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TRADE LIBERALIZATION AND IMPORT REVENUE EVIDENCE FROM GHANA

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Abstract

Trade liberalisation has been at the centre of economic reforms in Ghana since 1983. This has led to an increase in the volume and value of imports which in turn is expected to increase import revenue in the country. The study uses Time Series data on Ghana to examine both the short and long term relationship between trade liberalisation and import revenue. It makes use of the Johansen and Juselius (1990) Cointegration tests and the Granger (1997) causality tests to examine both the long run and short run dynamics. The empirical result indicates that trade liberalization enhances imports both in the long-run and short-run. Again, the result shows that there is a positive unidirectional causality running from trade liberalisation to imports revenue without feedback in Ghana. This suggests that policies concerning imports can be boosted by trade liberalisation in the economy.

Keywords: Trade Liberalisation, Trade openness, Import Revenue, Cointegration, Granger Causality, Time Series

INTRODUCTION

Most of the economic literature consider that trade leads to an increase in welfare derived from an improved allocation of domestic resources. Trade Openness or liberalisation refers to the degree to which nationals and foreigners can transact trade without artificial (that is, governmentally imposed) costs, including delays and uncertainty. Trade openness is desirable because relative international prices that reflect the international marginal rate of transformation in a competitive international economy is equated with domestic prices for an efficient allocation of resources (Quartey, Aidam & Obeng, 2007).

Trade liberalization is normally associated with the reduction, removal and elimination of taxes on goods and services (including tariffs and import duties), and other trade barriers such as quotas on imports, subsidies, and non-tariff barriers to trade. It also includes the removal of trade-distorting policies, free access to market, free access to market information, the reduction of monopoly or oligopoly power, free movement of capital and labour between and within countries, and the creation of free trade zones. Trade liberalization may also take many forms such as free trade zones, free trade area, trade blocs, and free trade agreements at bilateral, multilateral, or regional agreements.

The issue of whether trade and increased openness leads to higher rates of imports is an age-old question which has sustained debate between pro-traders and protectionists over the years. The early proponents of free trade lauded the gains from trade that countries will derive when they specialize in the production of goods in which they have comparative advantage and engage in trade to meet their other needs. It is believed that the gains from this type of trade are static and exist only in the short term under a perfect competition.

The new development theorists contend that openness stimulates technological change by increasing domestic rivalry competition, leading to increased innovation; and, that trade liberalization by allowing new goods to flow freely across national borders increases the stock of knowledge for technological innovation which spurs growth.

Economists have long been interested in factors which cause different countries to import or export at different rates and achieve different levels of wealth. One of such factors is trade. Generally, many economists agree that openness to international trade accelerates development (Dollar and Kraay, 2000). The consensus on the relationship between trade liberalization and import composition has only recently become a topic of debate in the field of international and development economics. This debate follows the major article by Rodrik and Rodriguez (1999), which disputes the assumption of a strong positive correlation between external openness and import composition in developing countries.

Ghana, in 1986 adopted the policy of trade liberalization as part of the reform and adjustment programmes of the Breton Wood Institutions. 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 analysed to support this argument. One approach to development is to concentrate on exports and reducing imports. 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" (Hogendorn, 1996; Cyper& Dietz, 1997).

Although there are some disagreements among economists, some empirical works suggest that there is a strong positive relationship between trade liberalization and import composition. Most of the empirical studies concentrate on exports extensively, thus ignoring completely the effect of trade liberalization on import composition in the analysis. One technique to identify the important role of trade is to examine its effect of import composition.

However, in the economic development strategies, exports have long held centre stage. Imports have been shunned, regarded as substitutes for locally-produced goods. But as the high technology, global economy takes hold, the effect of trade liberalization on imports demands deeper examination. 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. There is therefore the need to examine trade liberalization and import revenue. This paper therefore focuses on the effect of trade liberalization on import revenue in Ghana. In particular, it assess empirically the relationship and the direction of causality between trade liberalization and imports in Ghana.

The rest of the paper is organised as following. Section 2 deals with related literature. Section 3 describes the empirical methodology. Section 4 presents data and empirical results. Conclusions and policy recommendations are given in section 5.

REVIEW OF RELATED LITERATURE

This section presents a brief review of empirical works that have been done in this area of study. Babatunde, et al. (2010) brought out the view that demand for import is functionally related to real expenditure and real exchange rate, a formulation based on the monetarist approach to the balance of payments. Olopoenia (1991) developed the stock adjustment import-exchange model that has its source in the balance of payment theory. Although this model omits

variables such as real domestic income and relative prices, it supports the proposition that foreign exchange earnings are major factors influencing real imports in developing countries.

Shiells, Stern and Deardorff (1989) investigate the impact of trade liberalization on import demand. The methodology of Shiells et.al (1989) has recently become a point of focus to researchers that conduct analyses on import-demand elasticities at disaggregated level. Its main attraction is that it treats different product groups symmetrically so that import demand functions derived for one product group are consistent with import demand functions in other product groups. It also accounts for the effects of changes in relative prices on the consumer's allocation of expenditures between imported and domestic product groups. Such changes may come from a variety of sources, like changes in tariffs, non-tariff barriers, exchange rates, domestic prices and wages, for which trade liberalization may be a basic stimulus. These are desirable qualifications to obtain reliable elasticity estimates. Their estimates have widely been used in many literatures, especially in testing the political economy and trade models:

Gawande and Krishna (2003) estimated price elasticities of disaggregated export and import demand for the U.S., the European Union and Japan. Marquez and McNeily (1988) obtained income and price elasticities for exports and imports of developing countries. Marquez et al., (2000) obtained income and price elasticities for bilateral trade flows for Canada, Germany, Japan, the UK the U.S. and (combined) rest of the OECD countries and all the LDCs. Asseery and Peel (1991) estimated aggregate import demand models for the U.S., Canada, UK, Japan and Germany.

Reinhart (1995) examined the determinants of import demand for developing countries. The study provided interesting results for developing countries involved, where the elasticities differ considerably across regions. The price elasticities for the regions are: Latin America: -0.36; Asia: -0.40; Africa: -1.36; All countries: -0.53. The income elasticities are: Latin America: 0.96; Asia: 1.39; Africa: 1.14; All countries: 1.22.

Besides, the influence of trade liberalization on import performance, and the behaviour of import demand elasticities during the process of reform, has been analysed in different ways. Melo and Vogt (1984) propose two interesting hypotheses in this regard, for which they found support by analysing the case of Venezuela. First, they suggest that as the degree of import liberalization increases, the income elasticity of demand increases. That is, the relaxation of controls will tend to increase the income elasticity automatically. Second, as economic development proceeds, the price elasticity of import demand also rises as the ability to substitute domestic production for imports (import substitution) become easier.

However, the subsequent empirical evidence regarding the hypotheses has not been conclusive. For instance, Boylan and Cuddy (1987) examined the two hypotheses for the case

of Ireland and did not find empirical support for them. Mah (1999) argues, however, that Boylan and Cuddy's findings are misleading because of methodological shortcomings. Mah (1999) examines the Melo and Vogt (1984) hypotheses during the process of economic development in Thailand using according to the author, 'a more appropriate empirical technique'. The results support the hypothesis related to the income elasticity, showing that the income elasticity increased as a result of trade liberalization. However, the price elasticity was not found to be responsive to trade liberalization.

Ghani, (2011) studied the impact of trade liberalization on imports for a developing economy, accounting for the response of imports to the elimination of tariff and non-tariff barriers. Through the development of a theoretical model and empirical application to Morocco, the authors show that quantity restrictions (QRs) had a significant impact not only on the level of imports, but also on their sensitivity to income and price variations. For instance, the authors demonstrated that, QRs for consumption goods been lifted in 1985 (the date used for the prediction test), their income elasticity would have increased from 0.93 to 1.20.

RESEARCH METHODOLOGY

Empirical studies examining the long and short run relationship between two or more time series variables are generally based on cointegration and the standard Granger –causality tests. The study uses the Johansen and Juselius (1990) cointegration procedure. Prior to testing for causality, the unit root test is implemented to determine the order of integration of the individual series and cointegration tests to control for long run relationship. When cointegration exists, the relationship between the variables are transformed into an error correction model to take care of the short run dynamics and the parameters associated with the causality identified (Engle and Granger 1987; Johansen and Juselius, 1990). A good rationale for using Johansen and Julius (1990) procedure is the fact that our variables under investigation are all integrated of the same order, I (1).The Hendry-type testing-down (general-to-specific) procedure may be used to specify the short run relationship correctly (Thomas, 1993). This involves specifying a general model, which include all variables that influence the phenomenon being investigated.

Johansen and Juselius Approach to Cointegration

Johansen (1988) and Johansen and Juselius (1990) developed the multivariate method that explicitly used the vector autoregressive (VAR) and the vector error correction (VECM) framework for the testing of the presence of cointegration and estimation of long-run and short-run relationships among non-stationary macroeconomic time series. Moreover, both long-run

(cointegration) relationships and short-run dynamics of the variables in the system can be established. The relationship between VAR and VECM is expressed as follows.
Assume an unrestricted reduced form VAR (p):

$$X_t = \alpha + \phi_1 X_{t-1} + ... + \phi_k X_{t-k} + \varepsilon_t, \quad t = 1, 2..., n \qquad (1)$$

Where, $X_t, X_{t-1}...X_{t-k}$ contains integrated series of order one *I(1)* and *k* denotes the lag length of the series. $\phi_1.....\phi_k$ are a vector of coefficients to be estimated, α is a of vector intercepts while ε_t is a vector of error terms and since there are only lagged values of the endogenous appearing on the right-hand side of the equations, simultaneity is not an issue and OLS yields consistent estimates. Estimation of equation (1) requires that $\varepsilon_t \sim N(0, \Omega)$ where Ω is non-diagonal covariance matrix that remains constant overtime.
Following Johansen (1991) and provided that the variables are integrated of order one and cointegrated, further assuming Δ represent the first differences, equation (1) is transformed into an equilibrium error correction model of the form:

$$\Delta X_t = \alpha + \Pi X_t + \psi_1 \Delta X_{t-1} .... \psi_{k-1} \Delta X_{t-k+1} + \varepsilon_t \quad t = 1, 2..., n \qquad (2)$$
$$\text{where } \psi_i = -(\phi_{i+1} + ... + \phi_k), \; i = 1, ..., k-1, \text{and} \, \Pi = -(I - \phi_1 - .... - \phi_k)$$

The ψ_i represent the matrixes of coefficients of the first difference variables that capture the short-run dynamics. The coefficients of the lagged dependent variable indicate inertia as well as the formation of expectations. The coefficients of the other lagged endogenous variables provide estimates for pass-through effect or impact assessment. The coefficient matrix Π contains information about the long-run relationships among the variables involved in the model.

Since ε_t is stationary, the rank of matrix Π , denoted by *r*, determines how many linear combinations of X_t are stationary, i.e., the number of cointegrating vectors.
The error correction representation of equation (2) is expressed under the null hypothesis as in equation (3):

$$\Delta X_t = \alpha + \psi_1 \Delta X_{t-1} + ... + \psi_{k-1} \Delta X_{t-k+1} + \theta(\beta' X_{t-p}) + \varepsilon_t \qquad (3)$$

Where, the columns of β are interpreted as distinct cointegration vectors providing the long-run relationships $(\beta' X_t)$ among the variables, and $\theta's$ are the adjustment or the error correction

coefficients indicating the adjustment to the long-run equilibrium. β contains the coefficients of the *r* distinct cointegrating vectors giving that $\beta' X_t$ is stationary (X_t may not necessarily be stationary). The cointegrating vectors indicate the long-run interrelationship among these variables. A priori expectations about the past effects of independent (exogenous) variables on the dependent variables (normalized variables) can be specified only in the long run. Any idea about the past effects of lagged endogenous variables on the dependent variables cannot be ascertained a priori in the short run because the nature of these effects depends on the position of the short-run equilibrium in relation to the long-run equilibrium. In a dynamic model, the short-run equilibrium or disequilibrium is always adjusting towards the long-run equilibrium and this adjustment can be downward or upward. However, a priori expectations about the short-run effects of exogenous variables on the dependent variables can be specified.

One major problem in the estimation of VAR and VEC models is the selection of an appropriate lag length. Thus strictly speaking, in an m-variable VAR model, all the m variables should be stationary. The lag length plays a crucial role in diagnostic tests as well as in the estimation of VECM and VAR models (Bhasin, 2004). As a result, appropriate lag length (p) will be chosen using standard model selection criteria (AIC and SBC) that ensure normally distributed white noise errors with no serial correlation.

Johansen (1988) cointegration techniques allow us to test and determine the number of cointegrating relationships between the non-stationary variables in the system using a maximum likelihood procedure. There are two tests to determine the number of cointegrating vectors namely, the trace test and the maximum eigenvalue test. They are defined as follows:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1-\lambda_i) \qquad (4)$$

$$\lambda_{\max}(r, r+1) = -T \ln(1-\lambda_{r+1}) \qquad (5)$$

Where, λ_i the estimated value of the characteristic roots, T is the number of usable observations, and *r* is the number of distinct cointegrating vectors. In the trace test, the null hypothesis (H_0) is that there is at most r cointegrating vectors (r =0,1,2...) is tested against an alternative hypothesis. Alternatively, in the maximum eigen value test, the null hypothesis $(H_o : r = 0)$ is tested against the alternative $(H_1 : r = 1)$. This is followed by $(H_0 : r = 1)$ against $(\mathrm{H}_0 : r = 2)$, and so forth. The trace and maximum Eigen value statistics are compared with the critical values tabulated in Osterwald-Lenum (1992). The distribution of the

statistics depends on the number of non-stationary components under the null hypothesis and whether or not a constant is included in the cointegrating vector.

Granger causality

The study of causal relationships among economic variables has been one of the main objectives of empirical econometrics. Also according to Engle and Granger (1987), cointegrated variables must have an error correction representation. One of the implications of Granger representation theorem is that if non-stationary series are cointegrated, then one of the series must granger cause the other (Gujarati, 2004). Thus, Granger (1969) observed that it is difficult to determine the direction of causality between two related variables. Therefore to examine the direction of causality in the presence of cointegrating vectors, Granger causality is conducted based on the following:

$$\Delta X_t = \alpha_0 + \sum_{i=1}^{p} \beta_{1i} \Delta X_{t-i} + \sum_{i=0}^{p} \psi_{1i} \Delta Y_{t-i} + \varphi_{1i} ECT_{t-1} + \nu_t \qquad (6)$$

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{p} \beta_{2i} \Delta Y_{t-i} + \sum_{i=0}^{p} \psi_{2i} \Delta X_{t-i} + \varphi_{2i} ECT_{t-1} + \mu_t \qquad (7)$$

Where, ΔY_t and ΔX_t are non-stationary dependent and independent variables, ECT is the error correction term, φ_{1i} and φ_{2i} are the speed of adjustments, *p* is the optimal lag order while the subscripts *t* and *t-I* denote the current and lagged values. If the series are not cointegrated, the error correction terms will not appear in equations (6) and (7).

Model Specification

The empirical model draws on Osei (2012) by adopting a modified specification for import demand. Consistent with the objectives of the study and in accordance with the literature, the study applied natural logarithm in order to effectively linearize exponential trend (if any) in the time series data (Asteriou& Hall, 2007).The long run import revenue equation is then specified as follows:

$$\ln IMPREV_t = \phi_0 + \phi_1 \ln TLIB_t + \phi_2 \ln RGDP_t + \phi_3 \ln FEXC_t + \phi_4 \ln GEXP_t + \phi_5 \ln LEXC_t + \phi_6 \ln FASSET_t + \varepsilon_t \qquad (8)$$

Where, $IMPREV_t$ is import revenue, $TLIB_t$ represents trade liberalization, RGDP is real GDP, $FEXC_t$ denotes foreign exchange reserves, $GEXP_t$ is government expenditure, EXC_t and $FASSET_t$ represent exchange rate and foreign asset respectively. In most theoretical and

empirical studies, trade liberalisation is defined as the ratio of net exports (imports) to Gross domestic product (GDP). In this paper, trade liberalisation followed same measurement and captured as a dummy. Periods of implementation of liberalisation are represented as dummies or otherwise.

As domestic income level (real GDP) increases, import revenue (LIMPREV) increases, so RGDP is expected to be positively related to imports. Trade liberalization (TLIB) on the other hand, is expected to be positively related to imports. Thus a country that liberalises its trade, imports are expected to increase since it becomes relatively easier to engage in trade. An increase in the nominal exchange rate (LEXC) would deteriorate demand for imports as foreign goods would be relatively more expensive hence it is expected that exchange rate will be negatively related to imports. Foreign exchange reserves (LFEXC) is considered as an important determinant of imports in developing countries hence, its inclusion in the equation. The sign of foreign exchange reserve is expected to be positively related to imports. Thus an increase in foreign exchange reserves means there will be more funds available for imports. Government expenditure (LGEXP) and foreign asset (FASSET) are expected to be positively related to imports.

To estimate the short-run model for this study, it is necessary to estimate the error correction model. Thus the error correction model result demonstrates the speed of adjustment back to the long-run equilibrium after a disturbance. Thus the expected short run imports is indicated by equation (9).

$$\Delta \ln IMPREV_t = \phi_0 + \sum_{i=1}^{n} \gamma \Delta \ln IMPREV_{t-i} + \sum_{i=1}^{n} \phi_1 \Delta \ln TLIB_{t-i} + \sum_{i=1}^{n} \phi_2 \Delta \ln RGDP_{t-i} + \sum_{i=1}^{n} \phi_3 \Delta \ln FEXC_{t-i}$$
$$+ \sum_{i=1}^{n} \phi_4 \Delta \ln GEXP_{t-i} + \sum_{i=1}^{n} \phi_5 \Delta \ln LEXC_{t-i} + \sum_{i=1}^{n} \phi_6 \Delta \ln FASSET_{t-i} + \varphi_1 ECT_{t-1} + \varepsilon_t \quad .....(9)$$

Where, ln represents natural logarithm, *t*is time subscript ECT_{t-1} is the error-correction term; the residuals from the co-integration equation lagged one (1) period. The ϕ_1 to ϕ_6 are the elasticities of the respective variables while φ_1 is the speed of adjustment to the long-run equilibrium following a shock to the system. ε_t is the stochastic error term, ϕ_0 is the drift component and Δ is the difference operator. The coefficient of the lagged error correction term is expected to be negative and statistically significant to further confirm the existence of a co-integrating relationship.

ANALYSIS & FINDINGS

The study uses secondary data. Quarterly series is generated from an annual series using Gandolfo (1981) algorithm. Time series data runs from 1972Q1 to 2010Q4. All the series for the various variables are obtained from World Bank (2011), Bank of Ghana's Annual Reports(various issues) and Quarterly Economic Bulletins. The study adopted the Johansen approach to cointegration to obtain both the short and long-run estimates of the variables involved.

As a first step, we need to determine the order of integration for each of the variables used in the analysis. This is to ensure that all of the variables are I (1); an important requirement of the Johansen and Juselius (1990) test approach. We use the well-known Philips-Perron (1988), andthe Augmented Dickey-Fuller (1981) tests to identify the order of integration of each variable. The test results are reported in Table 1.

Table 1. Unit Root Test: ADF and PP Tests for the order of integration

Variables	ADF Statistics	PP Statistics	Order Of Integration(OI)
FASSET	5.054496(1.00)	7.037010 (1.0000)	I(1)
DFASSET	-5.258357 (0.00) ***	-3.524823 (0.0402)**	I(0)
LIMPREV	0.975420(0.9999)	-2.900114(0.1654)	I(1)
DLIMPREV	-8.944212(0.000)***	-8.936831(0.000)***	I(0)
LGEXP	-0.036537(0.9955)	-0.327766(0.9892)	I(1)
DLGEXP	-3.769731(0.0210)**	-10.15719(0.005)***	I(0)
LEXC	-1.346193(0.6071)	-0.900907(0.9524)	I(1)
DLEXC	-3.242062(0.0195)**	-3.742257(0.0224)**	I(0)
LFEXC	-1.876723(0.3426)	-1.811663(0.3738)	I(1)
DLFEXC	-9.409920(0.000)***	-9.031216(0.000)***	I(0)
TLIB	-1.783058(0.3878)	-1.747341(0.4055)	I(1)
DTLIB	-11.74192(0.000)***	-11.69282(0.000)***	I(0)
LRGDP	-2.144784(1.5164)	-2.312201(0.4245)	I(1)
DLRGDP	-5.323547(0.000)***		I(0)

*Note: D denotes first difference, *** and ** represent significance at the 1% and 5% levels respectively. Figures in brackets are P-Values, L represents lags.*

Source: Computed from WDI (2011) and BoG data

The results indicate that all the variables are not stationary in their levels. However, after first differencing the variables, the null hypothesis of unit root can be rejected at 5% significance level for all the series. This situation satisfies the Johansen and Juselius (1990) precondition that all the variables in the model must be I (1).

In the second step, the study tested for cointegration using Johansen's multivariate approach. Finally, the study employed granger-causality to test for causality. The causality test is preceded by cointegration testing since the presence of cointegrated relationships have implications for the way in which causality testing is carried out.

Johansen cointegration test and VECM were used to examine the long-run and short-run dynamics among the variables. As stated in the last section, a critical part of the Johansen and Juselius cointegration test is the selection of the appropriate lag length for the unrestricted VAR and VECM multivariate and causality analysis. The lag length k for the UVAR is determined using the Akaike information criterion (AIC), sequential modified LR test statistic (each test at 5% level), and Final prediction error criterion (FPE). Table 2 presents the lag order selection test results. It can be observed that the appropriate lag length for the model is 5.

Table 2: VAR lag order selection criteria for import revenue model

Lag	LogL	LR	FPE	AIC
0	-2931.185	NA	4.13e+08	39.70520
1	-1163.243	3344.755	0.033771	16.47625
2	-977.3815	334.0479	0.005335	14.62678
3	-928.1374	83.84815	0.005374	14.62348
4	-861.3424	107.4136	0.004313	14.38301
5	-798.4678	95.16153*	0.003698*	14.19551*
6	-772.0633	37.46588	0.005281	14.50086
7	-751.4638	27.28044	0.008336	14.88465
8	-715.2639	44.51609	0.010951	15.05762

** indicates lag order selected by the criterion*

Table 3 on next page, presents the cointegration tests results. As can be seen from Table 3, that the trace statistic indicates the presence of cointegration among the variables. In particular, the null hypothesis of no cointegrating relationship among the variables cannot be rejected at the conventional 5% level of significance. This confirms the existence of a stable long-run relationship among import revenue, trade liberalization, foreign exchange reserve, government expenditure, nominal exchange rate, foreign asset and real GDP.

Table 3a: Johansen's Cointegration Test (Trace) Results for import model

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.302891	215.7408	150.5585	0.0000
At most 1 *	0.285117	161.6188	117.7082	0.0000
At most 2 *	0.210497	111.2734	88.80380	0.0005
At most 3 *	0.198950	75.82063	63.87610	0.0036
At most 4	0.108316	42.54588	42.91525	0.0544
At most 5	0.085391	25.34932	25.87211	0.0580
At most 6	0.076641	11.96050	12.51798	0.0618

Trace test indicates 4 cointegrating equation(s) at both 5% and 1% levels
*Note: *(**) denotes rejection of the hypothesis at the 1% (5%) level*

Table 3b: Unrestricted Cointegration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.302891	54.12199	50.59985	0.0207
At most 1 *	0.285117	50.34537	44.49720	0.0104
At most 2 *	0.278173	48.89538	44.49720	0.0156
At most 3 *	0.198950	33.27476	32.11832	0.0360
At most 4	0.108316	17.19655	25.82321	0.4413
At most 5	0.085391	13.38882	19.38704	0.2977
At most 6	0.076641	11.96050	12.51798	0.0618

Max-eigenvalue test indicates 4 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Based on the fact that there are cointegrating vectors among the variables, the estimated long-run equilibrium relationship for import revenue is therefore specified as:

$$LIMPREV = 0.006844T + 0.436509TLIB + 0.330951LRGDP + 0.042602LFEXC + 0.081627LGEXP - 0.046794LEXC + 3.990245FASSET \quad (10)$$

The estimated long run coefficient of trade liberalisation is 0.436579 and the error correction term is negative and significant. Trade liberalization has a positive and significant impact on import revenue in the long run. This means that shifting from a period of non-trade liberalization to a period of trade liberalization in the long-run would lead to approximately 43.7% increase in import revenue in the long run. This positive effect is an indication that trade liberalization have led to an upward shift in the time path of imports in the long run. This is because, as countries

liberalise their trade, trading with the rest of the world become relatively easier making it possible for trade to effectively take place. This in the long run has the tendency of increasing import in the country, hence making import revenue to relatively increase. This result is however, consistent with findings of Masih and Masih (2000), Gawande and Krishna (2003) and Shiells, Stern and Deardorff (1989).

The time trend has a positive impact on import revenue which means that, as time passes by import composition will increase by approximately 0.68% in the long run. The results further indicate that real GDP, foreign exchange reserve, government expenditure, foreign assets and nominal exchange rate all have positive and significant impact on import revenue in the long run. As the economy expands peoples taste and preference increase thereby increasing the demand for goods and services. Thus if the demand for goods and services more than offset the supply, it in turn creates shortage which is catered for by importing the needed goods and services to offset the shortage (Bahmani- Oskooee and Rhee (1997) and Reinhart (1995)). This suggests that, these variables are good channels through which import revenue can be increased and decreased respectively (Olopoenia (1991) and Babatunde, et al., (2010)).

Given that our variables are non-stationary but cointegrated, estimation of the VECM, which included a first differenced VAR with a one period lagged error correction term yielded an over-parameterized model. However, the general to specific approach was employed to arrive at a more parsimonious model. The parsimonious VECM for the import revenue model is presented in Table 4. The process of moving from general to specific brings about a simplification of the model that makes the estimation more reliable and increases the power of the test (Rutayisire, 2010).

Table 4: Parsimonious Error Correction Model (VECM) for import revenue

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.182461	0.052016	-3.507786	0.0007
D(LIMPREV(-1))	0.290009	0.097535	2.973379	0.0036
D(TLIB(-4))	0.408972	0.079195	5.164147	0.0000
D(LFEXC(-4))	0.019254	0.006574	2.928993	0.0041
D(LGEXP(-4))	0.045840	0.019122	2.397185	0.0181
D(LRGDP(-1))	0.033092	0.010238	3.232249	0.0019
D(LEXC(-3))	-0.060618	0.030502	-1.987353	0.0493
D(LEXC(-5))	-0.045785	0.026097	-1.754413	0.0820
D(FASSET(-4))	0.588669	0.309361	1.902855	0.0614
C	0.224519	0.075805	2.961817	0.0042

R-squared=0.598788 DW= 2.044014 F-statistic= 4.861115 Prob= 0.000000

Table 5: Diagnostic Test

Diagnostic	Statistic	Conclusion
Ramsey RESET Test:	F-statistic=0.158822 (0.6914) Log likelihood ratio=0.224750 (0.6354)	Equation is stable
Heteroskedasticity Test: ARCH	F-statistic=0.568865 (0.7237)	No Heteroskedasticity
Breusch-Godfrey Serial Correlation LM Test:	F-statistic=1.055002 (0.3894)	No Serial Correlation
Multivariate Normality	Jarque-Bera test = 12.14009 (0.1451)	Residuals are normal

The results from the vector error correction model as displayed in the Table 4 suggest that the ultimate effect of previous periods' values of import revenue on current values of import revenue in the short-run is positive and significant. The implication is that current values of import revenue are affected by previous quarters' values of import revenue.

The coefficient of the lagged error-correction term is negative and statistically significant at 1% significance level. This suggests that it would take a short time for the system to return to its equilibrium once it is out of equilibrium. A highly significant error correction term further confirms the existence of a stable long-run relationship (Bannerjee, Dolado and Mestre, 1998).The estimated coefficient of-0.182461 denotes that about 18.25% of the disequilibrium in the imports market caused by previous years' shocks converges back to the long-run equilibrium in the current year. Thus, the study discerns that the variables in the model show evidence of moderate response to equilibrium when shocked in the short-run. Since, the magnitude of the coefficient in this study is relatively large it suggests that the speed of adjustment to the long-run changes is relatively high.

The results of the short run dynamic coefficient of trade liberalization has the expected sign. Thus, trade liberalization in the short run has a positive relationship with import revenue. This means that shifting from a period of non-trade liberalization to a period of trade liberalization in the short-run would lead to approximately 40.9% rise in import revenue in the short run. The positive effect is an indication that trade liberalization have led to an upward shift in the time path of import revenue. This however means that as countries liberalise their trade, import revenue in the short run has the propensity to also increase given that all other factors are held constant.

The diagnostic test result presented in Table 5 shows that the model is correctly specified and does not suffer from any specification errors. There is no evidence of spurious regression. The F-statistic is significant implying that the explanatory variables in the model are good predictors of import revenue.

Table 6: Granger causality test between imports and trade liberalization

Null Hypothesis:	F-Statistic	Probability
LIMP does not Granger Cause TLIB	0.97638	0.4345
TLIB does not Granger Cause LIMP	14.5538	2.E-11***

*Note: *** denotes rejection of null hypothesis at 1% level of significance.*

As can be seen from the p-values of the F-statistic, there is evidence of causality between trade liberalisation and import revenue and no causality between imports and trade liberalisation. There is a positive unidirectional causality running from TLIB to LIMPREV without feedback, implying that past values of trade liberalisation have a predictive ability in determining the present values of import revenue in Ghana. This suggests that policies concerning imports can be boosted by liberalising trade in the economy.

CONCLUSION AND POLICY RECOMMENDATIONS

In this paper, we have empirically examined the long run, short run and causal relationship between trade liberalisation and import revenue for Ghana. The Johansen and Juselius (1990) approach to cointregration was used. The result shows evidence of both long run and short run relationships between the series for Ghana. From the results of both the long-run and short-run estimates it is evident that all the explanatory variables in the model were significant in explaining variations in import revenue. Thus the results of the VECM also showed that the error correction term for the import revenue model was significant and did carry the expected negative sign. Finally, we find that there is a uni-directional causality running from trade liberalization to import revenue without feedback.

This study in line with the empirical literature, confirmed both the long run and short run relationship between import and its determinants. Also the results indicated that trade liberalisation, real GDP, government expenditure, foreign asset and foreign exchange reserve had positive effect on import revenue with the greatest arising from trade liberalisation and foreign asset respectively both in long run and short run. Exchange rate on the other hand had a negative effect on import revenue.

The error correction term of the import revenue model shows that we can count on trade liberalisation, real GDP, government expenditure, foreign asset, foreign exchange reserve and exchange rate as policy variables to bring back import revenue to equilibrium in the face of a short run disturbance. The implication is that trade liberalization will enhance import revenue in both the long-run and short-run. In order to have a sustained decrease in imports through trade liberalization, it is recommended that export promotion be highly intensified as part of the trade liberalization policy. This will thus ensure an increase in export and a reduction in import hence help improve the balance of trade of the country. In addition, there should also be diversification of our exports to attract competitive prices on the world market.

We also find government expenditure to be growth enhancing. This implies that government should embark on expansionary fiscal policies in the form of increased government spending in the key sectors of the economy so as to increase output.

Finally, once exchange rate had negative and significant impact on import revenue both in the long and short run. The Bank of Ghana should follow a consistent sterilization policy through prices with respect to the exchange rate. The exchange rate are likely to depreciate if the economy is import-dominated rather than export oriented. Thus, by arresting the rate of depreciation of the local currency, the Bank of Ghana could solve the problem of excess liquidity.

This study examined the effect of trade liberalization on import revenue by including other control variables. The long-run and short-run relationships as well as the direction of causality were determined. The main limitation to this study is availability of quarterly data. Data used was extrapolated from an annual data into quarterly data in order to increase the power of the tests. The study however did not determine the level of trade liberalization that would either promote or distort import revenue. Given the current study, subsequent works would consider the possibility of exploring the desired level at which trade liberalization would either propel or harm revenues from imports in the country.

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