UNIVERSITY OF CAPE COAST

FOREIGN AID AND THE DUTCH DISEASE: EVIDENCE FROM GHANA.

BY

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DECLARATION

Candidate's Declaration

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

Candidate's Signature ……. Date…….……

Name: PATIENCE AMARH

Supervisors' 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. VIJAY BHASIN

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ABSTRACT

The study sought to test the hypothesis that foreign aid flows generate "Dutch Disease" in the recipient country which in this case is Ghana.

Annual data covering the period 1983 to 2010 was collected and interpolated into quarterly series for the analysis of the study.

The outcome of the study showed that foreign aid as well as government expenditure, real GDP and money supply had an appreciating effect on real exchange rate where as trade openness and terms of trade exert depreciating effects on real exchange rate. In the export model we demonstrated that an increment in foreign aid is detrimental to exports. Also appreciation of real exchange rate causes reduction in export. We established from the variance decomposition and impulse response functions that foreign aid is an importance determinant of both real exchange rate and exports.

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Finally, I wish to show my appreciation to my family, Mr Enoch Pecku and to all individuals who contributed in diverse ways toward the successful completion of this thesis.

DEDICATION

To my sister and her husband Mr and Mrs Annang

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LIST OF ACRONYMS

ADF	Augmented Dickey-Fuller
AERC	African Economic Research Consortium
AIC	Akaike Information Criterion
AID	Foreign aid inflows
DD	Dutch Disease
ERP	Economic Recovery Programme
ECM	Error Correction Model
GEXP	Government Expenditure
HIPC	Highly Indebted Poor Country
HQ	Hannan and Quinn
IMF	International Monetary Fund
ISSER	Institute of Statistical, Social and Economic Research
MDG	Millennium Development Goals
M2	Money Supply
ODA	Official Development Assistant
OECD	Organisation for Economic Co-Operation and Development
OPEC	Organization of the Petroleum Exporting Countries
OPEN	Trade Openness
OLS	Ordinary Least Square
PP	Phillips-Perron
REER	Real Effective Exchange Rate
RER	Real Exchange Rate

RGDP	Real Gross Domestic Product
SAP	Structural Adjustment Programme
SBC	Schwartz Bayesian Criterion
TOT	Terms of Trade
VAR	Vector Autoregressive
VEC	Vector Error Correction
VECM	Vector Error Correction Model
WDI	World Development Indicator

CHAPTER ONE

INTRODUCTION

Background to the Study

Foreign aid is an important channel whereby wealth is transferred from richer to poorer nations. It plays a vital role in improving the lives of poor households across the developing world. Foreign aid has become institutionalized since World War II, and today it is a normal part of political and social relationships among nations. Aid in the form of money, goods or technical assistance can develop infrastructure, strengthen institutions, or address humanitarian crises in recipient countries. Foreign aid can exceed 10% of a recipient country's national income in many instances (World Bank, 2005).

Both the magnitude and the scope of these international transfers increased dramatically during the latter part of the 20th century, to the point where by the end of the millennium official development assistance from members of the OECD and OPEC countries had reached nearly $60 billion. Moreover, in July 2005, finance ministers of the G-8 countries pledged $50 billion as additional aid to low income countries by 2010, as part of an effort to help poor economies achieve the Millennium development goals by 2015. How foreign aid is allocated in a resource-scarce economy is important for both donors and recipients. This has generated an extensive debate as to whether international transfers should be

"untied" (i.e. provide income support to reduce poverty and raise consumption levels) or "tied" (i.e. facilitate economic development and growth by directly investing in the productive capacity of the private sector). World Bank studies suggest that over time a larger share of foreign aid has become "tied" in the sense of being linked to investments in public investment projects (Feltenstein, 2008)

The international donor community for reasons of development is being encouraged to deliver on its commitments to scale up its official development assistance (ODA) in low income countries (LICs). The G-8 Summit in Gleneagles agreed that the G-8 group of countries and other donors would increase ODA to Africa by US$25 billion per year by 2010, which would represent a doubling of aid to Africa compared to 2004 levels (World Bank, 2007).

This advocacy of the U.N. Millennium Project for a large scaling up of Official Development Assistance to reach the Millennium Development Goals has raised fears about a new epidemic of 'Dutch Disease' among developing countries. However, recent research by the International Monetary Fund has helped contribute to a more sensible, balanced evaluation than before of the validity of such fears (IMF 2005 & Gupta et al. 2005). If ODA is effective, it should lead to a transfer of real resources to a developing-country recipient. And these resources should, it is assumed, contribute to improved human development and enhanced prospects for domestic capital accumulation and sustained economic growth. However, even if there were a real transfer of resources in the short term, such success would not lead necessarily to sustained growth and human development (Mckinley, 2005).

With support from the World Bank and International Monetary Fund (IMF), the Ghanaian economy has since September 1980 witnessed the introduction of mechanisms to halt the downturn of the economy and to move on a path of sustained growth and development. This change elicited tremendous donor assistance in the form of grants, concessional loans and technical assistance. ODA to Ghana constituted about 4% of GDP in 1980, rose to 10% in 1990, to 10.4% in 2005 and further to 14.6% in 2009. More recently, ODA to Ghana amounted to US$ 1,236 million in 2007 and disbursements in 2008 were projected to rise to US$ 1,797 million. In 2010, grants from donors constituted the major contributory factor to Ghana's non-tax revenue (i.e. about 85% of non-tax revenue) which is one of the two main sources of revenue to government of Ghana (ISSER, 2011).

The overwhelming dependence on external aid inflows from developed countries for the supply of basic import commodities has made the Ghanaian economy vulnerable to policy conditionality that might accompany such assistance.

Concerns that large aid inflows will induce an appreciation of the real exchange rate and discourage the expansion of exports, particularly non-traditional exports, thereby damaging growth prospects in the recipient economy are rarely far from the centre of contemporary debates on the macroeconomics of aid to low-income countries. These concerns have recently been pushed to the fore in well-managed low-income countries which have already participated in the HIPC debt relief initiative and are identified by the United Nations Millennium

Project (2005) as potential 'fast-track' candidates for rapid scaling up of aid flows. As these countries face the prospect of significantly higher aid flows in the near future (and, arguably, increased pressure from donor nations to see these funds disbursed) they are concerned about whether such increases will generate sufficient returns in terms of sustained growth to outweigh the costs of absorbing the aid or whether higher aid flows will contribute to an unravelling of hard-won economic gains accumulated over recent years (Adam & Bevan, 2004).

Although, the literature on foreign aid is voluminous much of the attention has been focused around the aid-growth, aid-savings and aid-investment relationships. Studies on the effect of aid on the real exchange rate of the recipient economies are sparse in spite of the crucial role of the real exchange rate in policy discussion and in the economic performance of developing countries. The focal point of the theory on aid inflows and Dutch disease has been the impact exerted by aid on the relative prices of non-tradable goods (Wijnbergen, 1985 & 1986). This theory holds that part of foreign aid will be channelled to the non-tradable sector of the economy causing a possible increase in the demand for non-tradable goods, thereby raising their price. Given that the real exchange rate (RER) is defined as the relative price of tradable goods to that of non-tradable goods (i.e. *RER = price tradable/price of non-tradable*), a rise in the price of the latter would result in a decline (appreciation) in the real exchange rate. Given that Ghana has elastic export, this will in turn have negative effect on exportable as postulated by Loxley (1998), Issa & Ouattara (2004), Elbadawi & Soto (2005) and White & Wignaraja (1992).

Statement of the Problem

Since the late 1990s, the international community has increased its focus on poverty reduction as the overarching objective of economic policy for low-income countries (LICs). It has also recognized the importance of increasing official assistance, through debt relief, to support the implementation of poverty reduction strategies in poor countries. Despite the rhetoric in international forums, total official development assistance (ODA) per capita, as well as in percent of gross national income (GNI) of recipient countries, has been trending down even though many countries, because of insufficient domestic resources, still rely heavily on it to finance investment. For the few countries whose ODA inflows have increased, the large government spending that aid allow create macroeconomic management problems that raise concerns of undermining prospects for long-term growth through Dutch-disease-type effects, namely real exchange rate (RER) appreciation and a shrinkage of the tradable sector.

Aid inflows are important for Ghana as, like many developing countries, it has become dependent on it, mainly for budgetary support and also as a means of supporting the local currency. Although aid to Ghana has been sluggish previously (i.e. during the seventies) it has recorded quite substantial amounts in present times. The aid/GDP ratio in Ghana has increased from an average of 4% before the structural adjustment programme (SAP in mid 1980s) to almost 14.6% by 2009. Depending on whether these aid inflows have been temporary or permanent, and whether they were spent on imports or domestically produced goods and services, they have had various repercussions.

Throughout the economic adjustment agenda, exchange rate and trade reform occupied a core position. The real exchange rate, by virtue of its impact on the international competitiveness of an economy, assumed an overriding importance among the cohort of policy variables. For the period under consideration (1983-2010) both the real exchange rate and real effective exchange rates tended to move in the same direction, with the latter lagging slightly behind. The real exchange rate provides a measure of the relative price of domestic (i.e., Ghanaian) goods in terms of foreign (i.e., US) goods. The real effective exchange rate, also regarded as the multilateral real exchange rate, provides a measure of the degree of competitiveness of a country relative to a group of its partners. Here, it compares movement in Ghana's domestic currency with those in a basket of trading partners' currencies. Relative to the base year value, both real exchange rate indexes depreciated from 1970 to 1976 and appreciated from 1977 to 1983.

During the period of ERP and structural adjustment programme, there was a severe devaluation exercise which led to the depreciation of the real effective exchange rate however there was stability during 1987 to 1989. Further observation of the trends in REER revealed that there was rapid depreciation from 1989 to 1991, modest depreciation and then appreciation from 1990 to 1999, stability from 1999 to 2002, real appreciation between 2002 and 2006, modest depreciation from 2006 to 2008 and real appreciation between 2008 and 2010 (World Bank, 2011). The periods of rapid real depreciation can be explained by rapid nominal depreciation of the cedi vis-a-vis the trading partners and relatively higher prices in trading partner countries compared to Ghana's at the time.

The performance of Ghana's total exports was rather disappointing in 1990's, with growth sliding precipitously from the peak of 16.4% in 1994 to a meager 5.5% in 1996. Gross receipts from exports (both traditional and non-traditional) rose slightly from US$1431.2 million in 1995 to US$ 1510.2million in 1996. Exports to GDP increased from 32.11% in 1996 to its peak of 48.8% in 2000. There was a sharp fall from 48.8% in 2000 to 24.5% in 2007. In recent times however, exports have register significant increments. After going through drastic contraction in 2009(due to the worldwide economic down turn) export grew by 35.2% to US$ 7,896.3 million in 2010 (World Bank, 2011)

According to Younger 1992, one of the neglected effects of capital inflows is the loss of international competitiveness as a result of real exchange appreciation. Therefore faced with exchange rate appreciation (Dutch disease effect) would shift relative incentives away from exports into import trade with its adverse effect for Ghana's current account balance and consequently growth. Thus this study seeks to verify the Dutch Disease hypothesis in Ghana by specifically looking at the interrelationship between real exchange rate, foreign aid, exports and other macroeconomic variables using the Vector Autoregressive (VAR) and Vector Error Correction (VEC) approach.

Objectives of the Study

The objectives of the study are organised into the general objective and the specific objectives.

General objective

- The general objective of the study is to find out the interrelationships between real exchange rate, aid, exports and other macroeconomic variables**.**

Specific objectives

- Investigate the long run and short run relationships between aid and real exchange rate
- Examine the long run and short run relationships between real exchange rate and export
- Identify the relative importance of foreign aid, Government expenditure, trade openness, terms of trade, real GDP and money supply in explaining variations in real exchange rate.
- Identify the relative importance of real exchange rate, real GDP and foreign aid in explaining variations in exports.
- To find out the direction of causality between real exchange rate, foreign aid and exports.

Hypotheses

- H_0 There is no long run and short run relationship between aid and real exchange rate.
- H_0 There is no long run and short run relationship between real exchange rate and export.
- H_0 Foreign aid, Government expenditure, trade openness, terms of trade, real GDP and money supply are not important in explaining variations in real exchange rate.

- H_0 Real exchange rate, real GDP and foreign aid are not important in explaining variations in export.
- H_0 There is no causal relationship between real exchange rate, foreign aid and exports.

Significance of the Study

The study among other things helped to explain some of the misfortunes of developing countries as a result of aid they receive from outside. That is to say the study gave an indication to Ghana whether receiving aid is a good thing.

The research results are relevant to policy makers, development planners, finance experts and researchers. Investigating the relationship between foreign aid and real exchange rate as well as export was also of principal interest to government as a whole. It would help government to formulate policies capable of enhancing the development and effectiveness of the monetary system.

Delving deeper into the relationship between foreign aid and exchange rate was crucial for understanding of how aid flows in the country affect economic growth through exports, thus giving empirical guide for policy formulation. It also shed light on the determinants of real exchange rate and provided invaluable feedback for the design and implementation of stabilization policies as aid flows into the country increases with stable macroeconomic and political environments.

There exist few studies using multivariate time-series analysis on the aid and exchange rate especially in the case of Ghana. Thus this study adds to the existing

literature. In so doing the study addressed some of the methodological issues inherent in the literature.

Scope of the Study

Foreign aid and real exchange rate are not only broad but also complex areas so far as the Ghanaian economy is concerned. Because of limited time, space and resources, the study was limited to effects of external aid flows on Ghana's real exchange rate from 1983 – 2010, quarterly series were generated from the annual series using Gandolfo (1981) algorithm and this gave a total observation of 112. The real exchange rate and exports models were estimated empirically utilising Johansen's Cointegration and Granger causality techniques.

The study employed the following variables in the real exchange rate model: Real exchange rate proxied by change in relative prices, Aid proxied by the net official development assistant, real gross domestic product, government consumption, openness proxied by volume of trade, terms of trade and money supply. For the export model the following variables were relevant: exports, real exchange rate, real gross domestic product and external aid inflows.

Organisation of the Study

The study was organised into five chapters. Chapter one, which is the introductory chapter, presented a background to the study, problem statement, objectives of the study, hypotheses, significance and scope of the study as well as organisation of the study. Chapter two presented review of relevant literature, both theoretical and

empirical that underpins the Dutch disease economics and the possible influence it exerted on exchange rate. Chapter three presented the methodological framework and techniques employed in conducting the study. Chapter four examined and discussed the results and main findings with reference to the literature. The final chapter presented the summary, conclusions and recommendations of the study.

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 real exchange rate and foreign aid and to link the effect on export. The chapter is organised into two sections. The first section presents and discusses the theoretical foundations of Dutch Disease. The section further discusses some theories on real exchange rate and exports

Following Levine (2004), the second section which is the empirical literature is categorised around econometric approaches. This is as a result of the fact that many of the strides in empirical studies of Dutch Disease have been methodological. The categorisation is done into cross-country regressions and panel data, time-series and a subsection for studies done in Ghana. This is done in order to clearly identify the gap the study wished to fill.

Review of Theoretical Literature

This section reviewed some theories of Dutch Disease. In addition to this the section also reviewed some theories of real exchange rate and its determinants and some export theories.

Aid in the dependent economy model

Wijnbergen (1984) presented a Salter-Swan, dependent economy model in which the economy is split into a traded goods and a non-traded goods sector. Traded goods comprise exportables and importables, so that their price is determined on the world market. Nontraded goods do not enter the world market; hence their prices are domestically determined. Each type of good is assumed to be non-substitutable for the other. The model does not capture technical progress in the recipient country, and implicitly excludes the hypothetical case of a country in recession with substantially under-employed resources.

In this set-up, aid, which takes the form of foreign exchange, enters the economy and acts like a "windfall gain" by increasing domestic income. This extra income leads to added expenditure on both tradable and non-tradable goods. How much of the extra income is spent on each category of goods depends on the marginal propensities to consume non-traded and traded goods respectively. As the country in the model is assumed to be a price taker on the world market, the augmented demand does not cause the price of tradable goods to rise. It does, however, cause the price of nontraded goods, which is determined domestically, to increase. Consequently, the price of non-traded goods rises relative to that of traded goods. As the ratio of non-traded to traded goods is understood as the real exchange rate, an increase in the price of the former with respect to the latter means a real exchange rate appreciation. Moreover, this aid-induced spending effect is accompanied by a resource movement effect. Since the price of non-traded goods relative to that of traded goods has risen, production of the former

becomes more attractive than that of the latter. Hence, the real wage in terms of traded goods will rise, whereas the real wage in terms of non-traded goods will fall. Consequently, labor is drawn to the non-traded goods sector.

This means that there is a shift from agricultural production, particularly in less developed economies (like Ghana), to service employment, usually concentrated in urban areas. Both effects, the spending and the resource movement, result in a decline in competitiveness. The real exchange rate itself, as the rate at which one country's goods are traded for that of another, expresses the competitiveness of a country. Its appreciation depresses exports, as does the increased labour cost in the external sector.

Edwards and Wijnbergen (1989) developed a model which simplifies the issue of Dutch Disease from the static effect point of view. This further gives insight on the effects of resource boom in developing countries. To start with they made three points clear, firstly is that, although the initiating disturbance in all the models they considered is the discovery and exploitation of natural resources, they ignored issues of optimal depletion rates. Secondly, there is no presumption that the consequences of a natural resource discovery (or aid inflows) are harmful. On the contrary, their initial impact is beneficial and amounts to a Pareto improvement for the economy as a whole despite the legitimate grounds for concern over distribution of gains and over the issue of whether transitional assistance should be offered to declining sectors. Thirdly, the point of similarity, from structural adjustment and macroeconomic point of view, between increased income from natural resources and aid inflows. Both provide an increase in

foreign exchange availability at little or no additional use of domestic factors of production; moreover, both are almost certainly temporary.

They argued that the resource allocation consequences of a resource-based export boom (or of increased foreign aid) are a shift of labor out of manufacturing and agricultural sectors and into (often) urban services, upward pressure on real wages in terms of tradable goods, and a decline in external competitiveness. A decline in export performance is then unavoidable unless specific policy measures are taken to counteract it. In the particular case of foreign aid this is a reason for concern, since one of the main purpose of development aid has always been the promotion of a viable export sector, in the hope that future export revenues so generated would over time do away with the external sector constraint.

To illustrate this scenario they considered a simplest general-equilibrium model within the static effect of increased aid inflows (or higher resource income) which distinguishes between two sectors; one produces a single nontraded good whose price is determined endogenously by the interaction of domestic supply and demand, and the other produces a composite traded good whose price is fixed exogenously. They denoted the output levels of these two sectors by X_N and X_M ("M" for "manufacturing") respectively. Hence, in the think of natural resource revenues rather than aid, they assume that the natural resource sector does not directly compete with other sectors for factors of production. As a consequence, the resource boom operates in exactly the same manner as exogenous increase in aid. The market-clearing version is discussed as follows;

The spending effect of higher aid inflows;- Equilibrium in this economy according to them can be characterized solely in terms of the market-clearing condition for the non-traded good. In obvious notation, this may be written as;

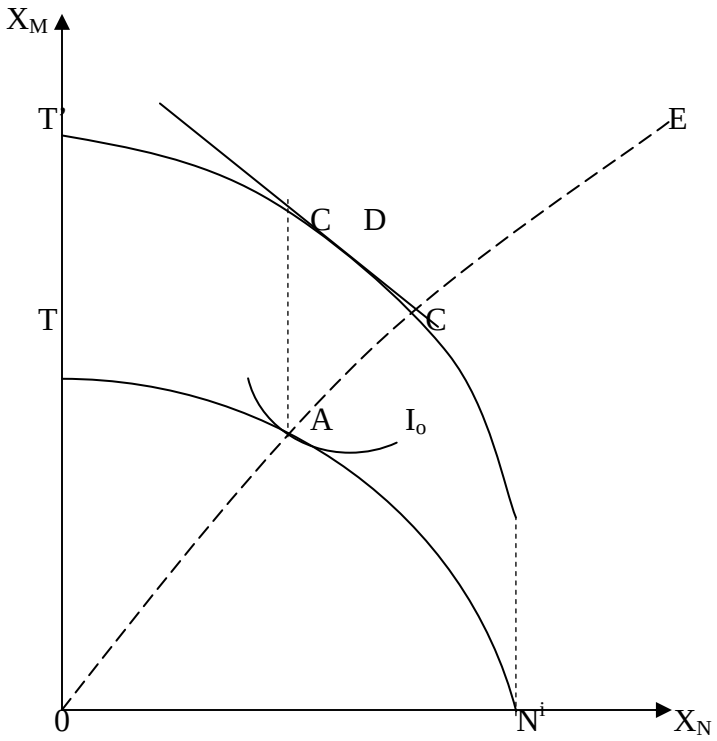
$x_N(q) = c_N(q, y)$. …….…….. (1)

Here X_N and C_N denote domestic production and consumption of the nontraded good, respectively, and equilibrium in the market is brought about by adjustment of the relative price of nontraded to traded goods, *q*. This price is thus a key variable in this economy: its inverse is often referred to as the *real exchange rate*. While output of the nontraded good depends solely on the real exchange rate, demand depends also on the level of real income, denoted by

$y = qx_N + x_T + v$ .....(2)

Where *v* is the value of the aid inflow. Aid raises real income in a once-and-for-all fashion, and the resulting excess demand for the nontraded good raises q, an outcome which we will refer to as “real appreciation”. The implication of this disturbance for the pattern of output in the economy may be illustrated using the Salter (1959) diagram in Fig. 1

Figure 1: The Spending Effect of higher aid inflows



Source: Edwards (1989)

Nontraded goods output is measured along the horizontal axis and traded goods output both manufacturing output and aid) along the vertical axis. The curve TN is the economy's initial production possibilities frontier, depending on domestic technology and factor endowments. Before the boom, equilibrium is determined by the intersection of this curve with the highest attainable social indifference curve, $I_{o,}$ at Point A. The effect of aid is to shift the production possibility curve vertically upwards to T'N'N, as shown.

The initial equilibrium relative price equals the slope of the common tangent to the two curves at point A. If this were to remain unchanged, the production point would shift vertically upwards to point B: domestic output of both manufactures and nontraded goods remains unchanged but total domestic

availability of traded goods is augmented by the extent of the additional resource output. With production and therefore domestic real income determined at B, desired consumption must lie along the price line tangential to B. Moreover, since relative prices are unchanged, it must take place at the point C, where the price line intersects the income-consumption through A, OAE. The resulting excess demand for nontradeables drives up their relative price until the new equilibrium at a point such as D is attained.

The characteristics of this new equilibrium are obvious; domestic welfare has risen, but at the expense of a reallocation of production-the output of the nontraded good has risen, whereas that of manufacturing has fallen: the spending effect of higher aid thus unambiguously gives rise to both deindustrialization and a real appreciation.

Corden (1981) also used the two-sector economy to illustrate the so called 'tradable squeeze' also known as Dutch disease. Using a simple model, he showed how the discovery of natural resources triggers large capital inflows—e.g. to finance investments in the natural resource sector—which in turn appreciates the domestic currency. The real appreciation results from two interconnected sources: capital inflows and the increase in demand for non-tradable goods (given higher income due to the discovered resources).

Furthermore, expectations of further appreciations increase (speculative) capital inflows, reinforcing the appreciation. The overall effect of the real appreciation is to redirect resources from (traditional) tradable goods to the natural resource tradable and non-tradable goods. If nominal wages are rigid this might increase

unemployment. To undo these effects, Corden suggested either contracting real domestic expenditures, or reducing public debt (in an amount equal to the capital inflows), or more importantly, spending the proceeds of natural resources in accumulating foreign financial assets.

Following the above, Corden and Neary (1982) analyzed the effects of Dutch Disease on income distribution and resource allocation. With a general equilibrium model they study what they label as a "resource movement" and a "spending effect." The former arises as the boom industry affects the marginal productivity of the factors of production—drawing resources out of the non-booming sectors—while the latter increases spending as a result of the wealth effect of the exogenous shock that triggers the boom. Conditional on different factor intensities, the model showed the effects of DD on income distribution and factor-utilization. Corden (1984) extends Corden and Neary (1982) to analyze the effects of immigration, endogenous terms of trade, domestic absorption, and some dynamics. He also looked at unemployment and protection policy.

Griffin's Model and the Savings Debate

Griffin (1970) and Griffin and Enos (1970) argued that an anticipated aid inflow would be treated as an increase in income and so allocated between savings and consumption unless the marginal propensity to save (MPS) is one. To them, once the MPS is between 0 and 1, total savings will increase but proportionately less than the increase in income brought about by the aid inflows. Thus, aid inflows will displace domestic savings as more of the aid flows go into

current consumption which underlies the DD phenomenon. Consequently, investment will increase but less than the value of the aid inflows.

One sharp criticism against the griffin's model was that it was not based on any economic model or tradition, either neo-classical or Keynesian. The model was considered to be more of an accounting identity. To Bhagwati and Grinols (1975), increased growth will exert a positive impact on savings in a dynamic context. Therefore, an aid programme may achieve a targeted increase in the savings rate earlier than in the absence of it. Eshag (1971) also argued that there is every reason to expect domestic savings to increase on the assumption that some domestic resources, which would have remained unemployed, are used in conjunction with foreign resources. According to Kennedy and Thirlwall (1971), if production expanded as a result of capital imports it will be possible to have increased consumption without a diminution of domestic savings.

Causes of Dutch Disease

In search for the causes of Dutch Disease, Krugman (1987) introduced dynamic economies of scale into standard trade model. This enabled him to show conditions under which DD may appear. In his work he observed that when a country discovers tradeable natural resources, such as oil, it normally experiences real appreciation of its exchange rate and thus a crowding out of its other tradeable sectors. According to him Dutch Disease which hurt the competitiveness of country is not really a problem. This he explained using conventional trade models which stipulate that countries should simply specialize

in whatever is their comparative advantage. Hence if an oil discovery shifts this comparative advantage then so be it. He however agreed that the worry set in when the natural resources run out, and the lost manufacturing sectors are not able to come back.

His model does not allow a role for natural resources directly. However, the discussion of the Dutch disease usually treats income earned in the natural resource sector much as if it were a pure transfer payment from abroad. So he approximated the discussion by considering the implications of a transfer payment from the foreign to the home country.

He first rewrote the balance of payments equilibrium condition to take account of the transfer. Following Dornbusch, Fischer and Samuelson (1977 cited in Krugman 1987) the condition was written as

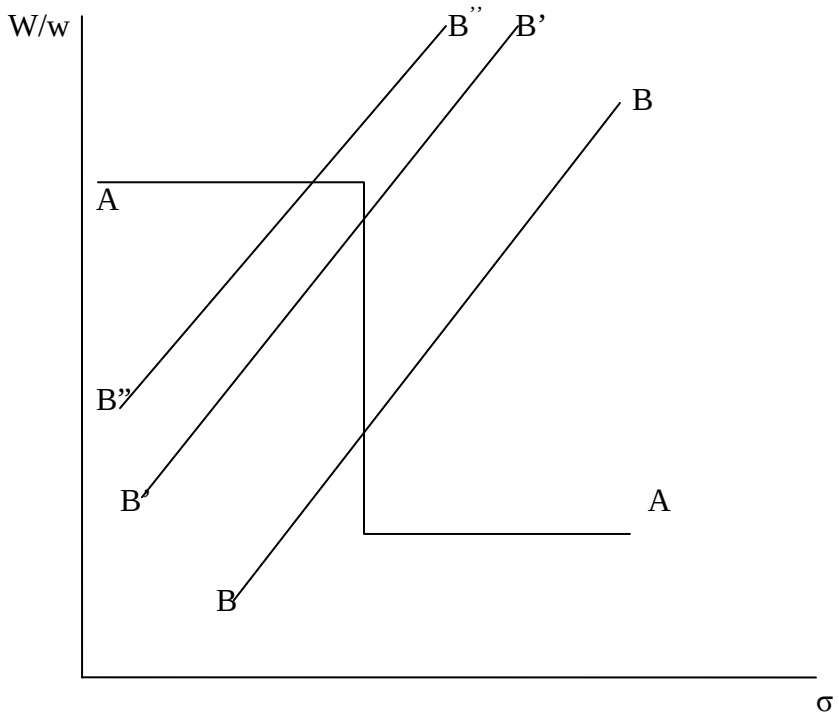
$$\sigma(t)s[l-T]=(1-\sigma(t))s\{[W(t)/w(t)]L+T\} \quad \text{..... (3)}$$

Where *T* is the transfer, measured in foreign wage units. This implies the relative wage equation

$$\frac{W(t)}{w(t)}=\frac{s(t)}{1-\sigma(t)}\frac{l}{L}+\frac{1-s}{S}+\frac{T}{L} \quad \text{..... (4)}$$

This now defines the BB schedule. As long as s < 1- that is, as long as there are non-traded goods - a transfer to the home country will shift the schedule up. The effects of this transfer depend both on its size and on its duration. Let us suppose that we were initially in or near a steady state in which each country has been specialized for a long period.

Figure 2: Short run impact of a transfer.

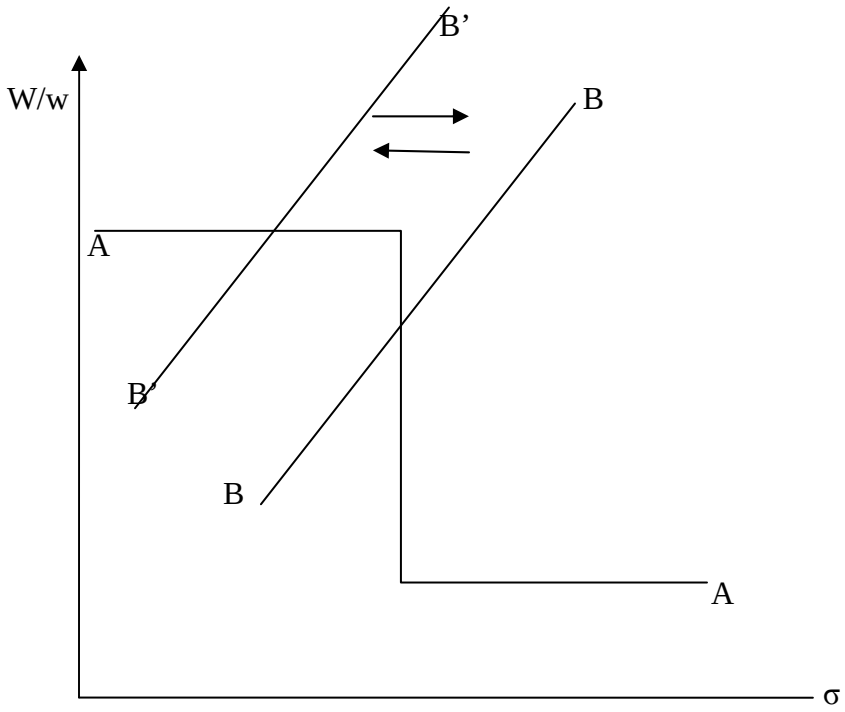


Source: Krugman (1987).

Then the schedule AA will have the shape shown in fig. 2: a step function. The effect of a small transfer is illustrated by the upward shift of BB to B'B'; this will raise the home country's wage but without altering the pattern of specialization. A larger transfer, however, will raise the schedule to B''B'': the rise in the recipient's relative wages will be enough to offset its productivity advantage, so that some sectors move abroad.

The longer run implications now depend on how long the transfer payment lasts. The shift of production from home to foreign will mean declining relative home productivity in those industries over time. Thus AA will develop a middle step, which will deepen over time. The possibilities are illustrated in fig.

Figure 3: Long run effect of a transfer.



Source: Krugman (1987).

Here a large transfer is assumed to shift BB up to B'B', results in a shift of some industries from the home to foreign country. If the transfer does not last too long, when it ends and BB returns to its previous position the old pattern of specialization and relative wages will reassert itself. If the transfer lasts longer, however, some of the industries will not come back when it ends. For a transfer of sufficiently long duration, all of the industries which move abroad in the short run will remain abroad even when the transfer ends. In either of the latter cases the home country's market share and relative wage will turn out to have been permanently reduced by its temporary good fortune.

However, it is only one of several possibilities in his model—and conditional on the size and duration of the shock. For Dutch Disease to be a de-

industrialization problem it has to either last for long enough or be large enough; otherwise it will just be a temporary phenomenon.

The Dual Gap Theory and Aid

Chenery and Strout (1966) presented the model which contains three constraints on growth. First, they formalized the need for technical assistance by limiting the capacity to invest. This constraint is assumed to be binding at low income levels. The second constraint is, as in Rosenstein-Rodan's model, the savings gap. Finally, the foreign exchange gap (also known as the trade gap) which is equal to the excess value of import requirements over export earnings ; this according to them emerges when the (exogenously determined) rate of export growth is insufficient to keep pace with the growing demand for imports.

In this model there are four possible combinations (or phases) of these constraints. On the one hand, the nature of the relationship between growth and investment depends on whether investment is limited by absorptive capacity or is set by the target growth rate and, on the other, the required level of capital inflows to realize planned investment is given by whichever of the savings or trade gaps is the larger. These phases are summarized in the Table below

Table 1: Phases of Growth in Chenery and Strout Dual Gap Model

Phase	Growth Constraint	Foreign Capital Determined By
IA	Ability to invest	Savings gap
IB	Ability to invest	Trade Gap
II	Growth target	Savings Gap
III	Growth target	Trade Gap

Source: White (1992)

Chenery and Strout argued that growth would initially be constrained by the ability to invest, during which period it is likely that the savings gap would be the larger of the two gaps and thus determine foreign exchange requirements. Thus Phase IA is the likely condition of the economies in the early stages of development. Once the investment constraint is no longer binding Phase II is likely to follow, in which growth is set by the target but foreign capital is required to fill the savings gap. But it is likely that import growth would exceed that of exports so that a large foreign exchange gap would open up, and the economy would be in Phase III.

The impact of aid on income depends on the regime faced by the recipient economy. The marginal productivity of aid is thus given by the following derivatives;

Phase II: $dY_{T+1} / d\sum A_t = 1/(k - b\tau)$ ……..…..…. (5)

Phase III: $dY_{T+1} / d\sum A_t = 1/\mu\tau)$ ……..…… (6)

Where Y is output, A is aid inflow, r the target growth rate of output, b and u the marginal propensities to save and import respectively and

$$\tau = \left\{T - \left(1 - \left(1+r\right)^{-t}\right)/r\right\} / \left\{r\left(T+1\right)\right\}$$ ……... (7)

With plausible values of the parameters, these results suggest that aid would be more productive (that is the derivative of future income with respect to aid is higher) under a foreign exchange constraint than when the savings gap is binding. Using empirical evidence the model predicts that aid impact would vary between countries according to (i) the relevant regime (i. e. which constraint is binding) and (ii) the values of marginal propensities to save and import.

They concluded that aid is more productive in Phase III since a binding trade gap creates redundant domestic resources which remain unused so long as the required imported complementary inputs are unavailable.

Performance of the Ghanaian Economy,

Ghana prior to the Economic Recovery Programme in the 1980's witnessed poor economic growth performance with the lowest of - 14.5% occurring in 1975. This can be attributed to the fact that policies that were implemented during the pre-ERP period were inappropriate and inadequate. The need for alternative policies that could turn the economy of Ghana around became evident, as in particular the ability of developing countries to receive financial assistance from the World Bank, IMF and other bilateral and multilateral institutions routinely became conditional upon the adoption of liberalization

policies (Edwards, 1993; World Bank, 1998; Remmer, 2004). For these reasons, Ghana undertook a broad range of economic reforms launched on the basis of liberalized policy regime that began with the World Bank and IMF sponsored Economic Recovery Programme and the Structural Adjustment Programme in 1980's. It initially focused on removing distortions in the foreign exchange market, trade restrictions and then corrected for structural and macroeconomic imbalances that were believed to have caused the economic decline. The government believes that, because the domestic market is small in general, economic growth must necessarily come from international trade. For this reason, the government has in recent years been committed towards trading partnerships and agreements, international trading rules, as well as participation in negotiations in multilateral trading.

It is not surprising that post-liberalization growth performance has been encouraging with the highest real GDP growth of 8.6% in 1984, the first year after the adjustment programme. To a much greater extent the reforms combined with inflow of foreign aid have helped Ghana recover from a prolonged period of economic decline. How ever, it was expected that real GDP growth could accelerate from the 8.6% rate achieved in 1984, but unfortunately the country has since not exceeded this rate. In particular, in 1993, under its Vision 2020 programme, Ghana set for itself a target aimed to move from a low-income country to an upper middle-income country by the year 2020. The economy was expected to grow at an average of 8% between 1995 and 2020. More ambitiously, and in order to achieve the Millennium Development Goals (MDGs) by 2015, the

Vision 2020 policy document was amended and it is now aimed at 2015 (that is, Ghana Vision 2015).

In spite of these policy efforts, the average real GDP growth in the country from 1990 to 2000 was only 4.3% while from 2000 to 2005, it increased only to 5.1% (World Bank, 2007). The rate in terms of real GDP per capita growth is even lower. Pessimists argue that, in spite of the many efforts of government, the recent growth record is still inadequate. To them, although the recent growth achievement is commendable, it is not unique as similar growth records were achieved under different policies in the early post-independence period (Aryeetey et al., 2000). The impact of reform policies and foreign aid inflows is deemed much lower than expected, if Ghana aims to achieve its 8% growth target. This raises a number of questions on the extent to which foreign aid inflows and real exchange rate behavior have contributed to economic growth in Ghana, over the post-reform era.

Aid Dependence and the Dutch Disease in Ghana

The notion of aid dependence has been used in both quantitative and qualitative senses. In the case of the former, it has been used to connote receipt of large flows of external aid, while in the latter it entails an insignificant contribution towards self-sustaining development in spite of continuous aid provision. To a large extent aid dependence in the context of any given country could be perceived as a situation in which the country becomes overly dependent on aid for its survival. The Ghanaian economy exhibits rather high aid

dependence. The intensity of aid, which is a crucial element in aid dependence analysis, is quite high for the economy (refer to Table 2- aid intensity indicators)

Table 2: Aid Intensity Indicators

Year	Aid/GNI	Aid/Imports	Aid/Gov Exp.	Aid/Investment
1983	2.71	15.02	45.75	71.51
1984	4.89	26.27	66.66	70.37
1985	4.40	20.45	46.00	45.17
1986	6.41	33.23	56.68	67.00
1987	8.29	30.83	75.86	77.32
1988	11.37	41.34	114.21	98.15
1989	13.95	50.77	138.55	103.26
1990	9.69	35.37	102.12	65.84
1991	13.56	50.34	140.39	83.84
1992	9.72	31.06	78.92	74.65
1993	10.62	27.29	72.14	46.93
1994	10.25	25.91	73.17	41.91
1995	10.25	28.66	83.17	50.15
1996	9.58	25.60	77.91	44.26
1997	7.31	18.66	58.03	28.90
1998	9.58	18.38	90.87	40.60
1999	8.05	14.91	72.64	37.51
2000	12.37	17.20	118.02	50.02
2001	12.30	17.30	123.97	45.31

2002	11.36	19.54	112.63	56.45
2003	13.17	22.59	111.69	56.16
2004	16.34	25.21	131.24	56.30
2005	10.85	16.77	70.017	36.96
2006	5.99	14.32	52.65	27.56
2007	4.75	11.32	40.87	23.49
2008	4.62	10.11	40.69	21.32
2009	6.12	13.90	63.08	30.90
2010	7.62	17.69	57.10	40.48

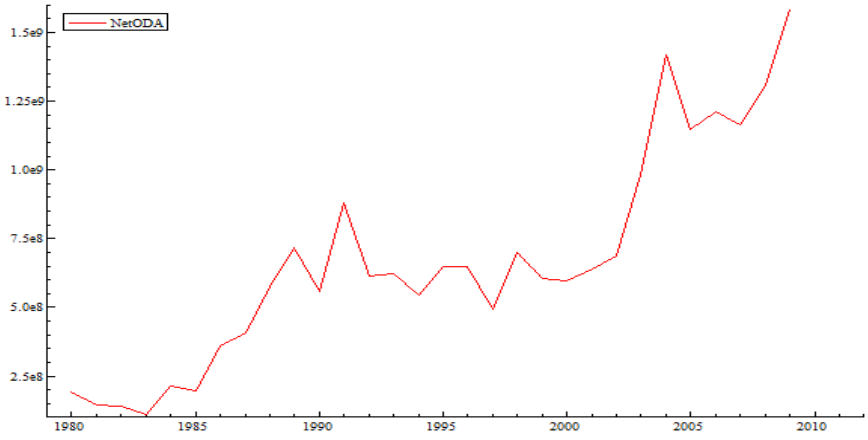
Source: Authors calculations based on data from OECD's Geographical Distribution of Financial Flows to Developing Countries, World Bank's Tables (2011).

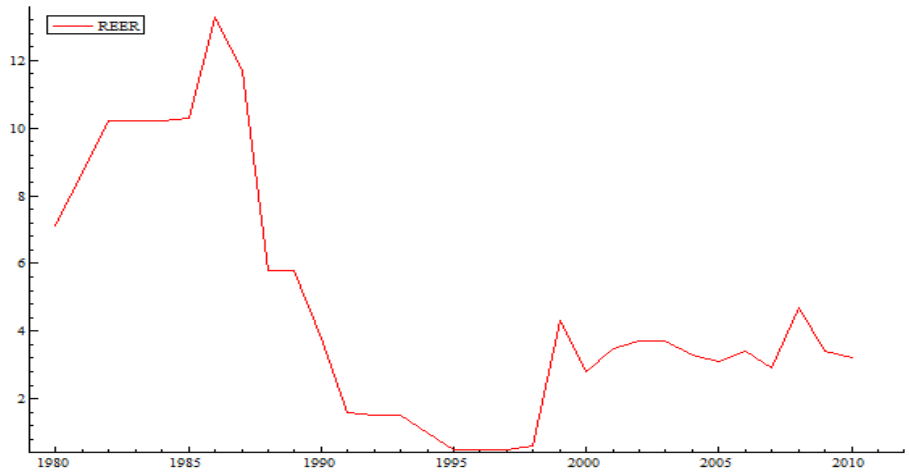
Since the commencement of the reforms, economic performance has generally been encouraging, discounting for some few slippages. Real GDP growth has been around 5% on an annual basis. Structural transformation appears to be taking place in the Ghanaian economy. The broad structure of the economy in terms of sector contribution to GDP, which had agriculture as the leading sector contributing no less than 45% of economic output, has been altered. In relative terms there has been a decline in agriculture, while an increase in service sector activity is pervading the production structure of the economy (about 50%). Growth in the economy is now service-sector driven, which to a large extent is evidence of Dutch disease. However, the service sector, which is dominated by the wholesale and retailing subsector, is to a large measure a non-tradeable sector.

Hence, the spending effect of increased aid inflows to the economy is likely to cause price increases in this sector that will invariably spill over to the other sectors as well. It is no surprise that government is still grappling with inflation. With the services sector being low on the extent of tradeability, such inflationary tendencies have had a potential appreciating effect on the real exchange rate. However, through nominal devaluations, often in excess of the rate of inflation, government has prevented the real exchange rate from appreciating. The industrial sector still appears to be struggling to make an imprint on the economy. Perhaps the appropriate incentive structure and conducive environment have still not been created for enhanced performance from industry.

In Ghana's search for economic renewal, accelerated growth and poverty reduction, the real exchange rate and its interplay with external aid inflows have been crucial for purposes of strategic economic decision making and efficient policy management. External aid inflows continue to play a tremendous role in Ghana's development efforts.

Figure 4: Trends in Aid Inflows and Real Effective Exchange Rate





Source: Eviews 5.

From the diagram above it can be observed that lower aid inflows in the 1980's as a result of poor economic performance is associated with depreciation of the exchange rate. However, it is evident that high aid inflows trends with appreciation.

The Real Exchange Rate Definitions

The various definitions of the real exchange rate can mainly be categorized under two main groups. The first group of definitions is made in line with the purchasing power parity. The second group of definitions, on the other hand, is based on the distinction between the tradable and the non-tradable goods. Although they can coincide in some very special cases, these definitions usually give different results.

Purchasing Power Parity

According to this definition, the real exchange rate can be defined in the long run as the nominal exchange rate (e) that is adjusted by the ratio of the foreign price level (P^f) to the domestic price level (P). Mathematically, it can be shown as

$$r_{ppp} = e\frac{P^{f}}{P} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

In terms of this definition, the decline in the r_{ppp} can be interpreted as the real appreciation of the exchange rate.

The Definition on the Basis of the Tradable and Non-tradable Goods

This definition takes the relative price of the tradables and non-tradables in the country as an indicator of the country's competitiveness level in the foreign trade. The rationale behind this definition is that the cost differentials between the countries are closely related with the relative price structures in these economies. Under the assumption that the prices of the tradables will be equal all around the world, the real exchange rate defined on the basis of tradable and non-tradable goods distinction can be mathematically represented as:

$$r_r = \frac{P_t}{P_n} = e\frac{P^{*}_{t}}{P_n} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

In this definition, Pt and Pt* stand for the domestic and international prices of the tradables respectively, while the prices of the non-tradables are denoted by Pn. In this definition, the decline of r_r indicates the real appreciation of the domestic currency.

Both definitions in the previous sections rely on the assumption that the home country has only one trading partner. However, in the real world, such an assumption is invalid. By considering this fact, we can make a third definition called the *real effective exchange rate*. In this definition, the real exchange rates corresponding to the trading partners of a country are used by some weighting criteria. The share of the foreign countries in a country's total foreign trade volume or the share of the currencies used in the foreign trade transactions can be given as examples of these weighting criteria and this is what will be employed in this study.

Theory of Long-Run Equilibrium Real Exchange Rate

Theoretically, the real exchange rate (RER) that prevails in an economy at any point in time is perceived as a short run phenomenon. The RER may change if the economy is shocked by dynamic forces that affect the short run equilibrium, thereby leading to disequilibrium in the long-run. In this case, the sustainability of the RER depends on whether the observed RER was the result of a sustainable long-run macroeconomic equilibrium. This brings to bear the importance of determining the factors that support the RER in the long-run.

The long-run equilibrium real exchange rate is that RER that is compatible with steady-state equilibrium for the economy's net international creditor position, conditioned on the permanent values of a variety of policy and exogenous variables. These permanent values need to be identified and their direction of influence explored. This way of defining the long-run equilibrium real exchange

rate highlights the permanent variables, which would be referred to here as the fundamentals (as in the literature). This implies that permanent changes in any of these fundamentals may lead to changes in the long-run ERER, which follows a steady-state path.

The study follows Montiel (1999) to derive the long run equilibrium real exchange rate. Montiel (1999) considers two composite good markets, tradables and non-tradables. To analyse these markets, he defined the internal balance (IB) as the condition where the nontradeable goods market clears in the current period and is expected to be in equilibrium in the future (consistent with Edwards, 1989), that is,

$$y_N(e) = c_N + g_N = (1-\theta)ec + g_N \quad \text{.. (10)}$$

And $\partial Y_N / \partial e < 0$

Where y_N is the supply of non-tradable goods given full employment, e is the real exchange rate, c is total private spending, with q being the proportion of this total private spending on traded goods and g_N represents government consumption of non-traded goods. The above shows the IB position where the real exchange rate is inversely related to consumption. This follows from the fact that, if we start from an initial equilibrium IB position, then an increase in private spending (c) results in an excess demand for non-tradable goods at the initial real exchange rate. To restore equilibrium, a real appreciation is required, promoting supply of non-tradable goods and increasing demand for tradable goods.

Similarly, Montiel (1999) defined the external balance (EB) as the current account balance that is compatible with long-run sustainable capital inflows:

$$\Delta f = y_T(e) - g_T - (\theta + \tau)c + z + rf \quad \text{.. (11)}$$

where Δf is change in net foreign assets over time, *f* is total net foreign assets, *r* is the real yield on the foreign assets (measured in traded goods), y_T *(e)* is the production of traded goods locally, g_T is government consumption of traded goods, *c* is total private consumption with *θ* representing the proportion of private consumption on traded goods, г captures transaction costs associated with private spending, with *z* and *rf* capturing net aid inflows and external debt service respectively.

Equation (11) posits that EB is given by the trade balance (that is, domestic output of traded goods net of local consumption of these goods), net aid inflows and less costs on foreign debt. In equilibrium, where $\Delta f = 0$, this gives the EB locus along which we have a relationship between consumption and the real exchange rate. This shows a positive relationship between consumption and RER because, assuming we started from an equilibrium position (initial EB), then an increase in private spending would generate a current account deficit at the original real exchange rate. To restore equilibrium the RER must increase (depreciate). The depreciation would then switch demand towards non-traded goods and supply towards traded goods. As established so far, whereas an increase in private spending in IB yields an appreciation of the real exchange rate (that is increase in the supply of non-traded goods), a similar shock in EB yields depreciation and promotes an increase in the supply of traded goods. The overall effect of the two markets, that is IB and EB, produces the equilibrium real exchange rate that is consistent with the fundamentals determining the RER.

Setting the right hand side of equation (11) to zero and combining with equation (10) yields the desired equilibrium real exchange rate:

$$e^* = e^*\left(g_N, g_T, r^* f^* + z, \tau^*\right) \quad \text{..... (12)}$$

$$e_1 < 0, e_2 > 0, e_3 < 0, e_4 > 0.$$

where * denotes steady state values of endogenous variables. The steady state variables were solved by Montiel (1999) by assuming that the economy faces an upward sloping supply curve of net external funds and that households optimize over an infinite horizon. By recognizing that the transactions costs per unit, r , is endogenous and depends on the ratio of money holdings to private spending, hence on the nominal interest rate (which is given in the long run by the rate of time preference and the domestic inflation rate), the final expression for the equilibrium real exchange rate is given as:

$$e^* = e^*\left(g_N, g_T, z, r_w, \pi_T\right) \quad \text{..... (13)}$$

where r_w is the world real interest rate and π_T is the rate of inflation in the domestic price of traded goods (the rate of time preference is suppressed). As is clear from the above, the nominal exchange rate does not appear among the fundamentals as at most it would only have a transitory effect on the real exchange rate. Equation (13) then states that the real exchange rate consistent with both internal and external balance is a function of fundamentals, perceived to be exogenous, and policy variables.

Empirical applications of the model estimate a version of equation (13), although the variables included as fundamentals differ across studies. Edwards (1994) and Baffes *et al* (1999) include policy variables such as terms of trade, trade policy

and productivity shocks as fundamentals. They also include macroeconomic imbalances (such as devaluation), thus allowing for nominal devaluation in the equilibrium equation. For the purpose of this study this model will be modified by adding foreign aid.

Export Function

Trade reforms have been important in reducing anti-export bias (policies to control the level of import such as tariffs, embargo and other inward looking policies like import substitution industrialization). However without appropriate real exchange rate adjustments, the incentive structure could still be significantly biased against exportable sector. Blassa (1990) finds exports in Sub-Saharan Africa to be highly responsive to exchange rate changes, especially agricultural exports.

Caves et al. (1999), in their book World Trade and Payments, specify the demand for exports EX_D as a decreasing function of their price expressed in foreign currency divided by the exchange rate:

$$EX = EX_D\left(\frac{P^x}{E}\right) \quad \text{……(14)}$$

Where EX_D is the foreign demand for the home country's exports, P^x is the price of exports in units of domestic currency and E is the exchange rate, i.e. domestic currency per unit of foreign currency.

Thrilwall (2003), by assuming constant price and income elasticities of demand for exports, made the following specification for the export function

$$EX = A\left(P^f \frac{E}{P^d} \right)^{\beta_1} Y^{\beta_2} \quad \text{…….. (15)}$$

Where *EX* is exports, A is a constant, P^d is the domestic price level, P^f is foreign prices, *E* is the nominal exchange rate measured as the domestic currency per unit of foreign currency, and Y is the income, β_1 and β_2 denote price and income elasticities, respectively. Taking the logs of the variables and differentiating with respect to time, we obtain the export growth function as follows:

$$ex = \alpha + \beta_1 \left(P^f + e - P^d \right) + \beta_2 Y \quad \text{…….(16)}$$

Both elasticities, β_1 and β_2 , are expected to be positive. The model, however, assumes that exports adjust without a lag to changes in competitiveness and income, so there is no difference between short and long run elasticities. By assuming that exports adjust partially to the difference between export demand in period t and the actual flow of exports in the previous period (t-1), the lag of exports becomes an explanatory variable, given in equation:

$$ex_t = \alpha + \beta_1 p_t + \beta_2 Y_t + \beta_3 x_{t-1} + \mu_t \quad \text{…….(17)}$$

Where p_t now denotes the rate of change of the relative price, μ is the stochastic term and *t* represents the time period. This model will be use with little modifications

Review of Empirical Literature

Starting with cross country and Panel regression studies, Wijnbergen (1985) conducted a study which presented an econometric model to analyze real exchanged rate in selected African countries. In his model he specified the following variables; real exchange rate (as an index of the nominal exchange rate time the dollar import price index over the CPI), GDP, technological progress, terms of trade and Aid. His results suggested that aid inflows have led to an appreciation of real exchange rate. However, this work has been criticized on a number of reasons; firstly. Some of the equations fit very poorly indeed and replication of the results suggests that they are frequently out-performed by a first order autoregressive process, which is strongly suggestive of misspecification. Secondly, the t-tests are based on the usual standard error formula. If the heteroscedastic consistent standard errors are used instead all coefficients are insignificantly different from zero at the five percent level. Estimation of a more general model, including lags and a variable for the nominal exchange rate shows that the model specified is an invalid restriction of the more general model in most cases. Finally, some of the Durbin-Watson statistics suggest the presence of autocorrelation, so, even if the model is correct, it is likely that the standard errors are biased downward, casting doubt on the significance of the regressors.

Edwards (1989) estimated an empirical model specifying explanatory variables like international terms of trade, government consumption of non-tradables, measure of extent of controls over capital flows, index of severity of trade restriction and exchange controls, measure of technological progress and

ratio of investment to GDP. Several versions of the model were estimated using pooled data for a group of 12 developing countries. Ordinary least squares and instrumental variables techniques were used. The results provide support for the view that both real and nominal variables cause short-run movements in real exchange rates.

Adenauer and Vagassky (1998) test the existence of Dutch Disease symptoms in four CFA zone countries during 1980–1992, by using regression analysis to study the link between higher aid and the real exchange rate. They find that an increase in aid leads to a RER appreciation. Then, they examine the channels of aid on a country-by-country basis, focusing on the particular policies followed by each of them. They argue that government policies, consumption levels and investment are crucial factors in determining the extent of Dutch disease effects in each country.

MacDonald (1998) presented a reduced form model of the real exchange rate to re-examine the determinants of real exchange rates in a long run setting. His model features productivity differentials, terms of trade effects, fiscal balances, net foreign assets and real interest rate differentials as key fundamental determinants of the real exchange rate. Using multivariate cointegration methods, the model is implemented for the real effective exchange rates of the U.S. dollar, Yen and the Deutschmark, over the period 1974 to 1993. He finds evidence of a significant and sensible long run relationship for his model, indicating that the fundamentals mentioned above have an important and significant bearing on the determination of both long and short run real exchange rates. All the variables

were found to have a positive relationship with the real exchange rate; an increase in any of them leads to an appreciation of the real exchange rate.

Hjertholm etal (1998) argued that the macroeconomic rationale for aid relates to its ability to supplement savings, foreign exchange and government revenue, thus contributing to growth. These processes presume a simple Harrod-Domar context in which growth is driven by physical capital formation. However, the macroeconomic reality of aid is more complicated. They considered three areas of complications: (i) the effects of aid on fiscal behavior, (ii) debt problems and (iii) Dutch disease effects. Their results showed that in the long run, rather than merely filling gaps, aid should help close gaps, since reliance on future aid and foreign borrowing is thus diminished and economic policy autonomy is increased. Closing the savings gap entails financial and technical support for mobilization of domestic savings. Closing the trade gap entails supporting a macro environment conducive to export growth, helping to expand and improve physical infrastructure and direct support for export activities, notably those of a nontraditional nature. Closing the fiscal gap entails support for increasing government revenue and improving expenditure management, which is the more delicate task since donors and recipient governments have to carefully balance the disadvantage of lower-than-needed government spending against the disadvantage of higher, and potentially distortionary, taxation.

Yano and Nugent (1999), in their paper on the transfer paradox, also found rather mixed econometric evidence on the relationship between aid flows, real exchange rates and the structure of production amongst a set of 44 aid-dependent

economies over the two decades from 1970-1990. Aid dependence here means that a country receives in excess of 5 percent per annum in aid. In 21 of these 44 countries, aid was associated with an appreciation in the real exchange rate, although in only two cases was the effect statistically significant, while in 23 cases the relationship was reversed (and was significant in four countries). In only six of the countries (Burkina Faso, Congo, Lesotho, Liberia, Senegal and Yemen) were aid flows statistically and negatively associated with the symptoms of a transfer paradox (an expansion of the non-tradable sector, contraction of the tradable sector and a decline in real GDP), and only in the case of Liberia was there any evidence that the decline in real income was statistically significant.

Yano & Nugent (1999) "Aid, Nontraded Goods, and the Transfer Paradox in

Sachs and Warner (1999) present a model with natural resources, increasing returns in the spirit of big push models, and expectations and show that when the increasing-returns-to scale (IRS) sector is non-tradable, a resource boom can indeed pull more goods into that sector, and thereby set off a dynamic growth process. However, when the IRS sector is in tradable manufactures, a resource boom can hurt growth, via the DD phenomenon. Empirically, they present evidence from seven Latin American countries that natural resource booms are sometimes accompanied by declining per-capita GDP. However, they recognize that they cannot distinguish between several possible channels associated with natural resource booms: DD, political instability, costs of high variability of export earnings (with imperfect financial and insurance markets), etc.

Sachs and Warner (2001) tried to explain why countries with large natural resource endowments tend to grow slowly (i.e., the natural resource curse). They find evidence that natural resource intensive economies tend to have higher price levels (hence higher nontradable prices, assuming roughly similar tradable prices across countries), after controlling for the relationship between price levels and per-capita income. They then showed that resource abundant countries tended to have small contributions from export growth in manufactures. They use these results as a potential explanation of the resource curse, by implicitly assuming that a larger manufacturing tradable sector drives long-term growth. However, they do not attempt to show evidence on this relationship. They also discuss other possible explanations for the curse, which relate natural resource abundance with crowding out of entrepreneurial activities or innovation, rent-seeking behavior (voracity effects), and higher corruption. Natural resource countries would thus experience lower innovation, lower entrepreneurial activity, poorer governments and lower growth.

Gylfason (2001) discussed the concept, existing literature, and case studies of DD to draw some lessons out of it. In the empirical section he shows that across countries: (a) economic growth varies inversely with natural resource abundance, (b) two different measures of education intended to reflect education inputs and participation are both inversely related to natural resource abundance, and (c) economic growth varies directly with education.

Therefore, natural resource abundance seems likely to deter economic growth not only through the Dutch disease, rent seeking, and overconfidence that tends to

reduce the quality of economic policy and structure, but also by weakening public and private incentives to accumulate human capital. If so, the adverse effects of natural resource abundance on economic growth since the 1960s that have been reported in the literature may in part reflect, and possibly displace, the effect of education on growth.

Bulí_ and Lane (2002) presented some striking evidence that suggests the tradable sector as a whole has declined by an average of 8 percent per annum in a sample of aid-dependent economies. Dramatic though this association is, it does not indicate causality running from aid to the contraction of the tradable sector. It is equally consistent with the reverse, namely that aid dependent economies may be in receipt of high aid flows precisely because the tradable sector is declining.

Athukorala and Rajapatirana (2003) conducted a comparative study on capital inflows and the real exchange for the main capital importing countries in Asia and Latin America. Unlike the aforementioned studies, this paper focuses on the behavior of the real exchange rate in terms of private capital inflows, disaggregated into FDI and 'other capital flows', and a set of macroeconomic indicators. They find that the real exchange rate appreciates with rising levels of 'other capital flows' whereas increases in FDI lead to a depreciation of the real exchange rate. They further observe that the degree of appreciation associated with capital inflows was lower in the Asian countries compared to the Latin American countries.

Adam and Bevan (2004) showed that the conventional Dutch Disease effect of aid may be overturned when productivity spillovers accrue in both the

tradable and non-tradable sectors. They presented a model, calibrated to Ugandan data, where public infrastructure investment generates an intertemporal productivity spillover which may exhibit a sector-specific bias. Their results suggest that for reasonable values of the parameters regarding the supply-side effects of public expenditure, the traditional DD effects are not present beyond the short-run. In fact, for a country like Uganda, public expenditure with productivity effects skewed towards the non-tradable sector leads to significant export and output growth in the medium term. These results hold even in the presence of learning-by-doing externalities in the manufacturing tradable sector. Hence, the authors conclude that analysis of the impact of aid must take into account supply-side issues, and these are likely to depend on how aid is spent.

Ouattara and Strobl (2004) assessed the impact of foreign aid inflows on the real effective exchange rate of the Central African CFA franc countries between 1980-2000 in order to test the hypothesis that foreign aid inflows cause real appreciation in the recipient country. Using the dynamic panel analysis proposed by Arellano and Bond (1991), they found that this hypothesis is rejected in the case of the CFA countries. Put differently, their finding refutes the belief that foreign aid inflows cause Dutch disease in the recipient country. On the contrary, foreign aid inflows are associated with a real depreciation of the franc. Their results also showed that openness of the economy and the nominal devaluation of the CFA franc in 1994 have also contributed to the depreciation of real exchange rate over that period. By contrast, their results indicate that terms of trade, government consumption and expansionary macroeconomic policies led to

real appreciation of the franc. The impact of public investment was also negative, but insignificant at the conventional levels.

Rajan and Subramanian (2005) analyzed why there is no robust association between aid and growth, and suggest that a plausible explanation is that aid may lead to real exchange rate overvaluation, affecting competitiveness in the tradable sector. Using a methodology that exploits both cross-country and within-country variation, they find that aid inflows negatively affect a country's competitiveness, as reflected in a decline in the share of labor intensive and tradable industries in the manufacturing sector. Their results also suggest that the channel is the real exchange rate overvaluation caused by aid inflows. Based on these results, the authors conjecture that because the tradable sector is typically the source of productivity improvements, positive spillovers associated with learning-by-doing, and scarce foreign exchange earnings that filter through to the rest of the economy, the adverse impact of aid on its competitiveness could retard not just that sector but also the growth of the entire economy. However, they did not show that aid is, on net, harmful to growth. They just provided evidence consistent with a channel that could offset potential beneficial effects of aid.

Kempa (2005) took as a starting point a simple textbook version of the Dornbusch model of exchange rate determination and transforms it to obtain a decomposition of exchange rate, output and price level data of the British- U.S., German-U.S. and Japanese-U.S. bilateral. Real exchange rates, as well as relative price levels and output movements, are decomposed into components associated with nominal shocks as well as shocks to aggregate supply and demand. In other

words, Kempa (2005: 440) identifies two distinct sources driving exchange rates: one arising in financial markets and other in the real economy. Nominal shocks are measured as changes in money supply and money demand and aggregate supply shocks are measured by a series on industrial production, while the rate of domestic absorption and elasticity of the current account are used as proxies for aggregate demand shocks. The decomposition suggests that nominal shocks account for less than 33 per cent of overall real exchange rate variability, aggregate supply shocks explain less than 10 per cent of overall variability and the remaining variability were accounted for by aggregate demand shocks, particularly at longer forecast horizons. Thus, the evidence in this study suggested that exchange rate fluctuations appear to be predominantly equilibrium responses to real shocks, rather than volatility in financial markets.

Chaban (2006) examined the relationship between real variables and real exchange rate. Specifically the researcher focused on the importance of traded goods in the transmission mechanism of how real variables impacts exchange rate. That is, the paper examined the contribution of real shocks to the relative prices of traded and nontraded goods. The researcher developed a VAR model that includes real variables and used Forecast Error Variance Decompositions (FEVDs) to address this issue with Canada-U.S. data.

The results showed that real shocks identified in the model propagate to the real exchange rate almost entirely through the relative price of traded goods. This finding casts doubt on the theoretical literature that postulates that real shocks propagate only through the relative price of nontraded goods.

Munemo (2006) examined the fact that the effect of foreign aid on economic activity of a country can be dampened as it can potentially have adverse effects on exports through a real exchange rate appreciation. His paper seeks to investigate the hypothesis of negative effect of foreign aid on export performance of a country. He used a panel of 84 developing countries to estimate the effect of foreign aid on export performance measures after controlling for the additional factors that may affect exports. The results do not show a negative effect of foreign aid on long term performance of exports. The estimates are predominantly positive but imprecise. The results are also robust to different sub-samples and accounting for possible endogeneity. We interpret these estimates as evidence against the quantitative importance of the real exchange rate channel effect of foreign aid on export performance in the long run.

In order to investigate the role of the real exchange rate in determining the effects of foreign aid, Cerra, Tekin, & Turnovsky (2008) developed a dynamic dependent economy model. From their discussion they raised concerns about Dutch disease causing untied aid to have adverse effects to be essentially unfounded. As long as capital can be freely moved between sectors pure transfers have no long-run effects on the real exchange rate. While the traded sector will decline, this is because the aid, being denominated in traded output, substitutes for exports in financing imports, rather than because of Dutch disease effects. And while untied aid does lead to real exchange appreciation in the short run, these effects tends to be very temporary and to be almost negligibly small. In contrast, tied transfers do generate permanent relative price effects. Aid directed toward

productivity enhancement of the traded sector will lead to an appreciation of the real exchange rate, via the Balassa-Samuelson effect, but if directed toward the nontraded sector, it will lead to real exchange rate depreciation. Specifically if capital is perfectly mobile between sectors, untied aid has no long run impact on the real exchange rate. A decline in the traded sector occurs because aid, being denominated in traded output, substitutes for exports in financing imports. While untied aid causes short-run real exchange appreciation, this response is very temporary and negligibly small. Tied aid, by influencing sectorial productivity, does generate permanent relative price effects. The analysis, which employs extensive numerical simulations, emphasized the tradeoffs between real exchange adjustments, long-run capital accumulation, and economic welfare, associated with alternative forms of foreign aid.

Rajan and Subramanian (2009) examined the impact of aid on the relative size of and growth in the tradable manufacturing sector, using an approach that exploits the variation within countries and across manufacturing sectors, and corrects for possible reverse causality. They also focused on finding evidence on the channel through which aid might have these effects. They found evidence that aid inflows negatively affect tradable manufacturing sectors, with real exchange rate appreciation being the channel for such effects. Although they did not provide any evidence of causation from manufacturing exports to growth, they conjectured that their findings may explain why the evidence about the impact of aid on growth is so ambiguous.

Jongwanich (2009) examined the equilibrium real exchange rate and real exchange rate misalignments in developing Asian countries during the period 1995–2008. In addition, the relationship between real exchange rate misalignment and export performance was investigated. In the lead-up to the 1997–1998 financial crisis, real exchange rate exhibited persistent overvaluation in the crisis-affected countries. After the crisis, real exchange rate undervaluation was evident in many Asian countries such as People's Republic of China (PRC), Malaysia, and Thailand. This study also showed that real exchange rate misalignment could have a negative impact on export performance in developing Asia. With its implications on economic activity, monitoring real exchange rate equilibrium and misalignment is a useful tool for governments/central banks to ensure balance in the economy.

Mouhamadou and Hamidreza (2009), revisited the link between capital inflows and real exchange rate movements in LDC theoretically and empirically. Theoretically by representing a simple model to show that the real exchange rate depends mainly on real fundamentals as the term of trade (TOT) or gross domestic product per capita and empirically by taking into account the heterogeneity of the sample, the dynamic of the RER(real exchange rate) and the non stationary nature of the data. Capital inflows can be the oil revenues, foreign aid or FDI. Empirically, they also showed that these real fundamentals are the main driving forces of real exchange movements in these countries comparing to capital inflows. The TOT by itself accounts for 40% of the RER variations while

capital inflows account only for 12% of RER variations. The Dutch disease theory was not rejected but its size on RER movements in LDC is not very big.

Nicolás and Sebastián (2010) conducted a survey on why and when to worry about real exchange rate appreciation. They tried to establish the missing link between Dutch disease and growth. They review the literature on Dutch disease, and document that shocks that trigger foreign exchange inflows (such as natural resource booms, surges in foreign aid, remittances, or capital inflows) appreciate the real exchange rate, generate factor reallocation, and reduce manufacturing output and net exports. They also observe that real exchange rate misalignment due to overvaluation and higher volatility of the real exchange rate lower growth. Regarding the effect of undervaluation of the exchange rate on economic growth, the evidence is mixed and inconclusive. However, there is no evidence in the literature that Dutch disease reduces overall economic growth. Policy responses should aim at adequately managing the boom and the risks associated with it. Despite their good findings quantitative backings could have yielded higher authentication of their claims.

Berg, Mirzoev, Portillo & Zanna (2010) examined the short-run macroeconomics of aid inflows, with respect to understanding the interaction of fiscal and reserve policy. They developed a tractable open-economy new-Keynesian model with two sectors to analyze the short-term effects of aid-financed fiscal expansions. They further went ahead to distinguish between *spending* the aid, which is under the control of the fiscal authorities, and *absorbing* the aid—using the aid to finance a higher current account deficit—

which is influenced by the central bank's reserves policy when access to international capital markets is limited. The standard treatment of the transfer problem implicitly assumed that spending equals absorption. Here, in contrast, a policy mix that results in spending but not absorbing the aid generates demand pressures and results in an increase in real interest rates. It can also lead to a temporary real depreciation if demand pressures are strong enough to threaten external balance. Certain features of low income countries, such as limited participation in domestic financial markets, make a real depreciation more likely by amplifying demand pressures when aid is spent but not absorbed. The results from their model can help understand the recent experience of Uganda, which saw an increase in government spending following a surge in aid yet experienced a real depreciation and an increase in real interest rates.

Ismail (2010) builds a static model. Then he tested it for the existence of Dutch disease using microeconomic data, as opposed to most of the other studies. Although using annual data for the period 1977–2004 in 90 countries, the problem is that only data from the manufacturing sector are used—due to data availability issues. With this caveats, he finds that a permanent oil shock resulted in manufacturing production reductions. Furthermore, these effects seem to be stronger in economies with more open capital accounts. The relative factor price of labor increases with respect to capital. Consequently capital intensity increases in the oil shock— consistent with his labor-intensive non-tradable sector model. Finally, he finds that sectors with higher capital intensity are affected relatively less by these types of shocks.

A substantial studies employed time-series to examine the Dutch Disease phenomenon using a variety of time-series techniques. These studies frequently used Granger-causality test, vector autoregressive (VAR) procedures and the Autoregressive Distributed Lag Models. Others employed several measures of exchange rate fundamentals and or more powerful and sophisticated econometric techniques to examine individual countries in much greater depth.

White and Wignaraja (1992) also present an econometric model of real exchange rate behavior in Sri Lanka using a general to specific modeling procedure. The model specifies the following variables: lagged real exchange rate, total aid and remittances lagged one period, terms of trade, nominal exchange rate and the nominal exchange rate lagged two periods. A major finding from the study is that the substantial rise in total aid and remittances has caused a real appreciation.

In order to test the hypothesis that aid inflows cause real appreciation (Dutch Disease), Nyoni (1998) examined the impact of foreign aid inflows to Tanzania on macroeconomic variables such as the real exchange rate, export performance, government expenditure, investment and growth. Using time series data from 1969 to 1993, the study employed cointegration techniques and an error-correction model to estimate the long-run equilibrium and the short-run real exchange rate, respectively. They argued that although seemingly beneficial, foreign aid may generate undesirable consequences for the recipient country. These undesirable impacts include appreciation of the real exchange rate and the consequent decline in export performance. The estimated model results however

suggested that foreign aid inflows, openness of the economy and devaluation of the local currency lead to depreciation of the real exchange rate, while government expenditure tends to appreciate the real exchange rate. The study recommended that the correct policy response to the influx of foreign aid is to direct the aid to domestic productive investment in order to induce a positive supply response. The government should also reduce its expenditure and enhance economic liberalization.

Falck (1997) examined aid-induced real exchange rate appreciation in Tanzania. The model for the determination of the real exchange rate specifies among other variables the real exchange rate lagged one period, rate of change of the nominal exchange rate, foreign aid, macroeconomic policy proxied by the growth of excess domestic credit, international terms of trade and investment. He computes twelve different real exchange rate indexes for Tanzania, applies a three-stage selection procedure to each one of them and estimates the model by the use of ordinary least squares. The results show some similarities across the various equations with respect to the signs on the coefficient estimates. Notably, foreign aid causes the real exchange rate to appreciate is in sharp contrast to the findings made by Nyoni (1998).

Antonopoulos (1999) tested the so-called “Shaikh hypothesis”, which states that the real exchange rate is fundamentally determined by the ratio of relative real unit labour costs (as a proxy for productivity differentials) of tradable goods between two countries. However, Antonopoulos’s model adds capital flows to the “Shaikh hypothesis” and employs cointegration methodology on Greece’s

data covering the period 1960 – 1990. The study provided evidence that real exchange rate movements cannot be explained by the PPP hypothesis, that there was a strong role of the productivity of the export sector of Greece *vis-à-vis* that of the rest of the world, and that there was a less important role of net capital inflows. The evidence in this study suggested that an improvement in the relative productivity of Greece's export sector and in capital inflows appreciated the country's real exchange rate.

Larsen (2004) showed that Norway was able to avoid the effects of DD after the discovery and extraction of oil in the early 1970s, and discusses the policies behind the success. He argued that the factor movement effect was dampened through income coordination: a highly centralized wage formation system made it possible to make the manufacturing sector the wage-leader (based on productivity increases). This made it possible to limit wage increases to all sectors from an expanding resource sector. The spending effect, in turn, was curbed because the government shielded the economy by fiscal discipline and investing abroad (through the creation of a Petroleum Fund). The spillover-loss effect was limited because losses were substituted for by gains in the highly technological off shore oil extraction sector, which requires more capital than on-land oil extraction. Moreover, social norms, transparent democracy, proper monitoring, an effective judicial system, and the wage negotiation system reduced rent seeking behavior, limiting the typical negative effects associated to the resource curse.

Issa and Ouattara (2004) investigated the relationship between foreign aid flows and real exchange rate in Syria. Using time series data for the period 1965 to 1997 they tested the hypothesis that foreign aid flows generate "Dutch disease" in the recipient country. They employed the newly developed technique to cointegration, the Auto Regressive Distributed Lag (ARDL) approach proposed by Pesaran *et al*. (1996) and Pesaran *et al.* (2001), they found no support for this hypothesis neither in the long run nor in the short run. On the contrary, their results indicate that foreign aid flows are associated with depreciation of the real exchange rate. Their main policy implication, based on the long run results, is that increasing aid to Syria is an effective policy tool to boost its export. However, a limitation of this paper is that it does not address the issue of heterogeneity of aid flows. This is because it has been argued that if project aid is accompanied by an equivalent value of imports then it will not have "Dutch disease" effects.

Acosta et al (2009) used the Bayesian techniques and data for El Salvador to estimate a DSGE model of a small open economy to analyze the effects of remittances on resource reallocation and the real exchange rate. The results suggest that a surge in remittances lead to DD phenomena. This is because higher remittances lead to a decline in labor supply and an increase in consumption demand that is biased toward nontradeables. The higher price of nontradeables stimulates an expansion of that sector, reallocating labor away from the tradable sector. Interestingly, results also show that remittances improve households' welfare as they smooth income flows and increase consumption and leisure levels. Using a Bayesian VAR they find that the empirical.

Baky-Haskuee (2010) investigated the effect of oil income on real exchange rate defined as relative prices of non-tradable to tradable sector in Iranian economy. Increase in oil income, increases demand for both tradable and non-tradable goods. Tradable goods prices follow international prices while non-tradable prices are set in domestic markets. Therefore increase in oil income would result in real exchange rate appreciation and change in resource allocation in different economic sectors. Oil windfalls have changed the structure of the economy and relative prices such that the shares of agriculture and industry have decreased and the shares of services and construction have increased in GDP. Using a co-integration approach the results showed that there is a long run co-integration relation between oil income, capital outflow, GDP and real exchange rate.

In Ghana related study was conducted by Lartey (2006) using a panel data for Sub-Saharan African countries on capital inflows and the real exchange rate. His work investigated the question of whether capital inflows, particularly Foreign Direct Investment (FDI), cause the real exchange rate to appreciate. He also examined whether different forms of capital inflow have variable effects on the real exchange rate. He estimated an empirical real exchange rate model specifying a set of capital inflow variables using dynamic panel techniques. Based on data for a sample of sub-Saharan African countries for the period 1980-2000, the study revealed that FDI as the category of private capital inflow causes the real exchange rate to appreciate. The results also showed that an increase in

official aid causes a real appreciation, the magnitude being greater compared to that associated with FDI.

Another study was by Sackey (2001) looked the effect of external aid inflows on real exchange rate in Ghana. He developed an empirical model for the real exchange rate in Ghana with special focus on the role of foreign aid and then linked this with an export performance model in order to identify policy implications and management issues. Using the ordinary least square approach and time series data expanding from 1964 to1996 he estimated the real exchange rate and export models. The empirical estimations concluded that terms of trade, aid inflows, government consumption and commercial policy stance, and technological progress are salient variables in the long-run equilibrium real exchange rate model for Ghana. In the short run, however, pertinent variables as far as the parsimonious model is concerned are nominal exchange rate together with all the real fundamentals with the exception of terms of trade. Specifically the study revealed that aid has a depreciating effect on the real exchange rate and also it has a positive impact on export performance. This finding, though contrary to standard Dutch disease economics, is not an exceptional feature of the Ghanaian economy, as a similar impact has been found in other countries. He concluded therefore that for external aid to be an effective investment, policy management needs to focus on ensuring the prevalence of sound macroeconomic fundamentals, among others.

Also, Opoku-Afari, Morrissey and Lloyd (2004) conducted a study on real exchange rate response to capital inflows: a dynamic analysis for Ghana. In

acknowledging the importance of the fundamentals in determining equilibrium real exchange rate, their paper concentrated on the effects of capital inflows (by decomposing capital inflows into official inflows, 'permanent' inflows and 'non-permanent' inflows). Vector Autoregressive (VAR) techniques were used to model the long-run equilibrium real exchange rate in Ghana, and based on a multivariate orthogonal decomposition technique, the equilibrium steady state path is identified which is used in estimating misalignments. As predicted by the Dutch Disease theory, results indicated that capital inflows tend to appreciate the real exchange rate in the long-run. Capital inflows is the only variable generating real appreciation in the long-run; technology change, trade (exports) and terms of trade all tend to depreciate the real exchange rate. The only variable that has a significant (depreciating) effect on the real exchange rate in the short-run is trade, implying that changes in exports are the major driver of exchange rate misalignment. It is also shown that the real exchange rate is slow to adjust back to equilibrium, implying policy ineffectiveness or inflexibility.

In general most of the studies reviewed above concentrated on developed countries with few on the developing countries. Yet there is scanty work done in Ghana as far as this relationship is concern. There is therefore the need to deepen the knowledge of the relationship between real exchange rate and export in Ghana and Africa as a whole.

There are two studies that are very important to the current study in that they are the pioneering works in the direction that the study wishes to explore.

The current study is very similar to Opoku, Morrissey and Lloyd (2004) in that both studies looked at the response of real exchange rate to changes in capital inflow to the country. The difference therein is the concentration on one type of capital inflow which is foreign aid in this study. Also the current study explicitly modelled an export function to capture the effect of real exchange rate as a result of changes in foreign aid. Sackey (2001), looked at the relationship between real exchange rate and foreign aid and linked this to an export model. However, it used the ordinary least square approach in its estimation. This study will use the Vector autoregressive model which will enable us looked at the interrelationship between the variables involved and also to discover the relative importance of these variables in explaining variations in real exchange rate and export through the impulse response function and variance decomposition.

Conclusion

This chapter reviewed relevant literature putting the study into perspective. Specifically, theories of the Dutch Disease, real exchange rate and exports were reviewed. It was evident from the discussions that Ghana is prone to having the Dutch Disease effect as foreign aid tends to increase overtime and the economy is now driven by the service sector which are mainly nontradeables. Among the numerous theories of Dutch Disease reviewed the study will be based on the Salter-Swan dependent economy model presented by Van Wijnbergen. This measure has particular appeal in the low-income country (LIC) context and has been widely used in empirical real exchange rate studies. The empirical literature,

made it clear that the conclusion on the Dutch Disease effect is illusive both at country and cross country level, the reason this study is important.

This study adds to existing works on the real exchange rate in Ghana in a unique way. In most Dutch disease empirical literature, especially on developing economies in sub-Saharan Africa, export contractions are only casually touched upon as off-shoot problems without systematically estimating the relationship between export performance and the real exchange rate. This study fills this gap by considering how exports interface with the policy environment by using vector autoregressive technique. In fact, it attempts to see whether real GDP, serving as a proxy for the policy environment, elicits positive macroeconomic performance from such variables as exports.

CHAPTER THREE

METHODOLOGY

Introduction

The purpose of this chapter is to present the methodological framework suitable for conducting the study. It discussed the methods and tools of analysis employed in this study. Specifically, the chapter presented a detailed description of the theoretical and empirical specification of the model, variables in the model, source and data type, estimation techniques as well as tools for data analysis.

Theoretical Model Specification

Edwards (1989) builds a theoretical model, which reproduces the process of output determination in a small open economy with tradables, non-tradables, and sector-specific capital. World prices of tradables are assumed to be fixed. Exportable and importable items use domestic labor and capital; non-tradables use imported inputs as well. The country has a stock of foreign debt and a wage indexation system that links wages with a price index. Edwards used his ten equation model to derive a testable reduced form, which has since been used unchanged or with minor enhancements by numerous authors in the literature. Thus the model used in this research is a modification of the work done by Edwards (1989), Montiel (1999), Baffes et al (1999) and Issa (2004). The real

exchange rate is specified as a single equation, the reduced form solution of a small simultaneous equation model:

$REER = F_T^{\alpha}$ .....(18)

Where *F* is a vector of the permanent components of macro fundamentals, and α is a vector of parameters to be estimated. Thus

F =f (Aid, GEXP, RGDP, OPEN, TOT, M2)…….(19)

Where *REER* is the real effective exchange rate, *Aid* is official development assistant (ODA), *GEXP* is real government consumption, R*GDP* real gross domestic product, *OPEN* is openness, TOT is terms of trade and M2 is money supply, which captures expansionary monetary policies.

In estimating the relationship between export performance and real exchange rate Thirlwall (2003), by assuming constant price and income elasticities of demand for exports, made the following specification for the export function

$EXP = A(RER)^{\beta_1} Y^{\beta_2}$ .....(20)

Where EXP is export A is a constant and RER is real exchange rate Y is output and β's denotes elasticities. Now following Thirwall (2003), Majeed & Ahmed (2005) and other factors suggested by conventional trade theory as influencing export growth the export model is specified as:

EXP = f [REER, RGDP, AID]…….……..(21)

In this model, a real export (EXP) is assumed to be a function of (change in) relative prices (i.e., *REER*), real gross domestic product (RGDP), and external aid inflows (*AID*).

By substituting equations (19) into (18) and (21) into (20) give;

$$REER_t = \eta Aid_t^{\alpha_1} GEXP_t^{\alpha_2} RDPC_t^{\alpha_3} Open_t^{\alpha_4} TOT^{\alpha_5} M2^{\alpha_6} e^{v} \quad \text{.....(22)}$$

$$EXP = AREER_t^{\beta_1} RGDP^{\beta_2} Aid^{\beta_3} \ell^{\mu} \quad \text{.....(23)}$$

Empirical Model Specification

Consistent with the objectives of the study and in accordance with the literature, the study applied natural logarithm to equations (22) and (23) and estimated a log-linear model of the following form:

$$LogREER_t = Log\eta + \alpha_1 LogAid_t + \alpha_2 LogGEXP_t + \alpha_3 LogRGDP_t + \alpha_4 LogOpen_t + \alpha_5 LogTOT_t + \alpha_6 LogM2_t + v_t \quad \text{.....(24)}$$

$$LogEXP_t = LogA + \beta_1 LogREER_t + \beta_2 LogsRGDP_t + \beta_3 LogAid_t + \mu_t \quad \text{.....(25)}$$

Given that logη = α_0 and log A = β_0, the long run model for both real exchange rate and export and their respective error correction terms will be specified as follows:

$$LogREER_t = \alpha_0 + \alpha_1 LogAid_t + \alpha_2 LogGEXP_t + \alpha_3 LogRGDP_t + \alpha_4 LogOpen_t + \alpha_5 LogTOT_t + \alpha_6 LogM2_t + \mu_t \quad \text{.....(26)}$$

$$ECT1 = LogREER_t - \alpha_0 - \alpha_1 LogAid_t - \alpha_2 LogGEXP_t - \alpha_3 LogRGDP_t - \alpha_4 LogOpen_t - \alpha_5 LogTOT_t - \alpha_6 LogM2_t \quad \text{.....(27)}$$

$$LogEXP_t = \beta_0 + \beta_1 LogREER_t + \beta_2 LogsRGDP_t + \beta_3 LogAid_t + v_t \quad \text{.....(28)}$$

$$ECT2 = LogEXP_t - \beta_0 - \beta_1 LogREER_t - \beta_2 LogsRGDP_t - \beta_3 LogAid_t \quad \text{.....(29)}$$

Where μ and ν are the error terms, *t* as time subscript and Log is the logarithm of the respective variables. α_0 to α_6 and β_0 to β_6 are the elasticities of the respective variables. We applied natural logarithm in order to effectively linearise

exponential trend (if any) in the time series data since the log function is the inverse of an exponential function (Asteriou & Price, 2007).

In the short run, the real exchange rate depends on its lagged values, lagged values of foreign aid, government expenditure, real GDP, trade openness, terms of trade and money supply. Also export depends on its lagged values and the lagged values of real exchange rate, real GDP and foreign aid. The expected relationships among these variables are indicated by the following equations:

$$\Delta LogREER_t = \alpha_0 + \sum_{i=1}^{j} \gamma \Delta LogREER_{i-1} + \sum_{i=1}^{k} \alpha_1 \Delta LogAid_{i-1} + \sum_{i=1}^{p} \alpha_2 \Delta LogGEXP_{i-1} + \sum_{i=1}^{q} \alpha_3 \Delta LogRGDP_{i-1}$$
$$+ \sum_{i=1}^{w} \alpha_4 \Delta LogOpen_{i-1} + \sum_{i=1}^{n} \alpha_5 \Delta LogTOT_{i-1} + \sum_{i=1}^{h} \alpha_6 \Delta LogM2_{i-1} + \zeta \quad (30)$$

$$\Delta LogEXP_t = \beta_0 + \sum_{i=1}^{j} \phi \Delta LogEXP_{i-1} + \sum_{i=1}^{p} \beta_1 \Delta LogREER_{i-1} + \sum_{i=1}^{q} \beta_2 \Delta LogsRGDP_{i-1}$$
$$+ \sum_{i=1}^{m} \beta_3 \Delta LogAid_{i-1} + \chi \quad (31)$$

The expected signs of the parameters are;

$\alpha_1<0$, $\alpha_2>/<0$, $\alpha_3<0$, $\alpha_4>/<0$, $\alpha_5>/<0$, $\alpha_6<0$

$\beta_1 >0$, $\beta_2 >0$ and $\beta_3>/<0$,

The expected theoretical impacts of the respective variables included in the real exchange rate model are as follows:

Foreign aid tends to cause real appreciation by changing the composition of the demand for traded and non-traded goods, according to the “Dutch disease” theory of foreign aid. This hypothesis have been confirmed by many empirical work among them are Van Wijnbergen (1985), Adenauer and Vagassky (1998), Saches and Warner (2001) Younger (1992) and Opoku-Afari and Lloyd (2004).The

expected effect of real GDP on RER is to be negative. According to the Balassa-Samulson hypothesis (Balassa 1973) as development takes place the productivity improvement in the tradable goods sector exceeds that of non-tradable goods sector. This implies that the decrease in the price of the former is relatively bigger than that in the later, thus, causes appreciation of the RER.

The effect government expenditure on real exchange rate depends on the composition of government consumption. Consumption of non-tradable tends to appreciate the RER, while that of tradables leads to real depreciation. Issa and Ouattara (2004) found a positive impact of government expenditure on real exchange rate where as Sackey (2001) observed a negative impact. Openness of the economy would cause real depreciation (appreciation) if it reduces (increases) the demand for non tradables. Takaendesa (2006) observed a depreciating effect of trade openness in South Africa where as Ogun (1998) found an appreciating impact in the case of Nigeria. The effect of the terms of trade on the real exchange rate depends on whether the substitution or the income effect dominates. The income effect of an improvement in terms of trade is that more is spent on all products, resulting in higher prices of non-tradables, causing appreciation in the real exchange rate. The substitution effect leads to a decrease in prices of imported goods and services, falling demand for nontradeables, hence depreciation of the RER. If the income effect associated with the TOT improvement is stronger than the substitution effect, an appreciation of the RER will occur, otherwise the RER will depreciate. This renders the *a priori* expectation of the impact of this fundamental on RER inconclusive. The

substitution effect dominated in the works of Elbadawi & Soto (1997), and Mkenda (2001) whiles the income effect dominated in the works of Ogun (1998) and Adenauer & Vagassky (1998)

Changes in the money supply (expansionary monetary policies) would tend to raise the general price level (CPI, Ghana) and thus leading to an appreciation of the RER. Issa & Ouattara (2004) confirmed this theory.

For the export model the following theoretical impacts are expected:

Increases in export are expected to be accompanied by depreciation of the RER. Thus increases in the real exchange rate are expected to result in exports expansion as stipulated by trade theories. In addition Sackey (2001) and Ogun (1998) observed such relation. Real GDP is a supply side determinant of exports. A higher level of production is the main cause of export expansion, because surplus of output can be exhausted in international markets. In a close economy surplus of production leads to fall in prices, which, in turn, creates pessimism among producers. In an open economy such surpluses create foreign reserves by exporting production. So we expect the positive impact of real GDP on exports growth. In empirical literature Majeed & Ahmed (2005) confirms the positive impact of GDP on exports. A good policy environment (proxy by real net ODA to Ghana) tends to elicit positive response from the export sector. Aid inflows, by providing some sort of assistance to the export sector, tend to encourage export competitiveness and output enhancement. Sackey (2001) affirmed this relation

Measurement of variables

Real exchange rate

The real exchange rate (RER) corresponds to the multilateral real effective exchange rate or trade weighted real exchange rate. Real effective exchange rate is the nominal effective exchange rate, which is a measure of the value of a currency against the weighted average of several foreign currencies, divided by a price deflator or index of costs. In the case of Ghana it was weighted against the currencies of the major trading partners which are United States, United Kingdom, France, Italy, Japan, Netherlands and Germany. A decrease in the index implies an appreciation of the RER. This by interpretation is a loss of competitiveness.

External aid inflows: This variable has been defined in the literature as official development assistance (ODA) from one government or organization to another government or organization in another country through the government of that country This variable however will be operationally defined as official development assistance and in order to obtain it real values it will be deflated by the GDP. This follows the literature as it has been used by Sackey 2001, Issa 2004, Nyoni 2004 and many others.

Terms of trade: This meant terms or rates at which the products of one country are exchanged for the products of the other. However operationally the study will measure and compute it by dividing export unit value by import unit.

Government consumption: This is basically government consumption of goods and services deflated by the GDP to obtain real values.

Export performance. Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.

This variable was operationally measured by exports goods and services expressed as a share of GDP.

Open: openness of the economy will be calculated as 100*(imports + exports)/GDP.

RGDP: This is operationally defined as GDP deflated by the consumer price index (2005=100) to obtain it real values.

M2 Money supply: This will capture expansionary monetary policy in the model.

Sources of Data

The study employed secondary data. Time series data was collected from 1983 to 2010. Quarterly series were generated from the annual series using Gandolfo (1981) algorithm and this gave a total observation of 112. The choice of the data coverage was informed by the fact that after the economic recovery programme Ghana has had very little exchange rate misalignment if any. The series for the various variables were drawn from the following sources: World

Development Indicators (2011), Bank of Ghana's Annual Reports and Quarterly Economic Bulletins, OECD's Geographical Distribution of Financial Flows to Developing Countries, Direction of Trade Statistics, and IMF's International Financial Statistics.

Estimation Procedure

To test the relationship between real exchange rate, foreign aid inflows and exports the study applied Granger causality test within the framework of cointegration and error-correction models. The testing procedure involves the following steps. The study first investigated the time series properties of our data by using the Augmented Dickey–Fuller (ADF) Phillip-Perron (PP) tests. The unit root test was used to check the stationarity position of the data. In the second step, it tested for cointegration using Johansen's multivariate approach. In the third step, the study employed granger-causality to test for causality. The causality test is preceded by cointegration testing since the presence of co-integrated relationships have implications for the way in which causality testing is carried out. Finally, variance decomposition analysis and impulse response functions were conducted.

Unit Root Test

It is crucial 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 stationary if its mean, variance and auto-covariances are independent of time.

The study employed a variety of unit root 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 generalizes 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 investigation has a unit root against the stationarity alternative. 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:

$$\Delta X_t = \alpha + \delta t + \rho X_{t-1} + \sum_{i=1}^{P} \lambda_i \Delta X_{t-1} + \varepsilon_t \text{.....(32)}$$

Where X_t denotes the series at time *t*, Δ is the first difference operator, α, δ, β, λ are parameters to be estimated and ε is the stochastic random disturbance term. Thus, the ADF and the PP test the null hypothesis that a series contains unit (non-stationary) against the alternative hypothesis of no unit root (stationary). That is:

$$H_0 : \rho = 0$$

$$H_1 : \rho \neq 0$$

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. Conversely, 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.

Cointegration Test

A number of techniques for testing the presence of equilibrium long-run relationship among time series variables have been advocated and used by researchers. Most time series studies have used either the Engle-Granger (1987), the Fully Modified Ordinary Least Squares (FMOLS) procedures of Phillips and Hansen (1990), the Johansen (1988, 1991) or the Johansen and Juselius (1990, 1992) and the Autoregressive Distributed Lag (ARDL) approach by Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001) to determine the long-run relationship in bivariate and multivariate frameworks. Johansen (1988) and Johansen and Juselius (1992) particularly developed multivariate method that explicitly used the vector autoregressive (VAR) and the vector error correction (VECM) framework for the testing of the presence of cointegration and estimation of long-run and short-run relationships among non-stationary macroeconomic time series. The VAR and VECM provide a useful framework to study the impact of unanticipated shocks (individual and system) on the endogenous variables (impulse response functions). Additionally, we can identify

the relative importance of each variable in explaining the variations of endogenous variables (variance decomposition analysis). Moreover, both long-run (cointegration) relationships and short-run dynamics of the variables in the system can be established. The relationship between VAR and VECM is expressed as follows. Assume an unrestricted reduced form VAR (p):

$$X_t = \mu + \theta_1 X_{t-1} + \ ... + \theta_k X_{t-k} + \nu_t, \qquad t = 1, 2, ..., n, ...(33)$$

Where X_t is a vector of integrated series (real exchange rate, foreign aid, gross domestic product, openness, terms of trade, exchange rate misalignment, export, money growth and income of trading partners), μ is a vector of intercepts while ν_t is a vector of error terms and *k* represents the lag length of the series. It is important to note that a VAR does not contain explanatory variables. Estimation of equation 4 requires that $\nu_t \sim ID(0, \Omega)$ where Ω is a non-diagonal covariance matrix that remains constant overtime. Following Johansen (1991) and provided that the variables are integrated of order one and cointegrated, further assuming Δ represent the first differences, equation 4 is transformed into an equilibrium error correction model of the form:

$$\Delta X_t = \mu + \Gamma_1 X_{t-1} + \Gamma_2 X_{t-2} + ... + \Gamma_{p-1} \Delta X_{t-p+1} + \Pi X_{t-1} + \varepsilon_t .....(34)$$

Where $\Gamma_i = -(\theta_{i+1} + \ ... \ + \theta_k), \qquad i = 1, ..., k-1,$ and $\Pi_i = -(I - \theta_1 - \ ... \ - \theta_k).$

Γ_i represents a matrix of coefficients of the first difference variables that capture the short-run dynamics. The coefficients of the lagged dependent variable indicate inertia as well as the formation of expectations. The coefficients of the other lagged endogenous variables provide estimates impact assessment. The

coefficient matrix Π contains information about the long-run relationships among the variables involved in the model. Given that the rank of Π is $0< r <$ n, then it can be decomposed into $\Pi=\alpha\beta$ and the error correction representation of equation 5 can be reformulated as:

$$\Delta X_t = \mu + \Gamma_1 X_{t-1} + \Gamma_2 X_{t-2} + ... + \Gamma_{p-1}\Delta X_{t-p+1} + \alpha(\beta' X_{t-p}) + \varepsilon_t .....(35)$$

Where the columns of β are interpreted as distinct cointegration vectors providing the long-run relationships $(\beta' X_t)$ among the variables, and the α's are the adjustment or error correction coefficients (loading matrix) indicating the adjustment to long-run equilibrium. One major problem in the estimation of VAR and VEC models is the selection of an appropriate lag length. Most researchers have selected lag lengths in an arbitrary way. The lag length plays a crucial role in diagnostic tests as well as in the estimation of VECM and VAR models (Bhasin, 2004). As a result, appropriate lag length (p) will be chosen using standard model selection criteria (AIC and SBC) that ensure normally distributed white noise errors with no serial correlation.

Johansen (1988) cointegration techniques allow us to test and determine the number of cointegrating relationships between the non-stationary variables in the system using a maximum likelihood procedure. In making inferences about the number of cointegrating relations, Johansen (1988, 1991) and Johansen and Juselius (1990) proposed the use of two test statistics: the trace statistic and the maximum Eigen value statistic. The trace statistic is determined using the following formula:

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} \log(1-\lambda_i) \qquad r = 0, 1, 2, \ldots, n-1 \quad .....(36)$$

T = number of observations

λ_i = is the i^{th} Eigen value.

The maximum Eigen value statistic is determined using the following formula:

$$\lambda_{max} = - T \log (1 - \lambda_{r+1}) \qquad r = 0,1,2, \ldots, n-2, n-1 \quad .....(37)$$

The trace and maximum Eigen value statistics are compared with the critical values tabulated in Osterwald-Lenum (1992).

Granger Causality Test

A good feature of VAR models is that they allow for testing of the direction of causality. Causality in econometrics refers more to the ability of one variable to predict (and therefore cause) the other (Asteriou and Hall, 2007). According to Walsh (2003) 'a variable X is said to Granger cause Y if and only if lagged values of X have marginal predictive content in a forecasting equation for Y'. 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. 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, 2001). To examine the direction of causality in the presence of cointegrating vectors, Granger causality was conducted based on the following:

$$\Delta Y_t = \mu_0 + \sum_{i=1}^{p} \beta_{1i} \Delta Y_{t-i} + \sum_{i=0}^{p} \phi_{1i} \Delta X_{t-i} + \xi_{1i} ECT_{t-1} + \nu_t \quad (38)$$

$$\Delta X_t = \mu_0 + \sum_{i=1}^{p} \beta_{2i} \Delta X_{t-i} + \sum_{i=0}^{p} \phi_{2i} \Delta Y_{t-i} + \xi_{2i} ECT_{t-1} + u_t \quad (39)$$

Where ΔY and ΔX are our non-stationary dependent and independent variables, ECT is the error correction term, ξ_{1i} and ξ_{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 38 and 39. To find out whether the independent variable (*X*) granger-causes the dependent variable (*Y*) in equation 38, we examine the joint significance of the lagged dynamic terms by testing the null hypothesis:

$H_0 : \phi_{1i} = 0$, implying that the independent variable (*X*) does not granger-cause the dependent variable (*Y*), against the alterative hypothesis that

$H_1 : \phi_{1i} \neq 0$, implying that the independent variable (*X*) granger-cause the dependent variable (*Y*).

Similarly, to find out whether the independent variable (*Y*) granger-cause the dependent variable (*X*) in equation 39, we examined the significance of the lagged dynamic term by testing the null hypothesis

$H_0 : \phi_{2i} = 0$, implying that the independent variable (*Y*) does not granger-cause the dependent variable (*X*), against the alterative hypothesis that

$H_1 : \phi_{2i} \neq 0$, implying that the independent variable (*Y*) granger-cause the dependent variable (*X*).

Using the standard F-test or Wald statistic, four possibilities exist: First, rejection of the null hypothesis in equation 38 but failing to reject the null in equation 39 at the same time implies unidirectional causality running from *X* to *Y*. Second, a rejection of the null hypothesis in equation 39 but at the same time failing to reject the null in equation 38 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.

Variance Decomposition

The forecast error variance decomposition, which is obtained from the VAR model, is used to identify the most important variable for each of the endogenous variables in this case real exchange rate and export. The variance decomposition also provides complementary information for a better understanding of the relationships between the variables of a VAR model. It tells us the proportion of the movements in a sequence due to its own shock, and other identified shocks (Enders, 2004). While impulse response functions trace the effects of a shock to one endogenous variable on to the other variables in the VAR, variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. Therefore variance decomposition provides information about the relative importance of each variable in explaining the variations in the endogenous variables in the VAR. To assign variance shares

to the different variables, the residuals in the equations must be orthogonalized. Therefore, the study applied the Cholesky decomposition method.

Impulse Responses

In order to analyze the impact of unanticipated shocks emanating from other variables in the VAR to one endogenous variable, the study conducted the impulse response functions. The impulse response function traces the effect of each shock on each variable in the VAR over a given time horizon. A shock to the i^{th} variable directly affects the i^{th} variable and is also transmitted to all the endogenous variables through the dynamic structure of the VAR (Enders, 2004). The impulse response functions of the VAR model are used to trace the effect of unanticipated foreign aid, real GDP and government expenditure shocks on the real exchange rate and export. The empirical evidence on impulse response functions would enable the policy makers to predict the consequences of these unanticipated shocks in advance so that they would be well prepared to react to these changes in future.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter seeks to present and analyze the regression results of the functions specified in chapter three. As indicated earlier, the purpose of this study is to investigate the long-run and short-run relationship between foreign aid and real exchange rate and hence the effect this has on export. The results of the descriptive statistics of the relevant variables, both ADF and PP unit root tests, Granger-causality test, Johansen's approach to co-integration, various VAR diagnostics, impulse response functions and variance decomposition analysis for both the real exchange rate and export model are presented and discussed. These results are discussed in relation to the hypotheses of the study.

Descriptive Statistics

In this section, the study conducted the descriptive statistics of the relevant variables involved. The issues looked at include the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, sum, sum squared deviation and number of observations. The Table 3 illustrates vividly these statistics.

It can be observed from the Table that all the variables have positive average values (mean and median). This is normal considering the series involved. Also the minimal deviation of the variables from their means as shown

by the standard deviation gives indication of slow growth rate (fluctuation) of these variables over the period of consideration. Again, most of the variables show signs of negetive skeweness.

Table 3 Summary Statistics

	LAID	LEXP	LGEXP	LM2	LOPEN	LREER	LRGDP	LTOT
Mean	0.714	1.764	0.981	1.519	2.660	3.5908	15.0329	2.849
Median	0.852	1.819	0.989	1.539	2.766	3.4293	15.2054	2.855
Maximum	1.446	2.582	1.373	2.095	3.4365	6.9795	18.6701	3.192
Minimum	-0.627	0.243	0.344	0.860	0.926	0.7764	11.3256	2.392
Std. Dev.	0.436	0.511	0.198	0.349	0.539	0.7983	2.0853	0.133
Skewness	-0.755	-0.93	-0.894	-0.27	-1.1665	2.2254	-0.0298	-0.23
Kurtosis	3.070	3.783	4.782	1.916	4.327	11.729	1.8738	3.437
Sum	79.93	197.6	109.9	170.1	297.9	402.17	1683.68	319.0
Sum S. D.	21.10	29.00	4.334	13.53	32.21	70.741	482.69	1.96
Obs.	112	112	112	112	112	112	112	112

Note: Std. Dev. represents Standard Deviation while Sum S. D. represents Sum of Squared Deviation. Source: computed using Eviews 5.0 Package

Unit Root Test

Before applying the Johansen's multivariate approach to cointegration and Granger-causality test, unit root test was conducted in order to investigate the stationarity properties of the data. As a result, all the variables were examined by first inspecting their trends graphically (Appendix A). From the graphs in Appendix A, it can be seen that, all the variables appear to exhibit behaviors of

non-stationary series. However, the plots of all the variables in their first differences exhibit some stationary behavior. Additionally, the Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) tests were applied to all variables in levels and in first difference in order to formally establish their order of integration. The Schwartz-Bayesian Criterion (SBC) and Akaike Information Criterion (AIC) were used to determine the optimal number of lags included in the test. The study presented and used the P-values for making the unit root decision which arrived at similar conclusion with the critical values. The results of both tests for unit root for all the variables at their levels with intercept and trend and their first difference are presented in Table 4 and 5

Table 4: Unit Root Test: ADF Test for the order of integration

Levels (Trend & Intercept)			1st Difference (Trend & Intercept)			
Var.	ADF-Statistic	Lag	Var.	ADF-Statistic	Lag	*I*()
LAID	-2.2993(0.4305)	1	DLAID	-6.4027 (0.000)*	0	I(1)
LEXP	-1.0286(0.9350)	1	DLEXP	-4.6635 (0.0014)*	0	I(1)
LRGDP	-3.0214 (0.1312)	1	DLRGDP	-6.8325 (0.000)*	0	I(1)
LGEXP	-2.7798(0.2079)	1	DLGEXP	-6.0667(0.000)*	0	I(1)
LM2	-1.3901(0.8587)	1	DLM2	-5.2501 (0.000)*	0	I(1)
LOPEN	-1.0721(0.9283)	1	DLOPEN	-4.2952 (0.0046)*	0	I(1)
LREER	-1.8396(0.0629)	1	DLREER	-10.8942 (0.000)*	0	I(1)
LTOT	-2.9902 (0.1399)	4	DLTOT	-3.8109(0.0195)*	3	I(1)

Note: *IO* represents order of integration and D denotes first difference. * represent significance at 5% levels

Table 5: Unit Root Test: PP Test for the order of integration

Levels (Trend & Intercept)			1st Difference (Trend & Intercept)			
Var.	PP-Statistic	BWd	Var.	PP-Statistic	BWd	*I*()
LAID	-2.3198(0.4196)	2	DLAID	-6.0004 (0.000)*	0	I(1)
LEXP	-1.2578(0.8928)	4	DLEXP	-4.7337 (0.0011)*	2	I(1)
LRGDP	-2.4281 (0.3633)	4	DLRGDP	-6.3754(0.000)*	2	I(1)
LGEXP	-2.2975(0.4315)	1	DLGEXP	-5.8378 (0.000)*	0	I(1)
LM2	-1.1070(0.9226)	4	DLM2	-4.5068 (0.0023)*	0	I(1)
LOPEN	-1.5247(0.8153)	4	DLOPEN	-4.2952 (0.0046)*	0	I(1)
LREER	-1.8729 (0.2342)	3	DLREER	-13.2126 (0.000)*	4	I(1)
LTOT	-2.6377(0.2648)	2	DLTOT	-3.8109(0.0195)*	0	I(1)

Note: * represent significance at 5% level. BWd is the Band Width. The values in parenthesis are the P-values.

Source: computed using Eviews 5.0 Package

From the results of the unit root test in Tables 4 and 5, it can be observed that at levels, the null hypothesis of the presence of unit root for all the variables cannot be rejected since the P-values of the ADF and the PP statistic are not significant at all the conventional levels of significance. However, at first difference, all the variables are stationary since the unit root hypothesis could be rejected for all the variables. It is therefore clear that all the variables are integrated of order one *I*(1). Therefore, in order to eliminate the possibility of

spurious regression results, the first difference of the variables should be employed in the estimation process.

Cointegration Test

Contributing to the significance and rational for cointegration analysis, Johansen (1991) argued that cointegration can be used to establish whether there exists a linear long-term economic relationship among variables of interest. Pesaran and Shin (1995) added that cointegration enables researchers determine whether there exist disequilibrium in various markets. In this regard, Johansen (1991) asserts that cointegration allows us to specify a process of dynamic adjustment among the cointegrated variables and in disequilibrated markets.

Given that all the variables selected are integrated of order one, *I* (1), the result of the trace statistic and the unrestricted cointegrating coefficients of the Johansen cointegration test for the real exchange rate model are presented in Table 6 and 7 below.

Table 6: Johansen's Cointegration Test (Trace) Results for REER Model

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.90394	414.9153	150.5585	0.000***
At most 1	0.439683	168.9228	117.7082	0.000***
At most 2	0.337765	108.1012	88.8038	0.001***
At most 3	0.235589	64.82706	63.8761	0.0415**

Note: ***, ** indicates rejection of the null hypothesis. The Trace statistic indicates 4 cointegrating equation at 1% and 5% level of significance

Table 7: Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=l)

LREER	LAID	LGEXP	LRGDP	LOPEN	LTOT	LM2	@TREND
8.7919	4.605207	1.246566	2.61814	-5.77497	-4.07196	10.22025	0.213208
5.799418	4.51131	3.4663	9.923729	8.283345	8.250156	-20.9495	-0.444765
0.265253	1.218319	6.948228	-12.5809	0.538972	18.85176	-11.1501	0.888342
0.997966	-5.11074	-6.04528	13.80107	4.715584	-5.91684	6.638328	-1.015418
-1.70919	3.174334	-6.13786	2.975843	-7.98438	6.470793	9.15693	-0.177578
0.216109	-1.94361	7.457593	12.06221	-4.17653	4.034964	15.73284	-0.879851
-0.41679	-2.64909	-2.01091	-6.23519	3.324696	3.570748	0.611691	0.374162

From Tables 6, the result of the trace statistic indicates the presence of cointegration among the variables. Specifically, the null hypothesis of no cointegrating relationship is rejected since the computed value of the trace statistic of 64.82706 is greater than it critical value of 63.8761. The P-value of 0.0415 further confirms the rejection of the null hypothesis at 5 percent significance level. Implying the failure to reject the alternative hypothesis of at most four cointegrating relationship. This confirms the existence of a stable long-run relationship among real effective exchange rate (REER), foreign aid (AID), real gross domestic product (RGDP), government expenditure (GEXP), money supply measured by (M2), terms of trade (TOT) and trade openness (OPEN).

Also in observing Table 7 the first vector and the row appears to be the one on which we can normalize the real exchange rate. The choice of this vector

is based on the a priori expectations about the long- run relationships as indicated in chapter three.

In order to estimate both the direct and indirect effect of foreign aid on export a separate export model was estimated, the results of Johansen Maximum Likelihood Cointegration test are displayed in Tables 8 and 9 respectively.

Table 8: Johansen's Cointegration Test (Trace) Results For Export Model

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.618746	133.642	54.07904	0.0000***
At most 1	0.137707	32.39154	35.19275	0.0973
At most 2	0.119097	16.83467	20.26184	0.1388
At most 3	0.032967	3.519869	9.164546	0.4883

Note: *** indicates rejection of the null hypothesis. The Trace statistic indicates 1 cointegrating equation at 1% level of significance

Table 9:Unrestricted Cointegrating Coefficients (normalized by b*S11*b=l)

LEXP	LREER	LRGDP	LAID	C
0.954799	-7.915679	-1.458415	-4.132839	51.7483
-2.997182	-0.604985	0.782107	1.501047	-8.083235
3.027851	-0.598944	-1.016224	-4.471177	14.722
3.99289	-0.61622	-0.203306	2.269872	-4.521954

From Tables 8, the result of the trace statistic indicates the presence of cointegration among the variables. Specifically, the null hypothesis of no

cointegrating relationship is rejected given that the computed value of the trace statistic of 133.642 is greater than its critical value. The P-value of 0.000 further confirms the failure to reject the alternative hypothesis of at most one cointegrating relationship at 5 percent significance level. This also indicates a long run relationship among export, real effective exchange rate, real GDP and foreign aid.

In Table 9 the first vector and the fourth row appear to be the one on which we can normalize export. The choice is based on the a priori expectations about the long- run relationships as indicated in chapter three.

Long Run Estimates

Given the results of the cointegration analysis, we can go ahead and estimate the long run relationship among the variables. In order to establish the long-run equation, we normalize the first variable in the VAR which is real exchange rate and export for the two models respectively. These variables are also of considerable interest to the study. The estimated long-run equilibrium relationship for real exchange rate and export derived from the normalized vectors and the appropriate rows as discussed above are expressed as follows:

Real Exchange Rate Model

$$LREER = 0.024250T - 0.523801\text{LAID} - 0.141786LGEXP - 0.297790\text{LRGDP} + 0.656851LOPEN + 0.463148LTOT - 1.162462LM2 \quad \text{....(40)}$$

The first error correction term is generated as:

$$ECT1 = LREER - 0.024250T + 0.523801\text{LAID} + 0.141786LGEXP + 0.297790\text{LRGDP} - 0.656851LOPEN - 0.463148LTOT + 1.162462LM2 \quad \text{.....(41)}$$

Export Model

$$LEXP = 1.132502C + 0.154329LREER + 0.05091LRGDP - 0.568478LAID \quad \text{.....(42)}$$

The second error correction term is generated as:

$$ECT2 = LEXP - 1.132502C - 0.154329LREER - 0.05091LRGDP + 0.568478LAID \quad \text{.....(43)}$$

Note: In equation 40 and 41, T represents time trend.

From equation 40, holding all other factors constant in the long run, as time passes by, real exchange rate in Ghana grows (depreciates) by about 2% each quarter. Also from the equation it is evident that foreign aid has an appreciating effect on real effective exchange rate in the long run. That is for every 1% increase in foreign aid real effective exchange rate falls by 0.52%. This is consistent with the Dutch Disease theory which stipulates that an increase in foreign aid to a small country like Ghana will lead to increase in demand for both tradables and nontradeables. Thus the price of nontradeables will increase because it's determined domestically thereby causing loss of competiveness due to exchange rate appreciation. This result also corroborates the findings of Younger (1992) and Opoku (2004) but contrary to the findings of Sackey (2001) for Ghana.

Government expenditure tends to have an appreciating effect on real exchange rate. A percentage increase in government expenditure appreciates the real exchange rate by 0.17%. This implies that consumption by government is nontradeable based. The impact of real Gross domestic product is negative implying that higher income levels tend to appreciate the exchange rate as predicted by the Balassa-Samuelson hypothesis, Balassa (1973). This also implies that the rate of technical progress has increased the prices of non-tradable goods

over time, and hence appreciating the real exchange rate. In this case a percentage increase in GDP will lead to 0.3% appreciation of the real exchange rate.

The degree of openness has a depreciating effect on real exchange rate as it carries a positive sign. For any percentage increase in the degree of openness will lead to 0.67% depreciation in real exchange rate. This means that, reduction in trade barriers lead to a fall in price of nontradeables and consequently depreciation of the currency. This is true in the sense that open international trade will lead to influx of imported products on the market which is relatively cheaper than the domestic product. Demand for these domestic products will fall and consequently lead to fall in their prices. This finding is similar to that of Opoku (2004), Takaendesa (2006).

The positive effect of the terms of trade on the real exchange rate indicates that the substitution effect dominates the income effect. The substitution effect may have been on the supply side, in which case an improvement in the terms of trade may have relaxed the foreign exchange constraints on intermediate inputs in the production of non-tradables. This in turn helped the producers to increase the supply of non-tradable goods, and hence lowering the price of non-tradables. It is also possible however; that the impact of term of trade may be that aid inflows support production rather than consumption in the long run, so that the substitution effect outweighs the income effect causing depreciation in the real exchange rate index in the long run. This result accord with that of Elbadawi & Soto (1997), Mkenda, (2001), Issa & Outtara (2004) and in the case of Ghana Sackey (2001) and Opoku (2004).

The coefficient on money supply is negative indicating that an increase or expansionary monetary policy will raise the general price level (CPI, Ghana) and hence appreciation of the real exchange rate for exports. This is consistent with theory. Aron *et al* (1997) also found that in the case of South Africa where an increase in reserves appreciates the real exchange rate. Also Issa & Outtara (2004) also found the same relationship only that it was not significant.

The export model in equation 4.3 indicates that real exchange rate has a positive effect on export. For any 1% appreciation of real exchange rate, export will reduce by 0.15%. This further confirms the Dutch disease hypothesis that aid will appreciate real exchange rate leading to loss of competiveness which will be transmitted through low levels of export. This contradicts the findings of Ogun (1998), who realized that aid has a depreciating effect on real exchange rate which intend has a positive impact on exports.

The aid variable is negative meaning that a percentage increase in aid will lead to a fall in export by 0.57%. The reason for the estimation of the export model is to enable us view both the direct and indirect effect of foreign aid on export as stipulated by the Dutch disease. The findings however confirm the theory but contrary to the findings of Sackey (2001) in Ghana who realized a positive impact of aid on both real exchange rate and export. The coefficient of the real GDP is positive. Thus for any 1% percent increase in real GDP, export will rise by 0.05%. This finding is consistent with theory in the sense that surplus output can be exhausted in the international market in the form of increased

exports. This conforms to the works of Kumar (1998) and Majeed & Ahmad (2005).

Finally, the constant term tend to be positive implying that holding the influence of all the variables in the model constant, export will grow by approximately 1.13% percent due to the influence of all other variables that are not included in the model.

Equations 41 and 43 show how the error correction terms will be generated from the respective long models.

Short Run Estimates

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 adjustment to long-run equilibrium in the dynamic model. In other words, its magnitude shows how quickly 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 error correction term in absolute value, the faster the convergence to equilibrium. Given that our variables are non-stationary but cointegrated, estimation of the VECM, which included a first differenced VAR with one period lagged error correction term yielded an over-parameterized model. The

parsimonious VECM for the two equations are presented in the appendix. However, the approach of general to specific model was employed to arrive at a more parsimonious model were insignificant variables were deleted using the p-values. Rutayisire 2010 argued that this process of moving from general to specific brings about a simplification of the model that make the estimation more reliable and increases the power of the test. The general to specific models for both export and real exchange rate have been discussed in tables 10 and 11 below:

Table 10: Error Correction Model for the Real Exchange Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.294762	0.017047	-17.29154	0.0000
D(LREER(-1))	0.052613	0.004134	12.72689	0.0000
D(LREER(-2))	0.142041	0.012628	11.24810	0.0000
D(LREER(-3))	0.080431	0.008476	9.488566	0.0000
D(LREER(-4))	0.435389	0.071266	6.109344	0.0000
D(LREER(-5))	0.159733	0.070917	2.252389	0.0279
D(LREER(-6))	0.233574	0.058197	4.01345	0.0002
D(LAID(-2))	-0.086397	0.022316	-3.871472	0.0003
D(LAID(-6))	-0.300532	0.093582	-3.2114	0.0021
D(LGEXP(-1))	-0.007389	0.003625	-2.03804	0.0459
D(LGEXP(-2))	-0.097278	0.017306	-5.62102	0.0000
D(LGEXP(-3))	-0.029629	0.012491	-2.371896	0.0209
D(LGEXP(-6))	-0.082303	0.019077	-4.314189	0.0001
D(LRGDP(-2))	-0.029400	0.004951	-5.937696	0.0000

D(LRGDP(-3))	-0.052530	0.009927	-5.291228	0.0000
D(LRGDP(-4))	-0.174729	0.036134	-4.835546	0.0000
D(LRGDP(-5))	-0.021449	0.005934	-3.614352	0.0006
D(LRGDP(-6))	-0.012067	0.005821	-2.072852	0.0424
D(LOPEN(-2))	0.089398	0.017802	5.02153	0.0000
D(LOPEN(-3))	0.169035	0.0936622	1.804735	0.0761
D(LOPEN(-6))	0.492948	0.181122	2.721623	0.0085
D(LM2(-3))	-1.372656	0.645775	-2.125594	0.0376
D(LM2(-6))	-0.252726	0.080528	-3.138353	0.0026
C	1.133156	0.120486	9.404883	0.0000

R-squared	0.875629	Mean dependent var	-0.00737
Adjusted Rsquared	0.787958	S.D. dependent var	0.431459
S.E. of regression	0.198678	Akaike info criterion	-0.09925
Sum squared resid	2.407853	Schwarz criterion	-1.01288
Log likelihood	49.21076	F-statistic	9.987649
Durbin-Watson	1.287185	Prob(F-statistic)	0.0000

The results of the error correction model in table 10 above indicate that the previous values of real exchange rate affect the current values. Looking at the p-values for the lagged real exchange rate values, we realize that they are all significant at 5% and positive to the sixth lag. This means that for any percentage increase in the first to the sixth lag of real exchange rate, holding all other factors constant, will lead to depreciation of current real exchange rate by 0.05%, 0.14%,

0.08%, 0.44%, 0.16% and 0.23% respectively as expected. This finding is consistent with theory and also with the results of Takaenddesa (2006) and Opoku (2004) and also agrees with the results from the long run (time trend). Also aid indicated an appreciating effect on real exchange rate confirming the long run result. Meaning that for a percentage increase in aid inflows real exchange rate will appreciate by 0.08% and 0.30% in the second and sixth quarters respectively. This is expected as it has been stipulated by the Dutch Disease theory.

Government expenditure appreciated the real exchange rate in the short run. A 100 percent increase in government expenditure will lead to 1%, 9.7%, 3% and 5% appreciation in the real exchange rate in the first, second, third and sixth lags respectively. This shows that government spends more on nontradeables than on tradables.

Real GDP has a negative and significant relationship with real exchange rate. This further confirms the Balassa Samuelson hypothesis and the findings in the long run. For any percentage increase in real GDP, real exchange rate will appreciate by 0.03%, 0.05%, 0.17%, 0.02% and 0.12% in the second to sixth lag respectively.

Further in the short run dynamics, openness exert positive relationship on real exchange rate but this only takes place in the second, third and the sixth lags. This could mean that in the in the short run openness affect real exchange rate on average semi annually. For every percentage increase in openness, real exchange rate depreciates by 0.09%, 0.17% and 0.49% within the second, third and sixth

lags respectively. These findings are consistent with the results of the long run and it also implies that openness lead to reduction in price of non tradables.

Money supply is negative and significant for the third and sixth lags. A percentage increase in money supply will lead to appreciation of the real exchange rate by 1.37% and 0.25% respectively for the third and sixth lags. This conforms to the monetarist theory and to the long run result. The coefficient of the lagged error correction term is negative and statistically significant meaning that when there is any deviation from equilibrium in the short run, the model will adjust to it long run equilibrium by 29% each quarter.

Table 11: Parsimonious Error Correction Model For Export

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT2	-0.16700	0.072800	-2.293442	0.0242
D(LEXP(-1))	0.804995	0.08747	9.203108	0.0000
D(LREER(-4))	0.038882	0.010364	3.751763	0.0003
D(LREER(-5))	0.084064	0.011306	7.43552	0.0000
D(LREER(-6))	0.024396	0.011731	2.079548	0.0404
D(LRGDP(-1))	0.018171	0.006901	2.633019	0.0099
D(LRGDP(-3))	0.020850	0.0075047	2.778387	0.0066
D(LAID(-4))	-0.107212	0.03695	-2.90157	0.0047

R-squared	0.649462	Mean dependent var	0.006584
Adjusted R-squared	0.599385	S.D. dependent var	0.074402
S.E. of regression	0.047092	Akaike info criterion	-3.149855
Sum squared resid	0.201808	Schwarz criterion	-2.795994

Log likelihood	179.3674	Durbin-Watson stat	1.947352

From table 11 previous exports lead to increases in current export perhaps due to income achieved in the past but this happens only in the first quarter (i.e lag one). The positive and significant lagged export means that a 100 percent increase in the previous first quarter of export will lead to 80% increase in exports in the current year. This is consistent with theory and also with the work of Ogun (1998) and Sackey (2001).

Also, we realize that real exchange rate impacts positively on export in the forth fifth and sixth lags. This conforms to basic trade theory and to the results of the long run. In this case, a percentage appreciation of real exchange rate will lead to fall in exports by 0.04%, 0.08% and 0.02% in the forth fifth and sixth lags respectively. Real GDP have a significant and positive impact on export in the first and third lags. This is expected since surplus production is exhausted through increased exports. For a percent increase in real GDP exports will increase by 0.02% in both the first and third quarters. Foreign aid has a negative impact on export but this occurs only in the fourth quarter. A percentage increase in foreign aid will lead to reduction in export by 0.11%. This further means that foreign aid adversely affects the competitiveness of Ghana in this case both directly and indirectly. The coefficient of the error correction term is negative and significant as expected. This means that the export model speedily adjust to long run equilibrium at 17% per quarter given that the disturbance is from the same

market. To conclude, it was found that foreign aid is detrimental to the Ghanaian economy because it leads to real appreciation in both the short run and long run.

Evaluation of the Models

Table 12: Diagnostic Test for REER Model

Diagnostic	**Statistic**	**Conclusion**
Ramsey Reset Test	F-statistic = 0.0985 (0.7547) Log likelihood ratio=0.172(0.678)	Equation is stable
ARCH Test	F-statistic 0.9592(0.4574) Obs*R-squared 5.8285 (0.4427)	
Breusch-Godfrey Serial Correlation LM Test	F-statistic 3.8247(0.2947) Obs*R-squared 30.91210 (0.2651)	No serial correlation
Multivariate Normality	Jackque-Bera test=1.2091 p-value = 0.5463	Residuals are normal
Heteroscedasticity	F-statistic 1.431953(0.1962) Obs*R-squared91.60979 (0.3194)	Residuals are not heteroskedastic

Table 13: Diagnostic Test For The Export Model

Diagnostic	**Statistic**	**Conclusion**
Ramsey Reset Test	F-statistic = 3.8286 (0.5348) Log likelihood ratio = 4.374 (0.364)	Equation is stable
ARCH Test	F-statistic 1.5080(0.1842) Obs*R-squared 8.8646 (0.1813)	
Breusch-Godfrey Serial Correlation LM Test	F-statistic 1.5259(0.1795) Obs*R-squared 10.12116(0.1196)	No serial correlation
Multivariate Normality	Jackque-Bera test=1.5730 p-value = 0.1214	Residuals are normal
Heteroscedasticity	F-statistic 2.0329 (0.7911) Obs*R-squared 44.9647 (0.2225)	Residuals are not heteroskedastic

The results from Table 12 and 13 indicate that the general to specific model passes all the diagnostic test of stability, ARCH test, Breusch-Godfrey serial correlation test, residual multivariate normality and residual hetroscedasticity.

Moreover, the joint test results for restrictions on the coefficients of the lagged variables in both models are displayed in Appendix G. The F-statistics with their probability values suggest that these coefficients are jointly and statistically significant at 1% level. Lagged aid variables are jointly significant in explaining variations in the short run real exchange rate model. Likewise, lagged real exchange rate variables are jointly significant in explaining variations in the short run export model. This further confirms the presence of the Dutch Disease in Ghana.

Table 14: VAR Lag Order Selection Criteria For REER Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	72.94597	NA	6.64E-10	-1.268192	-1.090204	-1.1961
1	1022.502	1753.027	2.00E-17	-18.58658	-17.1627*	-18.010
2	1127.555	179.8028	6.90E-18	-19.66453	-16.99471	-18.58*
3	1149.237	34.19106	1.20E-17	-19.13918	-15.22345	-17.55
4	1204.91	80.29655	1.12E-17	-19.26749	-14.10585	-17.176
5	1290.461	111.8753	6.17E-18	-19.97041	-13.56285	-17.375
6	1375.634	99.91416*	3.61e-18*	-20.66604*	-13.01256	-17.565
7	1423.486	49.69283	4.68E-18	-20.64397	-11.74458	-17.039
8	1468.307	40.51123	7.12E-18	-20.5636	-10.4183	-16.453

Table 15: VAR Lag Order Selection Criteria For Export Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-197.12	NA	0.00056	3.867702	3.96941	3.908907
1	425.813	1185.97	4.80E-09	-7.8041	-7.29556*	-7.598077
2	454.02	51.53144	3.80E-09	-8.03884	-7.12348	-7.66800*
3	459.473	9.54292	4.67E-09	-7.83602	-6.51382	-7.300359
4	473.768	23.9159	4.86E-09	-7.80322	-6.0742	-7.102744
5	507.901	54.48238	3.46E-09	-8.15194	-6.01609	-7.286647
6	528.245	30.9073*	3.24e-09*	-8.23548*	-5.6928	-7.205368
7	537.421	13.23372	3.77E-09	-8.10424	-5.15473	-6.909306
8	549.716	16.78814	4.18E-09	-8.033	-4.67666	-6.673248

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: computed using Eviews 5.0 Package

It can be observed from the VAR lag selection criteria presented in Table 14 and 15 that there are asterisks attached to some statistics of the six lag selection criteria (LR, FPE and AIC). Tracing these statistics against the first

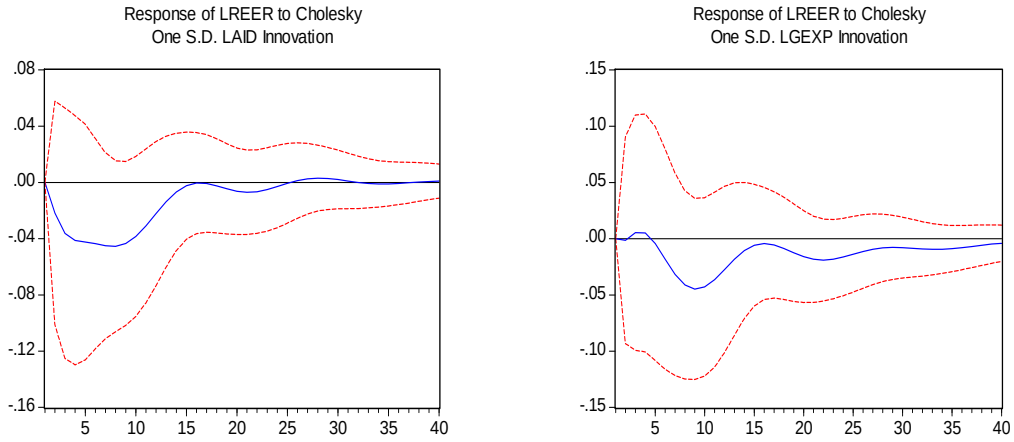
column labeled ‘lag’ shows that they coincide with lag 6. This implies that the appropriate lag length chosen is 6 for both models.

Impulse Response functions

Real Exchange Model

The extant literature on real exchange rate argued that unanticipated shocks in its fundamentals such as real GDP, trade openness, money supply, foreign aid etc can lead to disturbances in the real exchange rate market. Notably, Opoku (2004), Korsu & Braima (2007) and Takaendesa 2006 found shocks in such fundamentals to have affected the real exchange rate significantly. The effect of these unanticipated shocks on the real exchange market (deviation of the short-run equilibrium values from the long-run equilibrium values) can be ascertained from the impulse response functions from a VAR model. If the response is such that the short-run values converge to the long-run values, then it can be deduced that stability can be achieved in the future (Bhasin, 2004). The impulse responses of the real exchange rate owing to one standard deviation shock in the innovations of government expenditure and foreign aid extracted from the detailed results in Appendix C are presented in figure 5 below. It is evident from the functions presented in Appendix C that, the real exchange rate is more responsive to a shock in itself followed by a shock in foreign aid and least responsive money supply.

Figure 5: Selected impulse response functions from the VAR model of REER



Source: Computed from Eviews 5 package

From the figure 4.1 any unanticipated one period standard deviation shock to the foreign aid will cause a wide deviation between the short run equilibrium value of the real exchange rate and its long run equilibrium value throughout the tenth quarter and thereafter maintains a minimal deviation to the twentieth quarter. There after converges to its long run equilibrium with insignificant variations.

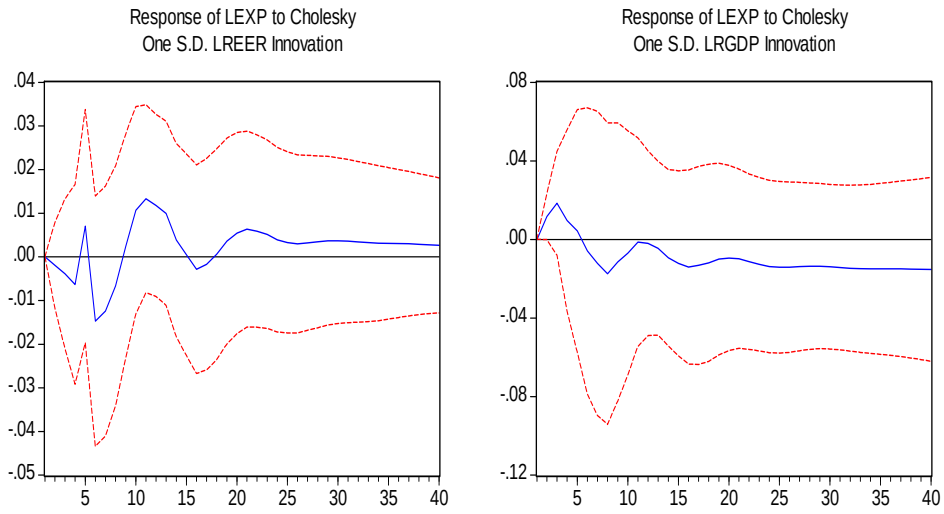
A one period standard deviation shock to government expenditure would result in fluctuations in the real exchange rate between positive and negative five (5) per cent for the first five (5) year period. However, it converges to its long run level after the fifth year with little deviation. Real exchange rate stabilizes by the tenth year when disturbed by shocks in government expenditure.

Export model

Similarly, empirical studies support the effects of shocks in various fundamental economic variables on exports. Such effects as well can be explained using the impulse response functions from the VAR. The functions for GDP and real

exchange rate are extracted from the Appendix C and discussed as they appear in the figure 6 below;

Figure 6: Selected impulse response functions from the VAR model



Source: Computed from Eviews 5 package

Any unanticipated shock to export will cause deviation between the short run equilibrium value of the export and its long run equilibrium value throughout the five (5) year period. However, the deviation diminishes drastically showing significant signs of long run convergence after the twentieth quarter.

The export oscillates around the long run equilibrium values for any one period unanticipated standard deviation shocks to both real GDP and real exchange rate. The export fluctuates between positive and negative two (2) per cent and five (5) per cent for any shocks in real exchange rate and real GDP respectively. Export stabilizes after the sixth year when disturbed by both real exchange rate and real GDP.

The results of the impulse response further confirm the results of the error correction model for two equations. That is a disequilibrium resulting from the short-run will be corrected in the long-run.

Variance Decomposition Analysis

Following the VAR estimation, the study decomposed the forecast error variance by employing Sim's Recursive Cholesky decomposition method. The forecast error variance decomposition provides complementary information for a better understanding of the relationships between the variables of a VAR model. It tells us the proportion of the movements in a sequence due to its own shock, and other identified shocks (Enders, 2004). Thus, the variance decomposition analysis will enable us identify the most effective instrument for each targeted variable based on the share of the variables to the forecast error variance of a targeted variable. The results of the forecast error variance decomposition of the endogenous variables, at various quarters are shown in Tables 16 and 17:

Table 16: Results of Variance Decomposition For REER Model

Period	S.E.	LREER	LAID	LGEXP	LRGDP	LOPEN	LTOT	LM2
4	0.48221	94.2486	1.49945	0.02388	0.17095	0.52824	2.98669	0.54221
8	0.501545	88.6639	4.48346	1.22928	0.36371	0.51403	3.89042	0.85517
12	0.515881	84.1347	6.04935	3.38859	0.44156	1.29905	3.795	0.89171
16	0.523326	82.0232	5.96676	3.47478	0.80681	2.72481	4.07309	0.93054
20	0.52817	80.7375	5.88251	3.59817	1.00155	3.70672	4.14325	0.93035
24	0.533451	79.2444	5.81203	3.98446	1.02682	4.86721	4.08763	0.97743
28	0.53754	78.1215	5.72998	4.08985	1.08985	5.90353	4.04659	1.01874
32	0.539938	77.4907	5.68354	4.14953	1.15129	6.46045	4.03187	1.03266
36	0.541508	77.073	5.65185	4.23377	1.1795	6.80645	4.00874	1.04667
40	0.542496	76.8111	5.63173	4.25971	1.20971	7.03478	3.99737	1.0556

Source: computed using Eviews 5.0 Package

Table 16 shows that the largest source of variations in real exchange rate forecast error is attributed to its own shocks. The innovations of foreign aid, openness, terms of trade, government expenditure, money supply and real GDP accordingly are other important sources of the forecast error variance of real exchange rate. The ratio of real GDP to real exchange rate contributed least to the forecast error variance from the fourth to sixteenth quarters however in the subsequent quarters it contributions where greater than those of money supply. This suggest that all the variables play important part in real exchange rate with the most effective variable being foreign aid to real exchange rate.

Table 17: Results of Variance Decomposition for Export Model

Period	S.E.	LEXP	LREER	LRGDP	LAID
4	0.189094	97.26827	0.163324	1.588235	0.980171
8	0.287514	92.68952	0.632022	1.30255	5.37591
12	0.327475	87.60729	0.892996	1.177818	10.3219
16	0.375947	85.70616	0.763938	1.216629	12.31327
20	0.415084	83.35235	0.653237	1.292982	14.70143
24	0.446137	81.35049	0.624406	1.409526	16.61558
28	0.471337	79.87529	0.578189	1.613676	17.93285
32	0.491217	78.67405	0.553957	1.816845	18.95514
36	0.506623	77.66267	0.536075	2.057966	19.74329
40	0.518334	76.84965	0.524034	2.307135	20.31918

Source: computed using Eviews 5.0 Package

In explaining the forecast error variance of export, it can be observed that the innovations of foreign aid are the next to its own shocks contributing 0.98% and 20% in the fourth and fortieth quarters respectively. The other important variable for the forecast error variance of export seems is real GDP. The source of least forecast error variance of export is the innovations of the real exchange rate throughout the quarters.

Granger-Causality Test

To find out the direction of causality between real exchange rate and its fundamentals and also between export and the selected macroeconomic variables, the study conducts a granger causality test and the results are presented in Table 18 and 19 respectively.

Table 18: Granger Causality Test Results for REER Model

Null Hypothesis:	Lags	F-Statistic	Probability
LAID does not Granger Cause LREER	6	3.08877	0.00839***
LREER does not Granger Cause LAID		0.28678	0.94189
LGEXP does not Granger Cause LREER	3	2.65876	0.00919***
LREER does not Granger Cause LGEXP		0.36321	0.94934
LOPEN does not Granger Cause LREER	6	5.07907	0.00015***
LREER does not Granger Cause LOPEN		8.98865	9.70E-08***
LM2 does not Granger Cause LREER	6	7.82935	7.80E-07***
LREER does not Granger Cause LM2		0.4552	0.8396
LRGDP does not Granger Cause LREER	6	5.46419	7.00E-05***
LREER does not Granger Cause LRGDP		1.93464	0.08327*
LTOT does not Granger Cause LREER	1	4.10914	0.04512**
LREER does not Granger Cause LTOT		0.48842	0.48614

Note: *, ** and *** denote rejection of null hypothesis at 10%, 5% and 1% level of significance.

Table 19: Granger Causality Test Results for The Export Model

Null Hypothesis:	Obs	F-Statistic	Probability
LREER does not Granger Cause LEXP	106	9.53201	3.70E-08***
LEXP does not Granger Cause LREER		3.70244	0.00241***
LAID does not Granger Cause LEXP	14	2.43123	0.00775***
LEXP does not Granger Cause LAID		1.13552	0.34443
LRGDP does not Granger Cause LEXP	111	6.05981	0.01541**
LEXP does not Granger Cause LRGDP		1.94533	0.01659**

Note: *, ** and *** denote rejection of null hypothesis at 10%, 5% and 1% level of significance. Source: conducted using Eviews 5.0 package

For the real exchange rate model, the results of the granger causality test in Table 18 shows that there is a unidirectional relationship between real exchange rate and foreign aid with the causality running from foreign aid to real exchange rate at 1% significance level. This finding is consistent with the Dutch Disease theory which argues that foreign aid causes changes in real exchange rate and thereby affecting the competitiveness of the country. This is also similar to the results of Sackey (2001). The results rejected the null hypothesis that government expenditure does not Granger Cause real exchange rate at 1% level f significance. Further, there is a unidirectional relationship between terms of trade and real exchange rate and between money supply and real exchange rate. The causality is however running from terms of trade and money supply to real exchange rate respectively. These finding as well are consistent with the results from Sackey (2001), Kemegue etal (2011) and Ahmad & Masood (2009).

However, we observe a bidirectional relationship between real exchange rate and trade openness and between real exchange rate and real gross domestic product. These findings are also in accordance with the work of Kemegue etal (2011). It worth noting that the results presented in Table 4.11 indicates that real exchange rate is caused by its fundamentals as specified in the model.

From the export model also, the results of the granger causality test in Table 19 shows that export granger cause real exchange rate and vice versa implying that there exist bi-directional causality between real exchange rate and exports. We also observe that foreign aid granger cause export since the study failed to reject the null hypothesis at 1% significance level. This observation stems from the fact that part of the aid inflows is invested into the productive sectors of the economy which later is manifested through higher exports. Also, it is evident from the table that real GDP Granger Cause exports and vice versa at 5% level of significance. This result is expected since on the demand side export is a key factor in determining GDP as stipulated by the Keynesian school of thought and on the supply side income is crucial to a country's export levels as higher levels of production is the main source of export expansions. These findings accord with that of Fidan (2006), Sackey (2001).

Studying tables 18 and 19 critically in relation to this study we observe that some of the explanatory variables share bidirectional causality with the dependent variable. This gives the indication that the appropriate method of estimation of the specified models is Variance autoregressive since this treats

every variable in the model as endogenous and thereby avoiding bias estimate for the parameters.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this final chapter is to present the summary, conclusions and recommendations. Whereas the summary presents a brief overview of the research problem, objective, methodology and findings, the conclusions capture the overall outcomes regarding the findings of the study in light of the hypotheses. Recommendations also present specific remedies to be implemented by specific bodies. The chapter also presents the limitations and direction for future research.

Summary

Since the 1960 when the Dutch Disease term was coined as a result of Netherlands natural gas discovering which increased the country's wealth, it has attracted a lot of attention by researchers, policy makers and government. This is due to the negative impact it's presumed to have on real exchange rate and growth. Despite the numerous studies conducted to confirm this hypothesis, the conclusions have been illusive. The study sought to develop an empirical model of the real exchange rate in Ghana with special focus on the role of foreign aid and to link this with an export performance model to examine aid's impact on exports. Specifically it investigated the long-run, short run and causal relationship

between real exchange rate, foreign aid and export in Ghana using quarterly time series data from 1983 to 2010. The study also investigated the dynamic adjustment of the real exchange rate and export following shocks to their determinants. The theories as well as empirical work that characterize foreign aid, real exchange rate and exports were briefly reviewed in this study and are well documented in the literature for both industrialized and developing economies. Based on an extensive review of the literature on the determinants of the real exchange rate and export an empirical model was specified. The variables included in the real exchange rate model as potential determinants include the terms of trade, a measure of the degree of openness, money supply, government expenditure, real GDP and foreign aid. The ones included in the export model are real exchange rate, real GDP and foreign aid. In order to determine both the long and short run determinants of the real exchange rate, the Johansen cointegration and error correction methodology was preferred to the other techniques, because of its several advantages over those alternative techniques. In the application of this methodology, we started by analyzing the time series properties of the data employing both informal and formal tests for stationarity. The Study went ahead to examine the causal relationship between real exchange rate and aid and between export and real exchange rate as well as other variables in the respective models using the pairwise Granger-causality test. It employed Johansen (1988) approach to cointegration and the VECM to examine the long-run and short-run dynamics among the variables used in the estimation. The study went further to estimate the general to specific model which is much simplified than the VECM.

Finally the VAR approach was used to conduct impulse response and variance decomposition analysis in order to identify which variables contributed to the forecast error variance of the targeted variables. All tests and estimations were conducted using econometric view (Eviews) 5.0 package.

The results of the Granger-causality test for the real exchange rate model suggested a unidirectional causality between real exchange rate and foreign aid with the causality running from aid to real exchange rate. In the export model the results suggested bidirectional causality between real exchange rate and export. It was also found that foreign aid Granger cause exports implying a unidirectional causality between them.

The cointegration analysis for the exchange rate model revealed the presence of four economically interpretable long-run relationships among real exchange and its fundamentals. However, the study only focused on the equation of interest which is the real exchange rate. We observed from the long run equation that foreign aid has an appreciating effect on real exchange rate as stipulated by the Dutch Disease theory. Government expenditure, real GDP and money supply as well have an appreciating effect on real exchange rate. Nevertheless, terms of trade and degree of trade openness have depreciating effect of real exchange rate. From the export model the cointegration analysis indicated one stable long run equation among export and it determinants. The long run estimates disclosed that real exchange rate and real GDP have a positive impact on exports with only foreign aid having a negative impact. The result of the foreign aid directly confirms the Dutch Disease Hypothesis.

The empirical evidence from the general to specific model of real exchange rate showed that all the variables except terms of trade exhibited both positive and negative effect on real exchange rate in the short-run with the negative impacts being dominant. The impacts were consistent with the long run findings. The error correction model of export also indicated that the first lag of exports affect current exports. Also real exchange rate and real GDP impacts positively whereas foreign aid impacts negatively on exports. The speed of adjustment for both models, were both negative and significant meaning deviations in the short run will be corrected with time.

The evidence from the forecast error variance decomposition suggests that the variables that influenced real exchange rate significantly were foreign aid and trade openness with real GDP having the least influence. Similarly, the forecast error variance decomposition of export revealed that foreign aid and real GDP were the variables that exerted much influence.

Conclusions

The Dutch Disease hypothesis has captured interest of governments and policy makers for a very long time because of the importance attached to real exchange rate and exports.

This study in line with the empirical literature, confirmed the Dutch Disease theory in both the long run and short run. That is to say aid appreciated the real exchange rate and it was further observed that this appreciation was not favorable for exports. We also confirmed from the export model that aid directly reduce

exports. The implication here is that despite the importance of foreign aid to Ghana given its aid intensity, government need to use them in infrastructural development or invest in order to curtail aid dependence in the future as it's not friendly to our competitiveness. Also the results indicated that there was more negative impact than positive on exchange rate by its fundamental. This implies that the cedi has a higher tendency to appreciates hence government should implement policies to curb this. The error correction terms of both models show that we can count on government expenditure and real GDP as policy variable to bring real exchange rate and exports respectively to equilibrium in the face of short run deviations.

From the results of the forecast error variance decomposition, the most important variable for both real exchange rate and export is foreign aid. This show how dependent the economy is on aid (another indication of how prone the economy is to the Dutch Disease epidemic).

Consistent with empirical literature, the study found evidence of unidirectional causality between real exchange rate and foreign aid and between exports and foreign aid. Also there was bidirectional causality between real exchange rate and export. This gives the indication that foreign aid has the capacity to make both permanent and temporary changes in both real exchange rate and export as disclosed by the Pairwise Granger causality test. Also it is evident that just as real exchange rate can stimulate export, export can also equally stimulate real exchange rate.

Recommendations

Taking cognisance of the findings from the study, the following recommendations are proposed.

First, the real exchange rate will be shocked by factors that are outside the direct control of policy makers, such as the trade openness which explain the greatest component of the variation in the real exchange rate in this study. The policy implication is that the central bank's ability to influence the movements in the real exchange rate is limited. The central bank may however reduce the impact of this shock, in the long run, by utilizing policies to promote the diversification of traded goods and acting on other fundamentals.

Second, we observe from the findings that money supply has an appreciating effect on real exchange rate due to inflation. It is therefore recommended that monetary authorities keep money supply as low as possible to avoid situations of international uncompetitiveness.

Third, from the export model aid had a decreasing effect on export. Government is therefore advised to strategically invest foreign aid into productive ventures in order to stimulate growth. In order words government can use foreign aid to subsidize nontraditional export in order to boost their production.

Finally, is strongly recommended that, developing countries and Ghana in particular wean themselves from the overdependence on foreign aid and donor conditionalities for budgetary support. The aid model over the years has not worked in most developing countries. Developing countries can therefore rely on

trade, foreign direct investment and intensify their capital markets as the main sources of enhancing growth.

Limitations of the Study

One of the reasons for investigating the determinants of the real exchange rate is to estimate the equilibrium real exchange rate and ultimately measure the degree of misalignment in the actual real exchange rate. Having not gone to this extent, the study has obviously left some important gaps, although it has successfully achieved its objectives.

The other issue, which has also confronted previous researchers, concerns the unavailability of data, particularly in developing countries, on the actual variables suggested by the theoretical models on the determination of the real exchange rate. This means that some of the variables either have to be excluded in the empirical model, albeit with the risk of an omitted variables bias, or proxies have to be found for those variables. The risk involved in finding proxies is that they may not correctly represent the impact of the actual variables, resulting in inconsistent results. Striking this balance poses a serious challenge to empirical studies on the determinants of the real exchange rate. However, these problems seem not to have significantly affected the findings presented in this study, since they corroborate both the theoretical and empirical knowledge on the Dutch Disease theory.

Areas for Future Research

The areas for further research that emerge from this study include covering the gap that has been left by this study of measuring the degree of misalignment in the exchange rate.

The other issues concern the proxies, measurement of the actual real exchange rate and the speed of adjustment parameter. Research into what proxies represent the actual real exchange rate and exports determinants efficiently may improve the performance of the empirical models. The other area that remains widely debated is the measurement of the actual real exchange rate. Research into what measure constitutes the best real exchange rate policy variable is still lacking.

Finally, instead of looking at aid as the only form of foreign income, concentration could be put on other forms of income such as remittances and foreign direct investment and evaluate the behaviour of these on macroeconomic variables.

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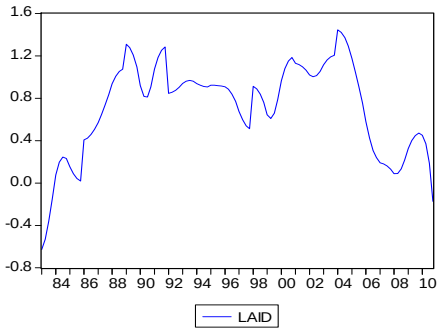
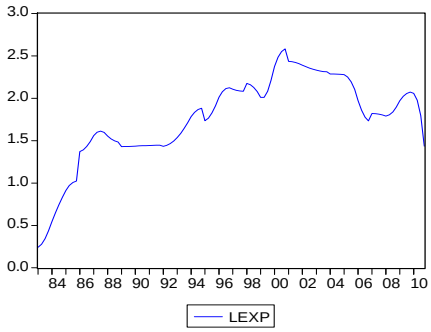
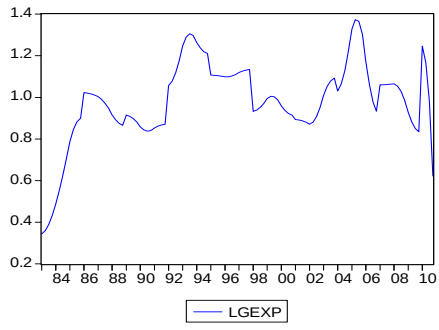
APPENDICES

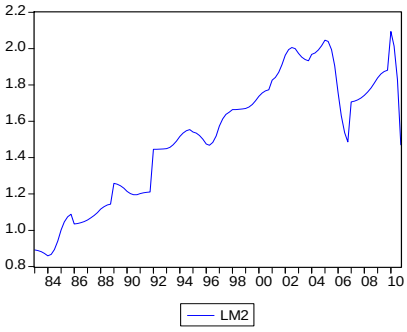
APPENDIX A

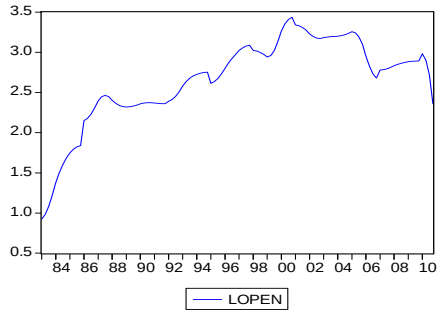
GRAPH OF VARIABLES AT LEVEL

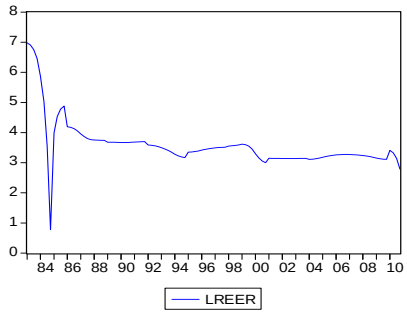


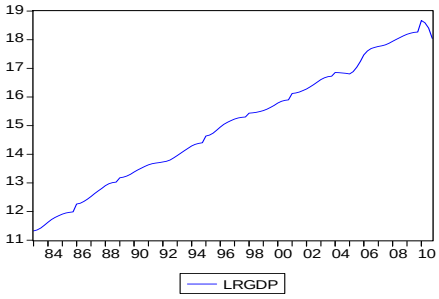


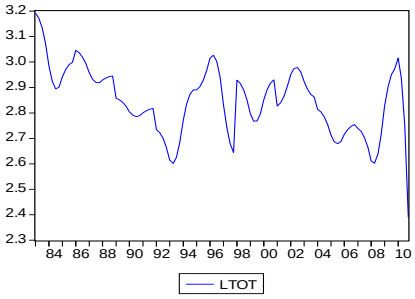






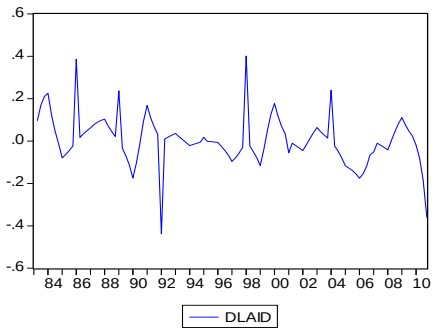


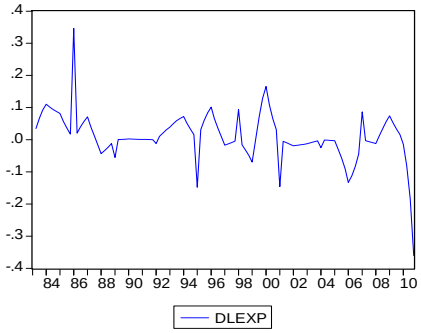


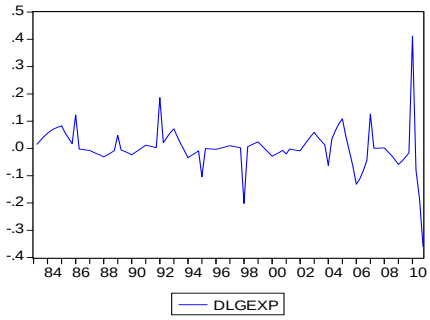


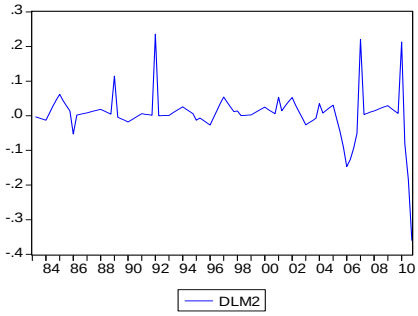
APPENDIX B

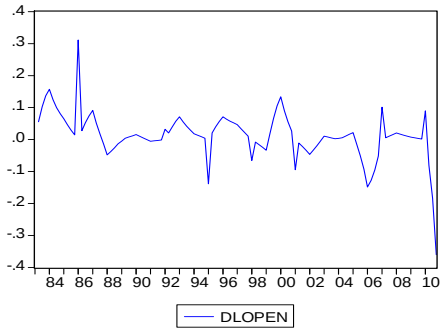
GRAPH OF VARIABLES AT FIRST DIFFERENCE

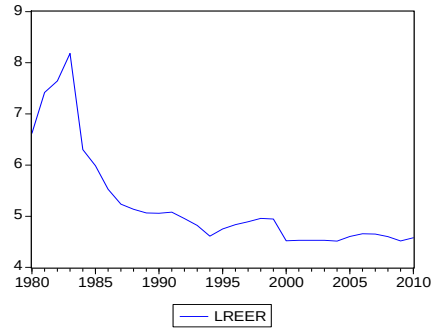


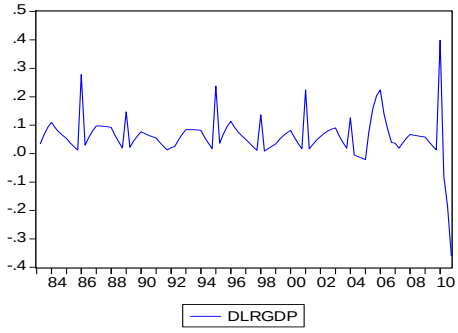


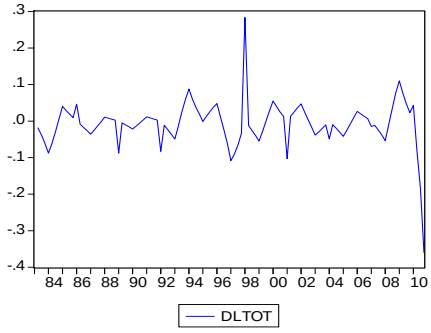






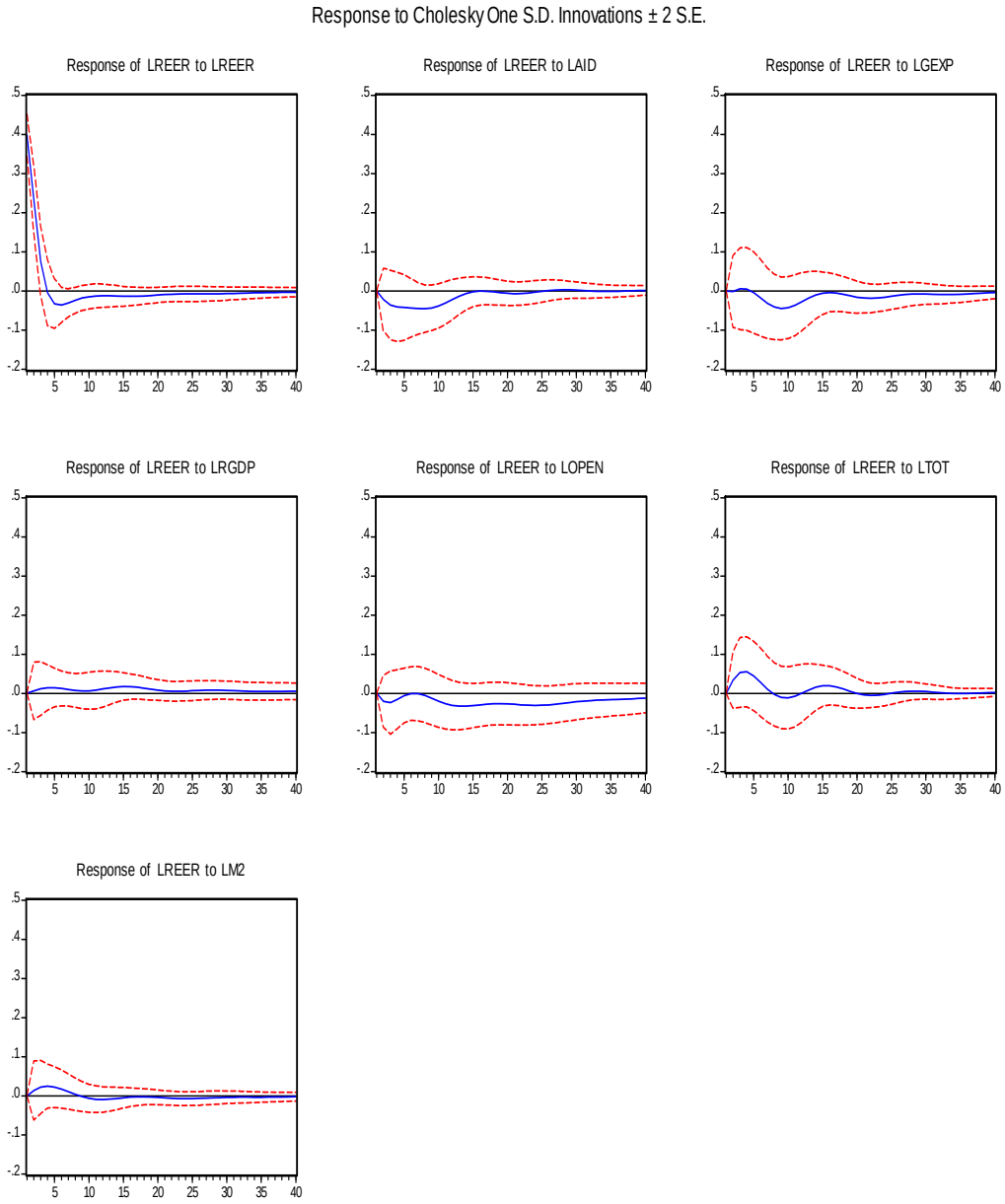






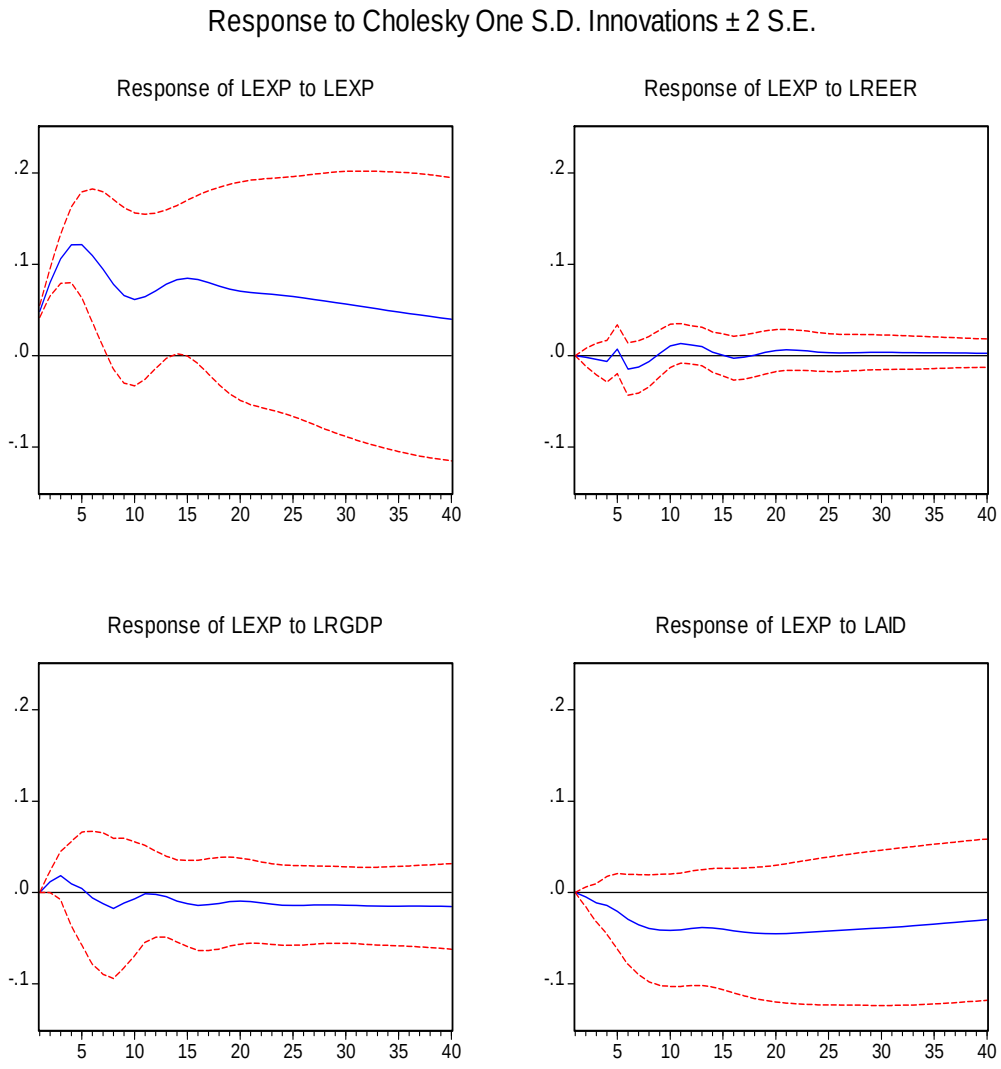
Appendix C

Impulse response functions of real exchange rate from the VAR model



Appendix D

Impulse response functions of export from the VAR model



Appendix E

Short Run Dynamic (VECM) Results For Real Exchange Rate Model

Variable	Coefficient	Standard Error	t-value
CointEq1	-0.547622	0.031670011	-17.2915
D(LREER(-1))	0.5261	0.041339263	12.7264
D(LREER(-2))	0.014204	0.001262814	11.2479
D(LREER(-3))	0.804311	0.084766303	9.48857
D(LREER(-4))	0.435389	0.071266127	6.10934
D(LREER(-5))	0.159733	0.070917115	2.25239
D(LREER(-6))	0.423357	0.105484558	4.01345
D(LAID(-1))	-0.224663	0.394014276	-0.57019
D(LAID(-2))	-0.086397	0.022316329	-3.87147
D(LAID(-3))	-0.071196	0.044277496	-1.60795
D(LAID(-4))	-0.191692	0.459285526	-0.41737
D(LAID(-5))	-0.168568	0.491194126	-0.34318
D(LAID(-6))	-0.100532	0.031304727	-3.21140
D(LGEXP(-1))	-0.073896	0.036258366	-2.03804
D(LGEXP(-2))	-0.097278	0.017306112	-5.62102
D(LGEXP(-3))	-0.029629	0.012491673	-2.37190
D(LGEXP(-4))	-0.033436	0.174591405	-0.19151
D(LGEXP(-5))	-0.086734	0.202834358	-0.42761
D(LGEXP(-6))	-0.082303	0.019077278	-4.31419
D(LRGDP(-1))	-0.073648	0.647284233	-0.11378

D(LRGDP(-2))	-0.029000	0.004884046	-5.93770
D(LRGDP(-3))	-0.052500	0.009922079	-5.29123
D(LRGDP(-4))	-0.097472	0.020157376	-4.83555
D(LRGDP(-5))	-0.021449	0.005934400	-3.61435
D(LRGDP(-6))	-0.190671	0.091984948	-2.07285
D(LOPEN(-1))	0.332097	1.257514484	0.26409
D(LOPEN(-2))	0.089398	0.017802941	5.02153
D(LOPEN(-3))	0.069035	0.038252047	1.80474
D(LOPEN(-4))	0.450698	1.291213293	0.34905
D(LOPEN(-5))	0.143753	1.450878078	0.09908
D(LOPEN(-6))	0.092948	0.034151718	2.72162
D(LTOT(-1))	0.037932	0.565895868	0.06703
D(LTOT(-2))	0.087046	0.060308311	1.44335
D(LTOT(-3))	0.211444	0.601085937	0.35177
D(LTOT(-4))	0.079091	0.080761965	0.97931
D(LTOT(-5))	0.057392	0.090195031	0.63631
D(LTOT(-6))	0.174530	0.181658271	0.96076
D(LM2(-1))	-0.173697	0.108883191	-1.59526
D(LM2(-2))	-0.565183	0.701437170	-0.80575
D(LM2(-3))	-0.472656	0.222364614	-2.12559
D(LM2(-4))	-0.046425	0.033264071	-1.39565
D(LM2(-5))	-0.315228	0.191510380	-1.64601
D(LM2(-6))	-0.252726	0.080528303	-3.13835

Constant	1.133156	0.120485960	9.40488
R-squared	0.875629	Log likelihood	49.21077
Adj. R-squared	0.787958	Akaike AIC	-0.099253
Sum sq. resids	2.407853	Schwarz SC	1.012883
S.E equation	0.198678	Mean dependent	-0.007370
F-statistic	9.987649	S.D. dependent	0.431459

Appendix F

Short Run Dynamic (VECM) Results For Export Model

Variables	Coefficient	Standard Error	t-value
ECT1	-0.002145	0.00147	-1.46174
DLEXP_1	0.859727	0.12806	6.7136
DLEXP_2	0.056837	0.13888	0.40926
DLEXP_3	0.115887	0.11500	1.00772
DLEXP_4	0.037012	0.11744	0.31515
DLEXP_5	0.113960	0.11713	0.97291
DLEXP_6	0.121112	0.11230	1.07844
DLREER_1	-0.001870	0.02753	-0.06338
DLREER_2	-0.003752	0.02297	-0.16338
DLREER_3	-0.001527	0.01872	-0.08153
DLREER_4	-0.038460	0.01576	-2.43961
DLREER_5	-0.087225	0.01452	-6.00864
DLREER_6	-0.027034	0.01680	-1.60893
DLRGDP_1	0.207790	0.07873	2.63943
DLRGDP_2	0.103115	0.08691	1.18651
DLRGDP_3	0.192261	0.08553	2.24787
DLRGDP_4	0.147455	0.11553	1.27630
DLRGDP_5	0.066914	0.11431	0.58537
DLRGDP_6	8.22E-05	0.10513	0.00078
DLAID_1	-0.020898	0.06445	-0.32423

DLAID_2	-0.014126	0.06802	-0.2768
DLAID_3	-0.060841	0.06846	-0.88873
DLAID_4	-0.072586	0.02424	-2.99476
DLAID_5	-0.009840	0.07403	-0.13292
DLAID_6	-0.031933	0.07041	-0.45355
R-squared	0.654499	Log likelihood	180.1273
Adj. R-squared	0.550849	Akaike AIC	-2954806
Sum sq. resids	0.198908	Schwarz SC	-2.322910
S. E equation	0.049863	Mean dependent	0.006584
F-statistic	10.314489	S.D. dependent	0.074402

Appendix G

Joint Test Results of the coefficients in the General to Specific models

Wald Test:

Restrictions [C(2)= C(3)= C(4)= C(5)= C(6)= C(7)= C(9)= C(13)= C(14)= C(15)= C(16)= C(19)= C(21)= C(22)= C(23)= C(24)= C(25)= C(27)= C(28)= C(31)= C(40)= C(43)= C(44)=0]

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	9.592507	(23, 61)	0.0000
Chi-square	220.6277	23	0.0000

Note: Where C() are the respective coefficient in the parsimonious general to specific model in table 4.10.

Wald Test: Restriction [C(9)=C(13)=0]

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	9.810920	(2, 61)	0.0002
Chi-square	19.62184	2	0.0001

Note: C(9) and C(13) are the significant coefficients of the lagged aid variables in the short run real exchange rate model

Export Model

Wald Test: Restriction [C(2)= C(6)= C(7)= C(8)= C(9)= C(11)= C(14)=0]

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	22.05003	(7, 91)	0.0000
Chi-square	154.3502	7	0.0000

Note: Where C() are the respective coefficients in the parsimonious export model.

Wald Test: Restriction [C(6)= C(7)= C(8)=0]

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	25.26137	(3, 91)	0.0000
Chi-square	75.78410	3	0.0000

Note: where C(6), C(7) and C(8) are the respective coefficients of the lagged real exchange rate variables in the export model.

Appendix H

Data For The Estimations

YEARS	LREER	LAID	LGEXP	LRGDP	LOPEN	LTOT	LM2	LEXP
1983-Q1	6.979541	-0.62731	0.344082	11.32561	0.926083	3.19156	0.892139	0.243303
1983-Q2	6.9103	-0.53009	0.359453	11.3602	0.981798	3.172736	0.888966	0.278287
1983-Q3	6.75553	-0.36011	0.389504	11.42598	1.084699	3.13399	0.882589	0.344784
1983-Q4	6.466401	-0.14946	0.432952	11.51719	1.221566	3.072902	0.872948	0.436908
1984-Q1	5.873969	0.076286	0.488093	11.62715	1.379042	2.985174	0.859946	0.547862
1984-Q2	5.030375	0.197804	0.552971	11.71818	1.50309	2.924055	0.867354	0.649607
1984-Q3	3.559976	0.246494	0.625625	11.79418	1.602593	2.895057	0.894727	0.74366
1984-Q4	0.776372	0.232456	0.704195	11.85783	1.683077	2.901073	0.940487	0.831192
1985-Q1	3.989431	0.152903	0.787011	11.91105	1.748183	2.941489	1.002205	0.913119
1985-Q2	4.531653	0.08879	0.844912	11.94919	1.794374	2.970763	1.046115	0.97044
1985-Q3	4.777755	0.043643	0.88173	11.97383	1.824023	2.989814	1.074353	1.006906
1985-Q4	4.881285	0.020282	0.899643	11.98592	1.838524	2.999205	1.088179	1.024652
1986-Q1	4.19594	0.406649	1.022467	12.26351	2.149605	3.04549	1.035296	1.370913
1986-Q2	4.174416	0.424185	1.020551	12.29325	2.177028	3.037084	1.037468	1.391524
1986-Q3	4.129925	0.458361	1.016706	12.35019	2.229714	3.02006	1.041798	1.431513
1986-Q4	4.059242	0.507529	1.010911	12.42995	2.303879	2.993966	1.048258	1.488649
1987-Q1	3.956485	0.569539	1.003133	12.52728	2.394915	2.95808	1.056807	1.560082
1987-Q2	3.869758	0.64697	0.989912	12.62418	2.446417	2.933007	1.068006	1.599999
1987-Q3	3.804504	0.736236	0.971031	12.71998	2.464012	2.919602	1.081767	1.611947
1987-Q4	3.765606	0.833952	0.946166	12.81419	2.449464	2.918344	1.097983	1.596921

1988-Q1	3.756338	0.937175	0.914868	12.90647	2.401319	2.929279	1.116534	1.553664
1988-Q2	3.749331	1.008151	0.890734	12.97049	2.363626	2.937402	1.130225	1.519948
1988-Q3	3.744632	1.052816	0.874315	13.01099	2.337684	2.94278	1.139249	1.496821
1988-Q4	3.742274	1.074422	0.866004	13.03065	2.324456	2.945459	1.143731	1.485054
1989-Q1	3.682675	1.310797	0.914485	13.17726	2.319422	2.857568	1.258341	1.430004
1989-Q2	3.681579	1.277993	0.908974	13.19968	2.323413	2.852393	1.254042	1.430668
1989-Q3	3.679383	1.208969	0.89786	13.24306	2.331347	2.841962	1.245388	1.431995
1989-Q4	3.67608	1.095584	0.880954	13.3048	2.343131	2.826108	1.232265	1.433982
1990-Q1	3.671658	0.921131	0.857958	13.3816	2.358629	2.804572	1.214496	1.436625
1990-Q2	3.670483	0.818322	0.843382	13.45172	2.368724	2.790996	1.202431	1.438914
1990-Q3	3.672565	0.812979	0.837602	13.51613	2.373574	2.785714	1.196281	1.440853
1990-Q4	3.677884	0.906604	0.840772	13.57557	2.373256	2.788856	1.196156	1.442443
1991-Q1	3.686389	1.075188	0.852807	13.63068	2.367765	2.800345	1.202059	1.443685
1991-Q2	3.692721	1.185257	0.86174	13.6701	2.363626	2.808876	1.206464	1.444616
1991-Q3	3.69692	1.252434	0.867651	13.69554	2.360858	2.814523	1.209389	1.445236
1991-Q4	3.699013	1.284403	0.870594	13.70803	2.359471	2.817335	1.210849	1.445546
1992-Q1	3.589394	0.846634	1.056645	13.72936	2.391664	2.734585	1.446324	1.433468
1992-Q2	3.581047	0.856394	1.077313	13.75425	2.412189	2.723265	1.446616	1.444215
1992-Q3	3.564141	0.875633	1.117411	13.80224	2.452016	2.700234	1.447199	1.465369
1992-Q4	3.538234	0.903815	1.174695	13.87016	2.508933	2.66466	1.448074	1.496283
1993-Q1	3.502612	0.940196	1.246302	13.9541	2.580109	2.61517	1.449238	1.536069
1993-Q2	3.460483	0.961343	1.288552	14.03837	2.635391	2.601671	1.456887	1.586304
1993-Q3	3.411046	0.96819	1.304915	14.12238	2.677067	2.625626	1.470872	1.645416

1993-Q4	3.353259	0.961029	1.29664	14.20565	2.706677	2.684469	1.490932	1.71178
1994-Q1	3.285746	0.939554	1.263102	14.28784	2.725227	2.772456	1.516704	1.783828
1994-Q2	3.231941	0.92314	1.237189	14.34533	2.738918	2.833711	1.535607	1.834649
1994-Q3	3.194392	0.912045	1.219533	14.3819	2.747941	2.872558	1.548013	1.86715
1994-Q4	3.175076	0.906452	1.210586	14.3997	2.752423	2.89143	1.554159	1.883012
1995-Q1	3.349487	0.924068	1.106713	14.6373	2.613728	2.890376	1.541149	1.735522
1995-Q2	3.356506	0.922594	1.105915	14.6734	2.634204	2.903603	1.534706	1.766916
1995-Q3	3.370396	0.91964	1.104317	14.74192	2.673939	2.929544	1.521694	1.826894
1995-Q4	3.390877	0.915194	1.101916	14.83662	2.730729	2.967235	1.501852	1.910612
1996-Q1	3.417547	0.909233	1.098705	14.95038	2.801756	3.015377	1.474769	2.012336
1996-Q2	3.440961	0.884522	1.098838	15.04281	2.86542	3.026795	1.468714	2.078079
1996-Q3	3.461327	0.839617	1.102315	15.11843	2.922767	3.002747	1.484068	2.11411
1996-Q4	3.478817	0.771673	1.1091	15.18028	2.974626	2.940544	1.519873	2.123469
1997-Q1	3.493574	0.675762	1.119126	15.23049	3.021659	2.83245	1.574023	2.106905
1997-Q2	3.5045	0.597265	1.126581	15.26655	3.055537	2.742948	1.612794	2.094298
1997-Q3	3.511719	0.541287	1.13152	15.28989	3.077501	2.678494	1.637831	2.085805
1997-Q4	3.515309	0.512077	1.13398	15.30136	3.088304	2.64464	1.650119	2.081531
1998-Q1	3.555589	0.912981	0.932474	15.43827	3.022924	2.928503	1.664043	2.175091
1998-Q2	3.561919	0.889202	0.938791	15.44717	3.01508	2.916059	1.66468	2.159745
1998-Q3	3.57446	0.839877	0.951307	15.46475	2.999207	2.890697	1.665953	2.128328
1998-Q4	3.592982	0.761004	0.969791	15.49055	2.974913	2.851404	1.667858	2.079271
1999-Q1	3.617155	0.645118	0.993917	15.52394	2.941576	2.796491	1.670394	2.009877
1999-Q2	3.603985	0.608509	1.004732	15.57293	2.959121	2.767961	1.678794	2.010999

1999-Q3	3.551938	0.660031	1.002661	15.63529	3.024997	2.768163	1.692912	2.082409
1999-Q4	3.454452	0.787413	0.987624	15.70853	3.130458	2.797078	1.71251	2.210622
2000-Q1	3.296751	0.965554	0.959023	15.79018	3.263946	2.852331	1.737267	2.376171
2000-Q2	3.159656	1.081007	0.937021	15.84731	3.353532	2.891854	1.755441	2.484514
2000-Q3	3.056562	1.151178	0.92208	15.88366	3.409088	2.917361	1.767376	2.550726
2000-Q4	3.000734	1.184499	0.914525	15.90136	3.435749	2.929875	1.773291	2.582257
2001-Q1	3.147022	1.129163	0.893713	16.12493	3.341483	2.827126	1.826756	2.436998
2001-Q2	3.146553	1.118779	0.891486	16.14182	3.330818	2.840079	1.841332	2.432428
2001-Q3	3.145614	1.097683	0.887015	16.17476	3.309139	2.865492	1.869863	2.423224
2001-Q4	3.144205	1.06518	0.880271	16.22223	3.275713	2.902441	1.911188	2.409257
2002-Q1	3.142321	1.020131	0.871208	16.2822	3.229333	2.949673	1.963759	2.390326
2002-Q2	3.141242	1.002471	0.880644	16.35312	3.195685	2.974439	1.994984	2.372895
2002-Q3	3.14097	1.013675	0.908065	16.43257	3.17615	2.978348	2.006761	2.357048
2002-Q4	3.141505	1.052799	0.952044	16.51832	3.171582	2.961647	1.999769	2.342869
2003-Q1	3.142847	1.116735	1.010471	16.60839	3.182186	2.923269	1.973608	2.33043
2003-Q2	3.143852	1.16214	1.052154	16.67098	3.190065	2.893488	1.953528	2.320999
2003-Q3	3.144521	1.191304	1.079008	16.71063	3.195284	2.873129	1.939914	2.314662
2003-Q4	3.144855	1.205573	1.09217	16.72989	3.197883	2.862792	1.933037	2.311478
2004-Q1	3.110588	1.445487	1.029916	16.85594	3.201456	2.814068	1.968222	2.286817
2004-Q2	3.118372	1.421636	1.063945	16.85086	3.207127	2.804409	1.976356	2.286096
2004-Q3	3.133762	1.372157	1.128714	16.84064	3.218374	2.784805	1.992429	2.284654
2004-Q4	3.156412	1.293021	1.218622	16.82511	3.23501	2.75466	2.016064	2.282486
2005-Q1	3.185834	1.17671	1.32716	16.80401	3.25677	2.712998	2.046733	2.279589

2005-Q2	3.210561	1.050123	1.373241	16.88218	3.243374	2.687404	2.03972	2.250995
2005-Q3	3.230914	0.910972	1.365057	17.03927	3.193358	2.679166	1.994208	2.194394
2005-Q4	3.247144	0.756068	1.30122	17.24342	3.100805	2.688715	1.904545	2.104721
2006-Q1	3.259443	0.580788	1.169884	17.4672	2.952674	2.715553	1.757575	1.972405
2006-Q2	3.26857	0.425671	1.058658	17.60729	2.825127	2.735218	1.631173	1.860242
2006-Q3	3.274608	0.307042	0.97698	17.69085	2.730055	2.748117	1.537054	1.777805
2006-Q4	3.277614	0.241996	0.933494	17.73015	2.6789	2.754505	1.48645	1.733889
2007-Q1	3.270666	0.190695	1.059942	17.76669	2.780127	2.739744	1.70719	1.820597
2007-Q2	3.267723	0.18105	1.060435	17.78593	2.785508	2.727628	1.71084	1.817724
2007-Q3	3.261809	0.161477	1.061419	17.82333	2.796184	2.702947	1.718099	1.811953
2007-Q4	3.252872	0.131379	1.062893	17.87694	2.811987	2.664743	1.72889	1.803234
2008-Q1	3.240831	0.089785	1.064856	17.94421	2.832676	2.611423	1.743099	1.791489
2008-Q2	3.225241	0.090963	1.053186	18.00892	2.849845	2.602633	1.761455	1.803955
2008-Q3	3.205936	0.134763	1.027396	18.07126	2.863666	2.639537	1.783729	1.839753
2008-Q4	3.182702	0.21596	0.986359	18.13143	2.874272	2.717397	1.809658	1.896488
2009-Q1	3.155268	0.326124	0.928135	18.18958	2.881764	2.827411	1.838953	1.970747
2009-Q2	3.134186	0.40145	0.882129	18.23107	2.887345	2.902643	1.860374	2.023033
2009-Q3	3.119881	0.448688	0.850239	18.25781	2.89105	2.949827	1.874404	2.056431
2009-Q4	3.112651	0.471497	0.833904	18.27091	2.892896	2.972609	1.881346	2.072721
2010-Q1	3.409721	0.451209	1.24589	18.67013	2.982433	3.015633	2.094452	2.058558
2010-Q2	3.329239	0.370727	1.165408	18.58964	2.90195	2.935151	2.01397	1.978076
2010-Q3	3.145774	0.187262	0.981943	18.40618	2.718485	2.751686	1.830505	1.794611
2010-Q4	2.786152	-0.17236	0.622321	18.04656	2.358864	2.392065	1.470884	1.43499