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UNIVERSITY OF CAPE COAST

TRADE OPENNESS AND ECONOMIC GROWTH: EVIDENCE FROM GHANA

BY

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Thesis submitted to the Department of Economics of the Faculty of Social Sciences of the College of Humanities and Legal Studies, University of Cape Coast in partial fulfilment of the requirements for award of Master of Philosophy degree in Economics.

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DECLARATION

Candidate's Declaration

I hereby declare that the thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Name: Isaac Dabel

Signature:…… Date: ……...

Supervisor's Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the university of Cape Coast.

Principal Supervisor's Signature:…….. Date:……..

Name: Prof. Isaac K. Acheampong

Co-Supervisor's signature:…… Date……..

Name: Dr. Camara K. Obeng

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ABSTRACT

In contrast to previous studies on the relationship between trade openness and economic growth, this study develops a new measure of trade openness. Composite Trade Intensity (CTI) was employed to generate an index to capture trade openness. The study used Trade Intensity (TI) and Relative World Trade Intensity (RWTI) dataset to create an index for trade policy openness. This new measure of trade openness improves on the results of trade openness compared with the traditional measure of trade openness which takes into account the size of Ghana's trade to the rest of the world in comparison to its national economy and this is shown in the long and short run estimates in Table 6 and Table 7 using CTI and Appendix C and Appendix D using TI (X+M/GDP) as a measure of trade openness respectively. The study used data which span from 1986 to 2015. The Autoregressive Distributed Lag (ARDL) approach to cointegration was used to examine this relationship. The regression results show that trade openness, FDI, real effective exchange rate, capital stock and labour force are important determinants of economic growth particularly in the long run. However, inflation was found to be growth hampering. The Granger causality test revealed a unidirectional causality between trade openness and economic growth running from trade openness to growth. The study recommends that policy should focus on export promotion strategy and encourage efficient utilization of capital goods; ensuring enabling environment to attract the needed FDI to the industrial and the agricultural sectors; and maintaining price stability in order to stimulate economic growth in Ghana.

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DEDICATION

To my lovely and blessed Dabel family and my lovely mother Madam Charlotte Armoo and Rev. Father Ansah.

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LIST OF ACRONYMS

ADF	Augmented Dickey-Fuller
AERC	African Economic Research Consortium
AIC	Akaike Information Criterion
AR	Autoregression
ARDL	Auto Regressive Distributed Lag
BLACK	Black Market Premium
BOP	Balance of Payments
BW	Bandwidth
BIC	Bayesian Information Criterion
CMAP	Collaborative Masters Programme
CRS	Constant Returns to Scale
CPI	Consumer Price Index
CTI	Composite Trade Intensity
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMSQ	Cumulative Sum of Squares of Recursive Residuals
DF	Dickey-Fuller
DW	Durbin Watson
ECM	Error Correction Model
ECT	Error Correction Term
ERP	Economic Recovery Programme
FDI	Foreign Direct Investment
FPE	Final Prediction Error
GDP	Gross Domestic Product
GNP	Gross National Product

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GFCF	Gross Fixed Capital Formation
GMM	Generalized Method of Moments
H-O	Heckscher-Ohlin
HQ	Hannan-Quinn Information Criterion
IMF	International Monetary Fund
INF	Inflation
JFE	Joint Facility for Electives
K	Capital
L	Labour
LDCs	Less Developed Countries
LF	Labour Force
LFDI	Log of Foreign Direct Investment
LRGDP	Log of Real Gross Domestic Product
LK	Log of Capital
LLF	Log of Labour Force
LOPEN	Log of Trade Openness
LOPENTR	Traditional measurement of trade openness
LR	Long Run
LREER	Log of Real Effective Exchange Rate
M	Imports
MLE	Maximum Likelihood Estimation
MNCs	Multinational Corporations
MTIP	Movement Towards International Prices
NTB	Non Trade Barriers

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OECD	Organization of Economic Co-operation and Development
OLS	Ordinary Least Square
OPEN	Trade Openness
PP	Phillips-Perron
QR	Quantitative Restrictions
R&D	Research and Development
REER	Real Effective Exchange Rate
RWTI	Relative World Trade Intensity
SAP	Structural Adjustment Programme
SADC	Southern Africa Development Community
SBC	Schwartz-Bayesian Criterion
SIC	Schwartz Information Criterion
SR	Short Run
SSA	Sub-Saharan Africa
TFP	Total Factor Productivity
TI	Trade Intensity
TII	Trade Intensity Index
UK	United Kingdom
US	United States
US$	United States Dollar
VAR	Vector Auto Regression
VEC	Vector Error Correction
VECM	Vector Error Correction Model
WB	World Bank

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WDI	World Development Index
WDR	World Development Report
WTO	World Trade Organization
X	Exports

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CHAPTER ONE

INTRODUCTION

Background of the Study

The role of trade openness in promoting economic growth has been debated for quite a long time and this has sustained debates between advocates for trade openness such as Mercantilists, Adam Smith, David Ricardo, and John Stuart Mill and protectionists such as Raul Prebisch and Hans Singer over the years (Asiedu, 2013). Advocates of trade openness argued that when countries engaged in free trade, they specialize in the production of goods and services in which they have comparative advantage and engage in trade to meet their other needs, besides they argued that trade openness stimulates technological change by increasing domestic rivalry competition which intents increases the stock of knowledge for technological innovation which spurs growth. The protectionists' advocates on the other hand contended that trade openness is detrimental to growth in that it comes with it unheatlthy competition and also serves as a means for dumping goods by the 'so called' advanced countries and could lead to deterioration in the economy if adopted by developing economies. The Protectionist theory helped shaped strategies emphasizing infant industries protection dependent on tariff and non-tariff barriers of trade among many others (Mwaba, 2000). Theorists from both camps have influenced policy in many countries and at various stages of economic growth and development (Ayibor, 2012)

Trade openness, according to Quartey, Aidam and Obeng (2013), refers to the degree to which nationals and foreigners can transact trade without artificial (that is, governmentally imposed) costs, including delays and

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uncertainty. Trade openness 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 subsidies and non-tariff barriers to trade. Economic growth, on the other hand, is defined as the growth in individual human welfare, but on a practical level, Economic Growth is defined as the sustained increase in a country's real output or real gross domestic product overtime (Demetriades & Hussein, 1996). In this study, real GDP will be used as a proxy for economic growth instead of GDP growth rate or GDP per capita since it is the most popular measure of economic growth in the literature and mostly used too by the Breton Wood Institutions. This measure is preferred to other measures because, it nets out the effect of inflation on the price of the goods and service produced by adjusting inflation terms.

Economists have long been interested in factors which cause different countries to grow at different rates and achieve different levels of wealth. One of such factors is trade. Generally, many economists agree that openness to trade accelerates economic growth and development while others disagree that that openness to trade accelerates economic growth and development. The more rapid growth may be a transition effect rather than a shift to a different steady state growth rate (Dollar & Kraay, 2003). The relationship between trade openness and economic growth has been a topic of debate in the field of development economics. This debate follows the major article by Rodriguez & Rodrik (2001), which disputes the assumption of a strong positive correlation between external or trade openness and economic growth in developing countries.

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Additionally, researches that have been done in this field have been noted to produce a mixed bag of results all over the world (Herath, 2010). Tahir, Haji, and Ali (2014) observed that the results in the literature are mixed because of the issue of measurement of trade openness, endogeneity issue, sample selection and quality of data. It is line with this, that this study proposes a new measurement of trade openness (Composite Trade Intensity) instead of the traditional measurement since one of the major problems of great concern in most analytical works is those associated with the measurement of variables of interest and this problem is more acute for openness variables and ostensibly see how the new measure contributes to the controversy in the literature.

When Ghana gained independence in 1957, the country pursued a strategy of import substitution and implemented a series of restrictive trade policies including increasing tariffs, non-tariffs and exchange rate control inhibiting trade openness. This restricted trade coupled with the misaligned exchange rate eroded the competitiveness of exports while limitation on imported inputs and consumer goods also inhibited export production and production as a whole causing extremely low capacity utilization (Ghartey, 1987). The economy experienced negative growth rate for some of the years particularly between 1978 and 1983 where the annual average real GDP growth rate was –1.34%. The other years however, experienced positive growth rates though at declining rates (World Bank, 1995).

In order to correct the imbalances in the economy created by the restrictive economic policies, Ghana adopted Economic Recovery Programme (ERP) as part of the reform and adjustment programme of the Breton Wood

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Institutions to halt the downward economic spiral. Included in the reform and adjustment programme was trade openness. The objective was to open the economy to competition to enhance efficiency in domestic production which would eventually lead to growth in output, reduce the high incidence of balance of payment deficits and consequently enhance GDP growth (Sakyi, 2011).

The full implementation of the programme spread over 1983 – 1986. The second phase of the reform was when the Structural Adjustment Programme (SAP) was introduced to supplement the ERP. The SAP was geared towards correcting a number of structural imbalances in order to engender sustained healthy economic growth. It must be noted that, from the full implementation of the reform program in 1986 up till now, Ghana has not recorded a negative growth rate as it used to be in the restrictive economic policies and exports and import volumes have increased continuously (World Bank, 2001).

Statement of the Problem

The effect of trade openness on economic growth has been the subject of many discussions and studies. This is because economic theory does not provide a definite conclusion about the effect of trade openness on economic growth and more so empirical studies conducted have yielded a mixture of results. While some studies find trade openness to be beneficial such as Wacziarg (2001) and Ayibor (2012) others find trade openness to be detrimental to economic growth such as Rodriguez and Rodrik (2001) and Githanga (2015). According to Tahir, Haji, and Ali (2014), the results in the

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literature are mixed because of the issue of measurement of trade openness, endogeneity issue, sample selection and quality of data. It is line with this, that this study proposes a new measurement of trade openness (Composite Trade Intensity) instead of the traditional measurement and ostensibly sees how the new measure contributes to the controversy in the literature. To add, most of the empirical studies on the effect of trade openness on economic growth are mainly cross – country studies (Edwards, 1993; Leamer, 1988; Sachs and Warner, 1995) with the implicit assumption that developing countries share many common characteristics: low per-capita incomes and high illiteracy rate etc. Whereas this may be true to some extent, these countries differ largely in their exposure to economic problems, stabilization policy experiences and most importantly in their reactions to external shocks. And so the findings and recommendations of these studies cannot be directly applied to country specific (say Ghana) since these findings may not accurately and adequately reflect country specific experience.

Studies that have ventured to highlight the short-run and long-run effects of trade openness on economic growth in country specifics are elusive. More specifically empirical studies in this area in Ghana to serve as a guide to policymakers to the best of my knowledge are few (Asiedu, 2013; Sakyi, 2011 and Ayibor, 2012). Nevertheless, these studies use the traditional measurement of trade openness (X+M/GDP) and this has motivated this study. As a contribution to the literature, this study uses a new measure of trade openness, the composite trade intensity (CTI), suggested by Squalli and Wilson (2006) as a measure of trade openness for Ghana instead of (X+M/GDP) though a regression will be run with the traditional measurement and compared with the

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new measurement whether the new measurement improves the results of the traditional measurement or not. Thus, the purpose of this study is to investigate the effect of trade openness using composite trade intensity measure on economic growth in Ghana.

Objectives of the Study

The general objective of the study is to examine the effect of trade openness on economic growth in Ghana from 1986 to 2015. This period is chosen because it was during this period that trade openness policy actually took full effect and hence the motivation.

Specifically the study seeks amongst other things to;

- Investigate the long run relationship between trade openness and economic growth.
- Explore the short run relationship between trade openness and economic growth.
- Examine the direction of causality between trade openness and economic growth

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Hypotheses of the Study

H_N: There is no long run relationship between trade openness and economic growth.

H_A: There is long run relationship between trade openness and economic growth.

H_N: There is no short run relationship between trade openness and economic growth.

H_A: There is short run relationship between trade openness and economic growth.

H_N: There is no directional causality between trade openness and economic growth

H_A: There is directional causality between trade openness and economic growth

Justification for/Significance of the Study

Since growth is the engine of economic prosperity of any nation, this study will contribute to the development of policies and strategies that seek to promote growth in Ghana. Trade openness is very crucial which is often hypothesised to raise growth through several channels from the literature such as greater access to a variety of inputs for production, access to advanced technology from abroad, possibilities of catch-up, and access to broader markets that raises the efficiency of domestic production through increased specialisation. It therefore stands to reason that a better understanding of the link between trade openness and economic growth is important for policies to attract the needed trade openness to the various sectors of the economy to

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propel economic growth. But one problem associated with trade openness is how to measure it. It is in line with this that this study uses a new measure of trade openness, composite trade intensity (CTI), which is combination of trade intensity which captures the size of Ghana's trade with the rest of the world in comparison to its national economy and Relative World Trade Intensity (RWTI) which captures Ghana's trade with the rest of the world in comparison to world economy that hitherto eludes trade openness studies in Ghana. The results of the new measure of trade openness (CTI) gives slight improvement compared with the results of the traditional measurement (X+M/GDP) as can be seen in the long run and short run estimates in Table 6 and Table 7 (for CTI) and Appendix C and Appendix D (for X+M/GDP) respectively in this study and hence the justification for the study.

Scope of the Study

The study investigates the relationship between trade openness and economic in Ghana using annual time series dataset from 1986 to 2015. The study employs the Auto-Regressive Distributed Lagged (ARDL) Model otherwise known as the bounds testing approach to cointegration developed by Pesaran & Pesaran (1997); Pesaran, Shin, & Smith (2001). The study employs seven variables – real GDP as a proxy for economic growth, trade openness, ratio of FDI inflows to GDP as a proxy for FDI, real effective exchange rate, inflation, gross fixed capital formation as proxy for capital stock, and labor force as a proxy for labour force participation rate

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Organization of the Study

The study is organized into five main chapters with each chapter further divided into sections and sub-sections. The first chapter is the introductory chapter. Chapter two reviews both the theoretical and empirical literature on trade, trade openness and economic growth. Chapter three focuses on the specification of the empirical model and estimation technique employed in conducting the study. The results of the data collected for the study will be analyzed and discussed in the fourth chapter. The final chapter presents the summary, conclusions, and recommendations of the study.

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CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

The broad aim of this chapter is to present the review of relevant literature on the relationship between trade openness and economic growth. The first section looks at the theoretical literature on trade (trade openness) and economic growth with particular reference to the traditional explanation of trade and growth, determinants of economic growth. There are also channels in the trade policy – Growth Nexus**,** and literature review on Measures of openness. The last section deals with review of related empirical literature.

Review of Theoretical Literature

According to Weiss (1995), the policy prescription of trade openness (elimination of non-tariff barriers and reduction of tariff barriers) was popularized in the 1980s as recognition of:

1. The efficiency distortions generated by the import substitution industrialization strategy and
2. The disappointing economic performance of the inward oriented Latin American countries in the 1960s and 1970s which contrasted with the success of the outward oriented East Asian Tigers (Republic of Korea, Taiwan, Singapore and Hong Kong).

The advocates of trade openness focus on the followings:

a. Short term effects: This means that there are positive once-and-for all effects of openness through gains in technical efficiency by existing producers and the output they will produce from existing resources.

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For example, less corruption and less time wasted in obtaining import licenses; entry of imports might push previously protected producers to improve efficiency.

b. Medium term effects: Resources in the economy will be reallocated in response to the new set of relative prices that is obtained after the removal of trade controls. The country can expect net income gains if previous prices significantly diverge from relative prices on the world market; and there is adequate mobilization of resources so resources will move from the sector whose relative prices fall into those whose relative prices rise.

c. Long term effects: They are related to the dynamic effects of trade openness so the economy moves to a higher growth path. The arguments here are often based on increasing returns to scale and faster technological change either from international competition or transfer of skill and technology from one country to another.

The above information is represented in the figure (1):

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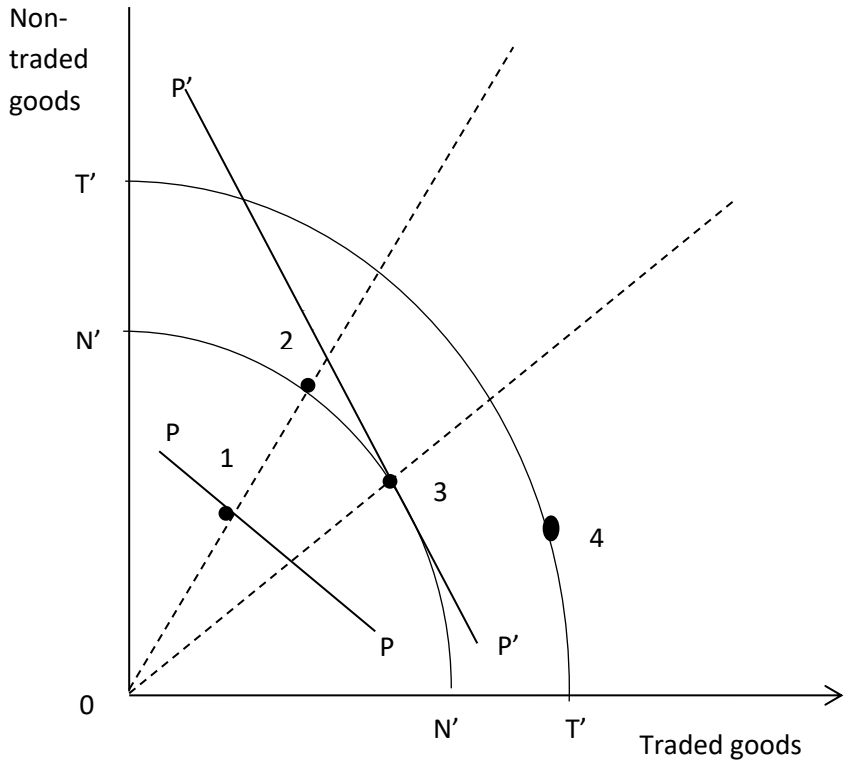

Figure (1): Effects of Trade Openness on the Economy

In explaining the diagram, let N'N' be the domestic production possibility frontier before trade openness. Under a system of trade controls, the initial position is a point such as 1 reflecting technical inefficiency. The protected relative domestic price ratio of traded to non-traded goods is PP. The short-term effect of openness can be represented as a move from 1 to 2 so as to remove the technical inefficiency. Let the post-liberation relative price be P'P' reflecting that the price of traded good increases relative to the non-traded goods. At P'P', the economy moves from 2 to 3 in the medium term and there is a shift towards production of traded goods. The long term effect is represented by T'T' (that is a shift in the domestic production possibility frontier) with a new production point such as 4 if technical progress is not neutral between sectors.

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The origins of the theoretical literature between trade and growth are Adam Smith's absolute advantage and David Ricardo's comparative advantage as well as the Hecksher–Ohlin theories (Jayme, 2001). The main key points of Adam Smith growth theory made in his book the *Wealth of Nations* are that; specialization and exchange must increase if the economy is to grow; that markets where transactions are voluntary result in individuals and firms making decisions that are compatible with the 'general welfare'; that there is a close association between specialization and the generation of new technology and that the bottom line in judging the performance of an economy is human welfare throughout the entire population. Adam smith also made note of institutions. By that he meant laws, norms and rules of just conduct.

Traditional explanations of trade as "the engine of growth" and the impact of trade on economic growth and development are rooted in the principles of comparative advantage. The theory of comparative advantage arises from nineteenth century free trade models associated with David Ricardo and John Stuart Mill, which were modified by trade theories embodied in the factor proportions or Heckscher and Ohlin (1991) trade theory and Stolper and Samuelson (1941). These trade models collectively and in various ways predict that an economy will tend to be relatively effective at producing goods that are intensive in the factors with which the country is relatively well endowed. In other words, comparative advantage provides that when nations specialize, they become more efficient in producing a product (and indeed a service), and thus if they can trade for their other needs, they and the world will benefit.

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The Ricardian model assumes two countries, two commodities and that all factors of production can be reduced to a single one, that is, labour. Besides, the production of each commodity is carried out according to fixed technical coefficients. Technology explains, thus, the pattern of international trade. Assuming absent costs of transportation, the condition for international trade to take place is the existence of differences between comparative costs in production of both goods in both countries. Even if one country has absolute advantage in costs of production in both goods, international trade is an option better than autarky. Since both conditions are satisfied, if each country specializes in commodities they have less comparative cost, and engage in international trade, the welfare of both economies and, also, the world welfare will improve.

Thomas also came through with his model. Thomas hypothesized that output is a function of labour and land, where the amount of land is fixed in quantity but labour can grow or contract depending on birth and death rates. He stated the production function as:

$$Y = f(L,N) \quad (1)$$

Where Y is real output, L is labour and N is fixed arable land. Because labour is combined with a fixed stock of land, production is subject to diminishing returns.

Romer (1986) suggested five stylized facts that growth theorists should be able to explain.

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1. In cross-section, the mean growth rate shows no variation with the level of per capita income.
2. The rate of growth of factor inputs is not large enough to explain the rate of growth of output; that is, growth accounting always finds a residual.
3. Growth in the volume of trade is positively correlated with growth in output.
4. Population growth rates are negatively correlated with the level of income.
5. Both skilled and unskilled workers tend to migrate towards high-income countries.

In view of the above, it is evident that these trade theories collectively and in various ways predict that an economy will tend to be relatively effective at producing goods that are intensive in the factors with which the country is relatively well endowed. That is when nations specialize, they become more efficient in producing a product (and indeed a service), and thus if they can trade for their other needs, they and the world will benefit. Figure (2) tries to capture the essential elements of trade and specialization and related gains, using a two-country-two goods model.

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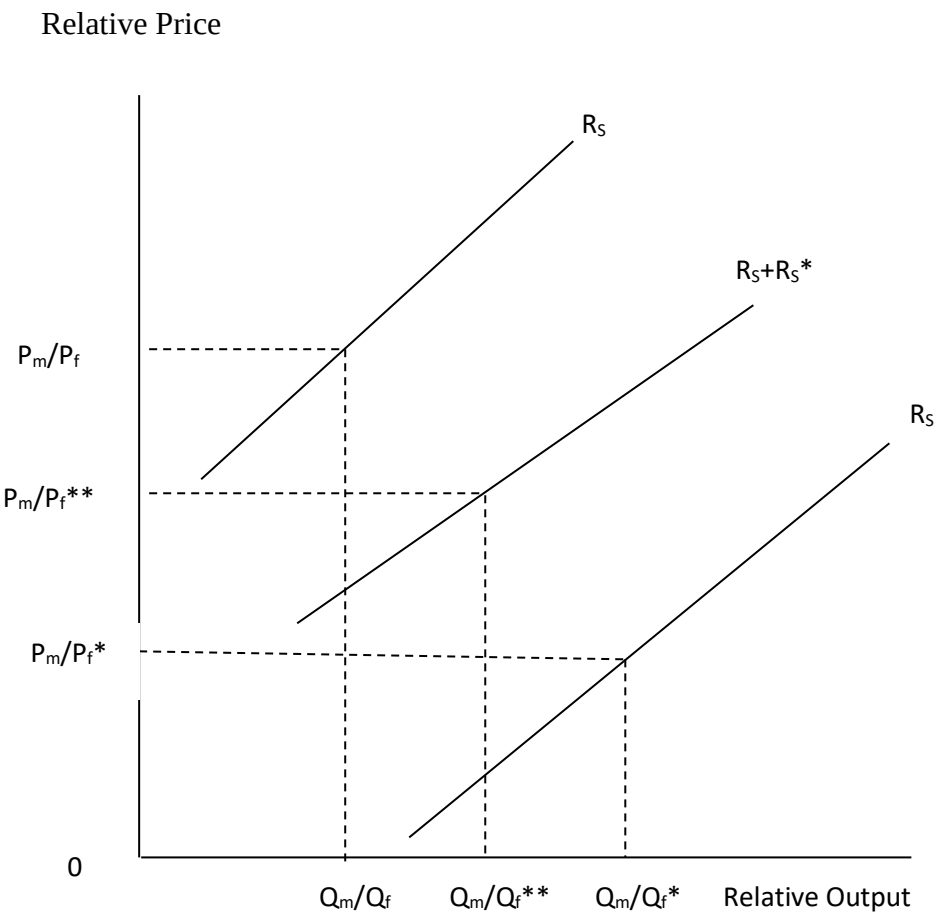

Figure (2): Gains from Trade in two country-two goods model

The above model shows two countries and two goods, food and manufactures before and after trade. The y-axis depicts the relative price while the x-axis is the relative output. Home country has comparative advantage in producing food but also produces manufactures, while the foreign country has comparative advantage in manufactures but also produces food. Under autarchy (no trade), the relative price in home is *Pm/Pf*, facilitating relative supply of *Qm/Qf* on the RS curve, and that in foreign is *Pm/Pf* * facilitating relative supply of *Qm/Qf** on the RS* curve. When the two countries trade, the home country will export food to the foreign country and imports manufactures. The relative price *(Pm/Pf)* in home falls because the price of

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food *(Pf)* increases due to the reduced supply of food in home country, while the relative supply of manufactures increases. Changes occur in foreign country when it imports food from home, as increased food suppliers bring down the price of food, causing the relative price *Pm/Pf* * to rise in foreign. The equilibrium relative price converges at *Pm/Pf*** on the *RS+RS** curve. This is the efficiency price that generates the relative supply of *Qm/Qf***, where home country produces the efficient level of food and foreign country produces the efficient level of manufactures as a result of trade and specialization. Trade has the impact of integrating the two economies as through exchange, they produce the economically efficient levels of both food and manufactures. The principles portrayed in the above model are also in line with the theories advanced in early writings by John Stuart Mill, stating that trade, according to comparative advantage, results in a more efficient employment of the productive forces of the world. According to Mill, this was considered as the direct economic advantage of international trade (Meier, 1995).

On the other hand, trade restrictions or barriers are associated with reduced growth rates and social welfare, and countries with higher degrees of protectionism, on the average, tend to grow at a much slower pace than countries with fewer trade restrictions. This is because tariffs reflect additional direct costs that producers have to absorb, which could reduce output and growth. The cost of a prohibitive tariff or quantitative restriction on a hypothetical country and world economy is demonstrated graphically in the graph below.

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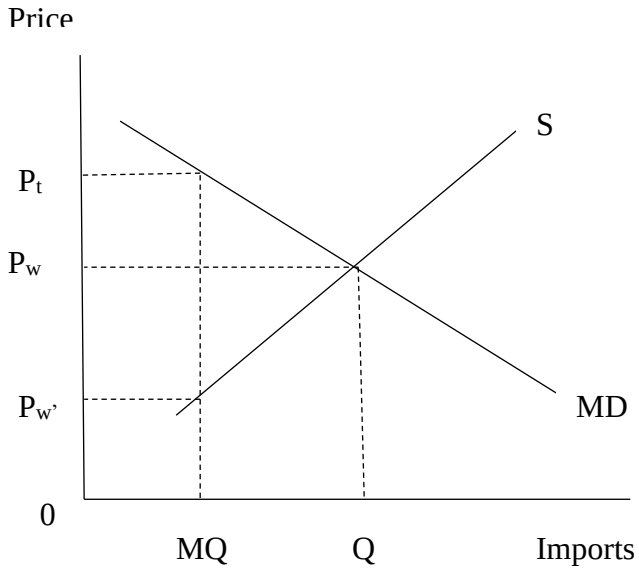

Figure (3): The cost of a prohibitive tariff or quantitative restriction

With free trade, both foreign suppliers and local producers would be willing to supply country X (a large importer) the combined output of product *Q* at the world price of *Pw*. If country X imposes a tariff or quota, however, total demand for product *Q* is reduced from *Q* to *MQ*. This drives down the world market price from the equilibrium price of *Pw* to the new world price of *Pw'*, while at the same time pushing the price facing local consumers in country X to the higher *Pt*.

It will be seen that the tariff or restriction is welfare worsening at the global level as it results in lower prices for exporters (who may have to face collapse), while country X consumers face unjustifiably higher prices at *Pt*. A narrow group of local suppliers or a rent seeking monopolist would, however, register a gain, in that due to the tariff or quantitative restriction, they earn a premium of *Pt-Pw'* and total rents amounting to *(Pt-Pw')*OMQ*. The dynamic effects are that world supply would decline as producers from the rest of the

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world cut back in response to the lower price, and the monopolist local suppliers have no incentive to increase output, since they can enjoy premium revenues without expanding output. This results in overall reduction in growth.

The model being examined predicts that protectionist measures in the form of tariffs or quotas could lead to reduced output and export growth and overall welfare. The direct implication of these conclusions is that unrestricted trade would tend to be associated with higher growth. Specialization on the basis of comparative advantage enables maximum level of output to be produced from a given amount of factor resources. Production increases, consumption increases and therefore global welfare increases.

There is nothing in the doctrine of comparative advantage that guarantees an equal or equitable distribution of the gains from trade. It depends on the international rate of exchange between the two goods, on what happens to the terms of trade, and on whether the full employment of resources is maintained as resources are reallocated as countries specialize. As to which country benefits most from specialization depend on how close the international rate of exchange is to the domestic transformation ratio between the two goods. The closer is the international rate of exchange to a country's own internal rate of exchange, the less it will benefit from specialization and the more the other country will benefit. In extreme circumstances one country may become absolutely worse off if the real resource gains from trade are offset by a decline in the terms of trade. This is the case of 'immisering growth' first demonstrated by Bhagwati (1958).

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In considering the distribution of the gains from trade between developing and developed countries, the problem for many developing countries is that the nature of the goods that they are 'forced' to specialize in under the aegis of free trade have characteristics which may cause both the terms of trade to deteriorate and the unemployment of resources.

Firstly, primary commodities have both a low price and income elasticity of demand which means that when supply increases prices can drop dramatically, and demand grows only slowly with income growth.

Secondly, primary commodities are land-based activities and subject to diminishing returns, and there is a limit to employment in diminishing returns activities set by the point where the marginal product of labour falls to the minimum subsistence wage. No such problem arises in manufacturing, such as cloth production, where no fixed factors of production are involved, and production may be subject to increasing returns. The preservation of full employment in both activities, as resource reallocation takes place, implicitly assumes non-diminishing returns in both activities; that is, constant or decreasing costs.

In practice, for countries specializing in diminishing returns activities, it is possible that the real resource gains from specialization may be offset by the real income losses from unemployment. In this case, complete specialization and free trade would not be optimal.

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Production Function used by Neoclassical Growth Theory

Some of the main proponents of the neoclassical growth theory are Ramsey (1928), Solow (1956) and Koopmans (1965). A great deal of modern theoretical and empirical work on economic growth is based on the neoclassical growth model. The widespread use of the neoclassical model centres on the important role it plays in coordinating and integrating various works in macroeconomics, public finance and international economics. As a result this model enjoys a wide usage in aggregate economic analysis.

Solow (1956) essentially argues that when production takes place under usually neoclassical conditions of variable proportions and constant returns to scale, there will be no opposition between natural and unwarranted rates of growth. The system is self-adjusting to any given rate of growth of labour force and eventually approaches a state of steady proportional expansion. To differentiate his model from the Harrod-Domar model and its fixed capital-output ratio, Solow defined a production function that permits factors to be continuously substituted for each other. Such continuous substitution means that the marginal product of each factor are variable, depending on how much of the factor is already used in production and how many other factors it is combined with. This continuous substitutability of the factors of production is what makes Solow's model neoclassical in nature Van den Berg (2012).

Solow furthermore assumed that each factor of production is subject to diminishing returns. That is, as equal increments of one factor are added to a fixed amount of the other factors of production, output increases, but it increases by ever-smaller amounts. This is not a radical assumption: Recall

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that, Thomas had assumed that labour was subject to diminishing returns when it was combined with a fixed stock of agricultural land. Solow's aim was to show that the Harrod-Domar model was wrong in concluding that a constant rate of saving and investment could bring everlasting economic growth. Solow showed that, with diminishing returns, continuous investment could not, by itself, generate permanent economic growth because diminishing returns would eventually cause the gains in output from investment to approach zero. Solow's model thus clashed with what many development economist were advising policy makers to do in order to increase economic growth, which was to increase saving and investment any way possible Van den Berg (2012).

In the basic neoclassical model, trade openness affects the economy by increasing the overall level of technological efficiency. This efficiency gain is of the comparative-static. The national price structure moves closer to the international price structure, and the marketplace reallocates workers and capital to those sectors whose product yields the highest incomes at international prices. In this respect, trade openness operates in a manner similar to a one-time improvement in technology, or a removal of government-induced domestic distortions to the economy, or any other event which increases the level of production obtainable from a given supply of labour and capital. Since economies with higher levels of technological efficiency enjoy higher per capita income, trade openness leads to a long-run higher level of per capita income. This implies a period of higher growth of per capita income, at first rapid and then slower, after which the economy settles down to the new, higher level of per capita income implied by the trade openness. (If technological progress is taking place for other reasons, the openness induces

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a period of growth of per capita income in excess of the rate of technological progress, after which the growth rate gradually declines to the rate of technological progress.)

This property of the neoclassical model is often described as a level effect of trade openness. Any increase in the rate of growth of per capita income takes place only in the transition to the new, higher level, and lasts only until sufficient savings and investment has taken place to achieve that higher level. The search for alternatives to the neoclassical growth model has been motivated in part by a desire to demonstrate that trade openness could induce growth effects as well, that is, permanent long-run increases in the rate of growth of per capita income. Increases in the national savings rate, or reductions in the rate of population growth, also increase the long-run level of per capita income in the neoclassical growth model. As is the case with improvements in technological efficiency, these changes have no long-run impact on the rate of growth of per capita income, but induce increases in the growth rate during the dynamic transition to the new, higher level of per capita income. Typically, those newer economic theories which predict permanent growth effects for trade liberalization also predict permanent growth effects for increases in the national savings rate or reductions in the rate of population growth.

The neoclassical Solow model explains economic growth as resulting from the combination of two elements, namely Capital and Labour. Now the question arises as to how much of the output growth can be attributed to other factors apart from capital and labour. To answer this question, Solow decomposes the growth in output into three components, each identifiable as

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contribution of one factor of production, that is labour, capital and total factor productivity. This type of measurement of total factor productivity is still often referred to as the Solow residual. The term residual is appropriate because the estimate present the part of measured GDP growth that is not accounted for by the weighted-average measured growth of the factors of production (capital and labour). To account for this, Solow used the Cobb-Douglas production function and started from his simple growth equation. For simplicity, the equation can be written as:

$Y=f(A,L,K)$ (2)

Where A = total factor productivity

L = labour stock

K = capital stock

Using Cobb-Douglas production function, Solow stated the following equation

$Y = AK^{\propto}L^{1-\propto}$ (3)

From this, Solow defined his other factor (total factor productivity) to be technology. Solow acknowledged the convenience of the Cobb-Douglas production function because it exhibits constant returns to scale which is consistent with his model. One should bear in mind the variable *A* is not constant but varies with different production functions based on the factors studied. Different authors have used different factors to account for the total factor productivity.

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Production Function used by Endogenous Growth Theory

Given the empirical and policy problems associated with the Solow model, a number of new models which attempt to endogenise the growth process have been approved. The dependence of growth on exogenous technological progress in the neoclassical growth model and the apparent inconsistency of the "unconditional convergence" hypothesis led to the renewed search for alternative models that can generate economic growth endogenously. The major proponents are Grossman and Helpman (1990), Jones (1995) and Lucas (1988).

Endogenous growth theory means economic growth from within a system (usually a nation state). Endogenous growth theory stresses the fact that if productivity is to increase, the labour force must continuously be provided with more resources. Resources in this case include physical capital, human capital and knowledge capital (technology).

Romer (1990) stressed that endogenous growth does not just happen. He identified four basic pre – conditions for growth which are:

1. Capital – measured in units of consumption goods.
2. Labour – skills available from a healthy human body.
3. Human capital – activities such as formal education and on the job training which is person specific.
4. An index of the level of technology.

A glaring problem here is that the empirical implications of these models are less clear as technological progress and the factors influencing it are difficult to measure. A number of studies have attempted to study economic growth within the neoclassical framework. The normal

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methodology of these growth studies is to begin with the neoclassical production function of the form;

$$Y(t) = A(t)\, f[K(t), L(t)] \quad (4)$$

Where; Y(t) = Output

A(t) = Technological change

K(t) = Capital stock

L(t) = Labour force.

Also the growth accounting approach has been a popular means of organizing data to describe economic growth. The major task is to measure the growth contributions of factor inputs.

Economic theories also suggest several ways by which trade may spur growth. A well-known classical argument in favour of international trade posits that international trade allows for greater specialization and division of labour resulting in increased productivity and output. One prevailing thought in economic literature is that globalization through the channels of openness, trade and investment has a positive and significant relationship with the rate of economic growth.

$$Y(t) = f[A(t)K(t), L(t)] \quad (5)$$

$$Y(t) = (1- akK(t)) \quad (6)$$

The output function is a generalized Cobb – Douglas production function. The knowledge function does not have constant returns to scale. This is so because the assumption of constant returns to scale will imply a replication of knowledge (A) which is not realistic because knowledge is a public good and its possession of one unit does not preclude others from having it. However, interactions among researchers would imply increasing returns to labour and

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capital. This explains the reason for the knowledge function in equation (5). Thus the theoretical relationship between trade and growth is fundamentally ambiguous Rodriguez & Rodrik (2001).

The question one needs to ask is does it matter particularly whether the story is told by the neoclassical growth model or the one told by the endogenous growth model? Both models provide complementary insights as to the potential linkages between trade openness and growth, with the neoclassical model emphasizing increases in economic efficiency arising from openness while endogenous growth models admit the possibility that trade openness might increase the rate of technical innovation. These insights are of great usefulness to policymakers, and the various trade-growth linkages which different models posit likely operate simultaneously in the real world.

Moreover, on many important issues, there is no deep clash between the two modelling traditions; while some causes of economic growth (example Research and Development spending) are explicitly modelled in the endogenous growth framework, these causes are not denied by the neoclassical model but simply assumed to be operating in the background. Neoclassical and endogenous growth models are in broad agreement that the accumulation of physical and human capital, and technological progress, are the principal causes of economic growth.

The principal difference between the two frameworks is that trade openness increases the growth rate in the neoclassical model only temporarily, during a transitional period; while in endogenous growth models the growth effect may be permanent. This may seem to be a dramatic difference, but in practice the distinction is probably not that significant. The period of

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transitional growth envisioned by the neoclassical model can last a generation or more; by the time transitional effects from a single openness have damped out, some new shift in economic efficiency (induced possibly by another round of openness, or through some extraneous cause) will have emerged. This makes it difficult to distinguish in practice between the effects of a large shift in efficiency in the neoclassical model and a small shift in the permanent economic growth rate in the endogenous growth model. At present, then, empirical evidence is unlikely to provide a definitive resolution to the debate among schools of growth theory. A belief that trade openness contributes importantly, marginally, or not at all to faster growth does not commit the analyst to any particular preference regarding competing theories of economic growth.

Channels in the Trade Policy-Growth Nexus

There is a broad consensus that a policy on increased openness generates, enhances or leads to economic growth; there is, however, some debate as the transmission mechanism through which the process occurs. Samuel (2007) classified the channels or the macro-determinants in the trade policy-growth nexus under three broad categories namely:

1. Government policy
2. Technological transmission and
3. Allocation and distribution.

The neoclassical growth models treat government policy and by extension the effect of trade policy as being largely exogenous to long-run growth. Instead the neoclassical growth models regard growth as being largely a

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function of the rate of growth of the quality and quantity of capital and the productivity or efficiency of labour. However, the new growth theory argues that economic growth is affected by factors such as trade policy acting through the mechanism of technological change. In this view the government sector and its policies in particular its trade policies play a role in generating economic growth through the adoption of trade reforms that leads to increase openness and the maintenance of macroeconomic stability. In this connection trade policies aimed at increased openness would lead to increased imports of capital and intermediate goods that embody modern technology and this helps to increase productivity for domestic production as well as exports. Implicitly embedded in this view is that the level of technological improvement is a positive function of the degree of openness. The increased foreign exposure of the export sector results in positive externalities such as the diffusion of knowledge and other spillover effects which then leads to enhanced productivity and the development of more competitive industries. The expected absorption of technological know-how is expected to reflect in a rise in the share of industry as whole in the economy and in manufacturing exports in particular. It is also assumed that openness leads to greater levels of foreign direct investment (FDI) which then serves as a channel for the transmission of technological innovations from trade partners which will further contribute to the transfer of technology developed in more advanced countries.

The government sector is also able to contribute positively to growth in a direct manner. This occurs through the participation of the government sector in the economy in terms of its consumption and investment in infrastructure

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particularly investment in human capital which in turn increases the productivity of labour.

The allocation and distribution captures the internal adjustment of the economy due to reduction of price distortion induced by changes in the price incentives away from protection of the domestic import-competing sector towards more neutral prices. This involves the factor accumulation process that follows the shifts in the composition of output and other reallocation effects as trade more closely reflects areas of specialization and comparative advantage. That is a more efficient pricing system due to the reduction of policy induced price-distortion would *ceteris paribus* lead to faster output growth.

Trade Openness

One of the major problems of great concern in most analytical works is those associated with the measurement of variables of interest. This problem is more acute for openness variables. This is because over the past, it has been difficult to find reliable systematic data on trade policies across most countries particularly developing countries and suitable theoretically-derived measure of trade openness. Many research works (including; Asiedu (2002); Dupasquier and Osakwe (2006); and Anyanwu (2011) have simply included trade volumes as a measure of trade openness. Kandiero and Wadhawan (2003) offer a comprehensive discussion on openness to trade and measurement problems related with this variable. As indicated in this study, trade intensity does not provide a good measure of the ease with which cross-border trading activities takes place, as a result, this study deviates from previous studies by employing

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the composite trade intensity (TI) which was first suggested and used by Squalli and Wilson (2006) as a measure of trade openness. The obvious weakness in using TI is that it is one-dimensional measure of trade openness. That is it looks only at the relative position of a country's trade performance compared to its domestic economy and also focus on the question of how large is the proportion of a country's income associated with international trade. The weakness of TI measure lies in its inability to consider another important dimension of trade openness, that is, how important is the particular country's trade level to world trade (Squalli and Wilson, 2006).

Other weaknesses of TI are possible effect of resource endowment, size of economy, technology and the level of trade restrictions (Cantah, Brafu-Insaidoo, Wiafe, and Adams, 2016). However, using the new measure (CTI) it addresses these weaknesses as it captures both dimensions of trade openness that is TI (size of Ghana's trade with the rest of the world in comparison to its national economy) and Relative World Trade Intensity (RWTI) which captures Ghana's trade with the rest of the world in comparison to world economy that hitherto eludes trade openness studies in Ghana. The estimates of the new measure of trade openness (CTI) improves the results of the traditional measurement (X+M/GDP) as can be seen in the long run and short run estimates in Table 6 and Table 7 (for CTI) and Appendix C and Appendix D (for X+M/GDP) respectively in this study and hence the justification for the study.

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Measures of Openness and Trade Orientation in the Literature

According to Das (2002), the review of empirical literature on economic growth examines a variety of methods for assessing the quantitative impact of increased trade, or of trade openness, on economic growth. While some of these attempts have produced evidence of a positive relationship, particularly for countries which undergo sudden and radical trade openness, the evidence for a positive relationship between more modest trade openness and economic growth is tentative and of mixed quality. One issue arising in such work is the difficulty of quantifying the degree of "openness" associated with a given economy. As can be anticipated, such a task is quite complex and hence, there is no single universally accepted technique for measuring the openness of an economy to international trade. The literature on trade policy reform includes several distinct concepts of "trade openness" It encompasses both openness and changes in trade orientation. Openness is an economy wide measure, whereas trade-orientation is an industry specific measure. The lack of an agreed upon definition of trade openness makes it difficult to provide an appropriate measure of openness or trade orientation. The evidence on trade and growth includes both cross-country comparisons of trade policies and GDP growth as well as inter-industry analysis of the impact of trade openness on productivity growth. For both these sets of exercises, the measures of trade barriers are usually of two kinds: incidence and outcome. Baldwin, (1989) suggests that the incidence based measures attempt to measure trade policies by direct observation of the policy instrument. The outcome-based measures of trade policy on the other hand, assess the deviation of the actual outcome from what the outcome would have been without the trade barriers. Table 1

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lists some of the various measures used in cross-country regressions to explain the relationship between trade openness and economic growth.

Table 1: Measure of Openness in Different Studies

Measure of Openness	Definition	Study (ies)
Trade Intervention	Difference between actual and predicted trade intensity	Edwards (1992)
Deviation from Actual Trade Trade Shares, Exports/GDP and Imports/GDP	[i]Ratio of exports and import to GDP [ii] Ratio of export to GDP [iii] Ratio of import to GDP	Balassa (1985), Quah and Rauch (1990), Harrison (1996), Jin (2000) Miller &Upadhyay (2000
Changes in trade shares	Change in export and Import/GDP	Helliwal & Chang (1991)
Trade Restriction I and II	Annual index of trade Openness [i]derived using information on commer-cial policy and exchange rate [ii]country sources on tariffs and NTB	Harrison (1996)
Leamer's Openness index	Ranking of deviation of trade volumes from values predicted by implementa-	Barron (1991), Edwards (1998) Sachs and Warner

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Table 1 continued

	tion of HOV theory	(1995)
Trade Openness Index	An index with value 1 for the case of highly repressed external sector and 20 when trade was fully liberalized	Edwards (1998)
Sachs and Warner Openness Index	A binary index which takes the value 1 if the county is considered open in a particular year and 0 if it is closed	Edwards (1998)
WDR Index	Classifies countries into four categories according to their perceived degree of openness	Edwards (1998)
MTIP	Relative Price of tradables to international prices	Bhalla and Lau (1992), and Harrison (1996)
Tariff	Import weighted average tariff rate	Edwards (1998) Whalee (1993)
Collected tariff ratio	Ratio of total revenue to taxes on the international trade to total trade	Edwards (1998)
QR	Average converges of NTB	Edwards (1998)
BLACK	Deviation of the black market rate from the official ex-	Harrison (1996) Edwards (1998)

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Table 1 continued

	change rate	
Black Market Exchange rate premium	Average of the black exchange rate premium	Wha-lee (1993)
Real Exchange Distortions and Variability	[i]Actual price level divided by the predicted price level and [ii] coefficient of variation in the index of price level	Dollar (1992), Harrison(1992)
HERITAGE Index	Classifies countries according to five categories, level of tariff and other distortions	Edwards (1998)

Notes: BLACK refers to black market premium; NTB refers to non-tariff barriers; WDR refers to World development Report index of outward orientation; MTIP refers to movement towards international prices; QRs stands for quantitative restrictions **Source:** Das, April (2002)

The simplest measures of trade orientation are based on actual trade flows, such as imports /GDP, exports/GDP and exports and imports as share of GDP [(Balassa (1985), Rauch and Quah (1990), Edwards (1992), Miller and Upadhyay (2000) and Jin, (2000)]. Most of these measures show a positive association with GDP growth. These measures are however an imperfect proxy for trade policy. Barro (1991) and Bhalla and Lau (1992) on the other hand use price-based measures of trade policy that is Price comparison between goods sold in domestic and international markets.

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Review of Related Empirical Literature

There are a number of studies which have been carried out to find the relationship between trade openness and economic growth. However findings of these studies tend to give conflicting results. Some studies have shown that trade openness has increased the performance of export and ultimately increasing economic growth. On the other hand, some studies have shown little evidence to prove strong relationship between trade openness and economic growth of world economies.

For instance, in a major study of trade orientation, distortions and growth in developing countries, Edwards (1992) develops a model which assumes that more open economies are more efficient at absorbing exogenously generated technology. Using various indicators of trade orientation constructed by (Leamer, 1988), he shows for a sample of 30 developing countries over the period 1970 to 1982, that more open economies tend to grow faster. To test the hypothesis, a conventional growth equation is used relating the growth of per capita income of countries to their investment ratio; to their initial level of per capita income as a proxy for technological backwardness, and a measure of trade distortion. All but one of the trade distortion measures produce a significant negative coefficient, and the findings are robust with respect to the sample taken, the time period taken and the method of estimation. The findings are also robust to some of the alternative indicators of trade liberalisation and distortion mentioned at the beginning. In Edward's model, however, the study concludes that,the only channel through which trade liberalisation enhances growth is the absorption of foreign

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technology. This is undoubtedly important, but there are other important mechanisms.

Besides, in another comprehensive study to address the question of whether outward oriented developing countries grow more rapidly, (Dollar, 1992) – taking a sample of 95 countries over the period 1976-1985 measured trade orientation by the degree to which the real exchange rate is distorted by not reflecting differences in the price level between countries. To Dollar, high relative prices indicate strong protection and incentives geared to production for the home market. Taking different continents, and comparing them with the successful economies of Asia, he finds that in Latin America the exchange rate was overvalued by 33 percent during this period, and in Africa by 86 percent. Growth equations are estimated across countries using each country's measure of exchange rate distortion, controlling for differences in the level of investment and the variability of the exchange rate. Dollar finds that, on average, trade distortions in Africa and Latin America reduced the growth of income per head by between 1.5 and 2.1 percent per annum. The results cannot be considered as conclusive because exchange rate distortions are likely to be correlated with other (internal) variables that impair growth performance, but they are certainly suggestive he argued.

Taking 79 countries over the period 1979 to 1989, Sachs and Warner (1995), applied the dummy variable technique of giving a country a zero value if it closed and a value of 1 if it is open. The study found that open economies grew on average by 2.44 percentage points faster than closed economies. Rodriguez and Rodrick claim, however, that it is not tariffs and non-tariff barriers that distinguish the two sets of countries but a combination of the

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black market premium exchange rate and the state monopoly of exports. The former is highly correlated with turbulent macroeconomic conditions and the latter with location in Africa (the slowest growing continent). All the countries with a black market premium in excess of 20 percent had serious problems of inflation, debt, and terms of trade deterioration or war. Also, Harrison (1996) used a general production function to analyze the relationship between openness and GDP growth. He specified GDP as a function of capital stock, years of primary and secondary education, population, labour force, arable land and technological changes. He used seven openness measures to test the statistical relationship between openness and GDP growth. The cross-section estimation results showed that only black market rate is significant with negative sign. The country time series panel result showed that three variable, tariff and non- tariff barriers with positive sign, black market rate and price distortion index used in dollar with negative sign, were found significant. Estimation for Annual data show two variables, tariff and non-tariff barriers, and black market rate, significant with negative sign. Population, labour force and technology were also found to have positive and significant. He therefore concluded that the choice of period for analysis, of relationship between trade openness measures and GDP growth, is critical.

In 1997, two years before the Seattle WTO trade negotiations, Anne Krueger in her paper *Trade policy and economic development: how we learn* addresses the relation between trade and economic growth. Krueger (1997) states that trade policies play a crucial role in the economic development in the past and in our days. Krueger provides a historical overview of trade policy concepts widely accepted by economists and governments. She states that in

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1950s and 1960s the concept of import-substitution policy was wide spread and it was believed to be a vehicle for the economic development in the "third-world". It was thought that through new manufacturing industries (or infant industries), developing countries could substitute imports of industrial goods and these industries should be protected in their initial stage. Some countries created state-owned enterprises in the new industries and provided direct investment for them. In the same period, some countries adopted another protectionist measure – sustaining a fixed nominal exchange rate. Thus, it was considered that by having such policy the imports of capital goods would be cheaper and this would attract investment. Krueger describes that import-substitution proved to be inefficient in many countries and it was chipper, in some cases (Pakistan), to "pay workers to stay home and import the final products" than to produce locally. Then, the author describes the East Asian "miracle" as trade policy that was opposite to the import-substitution. Korea, Taiwan, Singapore, Hong Kong encouraged exporting strategies. Thus, the author says, countries moved from a "static" [inward oriented] to "dynamic" [outward oriented] strategies of trade regimes.

Furthermore, using a comparative data for 93 countries Edwards (1998) analyze the robustness of the relationship between openness and total factor productivity (TFP) growth. He used nine indexes of trade policy to analyze the connection between trade policy and TFP growth for the period 1960 to 1990. Among these nine indexes, three were related to openness, a higher value of which denotes a lower degree of policy intervention in international trade. The other six were related to trade distortions, for which higher values denote a greater departure from 'free trade'. The results of OLS

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estimates found trade openness indexes significant with positive signs and trade distortion indexes were significant with negative signs. This relationship suggests that more open countries will tend to experience faster productivity growth than more protectionist countries. The important point of the study was that the coefficients were very small, up to 100^{th} decimals points, while the value of R^2 was also very low. However, Rodriguez and Rodrik (2001) criticize the estimation method used of weighted least squares where the weighting variable is a country's per capita income. This gives a weight to the US one-hundred times that of the poorest country in the sample. Using more reasonable weights (that is with variables measured in logarithms), Edward's results lose much of their significance. Of the nineteen different equations reported, only three are now statistically significant. Rodriguez and Rodrick conclude "we do not concur with Edward's assertion that the cross-country data reveal the existence of a robust relationship between openness and productivity of GDP growth".

Investigating long run relationship between GDP growth and openness for five South East Asian countries, namely, the Philippines, Indonesia, Malaysia, Singapore and Thailand for the period 1960 to 1997, Anorou and Ahmad (2000) used export plus import growth rate as proxy of openness. The Johansan estimation results rejected the hypothesis that there is no cointegration between economic growth (GDP) and openness while the hypothesis that error correction term is significant could not be rejected. The Vector Error Correction estimates showed bi-direction causality between economic growth and trade openness. Sinha and Sinha (2002) analysed the effects of trade openness and investment on the growth of GDP for 15 Asian

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countries during 1950 to 1992. They developed a model which specified GDP growth a function of growth rates of openness (export plus import), domestic investment and population. The Auto Regressive Model (AR) results show that for China, Hong Kong, Iran, Iraq, Israel, Myanmar, Pakistan and Singapore, the coefficient of the growth of openness is positive and statistically significant. For China, Hong Kong, Indonesia, Israel, Japan, Jordan, Philippines, Singapore and South Korea, the coefficient of the growth of domestic investment is positive and significantly different from zero. In some cases, the coefficient of the growth of population is negative but in all such cases, it is not statistically significant. Thus, they find support for the proposition that the growth rate of GDP is positively related to the growth rates of openness and domestic investment. However, the relationship between the growth rate of GDP and the growth rate of population is not that clear cut.

In a recent and influential study, *Trade, growth and poverty*, Dollar and Kraay (2001) advanced the argument that trade liberalisation improves the growth prospects of poor countries. They demonstrated this point principally using multiple regression analysis with data for 100 countries, through which the share of trade in an economy is shown to have had a statistically significant positive effect on income growth in the 1980s and 1990s. On the basis of this analysis, they asserted that developing countries should enact more liberal trade policies to foster growth and reduce poverty. Wacziarg (2001) also investigated the links between trade policy and GDP growth in a panel of 57 countries for the period of 1970 to 1989. His study employs a fully specified empirical model to evaluate the six channels though which trade policy might affect growth. He measured openness through an index which

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consisted of three trade policy variables, Tariff barrier, captured by share of import duties to total imports, Non-tariff barriers, captured by un-weighted coverage ratio for the pre-Uruguay Round time period and a dummy variable (openness status). The fixed estimate OLS results showed that three channel variables i.e., FDI inflows as share of GDP, domestic investment rate and macroeconomic policy, were significant. He therefore concluded that there is a positive relationship between trade openness and GDP growth. Yanikkaya (2003) estimated the effect of trade openness on per capita income growth for 120 countries for the period 1970 to 1997. He used two types of trade openness measures. The first openness measure was estimated by using trade volumes which include different ratios of trade variables (exports, imports, exports plus imports and trade with developed countries) with GDP. Another measure based on trade restrictiveness estimated by calculating restrictions on foreign exchange on bilateral payments and current transactions. The results of the Generalised Method of Moments (GMM) estimates showed that first group of openness, based on trade volumes were significant and positively related with per capita growth. However, for developing countries, openness based on trade restrictions was also significant and positively related with per capita growth. He therefore concluded that trade restrictions in developing countries may cause faster GDP growth.

According to Nath and Mamun (2004) there is some evidence of trade liberalisation accelerating growth in Bangladesh. Also they have suggested that trade openness has promoted investment in Bangladesh. However study suggests a little evidence of trade affecting income distribution or of income distribution affecting growth or investment in Bangladesh. Aksoy and Salinas

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(2006) also carried out a study to investigate the relationship between economic growth before and after trade liberalisation of world economies. The sample of the study constituted 39 developing countries. The study used time series data for the period of 34 years from 1970 to 2004. According to this study, the post – reform economic growth of sample countries was 1.2 percent higher than before the reforms. Moreover this study investigated that trade liberalisation has been followed by acceleration in investment, exports of goods and services, and manufacturing exports, and as opposed to common belief, outward orientation did not lead to significant deindustrialization and actually seems to have increased export diversification.

Another vital study carried out on trade openness and economic growth is the study of Parikh and Stirbu (2004). For this study Parikh and Stirbu used panel data of 42 countries from three regions (Asia, Africa and Latin America) and used country by country analysis (OLS regression).This study used the latest available data on real GDP, growth rates of individual and advanced countries and examined the relationship between openness and growth, openness and trade balance and also the impact of exchange rate or terms of trade policies on trade balance. Findings of this study suggested that trade openness promotes growth but growth itself has negative effect on trade balance for a large majority of countries. Further the study showed that one unit change in openness index leads on average to 1.62 percentage point change in growth rates, ceteris paribus. However, the country level study had not permit to reach unambiguous conclusions. Because five countries of the sample had had a positive and significant effect while for twelve countries,

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trade balance tends to worsen with openness. Somehow further this study suggests that openness had a positive effect on growth in many economies.

On the contrary, study carried out by Sarkar and Bhattacharyya (2005) have found no meaningful relationship between the growth rate of real GDP or per capita real GDP and trade openness. The study has been based on two countries in Asian region, India and Korea. According to this study, in the first stage of simple trend analysis, it has been observed that both countries, India and Korea, opened up and consequently their shares of trade in their GDPs rose significantly. The process of opening up accelerated in India and decelerated in Korea after 1973. The study has identified that real growth rates of both India and Korea has been fluctuated and there has been some evidence of a rise in Indian real growth rates after post liberalisation period. However the GDP and per capita GDP growth rate has been swelled in Korea at a rapid rate up to the beginning of the 1970s and fell subsequently. To identify the deterministic trend of variables Sarkar and Bhattacharyya employed two tests of stationarity called Augmented Dicky – Fuller tests and Perron tests. Those tests have exhibited that the series did not have deterministic trends so that temporary shocks could have permanent effects. Moreover the study has found no positive relationship between opening up and economic growth. Contrary to the expectations in the pro-liberalisation circle, Sarkar and Bhattacharyya found a large negative relationship between trade openness and growth keeping calls for further investigation to explain such paradoxical finding.

In their study, Obadan and Okojie (2010) analysed the impact of trade openness on economic growth in Nigeria using time series data from 1980-2007. A regression analysis was carried out and the results showed that trade

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openness impacted positively on Nigeria's economic growth. Political instability had a strong negative impact on growth which reaffirms the very nature of our shaky nascent democracy. It is recommended that Nigeria should diversify her export base to include agricultural exports and solid minerals instead of depending solely on petroleum. Besides, Kazungu (2009) studied trade openness and the structure of production in Tanzania. His study used parametric and non-parametric tests to evaluate the impact of openness policies on the growth rate of exports. He also used OLS and instrumental variable to test the "inverse relationship hypothesis" and then estimated the effect of openness on land productivity. He lastly employed the cointegration technique to evaluate the effects of openness on economic growth. His findings suggested that despite the marked variation in the composition of traditional exports especially during the late 1990s; the contribution of trade openness in fostering export growth is rather weak. Second, although the volume of food crops during the post reform period was much higher than before the reforms, there were no symptoms of increased growth overtime. The empirical evidence from econometric analysis showed the existence of diminishing returns to land in the agricultural sector. On the other hand, the impact of trade openness on land productivity was mixed; while in some traditional exports its impact was negative and significant, in others the impact was positive but not significant.

For India, Jayachandran and Seilan (2010) investigated the causal relationship between trade, FDI and Economic growth. They employed Granger causality to examine the direction of causality among the three variables. The cointegration analysis suggests that there is a long-run

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equilibrium relationship between the variables. Also, Baafi (2010) using time series data tested the validity of the hypothesis for Ghana and the Western European Countries (with the United Kingdom (UK), as a proxy). He determined how fast or slow this convergence process is by using the returns to scale concept on Ghana's economy and latter account for the factor that determines economic growth in sectors. The study supported the null hypothesis of convergence that is Ghana is catching up with the Western European countries and also showed that Ghana's growth accounting exhibits decreasing returns which is an implication of its relatively slow convergence and unbalanced growth path (this refers to the simultaneous, coordinated expansion of several sectors of the economy). The study showed a negative relationship between GDP and labour supply both in the long run and short run relationship. Again, the study showed a positive relationship between GDP and capital, Agricultural and Industrial sector. Lastly, the study showed a negative relationship between GDP and AID and Service in the long run and positive relationship in the short run.

For Sri Lanka Herath (2010) examined impact of trade openness on economic growth. In identifying the impacts of trade openness on growth and trade balance, data were collected on a specific time interval before and after the trade openness. The time period selected was from 1960 to 2007. Using regression analysis and Chow test to the variables, findings of the study confirmed a significant positive relationship between trade openness and economic growth of Sri Lanka. The result of Chow test proved a clear change of economic growth before and after trade openness of the country. Moreover, one of the recent literatures was that of Awan, Khan, and Zaman (2011) who

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did a study on the impact of trade openness on economic growth in Pakistan. Their study confirmed the conclusions of the earlier economists by supplementing it with some of the much-debated national and international aspects and predicts that trade openness can have a positive and beneficial effect on economic growth if supported by appropriate sequencing of prudent macroeconomic policies including good management, integrated and strengthened efforts made by domestic institutions, focused and targeted flow of foreign direct investment (FDI's) towards export-oriented industries and services, and improved market access.

In their study, Manni et al., (2012) used Ordinary Least Square (OLS) technique to study the effect of trade openness on economic growth of developing countries using a case of Bangladesh economy between 1980 and 2010 through analyzing important variables namely exports, imports, growth and inflation. Findings from the study suggested that, both real exports and imports had increased with greater openness, which in turn, had eventually led to economic growth after 1990s. Concerning other variables on the other hand, growth and inflation were reported to increase consequent to liberation and unaffected by openness respectively.

Similar to the study of Manni et al., (2012), Hamad et al., (2014) investigate the effect of trade openness on economic growth in Tanzania. The study adopted a simple linear regression model where real GDP was the dependent variable while trade openness was the independent variable. Annual time series data was used covering the period 1970-2010. This overall period was then sub-divided into a closed economy period (1970-1985) and an open economy period (1986-2010). OLS technique was used to estimate the

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regression model twice, regarding the two sub-periods. The empirical findings indicated that trade openness had a positive and significant effect on economic growth in Tanzania. However, this effect was relatively greater during the closed economy compared to the open economy period. The study indicated that since late 1980s Tanzania experienced continuous trade deficits in her accounts. This has been the contributing factor in the obtained results. Thus, the study recommended that there is a need for the country to put strong initiative on adding value on her exports so as to compensate for imports, developing more domestic industries and attracting more investors in the economy and above all elimination of unnecessary tariffs.

Besides, in examining the effect of trade openness on economic growth in Kenya using annual time series data for the period 1975 and 2013, Githanga (2015) used ordinary least squares approach, the study found one cointegration relationship among real Gross Domestic Product (GDP), trade openness, gross fixed capital formation, labour force participation, and human capital. The Granger causality test showed that trade openness granger causes economic growth. The result suggested that trade openness which was proxied by (sum of export and import to GDP) exerted a negative and statistically significant effect on economic growth likewise labour force participation rate and which exerted a negative and statistically significant impact of trade openness on economic growth. Also, human capital exerted a negative but statistically insignificant impact on economic growth. The study also showed that capital affect economic growth positively was statistically significant. Similar to the the study of Githanga (2015), Ali and Abdullah (2015) used VECM and Johanson multivariate approach to study the impact of trade openness on the

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economic growth of Pakistan between 1980 and 2010 in the both short run long run. The results of the study showed a short-run positive relationship between trade openness and GDP growth of the country. The long-run results, however, showed a negative impact of trade openness on the economic growth of Pakistan. They suggested that this may be due to the weak conflict management institutions and lack of quality institutions in the country. They further argued that the negative impact may be due to the raw material exports instead of final goods. Export oriented trade policies and quality conflict management institutions are the policy recommendations the study proposed.

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CHAPTER THREE

METHODOLOGY

Introduction

This chapter presents the methodology employed in the study. It gives detailed description of the theoretical and empirical model specification, definition and measurement of variables in the model, estimation technique, sources of the data for the study, and the tools for data analysis.

Research Design

Following the objectives of the study, the study adopted the positivist philosophy within the framework of neoclassical economics. The positivist believes that reality is stable and can be observed and described from an impartial viewpoint without interfering with the phenomena being studied (Levine, 1997). Thus, positivist philosophy enables the researcher to study social processes in an objective fashion and be able to explain relationships between variables. More importantly, the positivist philosophy predicts the use of quantitative approach to research as used in this study. Positivist philosophy is suitable for development of mathematical models to investigate the relationship between quantitative measurements. Based on the positivist philosophy, this study employed the quantitative method.

The quantitative approach is appropriate for this study, because of the objective of the study to examine the effect of trade openness on economic growth. The quantitative approach enables the researcher to put the social world into a structure of causality and nullifies the role of human effect through the use of quantitative instrument such as multivariate statistical

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analysis in analyzing data as used in this study. More specifically, since the objective of the study is explanatory in nature (that is examine the effect of trade openness on economic growth), the study adopted the explanatory research under the quantitative approach.

Theoretical Model Specification

The study adopted the neoclassical growth model which maintains that growth can arise when capital and labour are augmented by additional inputs in the production function. The Solow growth model explains economic growth as resulting from the combination of capital (K) and labour (L)

$$Y_t = f\ (K_t, L_t) \quad (7)$$

The question that arises from equation (7) is how much of the increase in output can be attributed exclusively to changes in capital and labour. This is because it is possible for other factors, other than labour and capital to influence output. To resolve this problem, Solow (1956) disintegrates increase in output into three components: physical capital accumulation, growth of labour force and growth of total factor productivity (TFP). The growth of TFP captures the increase in output that is not accounted for by an increase in physical inputs (labour and capital) in the model. Thus, the TFP may be interpreted as the effect of exogenous technological progress that can also be reflected in increasing productive efficiency. To account for this, Solow employed the Cobb-Douglas production function expressed as:

$$Y_t = f\ (A_t, K_t, L_t, \ell) \quad (8)$$

where Y is output or real GDP at time t, A is total factor productivity, K is

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capital stock, L is labour stock and ℓ represents the naperian "e". Applying the Cobb-Douglas production function, Solow stated the equation

$$Y_t = A_t K_t^{\alpha} L_t^{\delta} \ell^{\varepsilon_t} \quad (9)$$

It is important to note that A is not fixed, but varies with different production functions based on the factors being studied.

Empirical Model Specification

The neoclassical production function described above is used as the basis for specifying the empirical model for this study. This is augmented with an error term. It is important to mention that, literature on economic growth indicates that, there are multitudes of potential variables that can affect the TFP (A). Following Mansouri (2005); Asiedu (2013); Sakyi (2011); Ayibor (2012) and Durlauf, Johnson & Temple (2005) the TFP was specified as: $A_t = f\ (OPEN_t, FDI_t, REER_t, INF_t)$ (10)

where OPEN is trade openness, FDI is foreign direct investment, REER is real effective exchange rates, and INF is inflation. This implies that:

$$A_t = OPEN_t^{\beta_1},\ FDI_t^{\beta_2}, REER_t^{\beta_3}, INF_t^{\beta_4} \quad (11)$$

Substituting equation (11) into equation (9) gives:

$$Y_t = \eta OPEN_t^{\beta_1}\ FDI_t^{\beta_2}\ REER_t^{\beta_3}\ INF_t^{\beta_4}\ K_t^{\alpha}\ LF_t^{\delta} \ell^{\epsilon_t} \quad (12)$$

Consistent with the objectives of the study and in accordance with the literature, the study applied natural logarithm to equation (12) and estimated a log-linear model of the following form:

$$\ln Y_t = \ln\eta + \beta_1 \ln OPEN_t + \beta_2 \ln FDI_t + \beta_3 \ln REER_t + \beta_4 INF_t + \alpha \ln K_t + \delta \ln LF_t + \varepsilon_t \ln \ell \quad (13)$$

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Let $\ln\eta = \beta_0, \alpha = \beta_5, \delta = \beta_6$ and $\ln \ell = 1$, equation (13) can therefore written as:

$$\ln Y_t = \beta_0 + \beta_1 \ln OPEN_t + \beta_2 \ln FDI_t + \beta_3 \ln REER_t + \beta_4 INF_t + \beta_5 \ln K_t + \beta_6 \ln LF_t + \varepsilon_t \quad (14)$$

where the coefficients;β_1, β_2, β_3, β_4, β_5 and β_6 are parameters of the respective variables, β_0 is the intercept, *t* denotes times and ε is the error term. The following are expected:

$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 < 0, \beta_5 > 0$, and $\beta_6 > 0$

To convert equation (14) to growth rate, the study employs growth accounting methodology to re-specify the model as:

$$\frac{\ln Y_t - \ln Y_{t-1}}{\ln Y_{t-1}} = \beta_0 + \beta_1\left(\frac{\ln OPEN_t - \ln OPEN_{t-1}}{\ln OPEN_{t-1}}\right) + \beta_2\left(\frac{\ln FDI_t - \ln FDI_{t-1}}{\ln FDI_{t-1}}\right) + \beta_3\left(\frac{\ln REER_t - \ln REER_{t-1}}{\ln REER_{t-1}}\right) + \beta_4\left(\frac{\ln INF_t - \ln INF_{t-1}}{\ln INF_{t-1}}\right) + \beta_5\left(\frac{\ln K_t - \ln K_{t-1}}{\ln K_{t-1}}\right) + \beta_6\left(\frac{\ln L_t - \ln LF_{t-1}}{\ln LF_{t-1}}\right) + \varepsilon_t \quad (15)$$

Equation (15) now becomes:

$$\ln Y_t - \ln Y_{t-1} = \beta_0 + \beta_1(\ln OPEN_t - \ln OPEN_{t-1}) + \beta_2(\ln FDI_t - \ln FDI_{t-1}) + \beta_3(\ln REER_t - \ln REER_{t-1}) + \beta_4(\ln INF_t - \ln INF_{t-1}) + \beta_5(\ln K_t - \ln K_{t-1}) + \beta_6(\ln \mathrm{LF}_t - \ln LF_{t-1}) + \varepsilon_t \quad (16a)$$

$$\Delta \ln Y_t = \beta_0 + \beta_1 \Delta \ln OPEN_t + \beta_2 \Delta \ln FDI_t + \beta_3 \Delta \ln REER_t + \beta_4 \Delta INF_t + \beta_5 \Delta \ln K_t + \beta_6 \Delta \ln LF_t + \varepsilon_t \quad (16b)$$

The long run growth model to be estimated in this study is:

$$\ln Y_t = \beta_0 + \beta_1 \ln OPEN_t + \beta_2 \ln FDI_t + \beta_3 \ln REER_t + \beta_4 INF_t + \beta_5 \ln K_t + \beta_6 \ln LF_t + \varepsilon_t \quad (17)$$

The short run model to be estimated for this study is given as:

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$$\Delta \ln Y_t = \sum_{i=1}^{h} \theta \Delta \ln Y_{t-i} + \sum_{i=1}^{g} \beta_1 \Delta \ln OPEN_{t-i} + \sum_{i=1}^{p} \beta_2 \Delta \ln FDI_{t-i} + \sum_{i=1}^{k} \beta_3 \Delta \ln REER_{t-i} + \sum_{i=1}^{z} \Delta \beta_4 INF_{t-i} + \sum_{i=1}^{w} \beta_5 \Delta \ln K_{t-i} + \sum_{i=1}^{q} \beta_6 \Delta \ln LF_{t-i} + \rho EC_{t-1} + \varepsilon_t \quad (18)$$

Where K_t and LF_t are already defined. Y_t refers to real gross domestic product growth ($RGDP_t$), $OPEN_t$ is trade openness, FDI_t is foreign direct investment, $REER_t$ is real effective exchange rate, and INF_t is inflation. 'ln' is natural logarithm operator, Δ is the difference operator, and EC_{t-1} is the error correction term lagged one period. β_i, where $i = 1, \ldots, 6$ represents the elasticity coefficients of the respective variables, with ρ showing the speed of adjustment. β_0 is the drift component, t denotes time and finally ε is the stochastic error term.

Definition, Measurement of Variables and Sign Expectations

For the purpose of this study, the following measurement and operational definitions were used for the variables being examined. The variables included in the study are real GDP (Economic Growth), trade openness, FDI, real effective exchange rate, inflation, gross fixed capital formation (capital), and labour force. The choice of the variables was based on extant literature, economic theory, available data and their significance to the study. The basis for the signs of the respective coefficient of the variables is explained in the description of the variables below.

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Economic growth

Economic Growth is defined as the sustained increase in a country's real output or real gross domestic product overtime (Demetriades & Hussein, 1996). In this study, real GDP will be used as a proxy for economic growth instead of GDP growth rate or GDP per capita since it is the most popular measure of economic growth in the literature and mostly used too by the Breton Wood Institutions. Besides, this measure is preferred to other measures because, it nets out the effect of inflation on the price of the goods and service produced by adjusting inflation terms. Economic growth is used as the dependent variable in the model. Thus, real GDP is used as a proxy for Economic growth. Ayadi and Ayadi (2008) employed real gross domestic product as a proxy of economic growth in examining the impact of external debt, and trade openness on economic growth for Nigeria and South Africa.

Trade openness (OPEN)

Trade openness 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 often hypothesised to raise growth through several channels from the literature such as, greater access to a variety of inputs for production, access to advanced technology from abroad, possibilities of catch-up, and access to broader markets that raise the efficiency of domestic production through increased specialisation. Various measures of openness have been proposed and tested, with no single 'best' measure emerging. Aseidu (2013) in examining Trade Liberalization and Growth: The Ghanaian Experience used the sum of exports and imports of goods and services measured as ratio to GDP as a measure of openness.

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Frequently used measures include the ratio of total trade to GDP and changes in terms of trade. This study will, however, deviate from these measures and adopt Composite Trade Intensity (CTI) as a measure of trade openness first suggested and used by Squalli and Wilson (2006). The CTI is a combination of Trade intensity (TI) and Relative world trade intensity (RWTI). By combining TI and RWTI, Squalli and Wilson (2006) derive a CTI index which they calculated as follows:

$$\mathrm{CTI} = \frac{1}{\bar{x}}[\mathrm{TI} \times \mathrm{RWTI}]$$

$$\mathrm{CTI} = \frac{1}{\bar{x}}[\frac{(X+M)_i}{GDP_i} \times \frac{(X+M)_i}{\sum_{j=1}^{n}(X+M)_j}$$

But $\bar{x} = 1/n$ and $\sum_{j=1}^{n}(X+M)_j = 2(X+M)_i$

$$\mathrm{CTI} = \frac{n[(X+M)_i \times (X+M)_i]}{GDP_i 2(X+M)_i}$$

$$\mathrm{CTI} = \frac{(X+M)_i^2}{GDP_i 2(X+M)_i}$$

$$\mathrm{CTI} = \frac{(X+M)_i}{2(GDP)}$$

Where X_i is the exports of a country of interest in this study (Ghana), M_i is imports, GDP_i is gross domestic product of a country of interest; and n is the sample of country assuming you conducting cross country studies. However, this study is country – specific study, and so n is equal to one. Trade openness enhances competition, promotes large markets, enhances technology transfer and hence efficiency in production. It is thus expected that trade openness will have a positive relationship with economic growth. Therefore, its coefficient β_1 is expected to be positive. Thus, $\beta_1 > 0$

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Foreign Direct Investment (FDI)

Foreign direct investment (FDI) is defined as investment made to acquire a lasting management interest possibly 10 percent or more of voting stock in enterprises operating outside of the economy of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown on the balance of payments. It is expressed as a ratio to GDP. Foreign Direct Investment is considered as an inflow of foreign capital to complement domestic investment and production and hence improving economic performance. Following the works of Lipsey (2001), Frimpong and Oteng-Abayie (2006); Asiedu (2013), and Esso (2010), this study uses FDI as a share of GDP to measure foreign direct investment. The role of foreign direct investment (FDI) has been widely recognised as a growth-enhancing factor in developing countries. It is therefore expected that an increase in foreign direct investment leads to an increase in total investment and hence increase in total output and its rate of growth. Thus, its coefficient β_2 is expected to be positive. Thus $\beta_2 > 0$

Real Effective Exchange Rate (REER)

Real Effective Exchange Rate is the weighted average of a country's currency relative to an index or basket of other major currencies adjusted for the effects of inflation. When real effective exchange rate increases, it is an indication of real depreciation of local currency relative to other foreign currencies. Depreciation of the local currency stimulates exports and hence growth rate is also influenced positively. Even though import volume decreases, the value of imports increases in domestic currency terms because

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the currency has depreciated. An appreciation of the domestic currency makes exports from the home country more expensive and so decreases demand for home country's exports and foreign exchange earnings and hence hampering economic growth. Thus, the study anticipates a positive relationship between real effective exchange rate and economic growth. Thus $\beta_3 > 0$

Inflation (INF)

Inflation is defined as a sustained increase in the general prices of goods and services over a period of time. A host country's economic instability can be a major deterrent to economic growth. Price stability is on indicator of a stable macroeconomic environment of a country. Usually, high rate of inflation in a country can reduce the return on investment and an indicator of macroeconomic instability and considered a sign of internal economic tension and unwillingness of the government to balance its budget and failure of the central bank to conduct appropriate monetary policy (Schneider & Frey, 1985). Inflation (INF) as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Inflation rate is a reflection of macroeconomic instability. A high rate of inflation is generally harmful to growth because it raises the cost of borrowing and thus lowers the rate of capital investment. However, at low levels of inflation, the likelihood of such a trade-off between inflation and growth is minimal. Inflation is therefore used as an indicator to capture macroeconomic instability, (Asiedu & Lien, 2004), (Asiedu ,2013) and (Ayibor, 2012). It is expected that $\beta_4 < 0$

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Gross Fixed Capital Formation (K)

Gross fixed capital formation (K) formerly gross domestic fixed investment includes plants, machinery and equipment. It also includes the construction of roads, railways, and others such as schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings and all these are necessary for economic growth. The variable is used as a proxy for capital stock. Gross fixed capital formation as a proxy for capital has been used in several other studies such as Balasubramanyam, Salisu, and Sapsford (1996), Kohpaiboon (2006), Mansouri (2005),Njindan Iyke & Takumah, (2015). Gross fixed capital formation as a percentage of GDP (a proxy for capital stock) is expected to positively affect real GDP growth. The higher the rate of investment the higher the growth rate of the economy, ceteris paribus, therefore $\beta_5 > 0$

Labour Force

Labour force (labour participation rate) is chosen instead of population growth because it denotes a proportion of the total population aged between fifteen (15) and sixty-four (64) years and is the active and productive population in the country. Solow (1956) and Swan (1956) advised that labour force should be included in the growth model because of its effect on the work force and this has been proven empirically in many researches that included labour force to be a good measure of economic growth. Labour force as a proxy for labour participation rate has been used in several other studies such as Frimpong and Oteng-Abayie (2006), Sakyi (2011) and Ayibor (2012). It is expected that $\beta_6 > 0$

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Data Source and Estimation Technique

The study employed secondary data. Annual time series data which span from 1986 to 2015 were used. The series were drawn from World Development Indicators (World Bank, 2015). The study employed the maximum likelihood estimation technique to examine the relationship between trade openness and economic growth. The MLE technique is a statistical method for estimating population parameters (such as the mean and variance) from sample data, which selects as estimates, those parameter values maximizing the probability of obtaining the observed data. The major advantages associated with this estimation technique are that: the maximum likelihood estimation procedure can be applied to a wide variety of models and it generally yields estimators with excellent asymptotic properties (Davidson & MacKinnon, 2004). In addition, several statistical software packages provide excellent algorithms for maximum likelihood estimates and for many commonly used distributions. This helps to mitigate the computational complexity of the MLE.

In order to examine the direction of causality between trade openness, other explanatory variables, and economic growth the study applied Granger causality test within the framework of cointegration and error-correction models. The empirical procedure involves the following steps. First of all, the study investigated the time series properties of the data by using the Augmented Dickey–Fuller (ADF) and the Phillip-Perron (PP) tests. The unit roots test was used to check the stationarity property of the data. In the second step, it tested for cointegration using the autoregressive distributed lag (ARDL) procedure developed by (Pesaran, Shin, & Smith, 2001). Also, the

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stability and diagnostic test statistics of the ARDL model is examined to ensure the reliability and the goodness of fit of the model. 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.

Unit Root Tests

It is very important to test for the statistical properties of variables when dealing with time series data. Time series data are rarely stationary in level forms. Regression involving non-stationary time series often lead to the problem of spurious regression. This occurs when the regression results reveal a high and significant relationship among variables when in fact, no relationship exist. Moreover, Stock and Watson (1988) have also shown that the usual test statistics (t, F, DW, and R^2) will not possess standard distributions if some of the variables in the model have unit roots. A time series is non-stationary if its mean, variance and autocovariances are not constant overtime or independent of time. However, a time series is stationary when its mean, variance and autocovariances are independent of time. The study employed a variety of unit roots tests. This was done to ensure reliable results of the test for stationarity due to the inherent individual weaknesses of the various techniques. The study used both the PP and the ADF tests. These tests are similar except that they differ with respect to the way they correct for autocorrelation in the residuals. The PP nonparametric test generalises the ADF procedure, allowing for less restrictive assumptions for the time series in question. The null hypothesis to be tested is that the variable under

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investigation has a unit roots (non-stationary) against the alternative that the variable under investigation has no unit roots (stationary). In each case, the lag-length is chosen using the Akaike Information Criteria (AIC) and Swartz Information Criterion (SIC) for both the ADF and PP test. The sensitivity of ADF tests to lag selection renders the PP test an important additional tool for making inferences about unit roots. The basic formulation of the ADF is specified as follows:

$$Y_t = \mu + \alpha Y_{t-1} + \gamma t + \varepsilon_t \quad (19)$$

Subtracting Y_{t-1} from both sides gives:

$$\Delta Y_t = \mu + (\alpha - 1)Y_{t-1} + \gamma t + \varepsilon_t \quad (20)$$

Letting $(\alpha - 1)$ be represented by ρ gives equation (23) that is:

$$\Delta Y_t = \mu + \rho Y_{t-1} + \gamma t + \varepsilon_t \quad (21)$$

The t-test on the estimated coefficient of Y_{t-1} that is ρ provides the DF test for the presence of a unit-root. The Augmented DF (ADF) test is a modification of the DF test and involves augmenting the above equation by lagged values of the dependent variables. It is made to ensure that the error process in the estimating equation is residually uncorrelated, and also captures the possibility that Y_t is characterised by a higher order autoregressive process. Although the DF methodology is often used for unit roots tests, it suffers from a restrictive assumption that the error processes are independent and identically distributed (i.i.d). Therefore, letting $(\alpha - 1)$, to be equal to ρ and by controlling for serial correlation by adding lagged first differenced to equation (24) gives the ADF test of the form:

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$$\Delta Y_t = \mu + \rho Y_{t-1} + \gamma t + \sum_{i=1}^{p} \beta_i \Delta Y_{t-1} + \varepsilon_t \quad (22)$$

Where Y_t denotes the series at time *t*, Δ is the difference operator, μ, γ, and β_i are the parameters to be estimated and ε is the stochastic random disturbance term.

The ADF and the PP test the null hypothesis that a series contains unit roots (non-stationary) against the alternative hypothesis of no unit roots (stationary). That is:

$H_0: \rho = 0$ (Y_t is non-stationary)

$H_1: \rho < 0$ (Y_t is stationary)

If the tau statistic is less negative than the critical values, the null hypothesis is accepted and the conclusion is that the series is non-stationary. Conversely, if the tau value or t-statistic is more negative than the critical values, the null hypothesis is rejected and the conclusion is that the series is stationary.

Tests for Cointegration

Most time series data are non-stationary with a unit roots at levels, first differencing appears to provide the appropriate solution to the problems. However, first differencing has the tendency of eliminating all the long-run information which economists are invariably interested in. Granger (1986) identified a link between non-stationary processes and preserved the concept of a long-run equilibrium. Two or more variables are said to be cointegrated (there is a long-run equilibrium relationship), if each of the series taken individually is non-stationary with I(1), while their linear combination is stationary with I(0).

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Autoregressive Distributed Lag (ARDL) Approach to cointegration

In order to analyse the long-run relationships as well as the dynamic interactions among the various variables of interest empirically, the autoregressive distributed lag cointegration procedure developed by (Pesaran et al., (2001) was used. The choice of ARDL to estimate the model was informed by the following reasons:

First, The ARDL cointegration procedure is relatively more efficient in small sample data sizes as is the case in this study. This study covers the period 1986–2015 inclusive. Thus, the total observation for the study is 30 which is relatively small.

Second, The ARDL enables the cointegration to be estimated by the ordinary least square (OLS) method once the lag of the model is identified. This is however, not the case of other multivariate cointegration techniques such as the Johansen Cointegration Test developed by (Johansen & Juselius, 1990). This makes the ARDL procedure very simple.

Third, The ARDL procedure does not require the pretesting of the variables included in the model for unit roots compared with other techniques such as the Johansen approach. It is applicable regardless of whether the variables in the model are purely I(0), purely I(1) or mutually cointegrated. The procedure will however crash in the presence of I(2) series.

Last but not the least, traditional cointegration methods such as Johansen (1988), Johansen-Juselius (1990), may experience endogeneity problem, however, the ARDL method can distinguish between dependent and explanatory variables and eradicate the problems that may arise due to the presence of autocorrelation and endogeneity. ARDL cointegration estimates

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short run (SR) and long run (LR) relationship simultaneously and provide unbiased and efficient estimates.

Following Pesaran et al (2001) as summarized in Choong, Yusop, and Liew (2005), this study applies the bounds test procedure by modeling the long-run equation that is equation (17), as a general autoregressive (AR) model of order p, in z_t:

$$z_t = \alpha_0 + \beta t + \sum_{i=1}^{p} \emptyset_i Y_{t-i} + \varepsilon_t \qquad \text{t} = 1,2,\dots,\text{T} \qquad (23)$$

With α_0 representing (k + 1) – a vector of intercept (drift), and β denoting (k + 1) – a vector of trend coefficients, Pesaran et al (2001) further derived the following vector error correction model (VECM) corresponding to (23):

$$\Delta z_t = \alpha_0 + \beta t + \Pi z_{t-1} + \sum_{i=1}^{p} \Gamma_i \Delta z_{t-i} + \varepsilon_t \qquad \text{t} = 1,2,\dots,\text{T} \qquad (24)$$

Where (k+1) x (k+1)-matrices, $\prod = I_{k+1} + \sum_{i=1}^{p} \Psi_i$ and $\Gamma = -\sum_{j=i+1}^{p} \Psi_i$,

$\text{i} = 1, 2, \dots, \rho - 1$ contain the long-run multipliers and short-run dynamic coefficients of the VECM. z_t is the vector of variables y_t and x_t respectively; Y_t is an I(1) dependent variable defined as $\ln Y_t$ (in this case $\ln GDP_t$); x_t ($OPEN_t$, FDI_t, $REER_t$, INF_t, K_t, LF_t) is a vector matrix of 'forcing' I(0) and I(1) regressors as already defined with a multivariate independent and identically distributed (i.i.d) zero mean error vector $\varepsilon_t = (\varepsilon_{1t}\varepsilon_{2t}^{'})'$, and a homoscedastic process.

Further assuming that a unique long-run relationship exists among the variables, the conditional VECM (27) now becomes:

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$$\Delta z_t = \alpha_{y0} + \beta t + \delta_{yy} y_{t-1} + \delta_{xx} x_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta y_{t-i} + \sum_{i=1}^{p-1} \xi_i \Delta x_{t-i} + \varepsilon_{yt} \qquad t = 1, 2, \ldots, T \tag{25}$$

On the basis of equation (25), the conditional VECM of interest can be specified as equation (26)

$$\begin{aligned} \Delta \ln RGDP_t = {} & \alpha_0 + \delta_1 \ln RGDP_{t-1} + \delta_2 \ln OPEN_{t-1} + \delta_3 \ln FDI_{t-1} \\ & + \delta_4 \ln REER_{t-1} + \delta_5 INF_{t-1} + \delta_6 \ln K_{t-1} + \delta_7 \ln LF_{t-1} \\ & + \sum_{i=1}^{p} \beta_{1i} \Delta \ln RGDP_{t-i} \\ & + \sum_{j=1}^{q} \beta_{2j} \Delta \ln OPEN_{t-j} + \sum_{k=1}^{q} \beta_{3k} \Delta \ln FDI_{t-k} \\ & + \sum_{l=1}^{q} \beta_{4l} \Delta \ln REER_{t-l} + \sum_{m=1}^{q} \beta_{5m} \Delta INF_{t-m} + \sum_{n=1}^{q} \beta_{6n} \Delta \ln K_{t-n} \\ & + \sum_{p=1}^{q} \beta_{7p} \Delta \ln LF_{t-p} + \varepsilon_t \end{aligned} \tag{26}$$

where δ_i are the long run multipliers, α_0 is the drift, and ε_t are white noise errors.

Bounds Testing Procedure

The first step in the ARDL bounds testing approach is to estimate equation (26) by ordinary least squares (OLS) in order to test for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables, that is,

H_N: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$ against the alternative

H_A: $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0$.

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The test which normalizes on RGDP is denoted by F_{RGDP} (LRGDP|LOPEN, LFDI, LREER, INF, LK, LLF). Two asymptotic critical values bounds provide a test for cointegration when the independent variables are I(d) (where $0 \leq d \leq 1$): a lower value assuming the regressors are I(0), and an upper value assuming purely I(1) regressors. If the F-statistic is above the upper critical value, the null hypothesis of no long-run relationship can be rejected irrespective of the orders of integration for the time series. Conversely, if the F-statistic falls below the lower critical value the null hypothesis cannot be rejected. Finally, if the statistic falls between the lower and upper critical values, the result is inconclusive and depends on whether the underlying variables are I(0) or I(1). This necessitates the testing for unit root on the variable under investigation (Pesaran & Pesaran, 1997). The approximate critical values for the F-test can be obtained from Pesaran and Pesaran, 1997, p.478). However, given that Pesaran's critical values are based on simulated large sample size, this study will use the critical values developed by (Narayan, 2004) since it is more appropriate for small samples.

After the confirmation of the existence of long run relationship between the variables in the model, the ARDL methodology estimates $(m + 1)^{k+1}$ number of the regressors. Where m is the maximum number of lags and k is the number of the variable in the equation (Shrestha & Chowdhury, 2005; Pesaran & Pesaran, 1997). The orders of lags of the ARDL models are selected using, either, Schawrtz-Bayesian Criteria, Akaike's Information Criteria the $\overline{R^2}$ criteria or the Hannan and Quinn criteria. The SBC uses the smallest possible lag length and is considered as most parsimonious model

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whereas the AIC chooses the maximum necessary lag length (Shrestha & Chowdhury, 2005).

In the second stage of the ARDL bounds approach, once cointegration is established the conditional ARDL (p, q_1, q_2, q_3, q_4, q_5, q_6), the long-run model for $RGDP_t$ can be estimated as:

$$\begin{aligned}\ln RGDP_t = \alpha_0 &+ \sum_{i=1}^{p} \delta_1 \ln RGDP_{t-i} + \sum_{i=1}^{q1} \delta_2 \ln OPEN_{t-i} + \sum_{i=1}^{q2} \delta_3 \ln FDI_{t-i} \\ &+ \sum_{i=1}^{q3} \delta_4 \ln REER_{t-i} + \sum_{i=1}^{q4} \delta_5 \ln INF_{t-i} + \sum_{i=1}^{q5} \delta_6 \ln K_{t-i} \\ &+ \sum_{i=1}^{q6} \delta_7 \ln LF_{t-i} \\ &+ \varepsilon_t \end{aligned} \quad (27)$$

This involves selecting the orders of the ARDL (p, q_1, q_2, q_3, q_4, q_5) model in the seven variables using Akaike Information Criterion (Akaike, 1981).

The third and the last step in the ARDL bound approach is to estimate an Error Correction Model (ECM) to capture the short-run dynamics of the system. The ECM generally provides the means of reconciling the short-run behaviour of economic variable with its long-run behaviour.

The ECM is specified as follows:

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$$\Delta \ln GDP_t = \alpha_0 + \sum_{i=1}^{p} \beta_{1i} \Delta \ln RGDP_{t-i} + \sum_{j=1}^{q} \beta_{2j} \Delta OPEN_{t-j} + \sum_{k=1}^{q} \beta_{3k} \Delta FDI_{t-k} + \sum_{l=1}^{q} \beta_{4l} \Delta REER_{t-l} + \sum_{m=1}^{q} \beta_{5m} \Delta INF_{t-m} + \sum_{n=1}^{q} \beta_{6n} \Delta K_{t-n} + \sum_{p=1}^{q} \beta_{7p} \Delta LF_{t-p} + \rho ECM_{t-1} + \varepsilon_t \quad (28a)$$

From equation (28a), β_i represent the short-run dynamics coefficients of the model's convergence to equilibrium and ECM_{t-1} is the Error Correction Model. The coefficient of the Error Correction Model, ρ measures the speed of adjustment to obtain equilibrium in the event of shocks to the system. The residual from the cointegration equation lagged one period is given as:

$$ECT_t = \ln RGDP_t - \alpha_0 - \sum_{i=1}^{p} \beta_{1i} \Delta \ln RGDP_{t-i} - \sum_{j=1}^{q} \beta_{2j} \Delta OPEN_{t-j} - \sum_{k=1}^{q} \beta_{3k} \Delta FDI_{t-k} - \sum_{l=1}^{q} \beta_{4l} \Delta REER_{t-l} - \sum_{m=1}^{q} \beta_{5m} \Delta INF_{t-m} - \sum_{n=1}^{q} \beta_{6n} \Delta K_{t-n} - \sum_{p=1}^{q} \beta_{7p} \Delta LF_{t-p} \quad (28b)$$

Engle and Granger (1987) argued that when variables are cointegrated, their dynamic relationship can be specified by an error correction representation in which an error correction term (ECT) computed from the long-run equation must be incorporated in order to capture both the short-run and long-run relationships. The error correction term indicates the speed of

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adjustment to long-run equilibrium in the dynamic model. In order words, its magnitude shows how quick the variables converge to equilibrium when they are disturbed. It is expected to be statistically significant with a negative sign. The negative sign implies that any shock that occurs in the short run will be corrected in the long-run. The larger the coefficients of the error correction term in absolute terms, the faster the convergence to equilibrium.

To ensure the goodness of fit of the model, diagnostic and stability tests are conducted. The diagnostic test examines the serial correlation, functional form, normality and heteroscedasticty associated with the selected model. Pesaran and Pesaran (1997) suggested that conducting a stability test is of great importance and must not be ignored. This technique is also known as cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ). The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the break points. If the plots of the CUSUM and CUSUMSQ statistics stay within the critical bounds of five percent level of significance, the null hypothesis of stable coefficients in a given regression cannot be rejected.

Granger Causality Tests

The study of causal relationships among economic variables has been one of the main objectives of empirical econometrics. According to Engle and Granger (1987), cointegrated variables must have an error correction representation. “Granger causality” is a term for a specific notion of causality in time series analysis. A variable say X Granger-causes say Y if Y can be explained or predicted using the histories of both X and Y than it can, using the history of Y alone. Grange-causality is thus, a powerful tool, in that it

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allows one to test for things that one might otherwise assume away or otherwise taken for granted. 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, 2009). To examine the direction of causality in the presence of cointegrating vectors, Granger causality is conducted based on the following:

$$\Delta Y_t = \delta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta Y_{t-i} + \sum_{i=0}^{p} \emptyset_{1i} \Delta X_{t-i} + \omega_{1i} ECT_{t-1} + u_t \qquad (29)$$

$$\Delta X_t = \delta_0 + \sum_{i=1}^{p} \beta_{2i} \Delta X_{t-i} + \sum_{i=0}^{p} \emptyset_{2i} \Delta Y_{t-i} + \omega_{2i} ECT_{t-1} + v_t \qquad (30)$$

Where ΔY and ΔX are the non-stationary dependent and independent variables, ECT is the error correction term, $\omega_{1i}$and ω_{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 (29) and (30). To find out whether the independent variable (X) granger-causes the dependent variable (Y) in equation (29), we examine the joint significance of the lagged dynamic term by testing the null hypothesis:

$$H_0 = \emptyset_{1i} = 0$$

Implying that the explanatory variable (X) does not granger cause the dependent variable (Y), against the alternative hypothesis that

$$H_1 = \emptyset_{1i} \neq 0$$

Implying that the explanatory variable (X) granger causes the dependent variable (Y)

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Similarly, to find out whether the independent variable (Y) granger-cause the dependent variable (X) in equation (30), we examine the significance of the lagged dynamic term by testing the null hypothesis:

$$H_0 = \emptyset_{2i} = 0$$

Implying that the independent variable (Y) does not granger cause the dependent variable (X), against the alternative hypothesis that

$$H_1 = \emptyset_{2i} \neq 0$$

Implying that the explanatory variable (Y) granger causes the dependent variable (X)

Using the standard F-test or Wald statistic, four possibilities exist: First, rejection of the null hypothesis in equation (29) but failing to reject the null in equation (30) at the same time implies unidirectional causality running from X to Y. Second, a rejection of the null hypothesis in equation (30) but at the same time failing to reject the null in equation (29) implies unidirectional causality running from Y to X. Third, simultaneous rejection of the two null hypotheses indicates bi-directional causality. Fourth, simultaneous failure to reject the two null hypotheses indicates independence or no causality between the variables of interest.

Data Analysis

The study employed both descriptive and quantitative analysis. Charts such as graphs and tables were employed to aid in the descriptive analysis. Unit roots tests were carried out on all variables to ascertain their order of integration. Furthermore, the study adopted ARDL econometric methodology for cointegration introduced and popularized Pesaran et al (2001) to obtain

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both the short and long-run estimates of the variables involved. All estimations were carried out using Microfit 4.1 and E-views 7.0 packages.

Conclusion

This chapter developed and presented the methodological framework suitable for conducting the study. The study followed the standard literature of Kohpaiboon (2004); Mansouri (2005); Asiedu (2013); Sakyi (2011); and Ayibor (2012) to specify the econometric model for economic growth. The model was developed from the theoretical formulations of both the neoclassical growth and the Solow theories. Annual time-series data on real GDP, trade openness, FDI, REER, and Inflation, gross fixed capital formation and labour force from 1986 to 2015 was used for the study. Stationarity test was conducted using ADF and PP tests. Moreover, ARDL econometric methodology was used to examine the long-run and short-run dynamics among the variables. Finally, the chapter used the Granger-causality technique to determine whether there is direction of causality among the variables.

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CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents and discusses the estimation results. The results of the descriptive statistics of the relevant variables, both Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, Autoregressive Distributed Lag (ARDL) approach to cointegration and Granger-causality test are presented and discussed. These results are discussed in relation to the various hypotheses of the study.

Descriptive statistics

The study computed the descriptive statistics of the relevant variables involved in the study. From Table 2, the variables have positive average values (means). It can also be seen from Table 2 that, log of real gross domestic product (LRGDP) and log of labour force (LLF) are negatively skewed implying that majority of the values are greater than their means. On the other hand, log of trade openness (LOPEN), log of foreign direct investment (LFDI), log of real effective exchange rate (LREER), log of capital stock (LK) and inflation (INF) are positively skewed implying that the majority of the values are less than their means. The minimal deviations of the variables from their means as indicated by the standard deviations demonstrate that taking the logs of variables minimizes their variances.

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Table 2: Summary Statistics of the Variables

	LRGDP	LOPEN	LFDI	LREER	INF	LK	LLF
Mean	9.5066	2.2944	3.3834	2.0200	21.6259	3.4796	7.0240
Median	9.5072	2.1656	1.9429	1.9934	17.2768	3.2882	7.0337
Maximum	11.0548	3.6811	9.5170	2.3630	59.4616	5.1586	7.1587
Minimum	7.7088	1.1820	0.0751	1.7796	8.7268	2.5445	6.8405
Std. Dev.	1.0414	0.7155	3.1524	0.1251	12.2803	0.6800	0.1032
Skewness	-0.0828	0.4451	0.6901	0.6239	1.2873	1.0393	-0.2647
Kurtosis	1.7532	2.0249	1.9602	3.2431	4.3736	3.1605	1.7374
Sum	285.197	68.833	101.503	60.600	648.778	104.39	210.721
Sum Sq.Dev.	31.452	14.848	288.185	0.4536	4373.36	13.409	0.3090
Observations	30	30	30	30	30	30	30

Note: Std. Dev. represents Standard Deviation while Sum Sq. Dev. represents Sum of Squared Deviation.

Source: computed using Eviews 7.0 Package

Unit Root Test Results

Even though the bounds test (ARDL) approach to cointegration does not require the pretesting of the variables for unit roots, it is however important to perform this test to verify that the variables are not integrated of an order higher than one. The purpose is to ascertain the absence or otherwise of *I*(2) variables to extricate the results from spurious regression. Thus, in

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order to ensure that some of the variables are not integrated at higher order, there is the need to complement the estimated process with unit root tests.

For this reason, before applying Autoregressive Distributed Lags approach to cointegrtion and Granger-causality test, unit root tests will be conducted in order to investigate the stationarity properties of the data. As a result, the ADF and PP tests were applied to all the variables in levels and in first difference in order to formally establish their order of integration. To be certain of the order of integration of the variables, the test was conducted with intercept and time trend in the model. The optimal number of lags included in the test was based on automatic selection by Schawrtz-Bayesian Criteria (SBC), Akaike Information Criteria (AIC) the $\overline{R^2}$ criteria or the Hannan and Quinn (H-Q) criteria. The study used the P-values in the parenthesis to make the unit root decision, (that is, rejection or acceptance of the null hypothesis that the series contain unit root) which arrived at similar conclusion with the critical values.

The results of ADF and PP test for unit root with intercept and trend in the model for all the variables are presented in Table 3 and Table 4 respectively. The null hypothesis is that the series is non-stationary, or contains a unit root. The rejection of the null hypothesis is based on the MacKinnon (1996) critical values as well as the probability values.

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Table 3: Results of Unit Root Test with constant and trend: ADF Test

Levels			First Difference			
Variables	ADF-Statistics	Lag	Variables	ADF-Statistics	Lag	*I(0)*
LRGDP	-0.2905[0.9870]	1	ΔLRGDP	-4.4510[0.0064]***	0	I(1)
LOPEN	-1.7025[0.7242]	1	ΔLOPEN	-5.2660[0.0011]***	0	I(1)
LFDI	-2.3107[0.4154]	1	ΔLFDI	-4.8552[0.0029]***	0	I(1)
LREER	-3.9604[0.0220]**	1	ΔLREER	-5.6730[0.0004]***	0	I(0)
INF	-3.8989[0.0252]**	1	ΔINF	-5.7068[0.0005]***	1	I(0)
LK	-3.2476[0.1953]	0	ΔLK	-5.6425[0.0005]***	1	I(1)
LLF	1.9180[0.2997]	2	ΔLLF	-5.1868[0.0014]***	0	I(1)

Table 4: Results of Unit Root Test with constant and trend: PP Test

Levels			First Difference			
Variables	PP-Statistics	BW	Variables	PP-Statistics	BW	*I(0)*
LRGDP	-0.4472[0.9804]	1	ΔLRGDP	-4.4038[0.0071]***	2	I(1)
LOPEN	-1.6656[0.7405]	2	ΔLOPEN	-5.2659[0.0002]***	1	I(1)
LFDI	-1.9405[0.6079]	3	ΔLFDI	-7.7675[0.0002]***	4	I(1)
LREER	-3.9741[0.0213]**	4	ΔLREER	-7.7749[0.0000]***	4	I(0)
INF	-4.3029[0.0102]**	3	ΔINF	-15.3249[0.0000]***	5	I(0)
LK	-3.1342[0.1175]	4	ΔLK	-17.1182[0.0000]***	5	I(1)
LLF	-2.0784[.1554]	0	ΔLLF	-5.2553[0.0012]***	4	I(1)

Note: ***, **, * indicates the rejection of the null hypothesis of non-stationary at 1%, 5%, 10% level of significance respectively, Δ denotes the first difference, BW is the Band Width and *I*(0) is the lag order of integration. The values in parenthesis are the P-values.
Source: Computed by author using Eviews 7.0 package

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From the unit root test results in Table 3, the null hypothesis of the presence of unit root for most of the variables in their levels cannot be rejected since the P-values of the ADF statistics are not statistically significant at any of the three conventional levels of significance with the exception of log of Real Effective Exchange Rate and inflation which were stationary at 5 percent significant levels. However, at first difference, the variables become stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1 percent significant levels for all the estimates.

The PP test results for the presence of unit root with intercept and time trend in the model for all the variables are presented in Table 4. From the unit root test results in Table 4, the null hypothesis of the presence of unit root for majority of the variables in their levels cannot be rejected since the P-values of the PP statistics are not statistically significant at any of the three conventional levels of significance with the exception of log of Real Effective Exchange Rate and inflation which were stationary at 5 percent significant levels. However, at first difference, the variables become stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1 percent significant levels for all the estimates. The PP unit root test results in Table 4 are in line with the ADF test in Table 3, suggesting that most of the variables are integrated of order one, I(1), when intercept and time trend are in the model.

It is therefore clear from the unit root results discussed above that all the variables are integrated of order zero, I(0), or order one, I(1). Since the test results have confirmed the absence of I(2) variables, the ARDL methodology is used for estimation.

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Cointegration analysis

Since the focus of this study is to establish the relationship between trade openness and economic growth, it is important to test for the existence of long-run equilibrium relationship between these two variables within the framework of the bounds testing approach to cointegration. Given that the study employs annual data, a lag length of 2 for annual data is used in the bounds test. Pesaran, Shin and Smith (1999) suggest a maximum lag of two for annual data in the bounds testing to cointegration. After the lag length was determined, an F-test for the joint significance of the coefficients of lagged levels of the variables was conducted. Thus, each of the variables in the model is taken as dependent variable and a regression is run on the others. For instance, LRGDP is taken as the dependent variable and it is regressed on the other variables. After that another variable for instance trade openness is taken as the dependent variable and it is also regressed on the other variables. This action is repeated for all the variables in the model. When this is done the number of estimated regressions would be equal to the variables in the model.

Pesaran and Pesaran (1997) indicates that "this OLS regression in the first difference are of no direct interest" to the bounds cointegration test. It is however, the F-statistics values of all the regressions when each of the variables is normalized on the other which are of great importance. This F-statistics tests the joint null hypothesis that the coefficients of the lagged levels are zero. In order words, there is no long run relationship between them. The essence of the F-test is to determine the existence or otherwise of cointegration among the variables in the long run. The results of the computed F-statistics

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when LRGDP is normalized (that is, considered as dependent variable) in the ARDL-OLS regression are presented in Table 5.

From Table 5, the F-statistics that the joint null hypothesis of lagged level variables (i.e. variable addition test) of the coefficients is zero is rejected at 5 percent significance level. Further, since the calculated F-statistics for F_{LRGDP} (.) = 4.5534 exceeds the upper bound of the critical value of band (4.148), the null hypothesis of no cointegration (i.e. long run relationship) between economic growth and its determinant is rejected.

Table 5: Bounds test results for cointegration

Critical Value Bound of the F-statistic: intercept and no trend (case II)						
K	90% Level		95% Level		99% Level	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6	2.334	3.515	2.794	4.148	3.976	5.691
Calculated F-Statistics:						
F_{LRGDP} (LRGDP|LOPEN,LFDI, LREER, INF, LK, LLF)					4.5535(0.024)**	

Note: Critical values are obtained from Narayan (2004), Appendix A1-A3, pp.26-28; ** denotes statistical significance at the 5% level and K is the number regressors in equations (26).

This result indicates that there is a unique cointegration relationship among the variables in Ghana's economic growth model (equation 26) and that all the determinants of economic growth can be treated as the "long-run forcing" variables for the explanation of economic growth in Ghana. Since this study is based on growth theory, $LRGDP_t$ is used as the dependent variable. Therefore, there is existence of cointegration among the variables in the growth equation and hence we therefore proceed with the growth equation.

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Long-run results (Economic growth is dependent variable)

Table 6 shows results of the long run estimate based on the Schwartz Bayesian criteria (SBC). The selected ARDL (1, 1, 0, 2, 1, 0, 2) passes the standard diagnostic test (serial correlation, functional form, normality and heteroscedasticity) as can be seen at Table 6. The coefficients indicate the long run elasticities.

Table 6: Estimated Long Run Coefficients using the ARDL Approach

ARDL (1, 1, 0, 2, 1, 0, 2) selected based on SBC Dependent Variable: LRGDP

Regressor	Coefficient	Standard Error	T-Ratio	P-values
LOPEN	0.2724	0.0813	3.3506***	[0.004]
LFDI	0.0684	0.0212	3.2264***	[0.005]
LREER	0.4822	0.1433	3.3650***	[0.004]
INF	-0.0055	0.0010	-5.5000***	[0.000]
LK	0.3214	0.1315	2.4441**	[0.026]
LLF	0.3830	0.0100	38.3000***	[0.000]
C	-0.8113	0.0362	-22.4116***	[0.000]

Diagnostic Tests

Test Statistics	LM Version	F Version
Serial Correlation	CHSQ (1) = 0.2296[0.632]	F (1, 15) =0.1157[0.738]
Functional Form	CHSQ (1) = 0.5483[0.459]	F (1, 15) = 0.2793[0.605]
Normality	CHSQ (2) = 1.3807[0.501]	Not applicable
Heteroscedasticity	CHSQ (1) = 1.1871[0.276]	F (1, 28) = 1.1536[0.292]

Source: Computed by Author using Microfit Version 4.1 developed by Pesaran and Shin (1999). Note: ***, **, * imply significance at the 1, 5, and 10 percent levels respectively.

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From Table 6, the long run results show that trade openness, foreign direct investment, real effective exchange rate, capital stock and labour force exerted a positive and statistically significant effect on economic growth. Inflation, however, exerted a negative and statistically significant effect on economic growth. From the results, the coefficient of trade openness is statistically significant at 1 percent significance level, indicating that if the country were to increase her trade openness by 1 percent, economic growth measured as real gross domestic product will increase by approximately 0.27 percent in the long run using the new measurement of trade openness (Composite Trade Intensity (CTI)) suggested and used by Squalli & Wilson (2006). When trade openness is measured by the traditional measurement as can be seen in Appendix C in the study, one percent increase in trade openness, leads to approximately 0.14 percent increase in real GDP in the long run and this is statistically significant at 1 percent significance level. This clearly showed that the new measure of trade openness (CTI) used in the study improves on the estimates of trade openness in the long run compared with the traditional measurement of trade openness (X+M/GDP), that is a difference of 0.13 (i.e 0.27-0.14). The results obtained in this study in the long run does not absolutely resolve the conflicting results in the extent literature but contribute to the controversy in the literature by aligning itself with those studies such as Edward (1992), Nduka (2013) and Ayibor (2012) which believe that trade openness positively affects real GDP. The new measurement of trade openness (CTI) proposed in the study found a positive relationship between trade openness and economic growth in the long run.

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The estimate for trade openness in Table 6 is in line with the first objective of the study which is to investigate the long run relationship between trade openness and economic growth. The results obtained for trade openness in Table 6, answers the first hypothesis of the study which states that there is no long run relationship between trade openness and economic growth. The null hypothesis is rejected at 1 percent significance level which implies that there is a long run relationship between trade openness and economic growth and that the relationship is positive according to the results in Table 6. This means that increases in trade openness (composite trade intensity) has the potential of stimulating economic growth in Ghana at the aggregate level over the study period. This is consistent with theoretical expectation of the classical views on the role of trade in the macro economy. It is also consistent with other empirical studies such as Edward (1992), Sachs & Warner (1995), Nduka (2013), and Hamad et al., (2014) who found a positive impact of trade openness on economic growth.

According to economic theory trade induces economic growth by enhancing capital formation and efficiency, and by increasing the supply of scarce resources. For Ghana, the results obtained suggests that the trade openness policy adopted as part of the structural reforms in the 1986 in Ghana has helped open the economy and raised output. This emphasizes the fact that trade openness enhances competition and efficiency as well as transfer of technology and knowledge and hence enhancing growth.

The results however contradict the findings of Ali and Abdullah (2015) in their study *'Impact of Trade Openness on the Economic Growth of Pakistan: 1980-2010'* and Githanga (2015) for Kenya. The findings by Ali and

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Abdullah (2015) showed a negative and statistically significant long-run relationship between trade openness and economic growth for Pakistan. Githanga (2015) on the other hand also found a negative and statistically significant long-run relationship between trade openness and economic growth for Kenya implying that trade openness is growth hampering in the long-run in Kenya.

Furthermore, the coefficient of foreign Direct Investment (FDI) carried the expected positive sign and is statistically significant at 1 percent significance level. Thus, if the country's FDI increases by 1 percent, real GDP will increase by approximately 0.07 percent in the long run. That is, the economic rationale for offering special incentives to attract FDI frequently stems from the belief that foreign investment produces externalities in the form of technology transfers and spillovers. Romer (1993), for example, argues that there are important "idea gaps" between rich and poor countries. He notes that foreign investment can ease the transfer of technological and business know- how to poorer countries. These transfers may have substantial spillover effects for the entire economy and hence leading to economic growth. Rappaport (2000) observed that foreign direct investment boosts the productivity of all firms, and not just those receiving foreign capital.

Most macroeconomic studies that used aggregate FDI flows for a broad cross-section of countries, generally suggest a positive role for FDI in generating economic growth especially in particular environments (De Gregorio, 1992). For instance, Alfaro, Kalemli-Ozcan, and Sayek (2009) found that FDI promotes economic growth in economies with sufficiently developed financial markets. To add Borensztein et al., (1998) argue that FDI

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has a positive growth-effect when the country has a highly educated workforce that allows it to exploit FDI spillovers. While Wang and Blomström (1992) find no evidence that education is critical, they argue that FDI has a positive growth-effect when the country is sufficiently rich. The result also supports most findings of empirical studies in the literature. Particularly, it agrees with studies by Dava (2012) who found a positive and significant effect of FDI on economic growth for a sample of seven Southern Africa Development Community (SADC) countries in his studies 'the effect of trade liberalization on the growth of real GDP'.

The results however contradict the findings of Frimpong and Oteng-Abayie (2006) for Ghana, Atique, Ahmad, Azhar, and Khan (2004) for Pakistan and Falki (2009) too for Pakistan. These studies found a negative and statistically significant effect of FDI on economic growth. In the case of Ghana, Frimpong and Oteng-Abayie (2006) argued that most of the FDI inflows into the country go to the mining and construction sectors of the country. This however, does not generate direct growth impact on the economy as a whole and hence the negative effect.

Moreover, the coefficient of Real Effective Exchange Rate (REER) also had positive effect on economic growth and is statistically significant at 1 percent significance level. The coefficient (0.4822) of REER indicates that if the country's currency depreciates by 1 percent, economic growth measured as real GDP will increase by approximately 0.48 percent in the long run. Thus, as expected a depreciation of the domestic currency makes Ghanaian exports relatively cheaper and as such leads to increase in demand for exports and by extension economic performance where as an appreciation of the domestic

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currency makes exports more expensive and as such reduces economic performance in the long run. The result supports Aksoy and Salinas (2006) findings that the overvaluation of the real exchange rate was an important factor limiting the supply response of trade reforms. They further argued that real depreciation/devaluation enhances a country's international competitiveness, leading to increase exports and foreign exchange supplies and, thereby, increasing official capacity to imports needed inputs for industrial production and therefore economic performance. The result is also in line with findings of (Anwar and Nguyen (2010); Fidan (2006); and Majeed & Ahmad, (2007). The real exchange rate which reflects the underlying relative movement of prices at home and abroad and also competitiveness of exports has a significant effect on economic performance. A fall in the relative domestic prices due to exchange rate depreciation makes exports cheaper in the international markets resulting in increased demand for exports which eventually leads to economic growth and vice versa (Majeed & Ahmad, 2007).

Besides, the results show that the coefficient of inflation (INF) is negative and statistically significant signalling a negative influence on economic growth. With a coefficient of -0.0055, it can be explained that a 1 percent increase in inflation leads to approximately -0.006 percent decrease in economic growth (real GDP). The coefficient of INF is statistically significant at 1 percent significance level. The impact on economic growth however is relatively minimal given the size of the coefficient. High INF affects the economy as well as the society significantly and adversely. Improper price regulation and imperfect information about aggregate price level causes inflationary situation in the economy. A high rate of inflation causes many

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economic problems like poverty, unequal distribution of wealth, market imperfections, deficit in balance of payments and unemployment as well as non-economic problems like social evils such as smuggling and hoarding *etc.* Inflation also disturbs the very important role of smoothness of price mechanism. Moreover, high inflation rate has more volatility over time.

The volatility of inflation rate is a hindrance for future economic planning and project evaluation and productive use of resources. High and unpredictable inflation slows down the process of economic growth and hurts the economy, Afzal, Malik, Butt, & Fatima (2013).

Stockman (1981) argued that individual's welfare falls whenever there is an increase in inflation. The negative effect of inflation on output is an indication that inflation causes economic growth in the long-run which is in tandem with the finding of Gylfason (1999) who finds a negative relationship between inflation and economic growth for low, middle and high income countries. Gylfason (1999) argued that higher rates of inflation leads to overvaluation of national currencies in real terms which affects the exchange rate and distorts production by driving a wedge between returns to real and financial capital and consequently reducing savings. This leads to lower returns to production and investments which invariably reduces economic performance. The finding is line with the findings of (Gokal and Hanif, 2004); Ahmed and Mortaza (2005); Samimi and Shahryar (2009); and Bittencourt (2012). Ahmed and Mortaza (2005) found a statistically significant long-run negative relationship between inflation and economic growth for Bangladesh. Gokal and Hanif, 2004) also found a statistically significant negative effect of inflation on output for Fiji. Bittencourt (2012) found out that inflation has a

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negative but significant effect on economic growth for four Latin American Countries (Argentina, Bolivia, Brazil and Peru).

The results however contradict the findings by Mallik and Chowdhury (2001), Khan and Ssnhadji (2001), Chimobi (2010) and (Erbaykal & Okuyan, 2008). Mallik and Chowdhury (2001) found a positive relationship between inflation and output for four South Asian Countries (Bangladesh, India, Pakistan and Sri Lanka). Khan and Ssnhadji (2001) argued that inflation per se is not harmful to growth. Their study suggested that there is a threshold beyond which inflation is harmful to growth (i.e. inflation negatively affects economic growth). Additionally, to them when inflation is creeping it is not harmful to growth. Chimobi (2010) found no cointegrating relationship between inflation and output for Nigeria implying no long-run relationship between the two variables. Also, Erbaykal and Okuyan (2008) showed no statistically significant long-run relationship between inflation and output for Turkey.

The coefficient of capital of 0.3214 shows that a 1 percent increase in capital input would result in a 0.32 percent increase in real GDP, holding all other factors constant and is statistically significant at 5 percent significance level. The sign of the capital variable support the theoretical conclusion that capital contributes positively to growth of output since the coefficient of capital in this long-run growth equation is positive and significant. This positive relationship between capital stock and output is consistent with the expectation of the classical economic theory. The finding is line with the findings of Shaheen et al., (2013); Falki (2009) and Khan & Qayyum (2007). It is also consistent with conclusions reached by Ibrahim (2011) and Asiedu

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(2013) in the case of Ghana. Ibrahim (2011) and Asiedu (2013) found positive and statistically significant effect of capital on economic growth for Ghana.

Finally, the results show that the coefficient of labour force (LLF) is positive and statistically significant signalling a positive influence on economic growth. Labor force is positive and significant at 1 percent with a coefficient of 0.3830 indicating an increase in economic growth by this amount (0.3830) if there is a 1 percent increase in the labor force (LLF). This is consistent with the argument of Jayaraman and Singh (2007) and Ayibor, 2012) who asserted that there can be no growth achievement without the involvement of labour as a factor input hence, the positive and significant coefficient. This result however contradicts the works of Frimpong and Oteng-Abayie (2006), and Sakyi (2011) who found a negative effect of labour on economic growth.

The long-run results indicate that any disequilibrium in the system as a result of a shock can be corrected in the long run by the error correction term. Hence, the error correction term that estimated the short-run adjustments to equilibrium is generated as follows.

ECM = LRGDP - 0.2724*LOPEN - 0.0684*LFDI - 0.4822*LREER + 0.0055*INF - 0.3214*LK -0.3830*LLF + 0.8113*C

Table 6 reports the results of the diagnostic test for the estimated ARDL model. From the table, the results show that the estimated model passes the Langrangean multiplier test of residual serial correlation, Functional Form Misspecification based on the square of the fitted values, Normality based on the skewness and Kurtosis of the residuals and heteroscedasticity test based on the regression of squared residuals on fitted values.

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Short Run Estimates (DLRGDP is the dependent variable)

The existence of a long run relationship among economic growth and its exogenous variables allows for the estimation of long run estimates. The long run estimates are as reported in Table 6. The short run estimates also based on the Schwartz Bayesian Criteria (SBC) employed for the estimation of the ARDL model are reported in Table 7.

Some descriptive statistics can be obtained from Table 7. From the Table, it can be observed that the adjusted R^2 is approximately 0.86. It can therefore be explained that approximately 86 percent of the variations in economic growth is explained by the independent variables. Also, a DW-statistics of approximately 2.09 reveals that there is no autocorrelation in the residuals.

The results also showed that the coefficient of the lagged error correction term ECT (-1) exhibits the expected negative sign (-0.6408) and is statistically significant at 1 percent. This indicates that approximately 64 percent of the disequilibrium caused by previous years' shocks converges back to the long run equilibrium in the current year. According to Kremers, Ericsson, and Dolado (1992) and Bahmani-Oskooee (2001), a relatively more efficient way of establishing cointegration is through the error correction term. Thus, the thesis or study discerns that the variables in the model show evidence of moderate response to equilibrium when shocked or disturbed in the short-run.

Theoretically, it is debated that an error correction mechanism exists whenever there is a cointegrating relationship among two or more variables. The error correction term is thus obtained from the negative and significant

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lagged residual of the cointegration regression. The ECM stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance. The negative coefficient is an indication that any shock that takes place in the short-run will be corrected in the long-run. The rule of thumb is that, the larger the error correction coefficient (in absolute terms), the faster the variables equilibrate in the long-run when shocked (Acheampong, 2007)

Table 7: Estimated Short-Run Error Correction Model using the ARDL Approach

ARDL (1, 1, 0, 2, 1, 0, 2) selected based on SBC Dependent Variable: dLRGDP

Regressor	Coefficient	Standard Error	T-Ratio	P-values
dLOPEN	0.5488	0.0818	6.7090***	[0.000]
dLFDI	0.0438	0.0170	2.5765**	[0.018]
dLREER	-0.1610	0.0898	-1.7929*	[0.088]
dLREER(-1)	0.1611	0.0550	2.9291***	[0.008]
dINF	-0.0021	0.0004	-5.2500***	[0.000]
dLK	0.2059	0.0677	3.0414***	[0.006]
dLLF	0.0634	0.0580	1.0931	[0.287]
dLLF(-1)	-0.2721	0.0871	-3.1240***	[0.005]
CONS	-0.5199	0.0795	-6.5396***	[0.000]
ECM(-1)	-0.6408	0.1104	-5.8043***	[0.000]

R-Squared	0.9207	R-Bar-Squared	0.8563
S.E. of Regression	0.0703	F-stat. F (9, 20) 20.652***	[.000]
Mean of Dependent Variable	0.3399	S.D. of Dependent Variable	0.1854
Residual Sum of Squares	0.0790	Equation Log-likelihood	46.5187
Akaike Info. Criterion	32.5187	Schwarz Bayesian Criterion	22.7104
DW-statistic	2.0984		

Note: ***, **, * denotes significance level at 1%, 5% and 10% respectively
Source: computed by author using Microfit 4.1

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Table 7 reports the short run dynamic coefficients of the estimated ARDL model. Consistent with the long run results, the coefficient of trade openness has the theorized positive impact on economic growth in short run. The coefficient of trade openness is statistically significant at 1 percent. From the results, the coefficient of trade openness is statistically significant at 1 percent significance level, indicating that if the country were to increase her trade openness by 1 percent in the short run, economic growth measured as real gross domestic product will increase by approximately 0.55 percent using the new measurement of trade openness (Composite Trade Intensity (CTI)) suggested and used by Squalli & Wilson (2006). Besides, when trade openness is measured by the traditional measurement as can be seen in Appendix D in the study, a one percent increase in trade openness in the short run, leads to approximately 0.27 percent increase in real GDP and this is statistically significant at 1 percent significance level. This vividly showed that the new measure of trade openness (CTI) used in the study improves on the estimates of trade openness in the short run compared with the traditional measurement of trade openness (X+M/GDP) as seen in the preceding sentences. The results obtained in this study in the short run does not absolutely resolve the conflicting results in the extent literature but contribute to the controversy in the literature by aligning itself with those studies such as Dollar and Kraay (2003), Sarkar (2008), Ali and Abdullah (2015) and Falki (2009) which believe that trade openness positively affects real GDP in the short run. The new measurement of trade openness (CTI) proposed in the study found a positive relationship between trade openness and economic growth in the short run.

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The estimate for trade openness in Table 7 is in line with the second objective of the study which is to explore the short run relationship between trade openness and economic growth. The results obtained for trade openness in Table 7, answers the second hypothesis of the study which states that there is no short run relationship between trade openness and economic growth. The null hypothesis is rejected at 1 percent significance level which implies that there is a short run relationship between trade openness and economic growth and that the relationship is positive as shown in Table 7. This means that increases in trade openness (composite trade intensity) has the potential of stimulating economic growth in Ghana at the aggregate level over the study period in the short run. This is consistent with theoretical expectation of the classical views on the role of trade in the macro economy. In the empirical literature the results in the study is consistent with the findings by Ali and Abdullah (2015), Shaheen et al., (2013); Falki (2009); Khan and Qayyum (2007), Sarkar (2008), and Dollar & Kraay (2003) who found a positive and statistically significant effect of trade openness on economic growth in the short run.

According to economic theory trade induces economic growth by enhancing capital formation and efficiency, and by increasing the supply of scarce resources. For Ghana, the results obtained suggests that the trade openness policy adopted as part of the structural reforms in the 1986 in Ghana has helped open the economy and raised output in the short run. This emphasizes the fact that trade openness enhances competition and efficiency as well as transfer of technology and knowledge and hence enhancing growth in the short run. This indicates the crucial role that trade openness plays in

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Ghana's growth process through the economic sector as its coefficient is positive in the dynamic model just as in the long run model.

However, the result contradicts the findings of Gries and Redlin (2012), Yucel (2009), and Rigobon and Rodrik (2005) who found and negative association between economic growth and trade openness in the short run.

From Table 7, it can be observed that foreign direct investment (dLFDI) exerts a positive influence on economic growth. Its coefficient of (0.0438) suggests that, a 1 percent increase in FDI leads to approximately 0.04 percent increase in economic growth at 5 percent level of significance. The positive effect of FDI reemphasizes the fact that Ghana has benefited positively from the spillover effect of foreign investors in the country. The study is consistent with the work of De Mello (1997). De Mello (1997) argued that FDI influences economic growth by serving as an important source of capital, which complements domestic private investment in developing productive capacity. He further observed that FDI has the potential to generate employment and raise factor productivity via knowledge and skill transfers, adoption of new technology which helps local firms to improve their productive capacity thereby enhancing economic performance. To add, Lall (1985) argued that foreign investments come to host country with a package, including capital, technology, and management and marketing skills. They can, thus, improve competition, efficiency; provide additional jobs and financial resources in an economy and hence leading to robust economic performance.

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The finding however contradicts the findings of Asiedu, 2013; Frimpong and Oteng, 2006 for Ghana respectively and Falki (2009) in the case of Pakistan). These studies found a negative and statistically significant effect of FDI on economic growth in the short run. In the case of Ghana, Asiedu (2013) argued that most of the FDI inflows into the country go to the mining and construction sectors of the country. This however, does not generate direct growth impact on the economy as a whole and hence the negative effect observed in the short run.

Real effective exchange rate (dLREER) did not have the expected a prior sign. The coefficient of real effective exchange rate is negative and statistically significant at 10 percent level of significance. With a negative coefficient of 0.1610, it is expected that a 1 percent increase in the coefficient of dLREER leads to approximately 0.16 percent decrease in economic growth meaning that real effective exchange rate is growth hampering in the short run in Ghana. And the possible explanation could be that, though, real depreciation/devaluation enhances a country's international competitiveness, leading to increases in exports and foreign exchange supplies and, hence, increasing official capacity of a country to import the needed inputs for production. However, the immediate effect of these vital inputs may not be realized or felt immediately in the economy as it takes a little longer for it to be felt in the economy hence accounting for the negative effect of real effective exchange rate on economic growth in the short run. Another reason is that Ghana as a country is import depended and so when there is real depreciation/devaluation, it affects the general prices of goods and services particularly those imported which reduces the purchasing power of domestic

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consumers, thereby, leading to a fall in aggregate demand in the economy which go a long way to affect production and economic performance negatively. This finding is inconsistent with the findings of Prasad (2000) who found that short run changes in real effective exchange rate leads to increased exports and economic growth for Fiji.

Interestingly, the lag of real effective exchange rate {dLREER (-1)} has the expected a prior sign and has a significant influence on economic growth in the short run. Thus, with a positive value of 0.1611, it can be explained that a 1 percent increase in last year's real effective exchange rate leads to approximately 0.16 percent increase in economic growth in the current year or period. Its coefficient is statistically significant at 1 percent level of significance. This finding is, however, consistent with the findings of Prasad (2000) who found that short run changes to real effective exchange rate leads to increased exports and economic growth in the short run for Fiji.

Again, the coefficient of inflation also maintained its negative sign and is statistically significant at 1 percent significance level which is consistent with the long run results. The result therefore suggests that if inflation goes up by 1 percent, economic growth will decrease by approximately 0.0021 percent in the short run. Thus, the short run and long run results indicate that inflation has been a discouragement for economic growth in Ghana. The negative effect of inflation on economic growth seem less severe in the short run (-0.0021) than in the long run (-0.0055). The results indicate how important it is to control inflation in the Ghanaian economy by putting in the appropriate policies. Its impact in both the short run and long run appear to be debilitating as inflation generally proxy macroeconomic instability. In the empirical

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literature the results supports the findings by (Gokal and Hanif, 2004; Ahmed and Mortaza, 2005; (Mallik & Chowdhury, 2001)Samimi and Shahryar, 2009; Bittencourt, 2010 and Gylfason, 1999). Gylfason (1999) found evidence in support of a negative effectof on economic growth in the short run for countries that export primary commodities.

The result in this thesis or study is inconsistent with the findings by Asiedu, (2013) for Ghana who found a positive and insignificant effect of inflation on economic growth. The result also contradicts that of Mallik and Chowdhury (2001) who found a positive relationship between inflation and economic growth for South Asian Countries (Bangladesh, India, Pakistan and Sri Lanka).

Furthermore, consistent with findings of Falki, 2009; (Khan and Qayyum (2007), Githanga, (2015) for Kenya; and Ibrahim (2011) for Ghana, the coefficient of capital stock maintained its positive sign and is statistically significant at 1 percent significance level which is consistent with the long run result. This means that in the short run, a 1 percentage point increase in capital stock will induce economic growth to increase by approximately 0.21 percent. This indicates the crucial role that capital stock plays in Ghana's growth process. The sign of capital stock variable supports the theoretical conclusion that capital contributes positively to growth of real GDP both in the short run and in the long run since the coefficient of capital in these two periods is positive and significant.

Finally, labour force maintained its expected positive sign as in the long run although it is statistically insignificant. This result, however, contradicts the findings of Frimpong and Oteng-Abayie (2006), and Sakyi

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(2011) who found a negative and significant effect of labour on economic growth in Ghana. Frimpong and Oteng-Abayie (2006) argued that labour force variable is negatively signed and statistically significant. To them, this is an indicative of the growing unemployment problem and the low productivity of labour in Ghana. They further argued that the economy of Ghana is based on land intensive agriculture, capital intensive mining, and labour intensive petty trading all of which have limited employment and income generation benefits for the country.

Interestingly, from Table 7, the lag of labour force {dLLF (-1)} does not have the expected a prior sign but has a significant influence on economic growth in the short run. Thus, with a negative value of 0.2721, it can be explained that a 1 percentage point increase in last year's labour force leads to approximately 0.27 percent decrease in economic growth in the current year or period. Its coefficient is statistically significant at 1 percent level of significance. This finding is, however, consistent with the findings of Frimpong and Oteng-Abayie (2006), and Sakyi (2011) who found a negative and significant effect of labour force on economic growth in Ghana.

Diagnostic Tests

Diagnostics test were conducted for the ARDL model. The tests as reported in table 6 indicate that the estimated model passes the Langrangean multiplier test of residual serial correlation among variables. Also, the estimated model passes the tests for Functional Form Misspecification using square of the fitted values. The model also passed the Normality test based on the Skewness and Kurtosis of the residuals. Thus, the residuals are normally

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distributed across observations. Finally, the estimated model passes the test for heteroscedasticity test based on the regression of squared residuals on squared fitted values.

Stability Tests

Pesaran and Pesaran (1997) suggests that the test for the stability for parameters using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) plots be conducted after the model is estimated. This is done to eliminate any bias in the results of the estimated model due to unstable parameters. Also, the stability test is appropriate in time series data, especially when one is uncertain about when structural changes might have taken place.

The results for CUSUM and CUSUMSQ are depicted in Appendices A (1) and Appendices A (2) respectively. The null hypothesis is that coefficient vector is the same in every period and the alternative is that it is not Bahmani-Oskooee and Nasir (2004). The CUSUM and CUSUMSQ statistics are plotted against the critical bound of 5 percent significance level. According to Bahmani-Oskooee and Nasir (2004), if the plot of these statistics remains within the critical bound of the 5 percent significance level, the null hypothesis that all coefficients are stable cannot be rejected.

Appendices A (1) depicts the plot of CUSUM for the estimated ARDL model. The plot suggests the absences of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the period of the study.

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Appendices A (2) depicts the plot of CUSUMSQ for the estimated ARDL model. The plot also suggests the absences of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the period of the study.

Granger Causality Tests

In order to examine the predictability of trade openness on economic growth, Granger causality test was applied to measure the linear causation among the variables. Employing the Pairwise granger causality test attributed to Engel and Granger (1987), the following results were obtained as depicted in Table 8: In testing for causality between variables, the following outcomes can be expected: a test concludes that a variable Granger causes the other when the set of coefficients for the two variables are statistically significant.

Table 8: Results of Pair-wise Granger Causality Tests

Null Hypothesis	F-Statistics	Probability
LOPEN does not Granger Cause LRGDP	3.5161	[0.0409]**
LRGDP does not Granger Cause LOPEN	0.4040	[0.6708]
LFDI does not Granger Cause LRGDP	5.5046	[0.0094]***
LRGDP does not Granger Cause LFDI	0.6830	[0.5130]
LREER does not Granger Cause LRGDP	4.1463	[0.0245]**
LRGDP does not Granger Cause LREER	0.8338	[0.4431]
INF does not Granger Cause LRGDP	9.0321	[0.0007]***
LRGDP does not Granger Cause INF	0.2552	[0.7763]
LK does not Granger Cause LRGDP	3.5210	[0.0408]**
LRGDP does not Granger Cause LK	0.6586	[0.5240]
LLF does not Granger Cause LRGDP	2.7707	[0.0768]*
LRGDP does not Granger Cause LLF	0.9290	[0.4047]

Note: ***, **, and * denote significance level at 1%, 5% and 10% respectively

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Thus, causality can be assumed to move from one variable to the other. On the other hand, a test concludes that a variable does not Granger cause the other, when the set of coefficients on the variables are not statistically significant. Table 8 reports the results for the Granger causality between the variable of interest in the study. From the Table, the null hypothesis that trade openness does not Granger cause economic growth is rejected at 5 percent significance level meaning that the lag values or histories of trade openness together with that of real GDP or economic growth help in explaining or predict variations in economic growth, than it can using only lag values or histories of economic growth. However, the other way round Granger causality is not rejected implying that the lag values of economic growth together with the lag values of trade openness do not predict variations in trade openness. The results suggest a unidirectional causality from trade openness to economic growth. The results obtained in the study on causality does not absolutely resolve the conflicting results in the extent literature but contribute to the controversy in the literature by aligning itself with those studies such as Olufemi (2004), and Nath and Mamun (2004) who also found a unidirectional causality running from trade openness to growth. Besides, the result is in line with the third objective of the study which is to examine the direction of causality between trade openness and economic growth. The third hypothesis of no directional causality between trade openness and economic growth is rejected at 5 percent and the alternative accepted which implies that there is directional causality between trade openness and economic growth and it is unidirectional running from trade to growth. This shows that an increasing level of openness will be beneficial, depending on the level of economic

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development in Ghana. In the empirical literature, the result concurs with the findings of Olufemi (2004), and Nath and Mamun (2004) who also found a unidirectional causality.

The study, however, contradicts the study done by Arif and Ahmad (2012) who examined the causal effects between trade openness and economic growth for Pakistan. Their results found a bi-directional significant relationship between trade openness and economic growth. Also, it contradicts studies done by (Nduka, Chukwu, & Nwakair, 2013). In the case of Nduka et al., (2013) their empirical findings clearly suggested that economic growth causes trade openness in the case of Nigeria and not vice versa. To them, there was a unidirectional causality running from economic growth to trade openness not the other way round.

Moreover, the results in Table 8 show a rejection of the null hypothesis that LFDI does not Granger Cause LRGDP at 1 percent significance level. However, the null hypothesis that real gross domestic product (economic growth) does not Granger cause foreign direct investment is not rejected implying that the lag values of economic growth together with that of FDI do not predict variations in foreign direct investment (FDI). Thus, there is a unidirectional causality from foreign direct investment to economic growth.

This finding of the study or thesis is in line with the findings of Esso (2010) who re-examined the relationship between FDI and economic growth in the case of Sub- Saharan Africa countries. The study suggests that, foreign direct investment significantly causes economic growth in three countries, while the growth causes foreign direct investment in two countries. The study is in consonance with the findings of Ayibor (2012) who found a

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unidirectional causality relationship between FDI and economic growth in Ghana. The results also support the findings of Zhang (2001), who in exploring the existence of bi-directional causation between foreign direct investment and economic growth for a sample of eleven Latin American and East Asian countries for a 30-year period found that there is unidirectional causality for five countries running from FDI to economic growth.

The study however, contradicts the study done by Andinuur (2013) who examined the causal effects between FDI and economic growth for Ghana. His results found a bi-directional causality between FDI and economic growth in Ghana. The results also contradict the study of Muhammad Adnan Hye (2011) who examined the causal relation between FDI and economic growth for Liberia. Also, the result is inconsistent with the studies done by Chowdhury & Mavrotas (2006). In the case of Chowdhury and Mavrotas (2006) their empirical findings clearly suggested that economic growth causes FDI in the case of Chile and not vice versa, while for both Malaysia and Thailand, there is strong evidence of a bi-directional causality between the two variables. The result in this study, again, contradicts the study done by Irandoust (2001) who examined the causal effects between FDI and output growth for four OECD countries. Their results found no causal relationship between FDI and output growth in Denmark and Finland.

Table 8 shows that the null hypothesis that real effective exchange rate (REER) does not Granger cause economic growth is rejected. This is because the coefficient resulting from the test is statistically significant at 5 percent leading the study to conclude the existence of a unidirectional causality running from real effective exchange rate (REER) to economic growth.

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However, the null hypothesis that economic growth does not Granger cause real effective exchange rate cannot be rejected since the resulting coefficient from the test is not statistically significant implying that the lag values of economic growth together with that of real effective exchange rate do not predicts variations in real effective exchange rate. Thus, a unidirectional causality between real effective exchange rate (REER) and economic growth is found. This is an indication that real effective exchange rate (REER) is a critical variable in achieving economic growth in Ghana.

In the empirical literature, the result concurs with the findings of Tarawalie (2010) who also found a unidirectional causality relationship between real effective exchange rate and economic growth running from real effective exchange rate to economic growth for Sierra Leone.

The study, however, deviates from the results obtained by Naseer (2013) who found no causal relationship between real effective exchange rate and economic growth for Pakistan.

Besides, the Granger causality test results in Table 8 suggest that the null hypothesis that inflation does not Granger cause real GDP (economic growth) an be rejected, implying that inflation Granger cause economic growth since the coefficient resulting from the test is statistically significant. However, the null hypothesis that economic growth does not Granger cause inflation cannot be rejected, meaning that economic growth does not Granger cause inflation since the resulting coefficient from the test is not statistically significant implying that the lag values of economic growth together with that of inflation do not predicts variations in inflation. Thus, a unidirectional

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causality has been identified running from inflation to economic growth at 1 percent significance level.

The unidirectional causality between inflation and economic growth is in line with the findings of Andinuur (2013) for Ghana, Chimobi (2010) for Nigeria and Erbaykal and Okuyan (2008) for Turkey. Andinuur (2013) found a unidirectional causality between inflation and economic growth running from inflation to economic growth. Chimobi (2010) identified a unidirectional causality between inflation and economic growth running from inflation to economic growth. Erbaykal and Okuyan (2008) found a unidirectional causality between inflation and economic growth running from inflation to economic growth.

However, the study deviates from the results obtained by Gokal and Hanif (2004) who found a unidirectional causality between inflation and economic growth for Fiji running from economic growth to inflation.

The results in Table 8 indicate that there is a unidirectional causality between capital stock and economic growth running from capital stock to economic growth at 5 percent level of significance. However, the null hypothesis that economic growth does not Granger cause capital stock cannot be rejected, implying that economic growth does not Granger cause capital stock since the resulting coefficient from the test is not statistically significant.

In the empirical literature, the study or thesis is in consonance with the findings of Adhikary (2011) for Bangladesh who found a unidirectional causality between capital stock and economic growth running from capital to economic growth.

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However, the study deviates from the results obtained by Ayibor (2012) who found a bi-directional causality between capital stock (gross fixed capital formation) and economic growth for Ghana. It also contradicts the results obtained by Kanu and Ozurumba (2014) for Nigeria. Kanu and Ozurumba (2014) identified a unidirectional causality between gross fixed capital formation (a proxy for capital stock) and economic growth running from economic growth to capital stock and not the other way round.

Finally, the Granger causality test suggested a unidirectional causal relationship from labour force to economic growth. This is because as observed from Table 8, the coefficient resulting from the test that labour force does not Granger cause economic growth is statistically significant at 10 percent. Thus, the null hypothesis that labour force does not Granger cause economic growth can be rejected. This is an indication that labour force is an important variable in achieving economic growth in Ghana. However, the reverse is not the case implying that the lag values of economic growth together with that of labour force do not predicts variations in labour force.

In the empirical literature, the result of the study or thesis concurs with the results obtained by Acaroğlu (2015) for Turkey. Acaroğlu (2015) identified a unidirectional causality relationship between economic growth and labour force variable running from labour force variable to economic growth.

Conclusion

The main focus of this chapter was the estimation of the ARDL model and the presentation and apparent discussion of its results. The chapter began with presentation of the descriptive statistics then proceeds with the tests for

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unit roots in the series by employing the ADF and PP test for unit root. The tests were conducted in levels and in first difference with intercept only, and intercept with trend.

The results of the tests confirmed that LREER, and INF were stationary at levels whereas LRGDP, LFDI, LOPEN, LK and LLF were not stationary at levels. However, when the first difference of these non-stationary series was taken, the study found them to be stationary. The study concluded that LREER, and INF are integrated of order zero [I (0)], while LRGDP, LFDI, LOPEN, LK and LLF are integrated of order one [I (1)]. All variables were transformed into natural logarithm. The study further tested for the existence of a cointegration relationship among the variables.

The long run results revealed a positive and statistically effect of trade openness on economic growth. This implied a complementary relationship between the two variables. The study also found a positive and statistically significant effect of foreign direct investment, real effective exchange rate, capital stock, and labour force on economic growth. Inflation exerted a negative and statistically significant effect on economic growth.

The short run estimates also provide evidence of statistically significance and positive effect of trade openness on economic growth. Thus, short run changes in trade openness leads to an increase in economic growth. Foreign direct investment, the lag of real effective exchange rate, and capital stock exhibited the expected signs and exerted a positive and statistically significant effect on economic growth in the short run. Labour force exhibited the expected sign but exerted a positive and statistically insignificant effect on economic growth in the short run. Inflation, real effective exchange rate, and

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the lag of labour force exerted a negative and statistically significant effect on economic growth. Finally, the model passed the parameter stability tests of serial correlation, functional form misspecification, non-normal errors, heteroscedasticity, CUSUM and CUSUMSQ. The study, in conclusion found a unidirectional causality between trade openness and economic growth running from trade openness to economic growth.

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CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The aim of this chapter is to elaborate on the findings of the study, draw conclusions upon these findings and also to provide policy recommendations. The chapter begins with a summary, then concludes and makes policy recommendations.

Summary

The study sought to examine, as the main objective, the relationship between trade openness and economic growth in Ghana using annual time series dataset from 1986 to 2015. The study set out to examine the possible existence of long run and short run relationship between trade openness and economic growth. The study in addition sought to examine the possibility of a causal relationship between the two variables and also to examine the direction of causality. In view of this, the Autoregressive Distributed Lagged Model (ARDL) approach to bounds testing developed by Pesaran and Shin (1999) was adopted to examine the long run and short run dynamic parameters of the model.

The study began with the descriptive statistics then with the tests for unit roots in the variables used in the study. This was done to check for the stationarity properties of the variables or series employed in the study. Thus, the study employed Augmented Dickey-Fuller (ADF) Phillips-Perron (PP) tests for unit roots testing. These tests for the presence of unit roots were done in levels and in first difference with constant and trend.

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- The ADF and PP tests for unit roots revealed that real GDP (economic growth), trade openness, foreign direct investment, , gross fixed capital formation (capital stock), and labour force were stationary after first difference, that is they are integrated of order one I(1). On the other hand, real effective exchange rate (REER) and inflation were stationary in levels and are thus integrated of order zero I(0). This allowed the use of ARDL model which although ignores the stationary problems in series, requires that variables are integrated of an order not higher than one. The next step was to examine the possible long run relationships among the variables in the study.
- The bounds tests results for long run relationship revealed that in the long run, trade openness exerted a positive and statistically significant effect on economic growth.
- Thus, the study concludes the existence of a complementary relationship between trade openness and economic growth.
- This suggested that, trade openness serves as a catalyst for economic growth. This finding is in line with the classical argument that trade openness resulting from comparative advantage leads to economic growth. This is because trade openness opens the economy to competition which enhances efficiency in domestic production and also reduce high incidence of balance of payment deficits and consequently enhance real GDP growth.
- The long run dynamic estimates also revealed that foreign direct investment exerted a positive and statistically significant influence on

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economic growth in the long run. This emphasizes the crucial role that that FDI plays in the growth process of Ghana.

- Also, the estimates of the long run results showed that real effective exchange rate (REER) exerted a positive and significant influence on economic growth in the long run. An increase in real effective exchange rate makes Ghana exports relatively cheaper and as such increases demand for exports and by extension improving economic performance. A decrease in real effective exchange rate, however, makes Ghana's exports more expensive and thus decreases export demand. Thus, in the long run Ghana stands to gain from increase in real effective exchange rate rather than decrease.
- The results from the long run revealed a negative and statistically significant effect of inflation on economic growth. Thus macroeconomic stability is important in determining economic performance as a stable macroeconomic environment is conducive for production and investment.
- Moreover, the results from the long run showed that gross fixed capital formation (capital stock) exerted a positive and statistically significant effect on economic growth in the long run. This is an indication that capital stock is critical in achieving sustained economic growth in Ghana.
- Finally, the long run results revealed a statistically significant and positive effect of labour force (LLF) on economic growth. This finding is in line with the argument of (Jayaraman & Singh, 2007) who asserted that there can be no growth achievement without the

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involvement of labour as a factor input. It also emphasises the crucial role that that LLF plays in the growth process of Ghana.

The short run dynamics also revealed that trade openness exerted a positive and significant effect on economic growth.

- This led the study to conclude that short run changes in trade openness leads to an increase in economic growth and thus posit a complementary relationship between the two variables.
- Also, the study found that foreign direct investment (FDI) exerted a positive and statistically significant effect on economic growth in the short run just as in the long run. This re-emphasises the significant role that FDI plays in the growth process of Ghana.
- Again, the study found that real effective exchange rate (REER) exerted a negative and statistically significant effect on economic growth in the short run. This is an indication that real effective exchange rate is growth hampering in the short run.
- Interestingly, the study revealed a significant influence of the lag of real effective exchange rate on economic growth. This led the study to conclude that previous year's value of real effective exchange rate influences positively on the values of economic growth in the current year.
- Inflation, on the other hand, exerted a negative and statistically significant effect on economic growth in the short run. Thus macroeconomic stability is important in determining economic performance as a stable macroeconomic environment is conducive for production and investment.

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- The short-run results revealed that capital stock has a statistically significant and positive effect on economic growth as in the long run. This re-emphasises the crucial role that capital stock plays in the growth process in Ghana.
- Also, labour force exerted a positive and statistically insignificant effect on economic growth in the short run.
- Finally, the study revealed a significance influence of the lag of labour force on economic growth. Thus, the study concludes that previous year's value of labour force influences negatively on the values of current economic growth in the short run.

It was necessary to establish a long run relationship among the variables in the study and this was given by the error term. The results revealed that

- The negative and statistically significant coefficient of the error term further consolidates the existence of a long run relationship among economic growth, trade openness, foreign direct investment, real effective exchange rate, inflation, capital, and labour force.
- The size of its coefficient suggests that about 64 percent of disequilibrium caused by shocks to the system in the previous year converges back to the long equilibrium in the current year.

The diagnostic tests for the model revealed that

- The model passes the tests of serial correlation, functional form misspecification, non-normal errors, and heteroskedasticity.

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- The parameter stability test which was conducted by plotting the graphs of the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares recursive residuals (CUSUMSQ) also revealed the existence of a stable relationship between trade openness and economic growth of the entire period of the study.

The study also examined the existence and therefore the direction of causality between trade openness and economic growth by utilizing the Pairwise granger causality test approach.

- The results of the test revealed a unidirectional causality between trade openness and economic growth running from trade openness to economic growth.
- Similarly, the study found a unidirectional causality among FDI, real effective exchange rate, inflation, capital stock, labour force, and economic growth in Ghana.

Conclusions

From the results and discussion that have been elaborated, the objective of the study which was to examine the effect of trade openness on economic growth was accomplished. The study tested the long run, short run and causal relationship between trade openness and economic growth in Ghana using annual time series dataset from 1986 to 2015.

The empirical evidence from the study reveal that trade openness, FDI inflows, capital stock and labour force exerted a positive and significant effect on economic growth in the long run and short run with the exception of labour force which was insignificant in the short run. Real effective exchange rate

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exerted positive and significant effect on economic growth in the long run but in the short run it exerted a negative and significant effect on economic growth.

This gives an indication that trade openness is significant for improving economic growth in the short and long term. Also, increase in FDI, capital stock and labour force leads to economic growth in the long run and short run with the exception of labour force which does not lead to economic growth in the short run. Besides, increase in real effective exchange rate leads to economic growth in the long run but hampers economic growth in the short run. The study also revealed a negative and statistically significant influence of inflation on economic growth in both the short run and long run. This gives an indication that lower rate of inflation serves to boost economic expansion whereas higher rate of inflation adversely affect economic performance by creating distortions in the production process and investment in both the short run and long run.

Finally, the study revealed a unidirectional causality relationship between trade openness and economic growth running from trade openness to economic growth. This gives an indication that the past values of trade openness can help in explaining economic growth than using past values of economic growth only. However, the lag values of economic growth together with that of trade openness do not predict variations in trade openness since economic growth does Granger cause trade openness.

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Recommendations

Based on the findings from the study, the following recommendations are proposed.

First, as indicated in the conclusions above, an increase in trade openness to boost economic growth can be considered as both a long run and short term policy instrument. That is, economic growth will increase just as in the long run and short run period. On the basis of the findings, it is recommended that policy makers should focus on export promotion strategy to enhance the economic growth in Ghana. In contrast, efficient utilization of capital goods should be ensured and reliance on non-capital goods should be less in order to ensure high domestic production in the country.

Second, from the study, FDI inflows are crucial for boosting economic growth in Ghana; to this end government needs to provide incentives to facilitate attraction of FDI. Thus, it is recommended that government policy should focus on encouraging and directing foreign direct investors to invest in the industrial and agricultural sectors as this could be growth enhancing. These may include tax holidays and tax relieves to investors who wish to go to these sectors as well as improvement in the infrastructural base of the country such as roads, railways, and communications, among others particularly in the rural areas. When this is done, it would complement domestic investment in those sectors so as to accelerate GDP and its impact will consequently be trickled down to the vast majority of people in the economy. The emphasis is placed on the manufacturing and agricultural sectors because of their contributions in the economy in terms of employment creation, income generation, foreign exchange generation, revenue generation, GDP growth, among others.

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Last but not the least, from the study, inflation was growth hampering; it is therefore recommended that effort should be made by the government to cut down 'wastage' in the economy and rigorously tackle corruption. On the basis of this, it can be recommended to keep inflation at stable level in the economy. Therefore, policy makers and Bank of Ghana should concentrate on those options which keep the inflation rate stable and below the level which has been found helpful for the achievement of sustainable economic growth. Stable and moderate inflation is also helpful for minimizing the uncertainties and fluctuations in the financial sector of economy, which, in turn, boost the capital formation activities in the country. So that it may exert its positive effects on the economy. So, maintaining price stability will ultimately be the best policy recommendation to stable and sustained economic growth of the economy.

Limitations of the study

The major limitation encountered in the study primarily involves data availability. There were not enough data points for all the variables included in the study thereby making the study to use a smaller sample size from 1986 to 2015. Also, to effectively analyze the impact of trade openness on economic growth; there was the need to do a sectorial and regional analysis by considering the distribution and consequently, the contribution of trade openness to specific sectors, components, and regions of the Ghanaian economy. This would have allowed the prescription of specific policies to tackle deficiencies in these sectors. However, the unavailability of data of this kind did not allow this kind of analysis.

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Direction for Future Research

It is imperative that a discriminating study on the relationship between trade openness and economic growth be done to analyze specific effects and contributions to the economy. Specifically, sectoral and regional distribution and contribution of trade openness to economic growth as well as trade openness specific effect to economic growth ought to be carried out. Also, it is important to include other variables which are touted as influential in explaining the relationship between trade openness and economic growth such as institutional quality, corruption index, and interest rate. Finally, future research could consider using many more measures of trade openness for both cointegration and causality tests in addition to using improved econometric techniques and long span of annual time series data.

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REFERENCES

Acaroğlu, H. (2015). The Relationship between Industrial Growth and Labor Force Markets in Turkey. *Issues in Social Science*, *3*(1), 83.

Acheampong, I. K. (2007). Testing Mckinnon-Shaw thesis in the context of Ghana's financial sector liberalisation episode. *International Journal of Management Research and Technology*, *1*(2), 156–183.

Adhikary, B. K. (2011). FDI, trade openness, capital formation, and economic growth in Bangladesh: a linkage analysis. *International Journal of Business and Management*, *6*(1), 16.

Afzal, M., Malik, M. E., Butt, A. R., & Fatima, K. (2013). Openness, inflation and growth relationships in Pakistan: An application of ARDL bounds testing approach. *Pakistan Economic and Social Review*, *51*(1), 13.

Ahmed, S., & Mortaza, M. G. (2005). Inflation and growth in Bangladesh: 1981-2005. *Policy Analysis Unit, Working Paper Series: WP*, *604*.

Akaike, H. (1981). Likelihood of a model and information criteria. *Journal of Econometrics*, *16*(1), 3–14.

Aksoy, A., & Salinas, G. (2006). Growth before and after Trade Liberalization. *World Bank Policy Research Working Paper*, (4062).

Alfaro, L., Kalemli-Ozcan, S., & Sayek, S. (2009). FDI, productivity and financial development. *The World Economy*, *32*(1), 111–135.

Ali, W., & Abdullah, A. (2015). The Impact of Trade Openness on the Economic Growth of Pakistan: 1980-2010. *Global Business & Management Research*, *7*(2). Retrieved from http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=19475667&AN=103267183&h=1qTwSTeSDPBZ%2BDA

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0ggWlBgQGr%2BRNXDdtN3F3aD3LreiXcKa2PgKocxFwLyhzqbvxlg6Zw3TcONAfnR1KhQYVKg%3D%3D&crl=c

Andinuur, J. (2013). *Inflation, Foreign Direct Investment and Economic Growth in Ghana*. University of Ghana. Retrieved from http://ugspace.ug.edu.gh/handle/123456789/5334

Anorou, E., & Ahmad, Y. (2000). Openness and Economic Growth: Evidence from selected ASEAN countries. *Indian Economic Journal*, *47*(3), 110.

Anwar, S., & Nguyen, L. P. (2010). Foreign direct investment and economic growth in Vietnam. *Asia Pacific Business Review*, *16*(1–2), 183–202.

Anyanwu, J. C. (2011). *Determinants of foreign direct investment inflows to Africa, 1980-2007*. African Development Bank Group. Retrieved from http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/WORKING%20136%20Determinants%20Of%20Foreign%20Direct%20Investment%20Inflows%20To%20Africa%201980-2007%20AS.pdf

Arif, A., & Ahmad, H. (2012). Impact of Trade Openness on Output Growth: Co integration and Error Correction Model Approach. *International Journal of Economics and Financial Issues*, *2*(4), 379.

Armah, B. (1993). Trade Structures and Employment Growth in Ghana: A Historical Comparative Analysis: 1960-89. *African Economic History*, (21), 21–36.

Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: is Africa different? *World Development*, *30*(1), 107–119.

Asiedu, E., & Lien, D. (2004). Capital controls and foreign direct investment. *World Development*, *32*(3), 479–490.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Asiedu, M. K. (2013). Trade liberalization and growth: The Ghanaian experience. *Journal of Economics and Sustainable Development*, *4*(5), 125–135.

Atique, Z., Ahmad, M. H., Azhar, U., & Khan, A. H. (2004). The Impact of FDI on Economic Growth under Foreign Trade Regimes: A Case Study of Pakistan [with Comments]. *The Pakistan Development Review*, 707–718.

Awan, M. Z., Khan, B., & uz Zaman, K. (2011). Economic determinants of Foreign Direct Investment (FDI) in commodity producing sector: A case study of Pakistan. *African Journal of Business Management*, *5*(2), 537.

Ayadi, F. S., & Ayadi, F. O. (2008). The impact of external debt on economic growth: A comparative study of Nigeria and South Africa. *Journal of Sustainable Development in Africa*, *10*(3), 234–264.

Ayibor, R. E. (2012). Trade liberalisation and economic growth in Ghana (Unpublished master's thesis). University of Cape Coast, Cape Coast.

Baafi Antwi, J. (2010). Ghana's Economic Growth in Perspective: A time series approach to Convergence and Determinants. Retrieved from http://www.diva-portal.org/smash/record.jsf?pid=diva2:326555

Bahmani-Oskooee, M. (2001). Nominal and real effective exchange rates of Middle Eastern countries and their trade performance. *Applied Economics*, *33*(1), 103–111.

Bahmani-Oskooee, M., & Nasir, A. B. M. (2004). ARDL approach to test the productivity bias hypothesis. *Review of Development Economics*, *8*(3), 483–488.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Balassa, B. (1985). *Industrial protection in the developed countries*. Springer. Retrieved from http://link.springer.com/chapter/10.1007/978-1-349-17991-6_19

Balassa, B., & Kreinin, M. E. (1967). Trade liberalization under the“ Kennedy Round”: the static effects. *The Review of Economics and Statistics*, 125–137.

Balasubramanyam, V. N., Salisu, M., & Sapsford, D. (1996). Foreign direct investment and growth in EP and IS countries. *The Economic Journal*, 92–105.

Baldwin, R. (1989). *Measureable Dynamic Gains from Trade*. National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w3147

Barro, R. J. (1991). A cross-country study of growth, saving, and government. In *National saving and economic performance* (pp. 271–304). University of Chicago Press. Retrieved from http://www.nber.org/chapters/c5994.pdf

Bhagwati, J. (1958). Immiserizing growth: a geometrical note. *The Review of Economic Studies*, *25*(3), 201–205.

Bhalla, S., & Lau, L. J. (1992). Openness, technological progress and economic growth in developing countries. *World Bank*.

Bittencourt, M. (2012). Inflation and economic growth in Latin America: Some panel time-series evidence. *Economic Modelling*, *29*(2), 333–340.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Borensztein, E., De Gregorio, J., & Lee, J.-W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, *45*(1), 115–135.

Cantah, G. W., Brafu-Insaidoo, G. W., Wiafe, E. A., & Adams, A. (2016). FDI and Trade Policy Openness in Sub-Saharan Africa. *Eastern Economic Journal*. http://doi.org/10.1057/eej.2016.9

Chimobi, O. P. (2010). Inflation and economic growth in Nigeria. *Journal of Sustainable Development*, *3*(2), 159.

Choong, C. K., Yusop, Z., & Liew, V. K. S. (2005). Export-led growth hypothesis in Malaysia: An investigation using bounds test. *Sunway Academic Journal*, *2*, 13–22.

Chowdhury, A., & Mavrotas, G. (2006). FDI and growth: What causes what? *The World Economy*, *29*(1), 9–19.

Das, D. K., & others. (2002). Trade liberalization and industrial productivity: An assessment of developing country experiences. *Indian Council for Research on International Economic Relations Working Paper*, *77*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi =10 .1.1.521.1147&rep=rep1&type=pdf

Dava, E. (2012). Trade Liberalization and Economic Growth in the SADC: A difference-in-difference alnalysis.“. In *MOÇAMBIQUE: ACUMULAÇÃO E TRANSFORMAÇÃO EM CONTEXTO DE CRISE INTERNACIONAL” Conference Paper*. Retrieved from http://www. iese.ac.mz/lib/publication/III_Conf2012/IESE_IIIConf_Paper8.pdf

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Davidson, R., & MacKinnon, J. G. (2004). *Econometric theory and methods* (Vol. 5). Oxford University Press New York. Retrieved from http://down.cenet.org.cn/upfile/28/20071110194334120.pdf

De Gregorio, J. (1992). The effects of inflation on economic growth: lessons from Latin America. *European Economic Review*, *36*(2), 417–425.

De Mello Jr, L. R. (1997). Foreign direct investment in developing countries and growth: A selective survey. *The Journal of Development Studies*, *34*(1), 1–34.

de Piñeres, S. A. G., & Ferrantino, M. (1997). Export diversification and structural dynamics in the growth process: The case of Chile. *Journal of Development Economics*, *52*(2), 375–391.

Demetriades, P. O., & Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. *Journal of Development Economics*, *51*(2), 387–411.

Dollar, D. (1992). Outward-oriented developing economies really do grow more rapidly: evidence from 95 LDCs, 1976-1985. *Economic Development and Cultural Change*, *40*(3), 523–544.

Dollar, D., & Kraay, A. (2003). Institutions, trade, and growth. *Journal of Monetary Economics*, *50*(1), 133–162.

Dollar, D., Kraay, A., & others. (2001). *Trade, growth, and poverty*. World Bank, Development Research Group, Macroeconomics and Growth. Retrieved from http://www.nber.org/~wei/data/FinGlobal-F&D.pdf#page=78

Dupasquier, C., & Osakwe, P. N. (2006). Trade Regimes, Liberalization and Macroeconomic Instability in Africa*. Retrieved from https://books.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

google.com/books?hl=en&lr=&id=foKbPBipXR4C&oi=fnd&pg=PA225&dq=Dupasquier+and+Osakwe,+2006&ots=FQQUAuVV6E&sig=kd4co_tcSw31Se0ewjqEFm6uYL8

Durlauf, S. N., Johnson, P. A., & Temple, J. R. (2005). Growth econometrics. *Handbook of Economic Growth*, *1*, 555–677.

Edwards, S. (1992). Trade orientation, distortions and growth in developing countries. *Journal of Development Economics*, *39*(1), 31–57.

Edwards, S. (1993). Openness, trade liberalization, and growth in developing countries. *Journal of Economic Literature*, *31*(3), 1358–1393.

Edwards, S. (1998). Openness, productivity and growth: what do we really know? *The Economic Journal*, *108*(447), 383–398.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, 251–276.

Erbaykal, E., & Okuyan, H. A. (2008). Does inflation depress economic growth? Evidence from Turkey. *International Journal of Finance End Economics*, *13*(17). Retrieved fromhttp://papers.ssrn.com/sol3/ papers. cfm?abstract_id=1288783

Esso, L. J. (2010). Long-run relationship and causality between foreign direct investment and growth: Evidence from ten African countries. *International Journal of Economics and Finance*, *2*(2), 168.

Falki, N. (2009). Impact of foreign direct investment on economic growth in Pakistan. *International Review of Business Research Papers*, *5*(5), 110–120.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Fidan, A. (2006). The relationship between energy consumption and economic growth. *Unpublished M. Sc. Thesis, Gazi University*.

Fiestas, I. (2005). The effects of trade liberalization on growth, poverty and inequality. *CILAE Nota Técnica NT/04/05*.

Frimpong, J. M., & Oteng-Abayie, E. F. (2006). Bounds testing approach: an examination of foreign direct investment, trade, and growth relationships. Retrieved from http://mpra.ub.uni-muenchen.de/352/

Ghartey, E. E. (1987). Devaluation as a balance of payments corrective measure in developing countries: a study relating to Ghana. *Applied Economics*, *19*(7), 937–947.

Githanga, B. (2015). Trade Liberalization and Economic Growth in Kenya: An Empirical Investigation (1975-2013). Retrieved from http://www.diva-portal.org/smash/record.jsf?pid=diva2:826512

Gokal, V., & Hanif, S. (2004). *Relationship between inflation and economic growth*. Economics Department, Reserve Bank of Fiji. Retrieved from http://www.rbf.gov.fj/docs/2004_04_wp.pdf

Granger, C. W. (1986). Developments in the study of cointegrated economic variables. *Oxford Bulletin of Economics and Statistics*, *48*(3), 213–228.

Gries, T., Redlin, M., & others. (2012). Trade openness and economic growth: a panel causality analysis. In *International Conferences of RCIE, KIET, and APEA, March* (pp. 16–18). Retrieved from http://groups .unipaderborn.de/fiwi/RePEc/Working%20Paper%20neutral/WP52%2 0-%202012-06.pdf

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Grossman, G. M., & Helpman, E. (1990). *Trade, knowledge spillovers, and growth*. National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w3485

Gujarati, D. N. (2009). *Basic econometrics*. Tata McGraw-Hill Education.

Gylfason, T. (1999). Exports, inflation and growth. *World Development, 27*(6), 1031–1057.

Hamad, M. M., Mtengwa, B. A., & Babiker, S. A. (2014). The Impact of Trade Liberalization on Economic Growth in Tanzania. *International Journal of Academic Research in Business and Social Sciences*, *4*(5), 514.

Harrison, A. (1996). Openness and growth: A time-series, cross-country analysis for developing countries. *Journal of Development Economics*, *48*(2), 419–447.

Heckscher, E. F., & Ohlin, B. G. (1991). *Heckscher-Ohlin trade theory*. The MIT Press.

Herath, H. (2010). Impact of trade liberalization on economic growth of Sri Lanka: An econometric investigation. Retrieved from http:// repository .kln.ac.lk/handle/123456789/7144

Ibrahim, B. (2011). Financial deepening and economic growth in Ghana (Unpublished master's thesis). Unversity of Cape Coast, Cape Coast.

Irandoust, M. (2001). On the causality between foreign direct investment and output: a comparative study. *The International Trade Journal*, *15*(1), 1–26.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Jayachandran, G., & Seilan, A. (2010). A causal relationship between trade, foreign direct investment and economic growth for India. *International Research Journal of Finance and Economics*, *42*, 74–88.

Jayaraman, T. K., Singh, B., & others. (2007). Foreign direct investment and employment creation in Pacific Island countries: an empirical study of Fiji. *Asia-Pacific Research and Training Network on Trade Working Paper Series*, *35*, 1–15.

Jayme Jr, F. G., & others. (2001). Notes on trade and growth. *Texto Para Discussão*, (166). Retrieved from http://core.ac.uk/download/pdf/ 65 20105.pdf

Jebuni, C. D., Oduro, A. D., & Tutu, K. A. (1994). Trade, payments liberalization and economic performance in Ghana. Retrieved from http://opendocs.ids.ac.uk/opendocs/handle/123456789/2102

Jin, J. C. (2000). Openness and growth: an interpretation of empirical evidence from East Asian countries. *Journal of International Trade & Economic Development*, *9*(1), 5–17.

Jin, J. C. (2004). On the relationship between openness and growth in China: Evidence from provincial time series data. *The World Economy*, *27*, 1571–1582.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, *12*(2), 231–254.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, *52*(2), 169–210.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Jones, C. I. (1995). Time series tests of endogenous growth models. *The Quarterly Journal of Economics*, 495–525.

Kandiero, T., & Wadhawan, S. (2003). Institutional quality, openness, and investment in Africa. *South African Journal of Economic and Management Sciences*, *6*(2), 346–368.

Kanu, S. I., & Ozurumba, B. A. (2014). Capital Formation and Economic Growth in Nigeria. *Global Journal of Human-Social Science: E Economics*, *4*(14), 43–58.

Kazungu, K. (2009). *Trade liberalization and the structure of production in Tanzania*. University of Glasgow. Retrieved from http://theses .gla.ac. uk/625/

Khan, M. A., & Qayyum, A. (2007). *Trade, financial and growth nexus in Pakistan*. Economic analysis working papers. Retrieved from http://www.econstor.eu/handle/10419/43428

Khan, M. S., & Ssnhadji, A. S. (2001). Threshold effects in the relationship between inflation and growth. *IMF Staff Papers*, 1–21.

Kohpaiboon, A. (2006). Foreign direct investment and technology spillover: A cross-industry analysis of Thai manufacturing. *World Development*, *34*(3), 541–556.

Koopmans, T. C., & others. (1965). On the concept of optimal economic growth. Retrieved from https://classes.soe.ucsc.edu/ams290/Fall 2008 /Koopmans%201965.pdf

Kremers, J. J., Ericsson, N. R., & Dolado, J. J. (1992). The power of cointegration tests. *Oxford Bulletin of Economics and Statistics*, *54*(3), 325–348.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Krueger, A. O. (1997). *Trade policy and economic development: how we learn*. National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w5896

Lall, S. (1985). *Foreign ownership and export performance in the large corporate sector of India*. Springer. Retrieved from http://link. springer.com/chapter/10.1007/978-1-349-17952-7_6

Leamer, E. E. (1988). Measures of openness. In *Trade policy issues and empirical analysis* (pp. 145–204). University of Chicago Press. Retrieved from http://www.nber.org/chapters/c5850.pdf

Levine, R. (1997). Financial development and economic growth: views and agenda. *Journal of Economic Literature*, *35*(2), 688–726.

Lipsey, R. E. (2001). *Foreign direct investment and the operations of multinational firms: concepts, history, and data*. National Bureau of Economic Research. Retrieved from http://www .nber.org /papers/w 8665

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3–42.

MacKinnon, J. G., & others. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics*, *11*(6), 601–618.

Majeed, M. T., & Ahmad, E. (2007). FDI and exports in developing countries: theory and evidence. *The Pakistan Development Review*, 735–750.

Mallik, G., & Chowdhury, A. (2001). Inflation and economic growth: evidence from four south Asian countries. *Asia-Pacific Development Journal*, *8*(1), 123–135.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Manni, U. H., Siddiqui, S. A., & Afzal, M. N. I. (2012). An empirical investigation on trade openness and economic growth in Bangladesh economy. *Asian Social Science*, *8*(11), 154.

Mansouri, B. (2005). The interactive impact of FDI and trade openness on economic growth: Evidence from Morocco. In *12th Econ. Res. Forum Conf*.

Meier, J. (1995). The importance of relationship management in establishing successful interorganizational systems. *The Journal of Strategic Information Systems*, *4*(2), 135–148.

Miller, S. M., & Upadhyay, M. P. (2000). The effects of openness, trade orientation, and human capital on total factor productivity. *Journal of Development Economics*, *63*(2), 399–423.

Muhammad Adnan Hye, Q. (2011). Financial development index and economic growth: empirical evidence from India. *The Journal of Risk Finance*, *12*(2), 98–111.

Mwaba, A. (2000). Trade liberalization and growth: Policy options for the African countries in a global economy. African Development Bank. *Economic Research Paper N*, 60.

Narayan, P. K. (2004). *Reformulating critical values for the bounds F-statistics approach to cointegration: an application to the tourism demand model for Fiji* (Vol. 2). Monash University Australia. Retrieved from https: //www.researchgate.net/profile/Paresh_ Narayan /publication/268048533_Reformulating_CriticalValuesfortheBoundsF-statistics Approach to_Cointegration_An_Application_to the _Tourism _Demand _Model _for_ Fiji/links /55d878 6e08ae9 d6 5948f8fd4.pdf

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Naseer, M. A. (2013). A causal relationship between trade, FDI, exchange rates and economic growth of Pakistan. *African Journal of Business Management*, *7*(21), 2020.

Nath, H., & Al Mamun, K. (2004). Trade Liberalization, Growth and Inequality in Bangladesh: An Empirical Analysis. In *This paper was presented at the 41st Annual Conference of the Missouri Valley Economic Association held in October*. Retrieved from http:// www .shsu.edu/~eco_hkn/hiranya_wip3.pdf

Nduka, E. K., Chukwu, J. O., & Nwakair, K. I. U. O. N. (2013). Trade openness and economic growth: A comparative analysis of the pre and post structural adjustment programme (SAP) periods in Nigeria. *Asian Journal of Business and Economic*, *3*(3.4). Retrieved from http://www.onlineresearchjournals.com/ajbe/art/89.pdf

Njindan Iyke, B., & Takumah, W. (2015). The Links between Economic Growth and Tax Revenue in Ghana: An Empirical Investigation. Retrieved from https://mpra.ub.uni-muenchen.de/67281/

Obadan, M. I., & Okojie, E. I. (2010). An empirical analysis of the impact of trade on economic growth in Nigeria.

Olufemi, S. M. (2004). Trade openness and economic growth in nigeria: Further evidence on the causality issue. *South African Journal of Economic and Management Sciences*, *7*, 299–315.

Parikh, A., & Stirbu, C. (2004). Relationship between trade liberalisation, economic growth and trade balance: an econometric investigation. Retrieved from http:// papers. ssrn.com /sol3/papers .cfm? abstract _id =567065

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Pesaran, M. H., & Pesaran, B. (1997). *Working with Microfit 4.0: interactive econometric analysis;[Windows version]*. Oxford University Press.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001a). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289–326.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001b). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289–326.

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, *94*(446), 621–634.

Prasad, S. (2000). *Determinants of Exports in Fiji*. Economics Department, Reserve Bank of Fiji. Retrieved from http: //www .rbf. gov. fj/docs /wp 2000-04.pdf

Pupongsak, S. (2010). *The effect of trade liberalization on taxation and government revenue*. University of Birmingham. Retrieved from http://etheses.bham.ac.uk/837/

Quartey, P., Aidam, P., & Obeng, C. K. (2013). *The impact of trade liberalization on poverty in Ghana*. Retrieved January. Retrieved from https://www.gtap.agecon.purdue.edu/resources/download/2665.pdf

Ramsey, F. P. (1928). A mathematical theory of saving. *The Economic Journal*, *38*(152), 543–559.

Rappaport, J. (2000). How does openness to capital flows affect growth? *FRB of Kansas City Research Working Paper No. 00-11*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=272432

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Rauch, R. Q.-J., & Quah, D. (1990). *Openness and the rate of economic growth*. MIT Press, Cambridge (Mass.).

Rigobon, R., & Rodrik, D. (2005). Rule of law, democracy, openness, and income. *Economics of Transition*, *13*(3), 533–564.

Rodriguez, F., & Rodrik, D. (2001). Trade policy and economic growth: a skeptic's guide to the cross-national evidence. In *NBER Macroeconomics Annual 2000, Volume 15* (pp. 261–338). MIT Press. Retrieved from http://www.nber.org/chapters/c11058.pdf

Romer, P. (1993). Idea gaps and object gaps in economic development. *Journal of Monetary Economics*, *32*(3), 543–573.

Romer, P. M. (1986). Increasing returns and long-run growth. *The Journal of Political Economy*, 1002–1037.

Romer, P. M. (1990). Capital, labor, and productivity. *Brookings Papers on Economic Activity. Microeconomics*, *1990*, 337–367.

Sachs, J. D., & Warner, A. M. (1995). *Economic convergence and economic policies*. National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w5039

Sakyi, D. (2011). Trade openness, foreign aid and economic growth in post-liberalisation Ghana: An application of ARDL bounds test. *Journal of Economics and International Finance*, *3*(3), 146–156.

Salvatore, D. (2001). *The economic performance of small versus large nations*. Springer. Retrieved from http://link.springer.com/ chapter/ 10. 1057/9780230513198_3

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Samimi, A. J., & Shahryar, B. (2009). Inflation uncertainty and economic growth in Iran. *Australian Journal of Basic and Applied Sciences*, *3*(3), 2919–2925.

Samuel, T. (2007). *The impact of trade liberalisation on economic structure and performance: case of the OECS*. Auckland University of Technology. Retrieved fromhttp://aut.researchgateway.ac.nz/handle/10292/348

Sarkar, P. (2008). Trade openness and growth: is there any link? *Journal of Economic Issues*, *42*(3), 763–785.

Sarkar, P., & Bhattacharyya, B. (2005). Trade Liberalisation and Growth: Case Studies of India and Korea. *Economic and Political Weekly*, 5635–5641.

Schneider, F., & Frey, B. S. (1985). Economic and political determinants of foreign direct investment. *World Development*, *13*(2), 161–175.

Shaheen, S., Ali, M. M., Kauser, A., & Bashir, F. (2013). Impact of trade liberalization on economic growth in Pakistan. *Interdisciplinary Journal of Contemporary Research in Business*, *5*(5). Retrieved from http://journal-archieves35.webs.com/228-240.pdf

Shrestha, M. B., & Chowdhury, K. (2005). ARDL modelling approach to testing the financial liberalisation hypothesis. Retrieved from http://ro.uow.edu.au/commwkpapers/121/

Sinha, D., & Sinha, T. (2002). Openness, investment and economic growth in Asia. *Indian Economic Journal*, *49*(4), 90–95.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Slavin, P., & Mate, M. E. (2007). *Trade and Economic Developments, 1450-1550: The Experience of Kent, Surrey and Sussex*. JSTOR. Retrieved from http://www.jstor.org/stable/20478502

Smith, A. (1776). An inquiry into the nature and causes of the wealth of nations: Volume One. Retrieved from https://www.era.lib.ed.ac.uk /handle/1842/1455

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 65–94.

Squalli, J., & Wilson, K. (2006). A new approach to measuring trade openness. *Economic & Policy Research Unit Working Paper*, (06–07). Retrieved from http://www.zu.ac.ae/epru/documents/06-07-web.pdf

Stock, J. H., & Watson, M. W. (1988). Testing for common trends. *Journal of the American Statistical Association*, *83*(404), 1097–1107.

Stockman, A. C. (1981). Anticipated inflation and the capital stock in a cash in-advance economy. *Journal of Monetary Economics*, *8*(3), 387–393.

Stolper, W. F., & Samuelson, P. A. (1941). Protection and real wages. *The Review of Economic Studies*, *9*(1), 58–73.

Swan, T. W. (1956). Economic growth and capital accumulation. *Economic Record*, *32*(2), 334–361.

Tahir, M., Haji, D. H. N. B. P., & Ali, O. (2014). Trade openness and economic growth: a review of the literature. *Asian Social Science*, *10*(9), 137.

Tarawalie, A. B. (2010). EVIDENCE FROM SIERRA LEONE. Retrieved from http://www.scielo.org.za/pdf/sajems/v13n1/02.pdf

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Thirlwall, A. P. (2000). Trade agreements, trade liberalization and economic growth: a selective survey. *African Development Review*, *12*(2), 129–160.

Van den Berg, H. (2012). *Economic growth and development*. World Scientific Pub. Retrieved from http://tyke.epage.au.edu.tw/ezfiles /72/1072/attach/53/pta_48464_7326813_98555.pdf

Wacziarg, R. (2001). Measuring the dynamic gains from trade. *The World Bank Economic Review*, *15*(3), 393–429.

Wang, J.-Y., & Blomström, M. (1992). Foreign investment and technology transfer: A simple model. *European Economic Review*, *36*(1), 137–155.

Weiss, J. (1995). *Economic Policy in Developing Countries: the reform agenda*. Prentice Hall Englewood Cliffs, NJ. Retrieved from http://library.wur.nl/WebQuery/clc/911873

Werlin, H. H. (1994). Ghana and South Korea. *Journal of Asian and African Studies*, *29*(3–4), 205–225.

World Bank. (1985). World Development Report. New York, Oxford University Press.

World Bank. (1995). World Development Report. New York, Oxford University Press.

World Bank. (2001). World Development Report. New York, Oxford University Press.

World Bank. (2015). World development indicators on online (WDI) database, Washington, DC: World Bank. Retrieved September 2015, from http://www.worldbank.org.

Digitized by Sam Jonah Library

University of Cape Coast https://ucc.edu.gh/jspui

Yanikkaya, H. (2003). Trade openness and economic growth: a cross-country empirical investigation. *Journal of Development Economics*, *72*(1), 57–89.

Yucel, F. (2009). Causal relationships between financial development, trade openness and economic growth: the case of Turkey. *Journal of Social Sciences*, *5*(1), 33–42.

Zhang, K. H. (2001). Does foreign direct investment promote economic growth? Evidence from East Asia and Latin America. *Contemporary Economic Policy*, *19*(2), 175–185.

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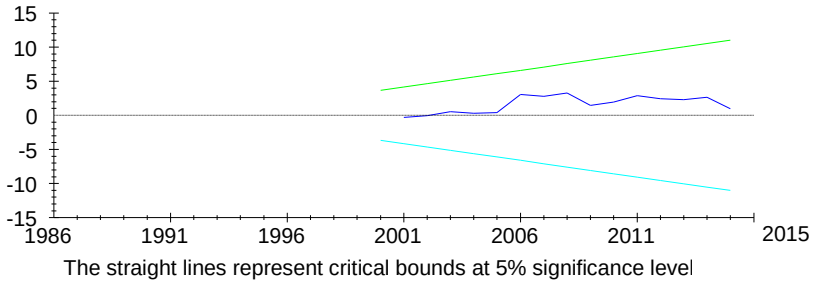
APPENDICES

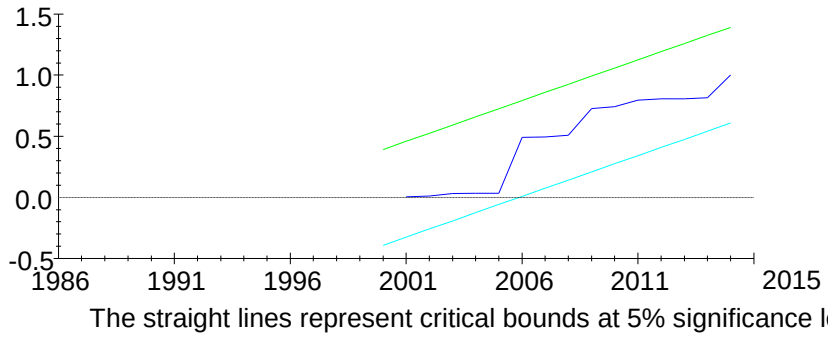
APPENDIX A

1. Plot of Cumulative Sum of Recursive Residual



Appendice A (1) : Plot of Cumulative Sum of Recursive Residuals. The straight lines represent critical bounds at 5 percent significance level Source: Computed by Author using Microfit Version 4.1

2. Plot of Cumulative Sum of Squares of Recursive Residual



Appendice A (2) : Plot of Cumulative Sum of squares of Recursive Residuals. The straight lines represent critical bounds at 5 percent significance level Source: Computed by Author using Microfit Version 4.1

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APPENDIX B

Bounds test results for cointegration using trade intensity (X+M/GDP)

Critical Value Bound of the F-statistic: intercept and no trend (case II)						
K	90% Level		95% Level		99% Level	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6	2.334	3.515	2.794	4.148	3.976	5.691
Calculated F-Statistics:						
F_{LRGDP}(LRGDP|LOPENTR,LFDI,LREER,INF,LK,LLF)					4.3412(0.012)**	

Note: Critical values are obtained from Narayan (2004), Appendix A1-A3, pp.26-28; ** denotes statistical significance at the 5% level and K is the number regressors in equations (26).

From APPENDIX B, the F-statistics that the joint null hypothesis of lagged level variables (i.e. variable addition test) of the coefficients is zero is rejected at 5 percent significance level. Further, since the calculated F-statistics for F_{LRGDP} (.) = 4.341 exceeds the upper bound of the critical value of band (4.148), the null hypothesis of no cointegration between economic growth and its determinants is rejected. This result indicates that there is a unique cointegration relationship among the variables in Ghana's economic growth model (equation 26) when X+M/GDP is used as a measure of trade openness and that all the determinants of economic growth can be treated as the "long-run forcing" variables for the explanation of economic growth in Ghana. And so we proceed to estimate the LR and SR.

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APPENDIX C

Estimated Long-Run coefficients using trade intensity (X+M/GDP)

ARDL (1, 1, 0, 2, 1, 0, 2) selected based on SBC Dependent Variable: LRGDP

Regressor	Coefficient	Standard Error	T-Ratio	P-values
LOPENTR	0.1363	0.0407	3.3489***	[0.004]
LFDI	0.0683	0.0213	3.2266***	[0.005]
LREER	0.4817	0.1433	3.3626***	[0.004]
INF	-0.0055	0.0010	-5.4186***	[0.000]
LK	0.3213	0.1315	2.4434**	[0.027]
LLF	0.3830	0.0100	38.1999***	[0.000]
C	-0.8072	0.0357	-22.6106***	[0.000]

Diagnostic Tests

Test Statistics	LM Version	F Version
Serial Correlation	CHSQ (1) = 0 .2258[.635]	F (1, 15) = .11375[.741]
Functional Form	CHSQ (1) = 0.5546[.456]	F (1, 15) = .28255[.603]
Normality	CHSQ (2) = 1.3767[.502]	Not applicable
Heteroscedasticity	CHSQ (1) = 1.1987[.274]	F (1, 28) = 1.1654[.290]

Note: ***, **, * denotes significance level at 1%, 5%, and 10% respectively
Source: computed by author using Microfit 4.1

Where LOPENTR is the traditional measurement of trade openness **(X+M/GDP)**

ECM = LRGDP - 0.1363*LOPENTR - 0.0683*LFDI - 0.4817*LREER + 0.0055*INF - 0.3213*LK - 0.3830*LLF + 0.8072*C

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APPENDIX D

Estimated Short-Run coefficients using trade intensity (X+M/GDP)

ARDL (1, 1, 0, 2, 1, 0, 2) selected based on SBC Dependent Variable: dLRGDP

Regressor	Coefficient	Standard Error	T-Ratio	P-values
dLOPENTR	0.2745	0.0410	6.6951***	[0.000]
dLFDI	0.0439	0.0170	2.5824**	[0.018]
dLREER	-0.1613	0.0899	-1.7942*	[0.088]
dLREER1	0.1614	0.0550	2.9345***	[0.008]
dINF	-0.0021	0.0004	-5.2500***	[0.000]
dLK	0.2062	0.0678	3.0413***	[0.006]
dLLF	0.0641	0.0580	1.1052	[0.283]
dLLF1	-0.2726	0.0872	-3.1261***	[0.005]
dC	-0.5180	0.0794	-6.5239***	[0.000]
ECM(-1)	-0.6419	0.1105	-5.8090***	[0.000]

R-Squared	0.9206	R-Bar-Squared	0.8560
S.E. of Regression	0.0701	F-stat. F (9, 20) 20.5979***	[.000]
Mean of Dependent Variable	0.3399	S.D. of Dependent Variable	0.1854
Residual Sum of Squares	0 .0792	Equation Log-likelihood	46.4824
Akaike Info. Criterion	32.4824	Schwarz Bayesian Criterion	22.6741
DW-statistic	2.0966		

Note: ***, **, * denotes significance level at 1%, 5%, and 10% respectively
Source: computed by author using Microfit 4.1

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