.

One technique to identify the important role of trade is to examine the effect of import on growth. To improve trade balance as well as to relieve the constant problem of insufficient foreign exchange reserve, many trading countries, especially developing countries, have tried to reduce imports. Such countries initiated to build new industrialization of the progressively replaced consumer good imported by domestic production known as import substitution industrialization strategy. In this respect, government must either subsidize the new import substitution industry firms to compete with foreign import at world price or squeeze imports by imposing various import tariff and import quota (Hogendorn, 1996).

Lee (1995) argued that any form of trade distortion imposed on capital goods imports normally increased the price of imported capital goods and hence reduce the growth rate by forcing the economy to use domestic product more than efficient level. In addition to that, protecting domestic firms without a consistent and appropriate trade policies may be inimical to the growth of local industries since some imports particularly intermediate and capital goods are also necessary inputs in the production of export goods. Compressing such imports would deteriorate the export performance and in turn reduce rate or economic growth. Since importing is also an important contributor to growth, more recent research takes into accounts the import growth on export promotion. Lee (1995,) examined the role of imported capital goods on economic growth and found that imported capital goods had a much higher productivity than domestically produced capital goods. One of key lessons from this investigation is that imports of foreign input are an important determinant of the link between trade and growth.

Riezman, Whiteman and Summers (1995) provided an investigation on export led growth that took account of import explicitly in the model. They found that there were some clear evidence that imports growth strongly explained economic growth in some selected countries. The co-integration test established long run relationships among the regressors. Using the forecast error variance decomposition, they found out that export-led growth works both directly (import→export→growth) and indirectly through import (export→import→growth) in these countries.

However, in the economic development strategies, exports have long held center stage. Imports have been shunned, regarded as substitutes for locally-produced goods, competing with the manufacturing base. Discussion about the benefits of imports is fraught with complexities and concerns about the jobs and income thought to be lost when citizens of a country buy foreign-made products. But as the high technology, global economy takes hold, the role of imports in a country demands deeper examination. This paper focuses on the role of imports to growth. Imports account for a substantial share of the tonnage and value moving through our international gateways. Import tonnage passing through our ports has exceeded exports over the years. In economic development strategies, there is a need to examine trade and competitiveness, as two-way streets. A blinkered focus on exports alone may hobble the very companies on which the state is depending to carry its prosperity forward.

As mentioned, the contributions of import trade to economic growth has failed to be given due importance and few studies are devoted to it. As a result, this study seeks to fill the gap by examining the import demand function of Ghana and empirically assess the contributions of import trade to economic growth in Ghana.

2. Some Stylized Evidence of Ghana's Import Trade

2.1 Analysis of Volume of Imports

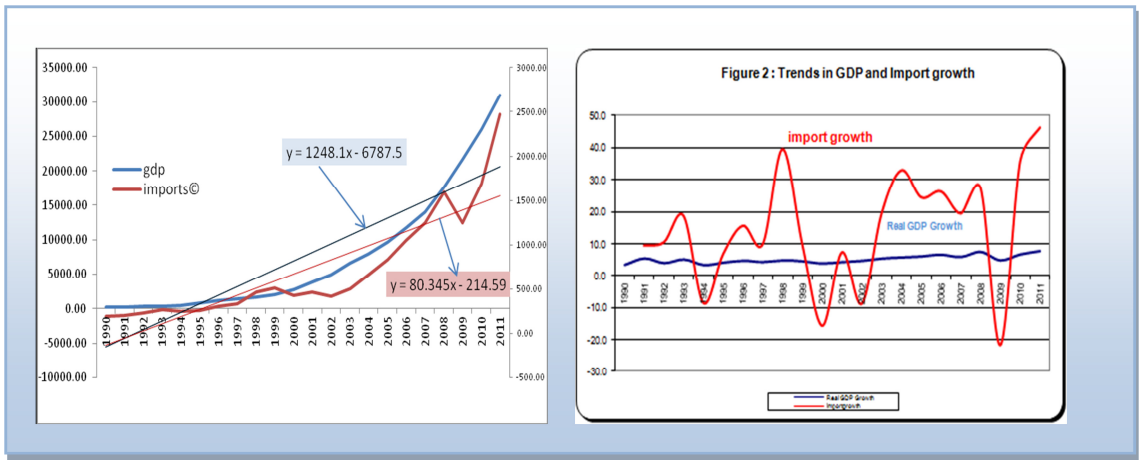
Trends in Ghana's total imports indicate that, on the whole, imports trade has been soaring over the years. Ghana's import sector plays a major role in compensating the shortfall in domestic supply in terms of capital and intermediate goods as well as ever-growing consumer demand for imported goods. A total of $1,318 million worth of goods were imported into the country in 1991 as against $ 1,204.96 million imports in 1990, suggesting about 9.4 per cent growth. Ghana's import trade has improved over the years, as a result, total imports into the country reached $4,297.28 million in 2004, up by 32 per cent compared with total imports of $3,232.82 million in 2003.

The import sector continues to expand as the economy gears up for more growth, and this is evidenced by an impressive growth in imports trade as total imports of the country increased to $6,753.68 million in 2006 as against $5,347.31 million in 2005, thus representing a growth rate of 26.3 per cent (See **Figure 1 & 2**). In addition, Ghana's total imports trade picked up significantly by 46.2 percent in 2011 to $15,968.40 million as against $10,922.11 million in 2010. The trend analysis suggested that Ghana's import trade grew on the average by 14.50 percent between 1990-2011, indicating strong performance for the review period compared to the Sub-Saharan average.

2.2 Quality of Ghana's Imports Trade

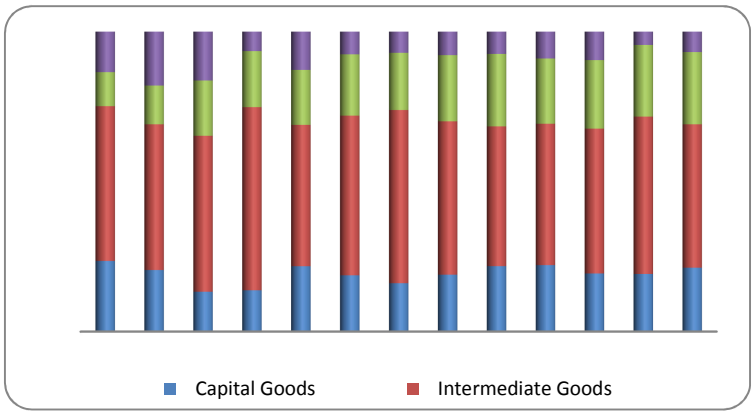
Ghana's domestic investment and consumer demand have expanded beyond the current domestic productivity and the current production supply is unable to meet the demand of advanced technology, which has resulted in supply bottleneck. Solving the supply bottleneck by importing the sources that the domestic markets are short of, key equipment and advanced technology is a major way of making the transformation of the domestic economy feasible. This could further also provide the necessary impetus for the attainment of an expanded economic growth in Ghana. A cursory look at Ghana's total imports since 1990 indicates that the quality of Ghana's imports has improved tremendously. Intermediate goods accounted for 48.7 per cent of Ghana's total imports in 2000. The composition of intermediate goods for industrial production out of Ghana's total imports further improved from 52.1 per cent in 2001 to 53.4 per cent in 2004. The marked improvement in the quality of Ghana's import suggests that imports trade plays a major role in Ghana's economic development and it would continue be a key sector to the economy. This compares favorably with the composition of consumer goods in Ghana's total imports, consumer goods formed 18.01 per cent out of a total imports of $ 7,301.39 million as against 58.7 per cent of intermediate goods and 15.78 of capital goods for electricity production in 2006 respectively (see **Figure 3**).

Figure 1: Trends in Real GDP and Imports



The imports of capital inputs for electricity production and other energy related projects increased markedly especially in 2007 when the energy crisis worsened in Ghana. The import of large volume of capital and intermediate goods, and other resources eased the pressure of limited domestic resources and compensated the shortage of domestic supply to a greater extent, thus contributing to economic growth in Ghana. In 2008, capital good and intermediate goods accounted for 69 percent of the total import trade of $7,891.67 million although the trend decline marginally to 67 percent in 2009. Similarly, capital and intermediate goods component of total import trade picked up again in 2010 to 71 percent and 69 percent in 2011 while consumption goods formed only 24 percent out of total import trade.

Figure 3: Composition of Ghana's Import Trade (Percentage)



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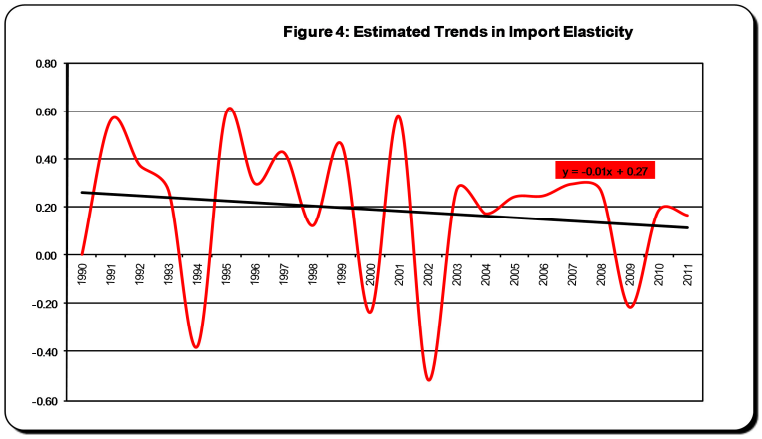
2.3 Import Elasticity Analysis

The ratio of Ghana's Gross Domestic Product (GDP) growth to growth rate of imports, which measures the degree to which economic growth responds to imports trade suggests an average imports elasticity of 0.20 during the period 1990-2011, thus indicating that about 1 per cent import growth has brought about 20 per cent GDP growth on average. It also further suggests to some degree that Ghana's import growth has some kind of positive relation with GDP growth. The above analysis indicates that imports trade plays a significant role in Ghana and the sector should be seen as such (see Figure 4).



3. Literature Survey

Several authors have undertaken empirical investigations of the factors affecting imports demand. The work by Hemphill (1974) is particularly striking. He developed the stock adjustment import-exchange model that has its roots in the balance of payments theory. Statistical evidence from the application of this model, which ignored real domestic income and relative import prices as in the traditional import demand model, drawing data from eight developing countries, suggested that the results were generally consistent with the hypothesized relationship (i.e., between import and foreign exchange receipts). Thus, this study supports the proposition that foreign exchange earnings are a major factor influencing aggregate imports in developing countries. Prior to this research, the basic import demand model that relates imports to income and relative prices was used in several empirical investigations (e.g., Leamer and Stern,1970; Houthakker and Magee, 1969). But the use of this model has been criticized by several authors. For instance, Burgess (1974) argued that although the traditional import demand model is able to provide measures of income and price elasticities, it assumes that total imports consist of final commodities that are not separable from those other goods that serve as inputs to the consuming sectors.

An econometric model of the Kenyan economy was constructed by Elliot, et al. (1986). This model describes a small and open economy that is affected by the world credit and commodity market conditions and sensitive to world commodity price movements. Therefore, imports are disaggregated as petroleum and nonpetroleum imports and OLS estimation technique was applied for the period 1968-80. Kenyan exports of refined petroleum products depend on petroleum imports to a great extent. As a consequence, petroleum imports are estimated as a function of exports of refined petroleum products and real GDP, where both variables have a positive impact on petroleum imports. The negative impact of the break down of East African Community is represented by an intercept dummy, which has a negative impact on petroleum imports. In addition, non- petroleum imports are estimated as a function of real GDP, net foreign assets divided by the real exchange rate and the GDP price deflator divided by the other commodity imports prices. All variables in the equation have significant positive effects on nonpetroleum imports.

A modification to the general import demand function attempted by Goldstein et al. (1980) is one in which imports are determined by income, prices of imports, non-tradeables and tradeables. The price indexes of tradeables and non-tradeables were constructed by the authors and estimates suggest that the price of non-tradeables significantly influenced imports in the sample countries. On the basis of this result, Goldstein and his associates argued that "one should not constrain price elasticity of demand for imports to be equal as between domestic tradeable goods and non-tradeable–goods a consideration which argues against, say, the income deflator as a proxy for the price of import substitutes"(Goldstein et al., 1980: 198).

A disequilibrium monetary model is constructed as a quarterly macroeconometric model for Turkey by Özatay(1997). The 1977:Q1- 1996:Q4 period is covered in the estimation. The model is estimated by two-step procedure of Engle-Granger methodology. Total imports of goods in US dollars are explained as a function of real income and real exchange rate. The hypothesis is the existance of long run relationships between the level of real imports and real manufacturing output, real total investments and real exchange rate. The short run dynamics is modeled as an adjustment to this long run relationship. In

the long run, income is found to be significant but it loses its significance in the short run. There is a correction

to the long run equilibrium every period in the short run. Real exchange rate is negatively influencing total imports of goods, both in the long and short run.

Erlat and Erlat (1991) study Turkish export and import performance and use annual data for the period 1967-87. Export supply, export demand and import demand functions are estimated by OLS first, then three equations are estimated as a set of seemingly unrelated regressions. Total volume of imports is regressed on domestic real income, price of imports (including tariffs) divided by domestic prices, real international reserves and one period lagged value of the dependent variable. Two dummies are introduced for the years 1978 and 1979 to explain the structural shift. International reserves are found to be the most important variable in explaining import demand. Relative prices, however, have no significant explanatory power on import demand.

Concerned about the matters arising from the various functional import demand models, Thursby and Thursby (1984) examined the appropriateness of alternative specifications, using five countries (Canada, Germany, Japan, UK and the United States) as case studies. They explored nine models of aggregate import demand from which alternative specifications were derived. The general conclusion from this detailed research is that there is no single functional form that is universally appropriate across countries and over time. It was also revealed that for all the countries (except Canada) the accepted models were in logarithmic specification. This reaffirmed an earlier finding by Khan and Ross (1977) for Canada, Japan and the United States that logarithmic functional form is more appropriate.

In the study by Saygılı, et al. (1998), long run and short run export and import functions are estimated in order to test how good the measures of competitiveness predict trade performance of Turkey. Import demand is estimated by domestic income, real effective exchange rate and a number of competitiveness indicators. The Johansen cointegration technique is used for long run estimation. Estimation results reveal that domestic income is the most significant variable in the explanation of imports. Results show that short run income elasticity of imports is significant and 0.85. In the short run, real effective exchange has a significant coefficient with the expected sign but in the long run, it loses its significance on imports.

4. Estimating Import Demand Function

4.1 The Model

Ghana is considered to be an open and small country. Hence, developments in the world commodity prices are easily reflected on trade volume. Due to the fact that oil imports depend strongly on world oil prices and that changes in oil prices are considered as exogenous shocks, oil imports are excluded from the total imports. Such price shocks may adversely affect our estimation results. Therefore, it is preferable to estimate the import function excluding oil imports. All variables are in US dollar terms. The sample period of estimation is from 1991:Q1 to 2011:Q4. The following import demand model was adopted based on the various literature surveyed.

$$\mathbf{LnIM_t = b_0 + b_1 lnGDP_t + b_2 dlnE_t + b_3 lnINF_t + b_4 lnFR_t + E_t} \quad (1)$$

In equation (1), b's are income, depreciation, inflation and reserve elasticities of the import demand. As domestic income level(GDP) increases, demand for imports(IM) increases, so b_1 is expected to be positive. b_2, on the other hand, is expected to be negative. An increase in the nominal rate of depreciation (dlnE) would deteriorate demand for imports as foreign goods would be relatively more expensive. The price elasticity of import demand is expressed by b_3. When domestic prices increase, foreign goods are relatively cheaper (ceteris paribus) and demand for imports increase. Therefore, its expected sign is positive. Foreign exchange reserves (FR) can be considered as an important determinant of import demand in developing countries. Therefore, it should be included in the equation. The sign of b_4 is expected to be positive, i.e., increase in foreign exchange reserves means there will be more funds available for imports.

4.2 Augmented Dicky-Fuller Unit Root Test

Standard Augmented Dicky-Fuller Unit Root test procedure is used for this purpose. Time series variables are not normally non-stationary in levels and when they are used in levels, the results tend to be spurious. The presence of unit root in the variables that would be used in the estimation is tested (See Table 1).

Table 1: Standard ADF Unit Root Test

Variable	Level (With trend)	Level (Without trend)	1st Difference
lnrim	-2.38191	-1.99012	-3.42839***
lnrgdp	-1.81837	-0.99839	-2.79042*
lnrfr	-1.12558	-1.73028	-2.98928**
lnre	-2.54937	-2.61511	-3.38026**
lncpi	-0.35459	-2.50827	-3.57448**

Note: *, ** and *** represent 10%, 5% and 1% significance levels respectively.

The result of the ADF Test suggests that all the variables have unit root and therefore non-stationary. However, the first difference of the variables indicates stationarity at different significant levels. That is, real imports (lnrim) is significant at 1 per cent (1%), real Gross Domestic Product(lnrgdp) which is used to measure real income is also significant at 10 per cent (10%), while international gross reserves(lnrfr), real exchange rate(lnre) and consumer price index(lncpi) are all significant at 5 per cent (5%) levels.

4.3 Johansen Cointegration Test

Johansen's methodology takes its starting point in the vector autoregression (VAR) of order *p* given by

$$y_t = \mu + A_1 y_{t-1} + ... + A_p y_{t-p} + \varepsilon_t \tag{2}$$

where $\mathbf{y_t}$ is an *n*x1 vector of variables that are integrated of order one – commonly denoted I(1) – and $\boldsymbol{\varepsilon_t}$ is an *n*x1 vector of innovations. This VAR can be re-written as

$$\Delta y_t = \mu + \prod y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i y_{t-1} + \varepsilon_t \tag{3}$$

Where

$$\prod = \sum_{i=1}^{p} A_i - I \text{ and } \quad \Gamma_i = \sum_{j=i+1}^{p} A_j \tag{4}$$

If the coefficient matrix **Π** has reduced rank *r*<*n*, then there exist *nxr* matrices α and β each with rank *r* such that $\prod = \alpha\beta^1$ and $\beta^1 y_t$ is stationary. *r* is the number of cointegrating relationships, the elements of α are known as the adjustment parameters in the vector error correction model and each column of β is a cointegrating vector. It can be shown that for a given *r*, the maximum likelihood estimator of β defines the combination of y_{t-1} that yields the *r* largest canonical correlations of Δy_t with y_{t-i} after correcting for lagged differences and deterministic variables when present. Johansen proposes two different likelihood ratio tests of the significance of

these canonical correlations and thereby the reduced rank of the **Π** matrix: the trace test and maximum eigenvalue test, shown in equations (5) and (6) respectively.

$$J_{trace} = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}) \tag{5}$$

$$J_{\max} = -T \ln(1 - \hat{\lambda}_{r+1} \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}) \tag{6}$$

Here T is the sample size and $\hat{\lambda}_i$ is the i:th largest canonical correlation. The trace test tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of $r+1$ cointegrating vectors. Neither of these test statistics follows a chi square distribution in general; asymptotic critical values can be found in Johansen and Juselius (1990).

Turning to the Johansen Maximum Likelihood procedure, it is first necessary to estimate the number of lags required in the VAR system. By arbitrarily starting from a VAR system of order 5, the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC) indicate that a VAR system of order 4 is the appropriate lag-length for the import demand function.

Table 2 indicates that the null-hypothesis of no cointegrating vector is rejected at both 1% and 5% levels of significance for *lnrim, lnrgdp, lnrfr,lnre and lncpi,* thus suggesting that, there exist at least three co-integrating relations. The long-run import demand function as indicated by the normalized equation suggests that, all of the variables have the expected signs except the price variables, which has a negative sign. The result further shows that 1 per cent change in income levels would lead to about 38 per change in imports, while 1 per cent change in foreign reserves could replenish about 14 per cent of imports. The result also revealed that, an increase in the nominal rate of depreciation would negatively affect imports of all types of imported goods including capital and intermediate goods.

Table 2: Johansen Co-integration Test

Test assumption: Linear deterministic trend in the data
Series: LNRIM LNRGDP LNRFR LNRE LNINF
Lags interval: 1 to 4

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.675802	136.5968	68.52	76.07	None **
0.488154	73.51836	47.21	54.46	At most 1 **
0.324722	36.01335	29.68	35.65	At most 2 **
0.208064	14.02599	15.41	20.04	At most 3
0.017042	0.962596	3.76	6.65	At most 4

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 3 co-integrating equation(s) at 5% significance level

Unnormalized Co-integrating Coefficients:

LNRIM	LNRGDP	LNRFR	LNRE	LNINF
1.790901	-0.695195	-0.255041	3.423892	0.746825
-4.606607	15.84304	-2.966023	7.303852	-7.132089
-8.075390	25.37251	-5.053217	11.90932	-11.70843
2.151099	-4.316588	0.320015	-3.316730	2.099948
-1.374087	0.486131	-0.130889	0.642182	-1.084759

Normalized Co-integrating Coefficients: 1 Co-integrating Equation(s)

LNRIM	LNRGDP	LNRFR	LNRE	LNINF	C
1.000000	-0.388182	-0.142409	1.911827	0.417011	-7.569318
	(1.37143)	(0.37303)	(1.69318)	(0.51275)	

Log likelihood 906.1399

4.4 Granger Causality Test

Formally, the different possible Granger causal relations between imports (lnrim) and economic growth(lnrgdp) in levels can be expressed using the parameters of equations (7) and (8) which form a vector autoregressive system:

$$\ln rim_t = \sum_{i=1}^{\infty} \alpha_i \ln rim_{t-i} + \sum_{i=0}^{\infty} \beta_i \ln rgdp_{t-i} + \varepsilon_t \quad (7)$$

$$\ln rgdp_t = \sum_{i=1}^{\infty} \gamma_i \ln rgdp_{t-i} + \sum_{i=0}^{\infty} \delta_t \ln rim_{t-1} + v_t \quad (8)$$

Thus there is Granger causality from economic growth to import if $\beta_i \neq 0$ and $\delta_i = 0 \ \forall$ i. Similarly, there is causality from import to economic growth if $\beta_i = 0$ and $\delta_i \neq 0 \ \forall$ i. The causality is considered as mutual if $\beta_i \neq 0$ and $\delta_i \neq 0 \ \forall$ i. Finally, there is no link between imports and growth if $\delta_i = 0$ and $\beta_i = 0 \ \forall$ i.

The results of the Granger-Causality test between the imports and economic growth is reported in the Table below (Table 3). The result of the Granger-Causality Test indicates that import trade Granger-Causes economic growth in Ghana at 10 per cent significant level. That is, improved imports trade can contribute to economic growth. This is evidenced by the improvement in the quality of imports into Ghana over the years as intermediate imports accounted for more than 50 per cent of total imports within the period 1990-2006. The result further indicates that the reverse causality also hold, that is, improvement in income can also promote import trade (i.e. economic growth could lead to improvement in import trade) in the long run.

Table 3: Pair-Wise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistics	Probability Value
LNRGDP does not Granger Cause LNRIM	88	3.47124	0.02263**
LNRIM does not Granger Cause LNRGDP	88	2.34983	0.08332*
DLNRG does not Granger Cause DLNRIM	57 87	3.65163	0.01855*
DLNRIM does not Granger Cause DLNRG	87	0.45591	0.71430

Note: * and ** indicates 10% and 5% level of significance

4.5 Vector Autoregression Analysis

The vector autoregression (VAR) model is one of the most successful and flexible models for the analysis of

multivariate time series. It is a natural extension of the univariate autoregressive model to dynamic multivariate time series. The VAR model has proven to be especially useful for describing the dynamic behavior of economic and financial time series and for forecasting. It often provides superior forecasts to those from univariate time series models and elaborate theory-based simultaneous equations models. In addition to data description and forecasting, the VAR model is also used for structural inference and policy analysis. The structure of the VAR is defined as follows:

Let $Y_t = [y_{1t}, y_{2t}, ..., y_{nt}]^1$ denote an (n×1) vector of time series variables. The basic p-lag vector autoregressive (VAR(p)) model has the form:

$$Y_t = c + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + ... + \Pi_p Y_{t-p} + \varepsilon_t \qquad t = 1, \ldots, T \tag{9}$$

where Π_i are (n×n) coefficient matrices and ε_t is an (n×1) unobservable zero mean white noise vector process (serially uncorrelated or independent) with time invariant covariance matrix Σ.

In lag operator notation, the VAR (p) is written as:

$$\Pi(L)Y_t = c + \varepsilon_t \tag{10}$$

Where $\Pi(L)_t = I_n - \Pi_1 L - ... - \Pi_p L^p$. The VAR(p) is stable if the roots of

$$\det(I_n - \Pi_1 z - ... - \Pi_p z^p) = 0 \tag{11}$$

lie outside the complex unit circle (have modulus greater than one), or, equivalently, if the eigenvalues of the companion matrix

$$\mathbf{F}=\begin{pmatrix} \Pi_1 & \Pi_2 & ... & \Pi_n \\ I_n & 0 & ... & 0 \\ 0 & \vdots & 0 & \vdots \\ 0 & 0 & I_n & 0 \end{pmatrix} \tag{12}$$

have modulus less than one. Assuming that the process has been initialized in the infinite past, then a stable VAR(p) process is stationary and ergodic with time invariant means, variances, and autocovariances.

If Y_t in (p) is covariance stationary, then the unconditional mean is given by:

$$\mu_t = (I_n - \Pi_1 - ... - \Pi_p)^{-1} c \tag{13}$$

The mean-adjusted form of the VAR(p) is then:

$$Y_t - \mu = \Pi_1(Y_{t-1} - \mu) + \Pi_2(Y_{t-2} - \mu) + ... + \Pi_p(Y_{t-p} - \mu) + \varepsilon_t \tag{14}$$

The result of the Vector Autoregression model is reported below (See **Table 4** in Appendix 1). The error correction term of the import demand model, is significant and has a negative sign. Hence, it can be inferred that

at time t 4 percent of the deviation from the long run equilibrium at time t_{-1} is corrected. Hence, it can be inferred that at time t 4 percent of the deviation from the long run equilibrium at time t_{-1} is corrected.

Insert Table 4 Here (Appendix 1)

In addition, the result suggests that income has a positive sign in the short run model at lag one(1), the lesson is that income has some amount of influence on imports demand growth favorably(i.e. 30% impact). The overall effects of foreign reserves on import demand is positive since 37% change in imports is explained by 1% change in foreign reserves in the short-run. Depreciation rate is found to have a significant negative impact on import growth. This finding is consistent with the long run model. Although the first lag of the domestic price has a negative sign, the overall effect of inflation on import is positive as higher domestic prices tend to boost import since imported goods become relative cheaper to domestic goods in this instance.

3.6 Impulse Response Analysis

The first row of chart 5 indicates the response of import demand to the innovations of the variables in the VAR system. Innovations in import demand have a positive effect on imports in the first quarter. Similarly, a shock to the growth of income has a positive effect on import demand in the first quarter and the response trends upward even to the third year. In both cases, the significance of the responses is strong for the later periods. The effect of a shock to real depreciation is negative and the response starts from the second quarter and continued to the third year. However, innovations of reserves have no significant effect on import demand as shown by the impulse response function.

Insert Figure 6 Here (Appendix 2)

3.7 Variance Decomposition

Variance decomposition provides a different method of depicting the system dynamics. The variance decomposition gives information about the relative importance of each random innovation to the variables in the VAR. For the first quarter, changes in import demand was 100 per cent explained by itself. During the second, income variable accounted for 5.5 per cent, while innovation in import itself represents 93.5 per cent. The innovations in the other explanatory variables accounting for less than 1

per cent change each in import demand during the second period. The impact of the innovations of the endogenous variables on import demand increases over time while the innovations in import itself declined. For the last period, the impact of the innovations in import itself reduced from 100 per cent in the first quarter to 36.9 per cent, while effects of innovations in income increased to 49.3 per cent with innovations in real exchange rate and domestic prices accounting for 12.2 per cent and 1.2 per cent respectively (See **Table 5**).

Table 5: Variance Decomposition

Period	S.E.	LNRIM	LNRGDP	LNRFR	LNRE	LNCPI
1	0.02710	100.00000	0.00000	0.00000	0.00000	0.00000
2	0.04603	93.55027	5.50676	0.09471	0.76719	0.08107
3	0.06273	75.18770	20.25450	0.08233	3.75108	0.72439
4	0.08634	55.91896	34.72014	0.06397	6.55538	2.74156
5	0.11964	48.31234	39.84045	0.11587	8.10756	3.62380
6	0.15601	44.43743	42.82656	0.17186	9.42729	3.13685
7	0.18915	40.92007	45.89217	0.17342	10.65342	2.36093
8	0.21989	38.71458	47.84962	0.16582	11.50936	1.76061
9	0.25087	37.95779	48.57288	0.17431	11.90920	1.38582
10	0.28239	36.97873	49.33226	0.19056	12.20639	1.29206

4.0 Conclusion

The import demand analysis in this study indicates that import trade plays a significant role in Ghana. The trend analysis of volume of imports, quality of imports and import elasticities over the period 1990-2011 suggests that import trade contributes to economic growth as evidenced by improvements in the quality of import with intermediate and capital goods accounting for more that 50 per cent over the study period. This conclusion is further corroborated by the result of the econometric analysis as shown by the Granger-Causality test, impulse response graphs and Variance Decomposition's table. The normalized equation from the Johansen Cointegration methodology established a long-run relationship between imports trade, income, foreign reserves, exchange rate and domestic price. The Granger causality analysis further confirmed that import trade has significant effect on economic growth and the relationship is clearer as shown by the result of the Vector Autoregression model.

4.1 Policy Discussion

The contributions of import trade to economic growth has failed to be given due importance and few empirical studies have focused on it. Imports trade plays a very important function by offsetting short supply, alleviating trade friction, inducing domestic demand, and stimulating technical know-how. The empirical analysis of the functional relationship between import trade and economic growth suggests that their relationship is long and that import trade when guided with right economic policies greatly promotes economic growth. Thus, authorities should make policies that focus not only on import trade expansion but also trade policies should place emphasis on import quality.

The country's import structure needs to be optimized. We should increase substantially the import scale of strategic products and mainly import the goods and technology that is urgently needed for Ghana's economic development but not available in domestic markets, especially the resources, advanced technology and key equipment that domestic market is short of. That is, the current import quality structure should be improved upon and be sustained accordingly.

With respect to the components of imports, empirical evidence has shown that the import of raw materials responds significantly to foreign exchange earnings, relative prices and industrial output through. Thus, it is obvious that in the absence of an increased domestic supply of raw materials, the growth of the industrial sector is expected to raise the demand for imported raw materials. This possibly indicates that import tariffs and nontariff measures represent important policy instruments that should be considered in designing policy packages to influence the import of raw materials within the conventions of World Trade Organizations (Egwaikhide, Festus., 1999).

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APPENDIX 1:

Table 4: Vector Autoregression Estimates with lag length 4

Cointegrating Eq:	CointEq1
LNRIM(-1)	1
LNRGDP(-1)	-0.388182 -1.37143 (-0.28305)
LNRFR(-1)	-0.142409 -0.37303 (-0.38177)
LNRE(-1)	1.911827 -1.69318 -1.12913
LNINF(-1)	0.417011 -0.51275 -0.81329
C	-7.569318

Error Correction:	D(LNRIM)	D(LNRGDP)	D(LNRFR)	D(LNRE)	D(LNCPI)

CointEq1	-0.041802	0.001665	0.081776	0.040469	0.002983
	-0.0623	-0.01568	-0.06544	-0.09588	-0.06258
	(-0.67102)	-0.10617	-1.24969	-0.42208	-0.04767
D(LNRIM(-1))	0.491309	0.27898	-0.49851	-0.319949	0.988801
	-1.24077	-0.31228	-1.30332	-1.90965	-1.24636
	-0.39597	-0.89337	(-0.38249)	(-0.16754)	-0.79335
D(LNRIM(-2))	0.39465	-0.309066	0.593282	2.17962	-1.002065
	-2.2626	-0.56946	-2.37667	-3.48233	-2.27279
	-0.17442	(-0.54274)	-0.24963	-0.62591	(-0.44090)
D(LNRIM(-3))	1.235536	0.042604	1.845772	-2.207999	-1.554279
	-2.18198	-0.54917	-2.29199	-3.35825	-2.19181
	-0.56625	-0.07758	-0.80532	(-0.65748)	(-0.70913)
D(LNRIM(-4))	-1.385805	0.011195	-1.884696	1.143503	1.540297
	-1.11944	-0.28174	-1.17588	-1.72292	-1.12448
	(-1.23794)	-0.03973	(-1.60280)	-0.6637	-1.36978
D(LNRGDP(-1))	0.309151	0.695854	0.046149	-3.123659	-0.732827
	-1.31948	-0.33209	-1.386	-2.03078	-1.32542
	-0.2343	-2.09539	-0.0333	(-1.53815)	(-0.55290)
D(LNRGDP(-2))	-0.646026	-0.214121	-1.07344	1.970787	0.916148
	-2.08284	(-0.40846)	-2.18785	-3.20567	-2.09222
	-0.52421		(-0.49064)	-0.61478	-0.43788
	(-0.31017)	0.191669			
D(LNRGDP(-3))		-0.54968	-0.154999	0.612859	0.562491
	-0.226547	-0.34869	-2.29414	-3.36142	-2.19387
	-2.18404		(-0.06756)	-0.18232	-0.25639
	(-0.10373)	-0.271036			
D(LNRGDP(-4))		-0.3746	1.740231	-0.264338	-1.225403
	0.663647	(-0.72354)	-1.5634	-2.29072	-1.49507
	-1.48837		-1.1131	(-0.11540)	(-0.81963)
	-0.44589	0.326037			
D(LNRFR(-1))		-0.16364	1.744748	0.220945	-0.068648
	0.374145	-1.99236	-0.68298	-1.00071	-0.65313
	-0.6502		-2.55462	-0.22079	(-0.10511)
	-0.57543	-0.36214			
D(LNRFR(-2))		-0.29193	-1.16176	0.249422	0.208702
	-0.52308	(-1.24051)	-1.21839	-1.7852	-1.16513

	-1.15991		(-0.95352)	-0.13972	-0.17912
	(-0.45097)	-0.069489			
D(LNRFR(-3))		-0.29228	0.802734	-0.322669	-0.712904
	0.614168	(-0.23775)	-1.21985	-1.78734	-1.16653
	-1.1613		-0.65806	(-0.18053)	(-0.61113)
	-0.52886	0.202254			
D(LNRFR(-4))		-0.15959	-0.784922	-0.213919	0.698449
	-0.450918	-1.26733	-0.66607	-0.97593	-0.63695
	-0.6341		(-1.17844)	(-0.21920)	-1.09655
	(-0.71112)	-0.154584			
D(LNRE(-1))		-0.05437	-0.468605	0.030797	0.093605
		(-2.84322)	-0.22691	-0.33248	-0.217
	-0.079498		(-2.06512)	-0.09263	-0.43137
	-0.21602	-0.090584			
D(LNRE(-2))	(-0.36801)	-0.04889	-0.249751	-0.028885	0.017879
		(-1.85294)	-0.20403	-0.29895	-0.19511
	0.01515		(-1.22408)	(-0.09662)	-0.09163
	-0.19424	-0.006452			
D(LNRE(-3))	-0.07799	-0.04357	-0.03883	-0.609241	-0.053452
		(-0.14810)	-0.18183	-0.26642	-0.17388
	0.113573		(-0.21355)	(-2.28679)	(-0.30741)
	-0.1731	-0.070796			
D(LNRE(-4))	-0.65611	-0.04515	-0.199931	0.01402	0.018863
		(-1.56810)	-0.18843	-0.27609	-0.18019
	-0.019062		(-1.06105)	-0.05078	-0.10468
	-0.17938	0.489588			
D(LNINF(-1))	(-0.10627)	-0.37382	0.770721	-0.097146	1.226438
		-1.3097	-1.56016	-2.28597	-1.49196
	0.481968		-0.494	(-0.04250)	-0.82203
	-1.48528	-0.705255			
D(LNINF(-2))	-0.3245	-0.69347	-0.348108	3.07932	-1.082601
		(-1.01700)	-2.89424	-4.24069	-2.76774
	0.129801		(-0.12028)	-0.72614	(-0.39115)
	-2.75533	0.007618			
D(LNINF(-3))	-0.04711	-0.69351	2.626129	-2.763878	-2.178713
		-0.01098	-2.8944	-4.24092	-2.76789
	1.774274		-0.90731	(-0.65172)	(-0.78714)
	-2.75548	0.228734			
D(LNINFI(-4))	-0.64391	-0.3758	-3.08145	0.733814	2.581826
		-0.60866	-1.56843	-2.29808	-1.49987
	-2.196464		(-1.96468)	-0.31932	-1.72136
	-1.49315	0.008946			
C	(-1.47103)	-0.00724	-0.013296	-0.024901	0.03351

	-0.019655 -0.02875 (-0.68360)	-1.23622 0.97741	-0.0302 (-0.44024)	-0.04425 (-0.56272)	-0.02888 -1.16025
R-squared	0.832957	0.963457	0.922051	0.624078	0.616568
Adj. R-squared	0.729783	0.002606	0.873905	0.39189	0.379742
Sum sq. resids	0.04114	0.008755	0.045392	0.097451	0.041511
S.E. equation	0.034785	70.05039	0.036539	0.053537	0.034942
F-statistic	8.073355	199.8481	19.15146	2.687819	2.603468
Log likelihood	122.5912	-6.351719	119.8368	98.44471	122.3396
Akaike AIC	-3.592544	-5.556045	-3.494173	-2.730168	-3.583558
Schwarz SC	-2.79687	0.012299	-2.698499	-1.934494	-2.787884
Mean dependent	-0.027139	0.045797	-0.023023	-0.003159	0.054533
S.D. dependent	0.066917		0.102897	0.068653	0.044367
Determinant Residual					
Covariance		6.07E-21			
Log Likelihood		906.1399			
Akaike Information Criteria		-28.255			
Schwarz Criteria		-24.09579			

APPENDIX 2: Impulse Response Function Graph(Figure 6)