KWAME NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY, KUMASI

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COLLEGE OF ART AND SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

IS TRADE DEFICIT IN GHANA SUSTAINABLE?

A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF ARTS DEGREE IN ECONOMICS

BY

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NOVEMBER, 2011

DELARATION

I declare that, I have personally, under supervision, undertaken the study herein submitted.

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I declare that, I have supervised the student in undertaking the study herein submitted and I confirm that the student has my permission to submit for assessment.

Signature ..... Date 13-12-11

Mr. Kwaku Boateng

(Supervisor)

DEDICATION

I dedicate this work first and foremost to the Almighty God who gave the spiritual empowerment to enable me collates ideas. Secondly, I do dedicate it to my late father Henry Kwame Attah whose advice has brought me this far. Thirdly, I dedicate this work to my mother; Miss Rebecca Amissah for her selfless life and financial support that has seen me throughout this course. Fourthly, I dedicate this work to my dear lovely wife; Mrs Lydia Attah Nyenzu for her endurance, tolerance and support. Finally, I dedicate this work to all my brothers and sisters; Daniel Attah, Moses Attah, Elizabeth Attah and Janet Attah for their players.

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I am highly indebted to Mrs Lydia Attah Nyenzu for her love, motivation, encouragement and support throughout this study.

Suffice to sum up by requesting whoever accorded any form of assistance in the accomplishment of this study, to accept my thanks with utmost sincerity. Nevertheless, for any mistakes, inaccuracies and inadequacies, substantial or marginal which may be found in this work, I am fully answerable and I bear total responsibility.

ABSTRACT

This paper examines the sustainability of trade deficit in Ghana. The paper used the simple theoretical model by Hakkio and Rush (1991) and Husted (1992), and reviewed other works from Ghana and other countries.

This study examines the long and short-run relationships between exports and imports of Ghana for the period 1970 to 2007 by means of time series analysis.

This is an important issue because long-run convergence will ensure that trade imbalances are sustainable. We explore this issue using the bounds-testing approach to cointegration and find that exports and imports for Ghana are indeed cointegrated; the coefficient on imports is unity. These results imply that Ghana satisfies the strong form of its intertemporal budget constraint.

It is therefore, concluded that overall macroeconomic policies have been successful in bringing both exports and imports toward their long run equilibrium and that Ghana trade deficit is sustainable which means that Ghana exports would be able to pay for its imports in the long-run. Again since the provision by Husted was met, it indicates that the economy of Ghana is functioning properly, it satisfies its budget constraint, and therefore, is expected not to default on its debt (Hakkio and Rush, 1991).

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LIST OF ACRONYMS & ABBREVIATIONS

ADF	Augmented Dicker-Fuller
AIC	Akaike Information Criterion
AR	Autoregressive
ARDL	Autoregressive Distributed Lag
BOP	Balance of Payments
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Square
DOTS	Direction of Trade Statistics
ECF	Error Correction Factor
ECM	Error Correction Model
ERP	Economic Recovery Programme
FDIs	Foreign Direct Investments
GDP	Gross Domestic Product
IMF	International Monetary Fund
ISSER	Institute of Statistical Social and Economic Research
LDCs	Less Developed Countries
OLS	Ordinary Least Squares
PP	Phillips Perron
PSBR	Public Sector Borrowing Requirement
SAP	Structural Adjustment Programme
SBC	Schwarz Bayesian Criterion
UN	United Nations
VAR	Vector Autoregression
VECM	Vector Error Correction Model
WDI	World Development Indicators

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The existence of the long-run equilibrium or cointegration relationship between exports and imports has been empirically tested by many researchers. These include Arize (2002); Bahmani-Oskooee (1994); Bahmani-Oskooee and Rhee (1997); Herzer and Felcitas (2006); Irandoust and Ericsson (2004); and Narayan and Narayan (2005).

Cointegration between exports and imports implies that trade deficits are only a short term phenomena and thus sustainable in the long-run. This means that countries are not in violation of their intertemporal budget constraint, since their macroeconomic policies have been effective in bringing exports and imports into a long-run equilibrium.

Trade deficit refers to a situation where the merchandise imports of a country exceed its merchandise exports. The trade deficit of Ghana just like any other country is often viewed with great alarm and has attracted considerable attention from both policy makers and the public at large. Much of the uneasiness about the Ghana trade deficit can quite simply be attributed to the term "deficit" itself, which has negative connotations.

For most years, imports have exceeded exports in Ghana leading to a balance of trade deficit. A number of reasons have been given for this subdued growth in exports. The continuous

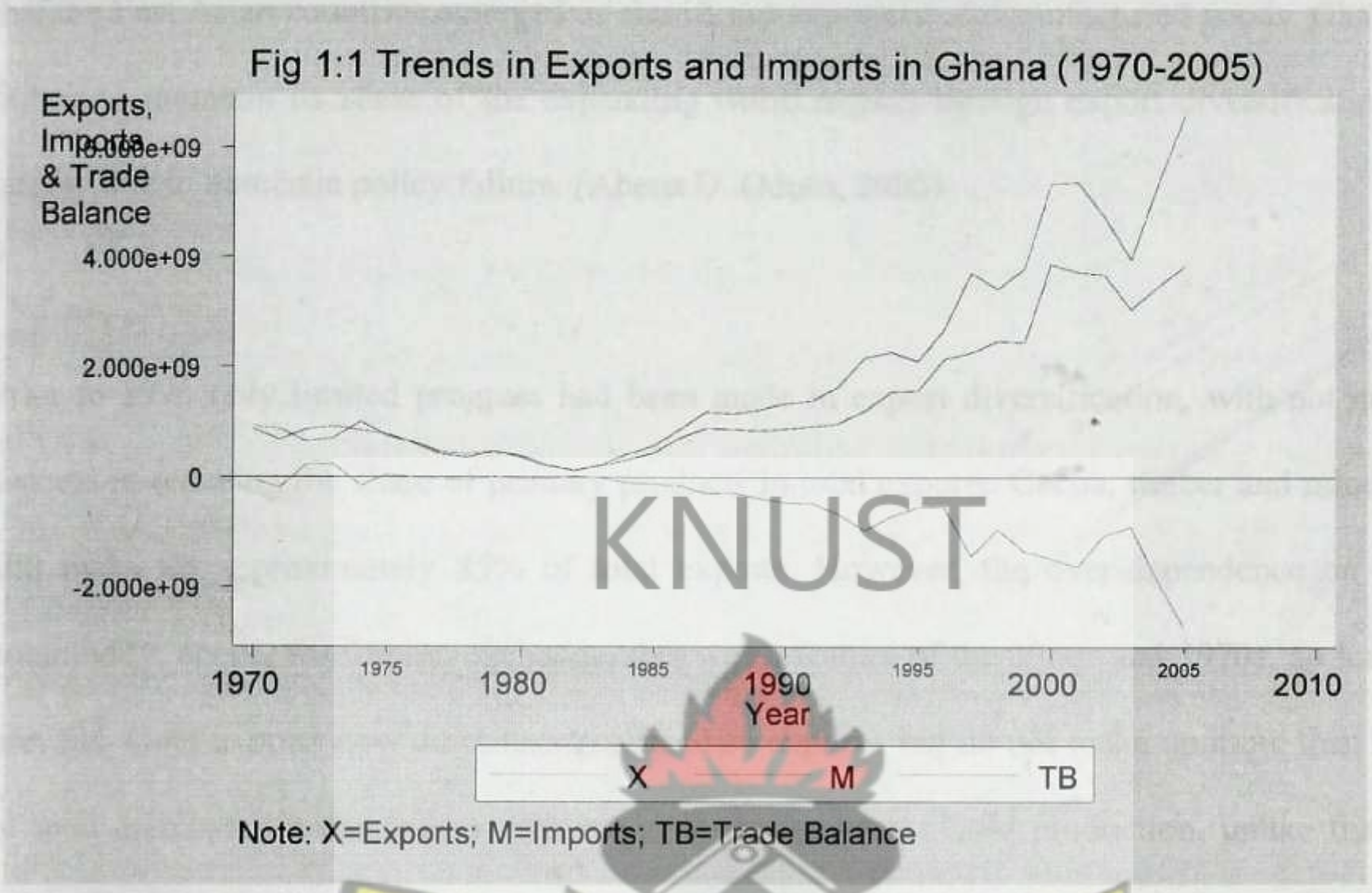
decline in world market prices for primary commodities, adverse weather conditions and low productivity in the agricultural sector have been some of the factors curbing export growth. The economy relies heavily on export receipts to finance imports of almost all investment goods used in capital formation.

Like most small developing countries, Ghana relies heavily on imports of machinery and transport equipment, energy and manufactured goods to facilitate its economic development. In the last decade, demand for machinery and transport equipment, energy, and manufactured goods has together accounted for 64 percent of total imports (Ademola Oyejide 2006). Strong demand for imports has often led to imbalances in Ghana external accounts.

1.2 Trends in Exports and Imports in Ghana

Figure 1.1 below shows that both imports and exports exhibit upward trend, albeit with fluctuations. The variables (exports and imports) exhibit the same long-run tendencies or trends. Both were low in the 1970's to mid 1980's, and have consistently been moving in an upward trend from 1984 to 2005, although they have been fluctuating. Although exports and imports differ, they appear to share a common stochastic trend. Because the trend in each individual series is eliminated by subtracting one series from the other the two series must have the same trend that is they have a common stochastic trend. Since imports and exports have a common stochastic trend then it means that they are cointegrated.

Figure 1.1



Source: Author's construct, (2008) using data from *DOTS (2005)* and *WDI (2004)*

The period 1970–1982 saw deterioration in the external trade sectors that became pronounced after 1975. A better picture of the state of the external trade sector can be obtained by examining trends in export and import volumes, trade ratio and the extent of export diversification. Both import volumes and the import to gross domestic product ratio registered continuous declines, particularly after 1974. The trend in the export to gross domestic product ratio declined, particularly from 1973. (Abena D. Oduro 2000)

The industrial countries are the major destinations of Ghana's exports, and this did not change dramatically during the period 1970-1982. Poor export performance cannot be wholly

explained by unfavourable conditions in the international economy. It was during the 1970s that the East Asian countries emerged as significant exporters of manufactured goods. Ghana's failure to maintain its share of the expanding world market through export diversification is largely due to domestic policy failure. (Abena D. Oduro, 2000)

Prior to 1995 only limited progress had been made in export diversification, with not much success in reducing the share of primary products in total exports. Cocoa, timber and minerals still make up approximately 85% of total exports. However, the over-dependence on one commodity, cocoa, for foreign exchange, that was a feature of the 1960s and 1970s, no longer prevails. Gold exports now dominate merchandise exports, but do not make up more than half of total merchandise earnings as did cocoa in earlier years. Gold production, unlike that of cocoa, is dominated by large transnational corporations; thus the increase in gross foreign-exchange flows from gold does not imply a commensurate increase in net flows because of profit repatriation and salary payments to expatriate staff. (Abena D. Oduro, 2002)

1.3 Statement of the Problem

Ghana's trade strategy after independence was import substitution industrialization, a strategy aimed at reducing the economy's dependence on trade. The period saw the establishment of state-owned Enterprise in critical sector of the economy and their involvement in almost every aspect of the economy, ranging from agro based industries to manufacturing companies. Unfortunately this policy could not be sustained following the overthrow of the first republic in 1966. Consequently, by 1970 the country's trade balance was in the deficit. But there was a quick reversal by 1972 and largely throughout the 1970's as the trade balance improved on the

back of increased domestic food production. The economic difficulties of the early 1980's precipitated the launch of the Economic Recovery and Structural Adjustment Programs with a view to addressing among others imbalances in the country's trade position. By 1986 Ghana's trade position had improved significantly resulting in a trade surplus of 0.25 percent of GDP. As exports earnings firmed and import eased, the trade balance improved. The 1990's saw the twin external shocks of rising crude oil prices and a collapse of prices of the country's main export commodities (cocoa and gold) and thus eroded any hopes of sustaining the early gains as the trade balance turned into deficit recording 5.0 percent of GDP in 1995, 10.29 percent in 1997, and 22.03 percent, in 1999.

However, 2004-2005 witnessed a worsening trade position as the trade deficit edged up from 23.96 percent of GDP in 2005 to 27.94 percent of GDP in 2007 a trend largely attributable to rising import bill. (Amoah et al 2007). As to whether the deficit can be sustainable or not is a question that needs to be considered, our imports continue to exceed our exports. Since all the indicators such as internationalization of modern economy, unfair trade barriers, loss of competition of domestic firms, low levels of savings and increase in oil prices which lead to the trade deficit are still in place and policy makers seems to do little about them or are incapable of rectifying the problem, Thus in the presence of chronic trade deficits, it has become imperative to examine whether these deficits are sustainable or not.

1.4 Objectives of Study

The main aim of this study is to examine whether trade deficit of Ghana is sustainable or not. Specifically the study will;

- Determine the extent to which exports and imports are cointegrated over the period under study.
- Examine effects of other economic variables on the trends of exports and the nature of relationship that exist between exports and foreign direct investment, exchange rate, gross domestic product and terms of trade.
- Examine the causal relationship between exports and imports.
- Explore the policy implications for managing the deficit.

1.5 Research Hypothesis:

H_0: Import does not Granger Cause Export.

H_1: Import Granger Cause Export.

H_0: Imports and exports are not cointegrated

H_1: Imports and exports are cointegrated

H_0: Economic variables do not influence the trends of exports values

H_1: Economic variables influence the trends of exports values

H_0: Trade Deficit is not sustainable

H_1: Trade Deficit is sustainable

1.6 Justification of Study

The findings of this paper would guide policy makers to come out with measures to eliminate

or reduce the deficit and its multiplier effect on the Balance of Payments (*BOP*) and the economy at large. It is anticipated that this study in terms of objectives and the methodology will add to knowledge. It will also serve as a basis for further research and a source of reference for students and other researchers.

1.7 Method of Study

1.7.1 Data Sources and Type

All data used in the analysis were gleaned from ISSER, Government Financial Statistics, Direction of Trade Statistics (DOTS), and Bank of Ghana Statistical Bulletin, World Bank, published articles and journals, textbooks and other relevant internet sources.

1.7.2 Data Analysis

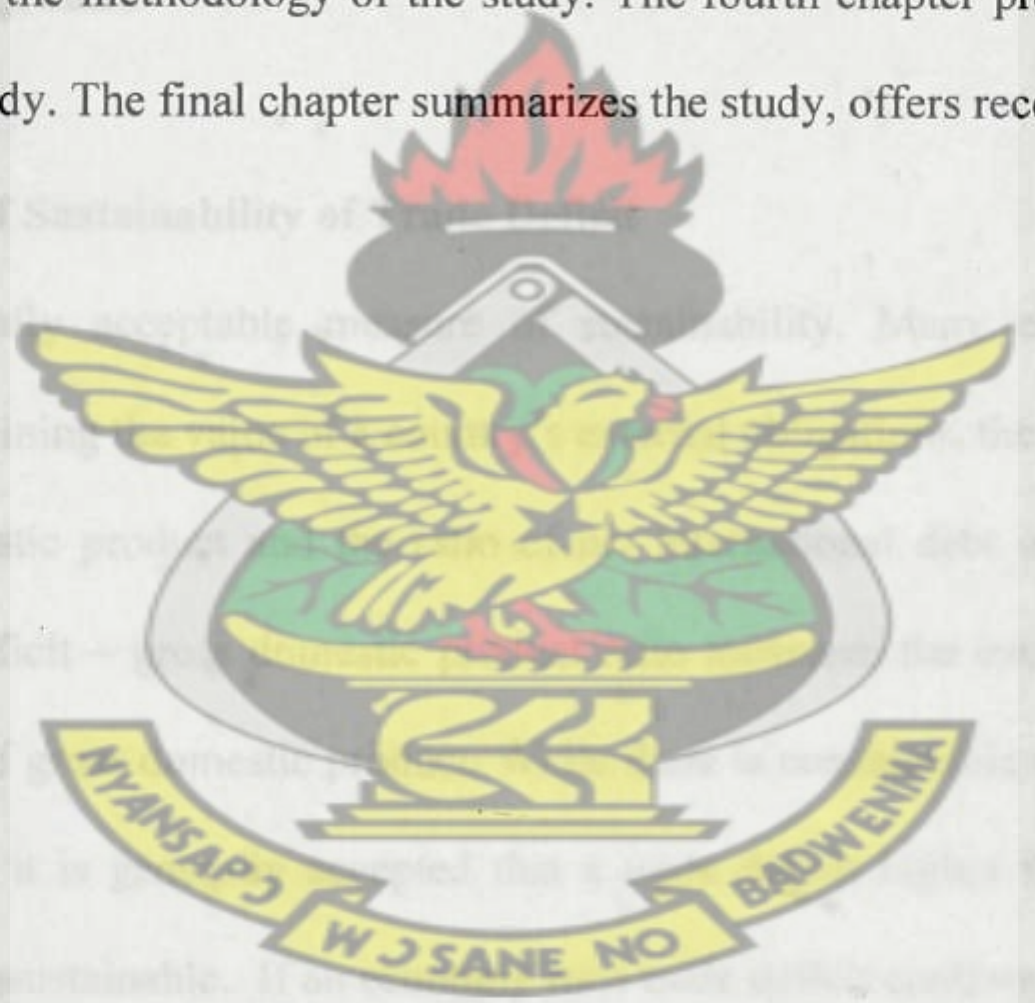
Data collected were analyzed both quantitatively and descriptively. Furthermore, the study tested for stationarity in the variables. Additionally, the Autoregressive Distributed Lag (ARDL) approach to cointegration was used to test for the possible long run relationship between exports and imports. Also the Wald's test of restriction was employed to ascertain whether the coefficient of imports is statistically different from one or not to confirm the sustainability of Ghana's foreign trade deficit. Furthermore, Granger causality tests were done to find the direction of causality, that is, whether imports granger causes exports or the reverse is true in estimating a long run relationship between exports and imports. Other variables would be regressed on exports to ascertain it imparts on exports.

1.8 Scope of the study

The research is limited to the period of 1970 to 2007. The choice of the study period depended on data availability and the fact that Ghana has undergone various trade reforms within that period.

1.9 Organization of the study

After this introductory chapter, the rest of the study is organized as follows; chapter two reviews the theoretical background as well as the empirical works done by other authors; chapter three outlines the methodology of the study. The fourth chapter presents the analysis and findings of the study. The final chapter summarizes the study, offers recommendations and concludes the study.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of empirical and theoretical review of issues concerning trade imbalances and its sustainability.

2.2 Theoretical Background

2.2.1 The Concepts of Sustainability of Trade Deficit

There is no universally acceptable measure of sustainability. Many economists judge sustainability by examining the value of a country's external obligations, the ratio of the trade deficit to gross domestic product and the ratio of net international debt to gross domestic product. The trade deficit – gross domestic product ratio measures the excess imports over exports as a fraction of gross domestic product. While there is considerable uncertainty about the precise threshold, it is generally accepted that a trade deficit higher than 5% of gross domestic product is unsustainable. If an economy runs trade deficit continuously, the foreign debt may become so large that foreign investor's lose confidence in the economy's ability to service it or, to repay the principal. If this situation occurs, the interest rates must rise or the currency must be depreciated to enable the country to continue finance its deficit.

Secondly, as noted by Rouging and Wachtel (1998), a country is not in the position of increasing its foreign debt faster than the real interest rate on this debt. They concluded by saying that "a country could then run a large trade deficit for a long period of time and remain solvent as long as there are surpluses at some point in the future". This also has an obvious implication of running a large foreign debt as long as the rate of increase is lower than the real interest rate.

Similarly, Milesi-Ferretti and Razin (1996) have maintained that sustainability depended on the country's willingness to pay and creditors willingness to borrow, making it even more difficult to use standard measures to predict sustainability assessments such as large imbalances relative to GDP.

Further to these measures, others have also developed empirical models to assess the vulnerability of developing and emerging economics to external shocks in addition to assessing the sustainability of the trade deficits.(Hakkio and Rush (1991) and Husted (1992). With developments in econometrics, mainly the concept of cointegration, the concept of 'sustainable' balances (imbalances) is somewhat empirical. Two approaches dominate the literature on these areas. The first approach examines if exports and imports are cointegrated. (Tang and Mohammed, 2005).

The second approach is about the stationarity property of current account. (Tang, 2006 and Chu et al., 2007) In their study, they adopted the theoretical model from Hakkio and Rush

(1991) and Husted (1992) to test for the sustainability of trade deficit. This approach looks at the long-run relationship between exports and imports in a particular country.

2.2.2 Trade Balance and Exchange rate relationship:

The elasticity model of balance of trade (Krueger, 1983) has shown the existence of a theoretical relationship between exchange rate and the trade balance. Generally the nominal depreciation (appreciation) of exchange rate is assumed to change the real exchange rate (Himarios, 1989) and thus has a direct effect on trade balance.

Bahmani-Oskooee (2001) noted that in an effort to gain international competitiveness and help to improve its trade balance, a country may adhere to devaluation or allow her currency to depreciate. Devaluation or depreciation increase exports by making exports relatively cheaper and discourage imports by making imports relatively more expensive, thus improving trade balance.

2.2.3 Effects of FDI on Exports – Theoretical Arguments

This section discusses theoretical arguments regarding the different potential effects of FDI on the host country's exports.

2.2.4 Theory of Multinational Enterprise

The theory of multinational enterprise (MNE) examines conditions under which firms may undertake foreign direct investment and become MNEs. (Markusen,2002). Such decisions may have consequences for host country's exports and it is a goal of this section to review parts of this theory which predict effects of inward FDI on host country's exports.

Overall, the theory indicates that positive effects of inward FDI on a host country's exports may be expected when the host country and a home country have different factor intensities. In this case, the MNE may outsource some segments of its production process to the host country and export these (intermediate) products back to the home country (as well as other countries). Similarly, when the host country has a cost advantage and costs of trade are low (as compared to the trade costs of the home country), the host country may be used by the MNE as an export platform for serving its home market, as well as other markets.

The starting point for the theory of multinational enterprise is the idea that firms must have certain advantages in order to become multinational companies.

Dunning (1993) organized these advantages in three basic groups: (1) *Ownership advantage* which refers to the case where the MNE has a product or a production process that provides it with market power in the foreign market, (2) *Location advantage* which indicates that the multinational needs to locate production abroad to maintain its competitive advantage, and (3) *Internalization advantage* which suggests that the MNE has an incentive to exploit its ownership advantage internally. In order to analyze the effects of FDI on a host country's exports, it is useful to distinguish between horizontally and vertically integrated multinational firms. (Helpman, 2006). In the case of horizontal integration, the MNE produces the same product in multiple plants located in more than one country, while vertical integration implies that different segments of the production process are carried out in different countries. Horizontally integrated firms often arise because of trade barriers in the form of tariffs ("tariff jumping investment"), or high transport costs.

The multinational firm basically faces the dilemma of either building an additional plant in the host country (FDI) to supply the host country's market, or exporting to host country from the (existing) plant in the home country. In a model with oligopoly competition, FDI is favored relative to exports (of home country) under three conditions: (i) high transport and tariff costs, (ii) relatively large firm-level economies of scale, compared to those of plant-level economies, and (iii) countries similar in size and their relative endowments (Markusen and Venables 1998; Markusen 2002, p. 103).

In the analysis of vertically integrated MNEs, which includes trade in intermediary products, models suggest that the production process is likely to be geographically fragmented if the countries have factor-price differences and the stages of production are associated with different factor intensities. (Zhang and Markusen, 1996) Since the segments of the production process occur in different countries, intermediate products need to be traded. As the portion of intermediate products produced by the foreign affiliates in the host country is typically shipped back to the home country (Zhang and Markusen 1999; Markusen 2002, p. 189), it is expected that FDI has a direct positive effect on host country's exports, which arises endogenously under specific conditions within the formal models of vertically integrated FDI.

Most of the models on multinational enterprise investigate the effect of FDI on trade flows between home and host countries. However, it is quite often that a foreign subsidiary of MNE is used to supply the markets of third countries. For example, an US MNE may set up a plant in Hungary and supply all the Central European markets from this production site. In this case, Hungarian exports to third countries would increase. Ekholm et al. (2003)

2.3 Empirical Review

Dr. Benjamin Amoah and Francis White LoLoh, (2009) The focus of their paper is to examine the nature and direction of the relationship between exports and imports in Ghana using unit root tests and cointegration techniques in a Vector Error Correction Framework. Their results indicate that there exists a long-run equilibrium relationship between exports and imports in Ghana. This finding implies that Ghana's trade policies have been effective in the long term. The Wald Restriction Test suggests that Ghana is not in violation of its international budget constraint. The causality test indicates absence of causation between exports and imports in the short run but they observe bidirectional causality between exports and imports in the long run.

Konya and Singh (2008) investigate the presence of an equilibrium relationship between the logarithms of Indian exports and imports between 1949 and 1950 and 2004 and 2005, using unit-root, cointegration approach. The results obtained indicate no-cointegration between exports and imports. They therefore conclude that Indian's macroeconomic policies have been ineffective in bringing exports and imports into long-run equilibrium and that India was in violation of her international budget constraint.

Nagvi and Kimio Morimune (2005) In their study by using quarterly data and employing cointegration method for trade flows of Pakistan, examined the long run relationship that exist between imports and exports of Pakistan. The result showed that both exports and imports are cointegrated and the slope coefficient on export is significant and close to unity. It implies the country is not in violation of its international budget constraint and despite short run fluctuations both exports and imports will converge in the long run towards equilibrium state. Therefore it is concluded that overall policies have been successful in bringing both exports

and imports toward their long run equilibrium. Thus the trade imbalance is sustainable in the long run.

In the case of Chile, Herzer and Nowak-Lehmann (2005) examine the long run relationship between exports and imports, using cointegration techniques that allow for endogenously determined structural breaks. They conclude that there exists long run equilibrium between exports and imports in Chile, indicating that Chile's macroeconomic policies have been effective in the long run and suggests that the country is not in violation of its international budget constraint.

Tang and Mohammad (2005) examine the presence of a long run relationship between imports and exports for 27 Organization of Islamic Conferences (OIC) member nations. The results of unit root and cointegration tests indicate that only four of them, namely Benin, Burkina Faso, Cameroun, and Guyana show a long run relationship between imports and exports. They conclude that exchange rate and macroeconomic policies may be effective to improve the countries' trade balances in the long run. For the other countries, they find no cointegration between their imports and exports, and conclude that they are in For Malaysia, Keong et al 2004) employ multivariate cointegration techniques to investigate the long run relationship between exports and imports. They demonstrate that exports and imports will converge towards equilibrium in the long run, which indicates, first, the effectiveness of Malaysia's long term macroeconomic planning in stabilizing the trade balance, and second, that Malaysian economy does not violate its inter-temporal budget constraint.

Using the bounds testing approach to cointegration, Nayaran and Nayaran (2004) explore the possibility of a long run relationship between exports and imports for Fiji and Papua New Guinea. They find evidence of unitary coefficient on exports, indicating that only Fiji satisfies its inter-temporal budget constraint. Violation of their international budget constraint and those other macroeconomic policies are unfavorable to the countries' external balances in the long run.

In the case of the US, Husted (1992) seeks to understand the history of the external imbalances by identifying the long run tendency of the current account balance and investigating its behaviour. The procedure that is adopted is to estimate cointegrating regressions between US exports and imports of goods and services. Estimates from cointegrating regressions between several measures of exports and imports show that up to about the end of 1983 the US current account balance tended toward zero. Since that time, there has been an apparent structural shift resulting in a long run tendency for a deficit in excess of $100 billion per year.

Utilizing cointegration analyses based on the Johansen (1995) likelihood-based inference cointegrating vector autoregressive models; Arize (2002) provides evidence on the long run convergence between imports and exports in 50 countries. He finds evidence in favour of cointegration in 35 of the 50 countries. His results suggest that countries in the regions of the Middle East, Latin America, and Europe have cointegrating relations that are more unstable than those in other regions

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the basic methodology of the empirical model of the study. The chapter consists of two sections. Section one is focused on the specification and the theoretical background of the operational model. This section also includes the time series properties of data and the econometric methods used in estimating the model. Section two provides the definitions of the variables used in the study and how they are measured.

3.2 The Simple Theoretical Model

The model starts with the budget constraint of an individual who is able to borrow and lend freely in the international market. The current-period budget constraint of this household is:

$$C_t = Y_t + B_t - I_t - (1+r_t)B_{t-1} \quad \ldots\ldots (1.1)$$

where C_t is current consumption; Y_t is output level; I_t is investment; r_t is the current world interest rate; B_t is the international borrowings; and $(1+r_t)B_{t-1}$ is the debt of the previous period, which corresponds to the country's external debt.

Because condition (2.1) must hold for every time period, the inter-temporal budget constraint is obtained by the summation of all individuals' budget constraint in the economy:

$$B_t = \sum_{t=1}^{\infty} \lambda_t TB_t + \lim_{n\to\infty} \lambda_n B_n \quad \text{..... (1.2)}$$

Where $TB_t = X_t - M_t \left(= Y_t - C_t - I_t\right)$ indicates the trade balance in period t, X_t is exports, M_t equals imports, $\lambda_0 = 1/(1+r_t)$ and is the discount factor defined as the product of the first values of λ. When the last term of equation (1.2) equals to zero, then a country's borrowing (lending) is exactly the same as the present value of the future trade surpluses (deficits).

We can derive the testable model by rearranging equation (1.1) as

$$Z_t + (1+r) B_{t-1} = X_t + B_t \quad \text{.....(1.3)}$$

Where $Z_t = M_t + (r_t + r) B_{t-1}$ and it is assumed that the world interest rate is stationary with unconditional mean r. According to Hakkio and Rush (1991), equation (1.3) can be expressed in more detail:

$$M_t + r_t B_{t-1} = X_t + \sum_{j=0}^{\infty} \lambda^{j-1} \left[\Delta X_{t+j} - \Delta Z_{t+j}\right] + \lim_{j\to\infty} \lambda^{t+j} B_{t+j} \quad \text{.....(1.4)}$$

Where $\lambda = 1/(1+r)$ and Δ is the first-difference operator. The left-hand side represents expenditure on imports as well as interest payments (receipts) on net foreign debt (assets). If X_t is subtracted from both sides of (1.4) and each side is multiplied by minus one, then the left-hand side becomes the country's current account.

Assuming both X and Z are I(1) variables (that is, they are non-stationary at level form), then equation (2.4) can be re-expressed as:

$$X_t = \alpha + MM_t - \lim_{j\to\infty} \lambda^{t+j} B_{t+j} + \varepsilon_t \quad \text{.....(1.5)}$$

Where $MM_t = M_t + r_t B_{t-1}$; $\alpha = \left[(1+r)^2 / r\right](\alpha_2 - \alpha_1)$ and $\varepsilon_t = \sum \lambda^{j-1}(\varepsilon_{2t} - \varepsilon_{t-1t})$. α is the drift parameter (possibly equal to zero) and ε_t are stationary process. From equation (1.5), since $j \to \infty$, then the limit term will become zero. Hence, equation (1.5) can be restated as a standardized regression:

$$X_t = \alpha + MM_t + \varepsilon_t \quad \text{.....(1.6)}$$

Where $MM_t = M_t + r_t B_{t-1}$ measures total imports of goods and services plus net unilateral transfers from other countries to Ghana, and X_t measures the total exports of goods and services to other countries. The necessary condition (weak form) for the economy to satisfy its intertemporal budget constraint is the existence of a stationary error structure, that is, ε_t in equation (1.6) should be an $I(0)$ process. On the other hand, failure to detect comovements between exports (inflow) and imports (outflows) would indicate the economy is not functioning properly and fails to satisfy its budget constraint, and therefore, is expected to default on its debt (Hakkio and Rush, 1991).

The necessary and sufficient condition (strong form) for the intertemporal budget constraint model is the existence of a vector (α, β) such that ε_t is a stationary process and $(\alpha, \beta) = (0, 1)$. In other words, if exports and imports are with cointegrating vector b= (1,-1), then the economy is said to satisfy its strong form of the intertemporal budget constraint in the long-run.

Equation (1.6) states that a country satisfies its inter-temporal budget constraint if the estimated coefficient of MM_t equals to unity $(b=1)$ and e_t is white noise disturbance term and stationary. If both the conditions are valid, then exports and imports are co integrated. Such a relationship would imply that the two series would never drift too far apart. Equation (1.6) above provides a useful framework for testing the sustainability of trade imbalances (deficit or surplus).

This study adopts a model used by Husted (1992). He developed a simple testable model for a small open economy. The economy is assumed to have three key features:

- an ability to produce and export a composite good;
- absence of government; and
- Consumers having access to international funds supporting the existence of a long run relationship between imports and exports.

The derivation of the testable model can be ascertained from above. The testable model is of the following form:

$$REXP_t = \alpha + \delta_1 RIMP_t + \varepsilon_t \quad \text{..... (3.2)}$$

This model can also be written as Arize (2002) puts as follows:

$$RIMP_t = \alpha + \delta_1 REXP_t + \varepsilon_t \quad \text{..... (3.3)}$$

Here *REXP* and *RIMP* refer to real exports and real imports respectively. α is constant which shows the degree of drift, δ_1 is the coefficient of the imports and ε_t shows the error term. According to this model, two conditions are necessary for an economy to maintain inter-temporal budget constraint. The necessary condition which constitutes the weak form of the model is the stationary of ε_t which is the error term. This means that there is a cointegration relationship between two variables, that is to say they act together in the long period. Failure to accomplish this condition indicates that the economy does not function as required and has not succeeded in maintaining the budget constraint. For this reason, it is expected that this economy cannot fulfill its foreign debt liabilities. The necessary and sufficient condition which constitutes the weak form of the model is the fact that δ_1 is statistically equal to 1 which is the slope coefficient in addition to the stationarity of ε_t.

Even if there is a cointegration relationship between exports and imports, it is necessary to look doubtfully on the sustainability of trade deficit (or surplus) if the slope coefficients obtained from the equations derived from exports and imports series is not equal to 1. The fact that the slope coefficient is lower than 1 in the equation (3.2) or the fact that the slope coefficient is higher than 1 in the equation (3.3) shows that the economy imports more than 1 dollar to get 1 dollar exports revenue. The fact that the slope coefficient is higher than 1 in the equation (3.2) or the fact that the slope coefficient is lower than 1 in the equation (3.3) shows that the economy imports less than 1 dollar for 1 dollar exports revenue. Trade deficit permanently grows in the first example while trade surplus permanently grows in the second example.

It should be noted that deficit sustainability in a weak sense means that the two series- exports and imports are moving together in the long run, but the coefficient on imports in Equation (3.2) is less than 1 (i.e. $\delta_1 < 1$). This is the same as saying that to generate ¢1 worth of exports the economy's imports exceed ¢1. At the outset, a ¢1 worth of exports generated from a ¢1 increase in imports given by δ_1 in Equation (3.2), provides the premise that the two series are moving together (i.e. cointegrated) and that, the closer the coefficient is to 1, the stronger is the sustainability of the deficit.

3.3 Cointegration Test

Cointegration was first introduced by Granger (1981) and Granger and Weiss (1983). It was extended and formalized by Engle and Granger (1987) in their seminal contribution. Cointegration describes the existence of an equilibrium or stationary relationship among two or more time-series, each of which is individually non-stationary. The advantage of the cointegration approach is that it allows one to integrate the long-run and short-run relationships between variables within a unified framework. More importantly, evidence of cointegration among the variables rule out the possibility of the estimated relationship being 'spurious'.

The bounds testing approach to cointegration involves two stages. The first stage is to establish the existence of a long-run relationship. Once a long-run relationship has been established, a two step procedure is used in estimating the long-run relationship. Investigating whether a

long-run relationship is present in Equations 3.2 and 3.3 is based on estimating the following unrestricted error correction (*UEC*) models:

$$\Delta \ln REXP_t = \alpha_{0X} + \sum_{i=1}^{n} \delta_{iX} \Delta \ln REXP_{t-i} + \sum_{i=0}^{n} \beta_{iX} \Delta \ln RIMP_{t-i} + \phi_{1X} \ln REXP_{t-1} + \phi_{2X} \ln RIMP_{t-1} + \varepsilon_{1t} \quad (3.4)$$

$$\Delta \ln RIMP_t = \alpha_{0m} + \sum_{i=1}^{n} \delta_{im} \Delta \ln RIMP_{t-i} + \sum_{i=0}^{n} \beta_{im} \Delta \ln REXP_{t-i} + \theta_{1m} \ln RIMP_{t-1} + \theta_{2m} \ln REXP_{t-1} + \varepsilon_{2t} \quad (3.5)$$

The F-test is used for testing the existence of long-run relationships. When a long-run relationship exists, the F test indicates which variable should be normalised. The null hypothesis of no cointegration amongst the variables in Equation 3.4 is ($H_0 : \phi_{1X} = \phi_{2X} = 0$) against the alternative hypothesis ($H_1 : \phi_{1X} \neq \phi_{2X} \neq 0$). This can also be denoted as $[F_X(X/M)]$. The null hypothesis for no cointegration amongst the variables in Equation 3.5 is ($H_0 : \theta_{1M} = \theta_{2M} = 0$) against the alternative hypothesis ($H_0 : \theta_{1M} \neq \theta_{2M} \neq 0$). This can be denoted as $[F_M(M/X)]$.

```q 1The F-test has a non-standard distribution which depends upon: (i) whether variables included in the *UEC* model are *I*(1) or *I*(0); (ii) the number of regressors; and (iii) whether the *UEC* model contains an intercept and/or a trend. Two sets of critical values are reported in Pesaran and Pesaran (1997) as well as in Pesaran et al. (2001). However, these critical values are generated for sample sizes of 500 observations and 1000 observations and 20,000 and 40,000 replications respectively. Given the relatively small sample sizes in our study (36 observations), this study will use the critical values generated by Narayan and Narayan (2004). The two sets of critical values provide critical value bounds for all classifications of the
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regressors into purely $I(1)$, purely $I(0)$ or mutually cointegrated. If the computed F-statistics fall outside the critical bounds, a conclusive decision can be made regarding cointegration without knowing the order of integration of the regressors. For instance, if the empirical analysis shows that the estimated F-statistic is higher than the upper bound of the critical values then the null hypothesis of no cointegration is rejected.

Once a long-run relationship has been established in the second stage, a further two-step procedure to estimate the model is carried out. First the orders of the lags in the *ARDL* model are selected using appropriate lag selection criteria such as the Schwartz Bayesian Criteria (*SBC*); and in the second step the selected model is estimated by the *OLS* technique.

3.4 Estimation Techniques

The analysis of the time series properties of the data is done in three stages. The first step is to verify the order of integration of the variables to ascertain the presence or otherwise of $I(2)$ variable. Standard tests for the presence of unit root based on the Dickey-Fuller (1979, 1981), and Phillip and Perron (1988) are used to examine the degree of the integration of the variables used in the export equation.

The second step is to apply the *ARDL* approach to cointegration to our model in order to find the long run relationship between exports and imports.

The third step is to estimate the granger causality test between exports and imports. The fourth step involves the utilization of the vector error correction model (*VECM*). We invoke the Engle-Granger theorem (1987) which states that in the presence of cointegration, there always

exists a corresponding error correction representation which implies that changes in the dependent variable are a function of the level of disequilibrium in the cointegrating relationship, captured by the error-correction factor (*ECF*), as well as changes in other explanatory variables to capture all short run relationships among the variables.

After adopting Husted to ascertain the sustainability of the trade deficit, other variables were added to show how exports would be increased in order to improve on Ghana's trade balance and if possible enter into trade surplus.

Therefore additional variables were added to the model represented as follows:

$$\ln REXP_t = \alpha + \beta_1 \ln RIMP_t + \beta_2 \ln RER_t + \beta_3 \ln RGDP_t + \beta_4 FDI + \beta_5 TOT + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots (3.6)$$

The model expresses real exports as a function of the real imports, real exchange rate, real gross domestic product, terms of trade and real foreign direct investment. Real foreign direct investment and terms of trade are not expressed in their natural logarithmic forms because of the negative figures recorded in some of the years. Equation 3.6 is our benchmark equation.

As standard macroeconomic theory suggests, relative prices are important in explaining a country's exports. Although previous studies use export prices, instead of real effective exchange rate index (*RER*), there is no comprehensive export prices series for the Ghana. We assume that Ghana is an open economy and a small country and hence exporters take prices as given. We believe that *RER* is an adequate alternative measure that captures the competitiveness of the country. Thus, our empirical specifications include the natural logarithm of *RER* to capture the influence of relative prices. The index of real effective exchange rate is constructed in a way that an increase in *RER* denotes a real appreciation of the currency. Thus, it is expected that the coefficient β_2 will be negative.

We include the natural logarithm of potential output (*RGDP*), which is a trend of real domestic *GDP*, as a proxy for supply capacity. This variable is expected to capture the effects of increased supply capacity (partly) due to *FDI* flows. An increase in real *GDP* is expected to boost business activities in the country and consequently increase the propensity to export goods. Thus the coefficient of *RGDP* is expected to be positive.

The coefficient of *FDI* variable takes into consideration the extent to which foreign direct investment contributes to increased potential output and consequently increases in exports. Thus, the coefficient of FDI is expected to be positive (i.e. β_2). Likewise, the terms of trade variable is expected to exert a positive influence on real exports

3.5 Data Sources and Definition

3.5.1 Data Sources

Yearly data frequency on trade flows spanning from 1970 to 2007 are utilized in the present analysis, hence providing a total of 38 observations. The data gathered were gleaned from IMF's Direction of Trade Statistics (DOTS) (various issues), International Financial Statistics (IFS) and Bank of Ghana Statistical Bulletin.

3.5.2 Variable Definitions

- **Exports**

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 labor and property income (formerly called factor services) as well as transfer payments. All the variables are expressed in domestic currency and converted into logarithm from prior to estimation. Since variables in the nominal terms conceal price effects therefore it was analyzed in real terms. In order to convert nominal variable into the correspondence variable in real terms, current values were deflated by the GDP deflator (2000 prices).

- **Imports**

Imports of goods and services represent the value of all goods and other market services received from 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 labor and property income (formerly called factor services) as well as transfer payments. In order to convert nominal variable into the correspondence variable in real terms, current values were deflated by GDP deflator (2000 prices).

- **Real Exchange Rate**

Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs.

- **Real Gross Domestic Product**

GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2000 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2000 official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

- **Real Foreign Direct Investment**

Foreign direct investment (net) shows the net change in foreign investment in the reporting country. Foreign direct investment is defined as investment that is made to acquire a lasting management interest (usually of 10 percent of voting stock) in an enterprise operating in a country other than that of the investor (defined according to residency), the investor's purpose being an effective voice in the management of the enterprise. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows in the reporting economy. Data are in

constant U.S. dollars.

- **Terms of Trade**

The terms of trade index shows the national accounts exports price index divided by the imports price index, with 2000 equaling 100.

CHAPTER FOUR

EMPIRICAL RESULTS, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents analyses and discusses the empirical results of the model outlined in the preceding chapter. Unit root, cointegration and Granger causality tests as well as trends in exports and imports in Ghana are all captured in this chapter.

4.2 Results of Unit Root Test

In other to examine the sustainability of trade deficit in Ghana, the stationarity or otherwise of the variables that enters the export function specified in section 3.2 of chapter three are determined. The stationarity test is based on the *ADF* test for unit root. The results of the unit root tests are presented in Table 4.1. The tests for stationarity are conducted using the log levels and the first differences of the variables in the export equation. The *ADF* test involves testing the null hypothesis of non-stationarity of the variables against the alternative hypothesis of stationarity.

The results of the unit root tests are presented in Table 4.1 below. The results indicate that the log level of exports is non stationary according to the *ADF* test, implying the non-rejection of the null-hypothesis of non-stationarity. Likewise all the other variables are non-stationary at their levels but become stationary at their first differences. This means they have a single unit

root. The combined results from the entire test suggest that all the variables are $I(1)$ in the levels but $I(0)$ in their first differences.

Table 4.1: Results of the Unit Root Tests

Panel A: Level		
Variable	**Augmented Dickey–Fuller**	
	Constant No Trend	Constant Trend
Data Period: 1970-2007		
lnREXP	−0.798719	−2.33179
lnRIMP	−0.472946	−1.95146
lnRGDP	1.64452	−1.63627
lnRER	−1.04091	−1.69874
TOT	0.531275	−3.38989*
FDI	0.946226	−0.61808
Panel B: First Difference		
Variable	**Augmented Dickey–Fuller**	
	Constant No Trend	Constant Trend
Data Period: 1970-2007		
ΔlnREXP	3.945446***	4.197717**
ΔlnRIMP	4.557458*	4.657325**

ΔlnRGDP	−2.78237*	−3.5696**
ΔlnRER	−2.83012*	−3.47109**
ΔTOT	−3.07313**	−3.50293**
ΔFDI	−4.57613***	−4.48142***

The null hypothesis is that the series is non-stationary. The rejection of the null hypothesis for *ADF* test is based on the MacKinnon critical values. ,** and *** indicate the rejection of the null hypothesis of non-stationary at 5% and 1% significance level, respectively

4.3 Cointegration Test (Bounds Test Results)

In the first step of the *ARDL* analysis, we test for the presence of long-run relationship in equation (3.3) using equation (3.4). As we use annual data, the maximum number of lags in the model was set equal to 1. The results of this bound test procedure for cointegration analysis between exports and imports are presented in Table 4.2.

Table 4.2: F-Statistics for Cointegration Relationship

Critical Value Bounds of the F-Statistic: intercept and no trend (Case II)						
K=1	10% Critical Level		5% Critical Level		1% Critical Level	
	I(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)
	3.247	3.773	3.990	4.590	5.757	6.483
Calculated F-Statistic:						
$F_X(X/M) = 3.8589$*					$F_M(M/X) = 6.5151$***	
K is the number of regressors.						

The calculated F- statistic reported in Table 4.2 is 3.8589 and is greater than the upper bound critical value of 3.773 at the 10 percent level, if export is the dependent variable. Thus the null hypothesis of no cointegration is rejected and there is a long run cointegration relationship amongst the variables. On the other hand, where import is the dependent variable, the calculated F-statistic reported is 6.5151 which is higher than the upper critical bound value of 6.483 at the 1 percent level, implying the rejection of the null hypothesis of no cointegration. All in all, there exists a long run relationship between exports and imports, which provides a weak form of sustainability of trade deficit in Ghana. An important advantage of the bounds-testing approach to cointegration is that it reveals exactly which variable should be the dependent variable in the proposed model. The results suggest that there is only a long run relationship between exports and imports when both imports and exports are the dependent variable. Therefore, there is the need to test for causality to ascertain which of the variables should be the dependent or otherwise. This information (i.e. Granger causality) is captured in section 4.6 in this chapter.

However, this is only a necessary condition for testing for sustainability of trade deficit. The sufficient condition is that the slope coefficient of imports be equal to unity. To establish this, we apply ARDL cointegration method to estimate the long run parameters from equation 3.4 and 3.5.

4.4 Results of the Long Run Relationship between Exports and Imports

The normalized long-run relationship between exports and imports presented in Table 4.3 is based on the conceptual framework in equation 3.2. The long run results indicate that the import coefficient is less than one and statistically significant at 1% level of significance. On the converse, the export coefficient is more than one and is also statistically significant at 1% level of significance.

Table 4.3: Estimated Long-Run Cointegrating Results (1970-2007)

ARDL(1,0) selected based on *SIC*			Dependent Variable: *lnREXP*	
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**P-Value**
Constant	2.0254	0.033256	26.8506***	0.000
lnRIMP	0.89294	0.69452	2.9163***	0.006

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

Table 4.4: Estimated Long-Run Cointegrating Results (1970-2007)

ARDL(1,1) selected based on *SIC*			Dependent Variable: *lnRIMP*	
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**P-Value**
Constant	-2.2145	1.4139	-1.5663	0.127
lnREXP	1.1191	.068409	16.3588***	0.000

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

As specified above, the existence of a cointegration relationship between imports and exports is not enough to state clearly that the trade deficit is sustainable. The slope coefficients obtained from the equations should also be equal to unity to put forth clearly that the trade deficit is sustainable. The results of the Wald tests are given which have been done to examine the slope coefficients obtained from the equations (3.2) and (3.3) is equal to 1 or not.

Table 4.5: Results of the Wald Tests of Restriction Imposed on Parameters

Coefficient	Equation	Null Hypothesis	χ^2 Statistic	P-Value
0.89294	$X_t = f(M_t)$	$H_0 : \delta_1 = 1$	2.1799	0.140
1.1191	$M_t = f(X_t)$	$H_0 : \delta_1 = 1$	5.1691**	0.023

** denotes 5% significance level.

It is found that, in the case where export is the dependent variable; the null hypothesis cannot be rejected, implying that the coefficient on imports is equal to unity. On the converse, where

import is the dependent variable; the results reveal that the null hypothesis can be rejected at 5% level of significance, implying that the coefficient on exports is not equal to unity.

Taken together, the results imply that, with cointegration relationship between exports and imports and the coefficient on imports equal to unity, there is evidence that both the necessary and sufficient conditions (strong form) for Ghana's inter-temporal budget constraint to hold are satisfied. The result is broadly consistent with the finding of Narayan and Narayan (2004). They found cointegration relationship for Fiji using annual data.

4.5 Results of the Short Run Vector Error Correction Model

Once the long-run cointegrating model has been estimated, the third step is to model the short-run dynamic parameters within the *ARDL* framework. The results of the short run dynamic equation of the relationship between exports and imports are presented in Table 4.6. It must be emphasized that, these results are based on the case where export is the dependent variable since both conditions underlying sustainability were satisfied.

From the table, it can be inferred that the coefficient on imports assumed the same sign as the long run coefficient and statistically significant at the 1 percent level. The error correction term (ECM_{t-1}) measures the speed of adjustment to restore equilibrium in the dynamic model in the case of a shock to the system.

Table 4.6: Estimates of the Short-Run Error Correction Representation

ARDL(1,0) selected based on *SBC*		Dependent variable: $\Delta \ln REXP_t$	
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**P-values**
Constant	1.4402	0.56282	2.5589**	0.015
$\Delta \ln RIMP_t$	0.63495	0.066465	9.5531***	0.000
ECM_{t-1}	−0.71107	−0.078351	9.0755***	0.000

$ECM = lnREXP - 0.89294*lnRIMP - 2.0254*C$

Model Criteria/Goodness of Fit			
R^2 0.97910		$\bar{R}^2$ 0.97780	
S.E. of Regression 0.13741		F-stat. F(2,32)	749.6669***
Akaike Info. Criterion 18.3726		Schwarz-BayesianCriterion	16.0395
DW-statistic 1.5204		Residual Sum of Squares	0.60422

The error correction coefficient has the expected negative coefficient and is highly significant, thus reinforcing the finding of long run equilibrium between exports and imports. The size of the error correction term (-0.71) indicates that about 71 percent of the deviation from equilibrium is corrected every year in the event of a shock to the system. Thus the speed of adjustment to equilibrium is relatively high.

4.6 Model Diagnostics and Parameter Stability

Apart from the statistical significance of the long and short run import parameter, the estimated model seem to be robust to various departures from standard regression assumptions in terms

of residual correlation, misspecification of functional form, non-normality and heteroscedasticity of residuals. This information is presented in Table 4.7 below.

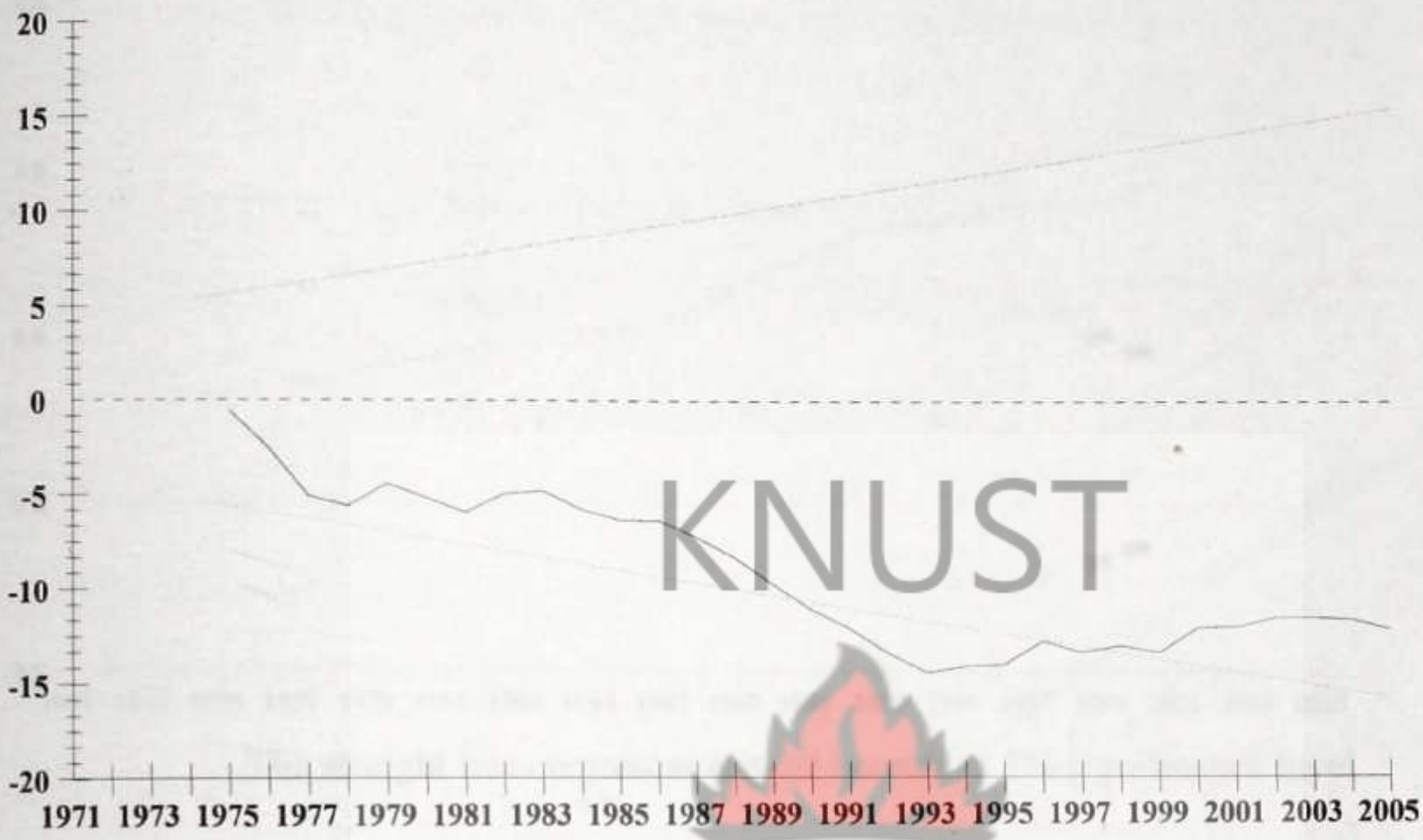
Table 4.7: Model Diagnostic Checking

Diagnostics	*Test Statistic*	*P-Value*
$F_{Auto}(1, 31)$	1.7796	0.192
$\chi^2_{Auto}(1)$	1.9002	0.168
$\chi^2_{Reset}(1)$	0.075684	0.783
$\chi^2_{Norm}(2)$	0.8660	0.648
$\chi^2_{White}(1)$	1.2816	0.258

χ^2_{Auto}, χ^2_{Reset}, χ^2_{Norm} and χ^2_{White} are Lagrange multiplier statistics for test of serial correlation, functional form misspecification, non-normal errors and heteroscedasticity, respectively. These statistics are distributed as Chi-square values with degree of freedom in parentheses. Values in parentheses [ ] are probability values.

A test of parameter stability was also conducted for the estimated model. The methodology used to test for stability of the parameter is the cumulative sum (*CUSUM*) and cumulative sum of squares (*CUSUMQ*) proposed by Brown et al (1975). If the plot of the *CUSUM* and *CUSUMQ* sample path moves outside the critical region, and in this case at 5 percent significant level; the null hypothesis of stability over time of the intercept and slope parameters is rejected (assuming the model is correctly specified). The plots of the *CUSUM* and *CUSUMQ* are presented in Figures 4.2 and 4.3 respectively.

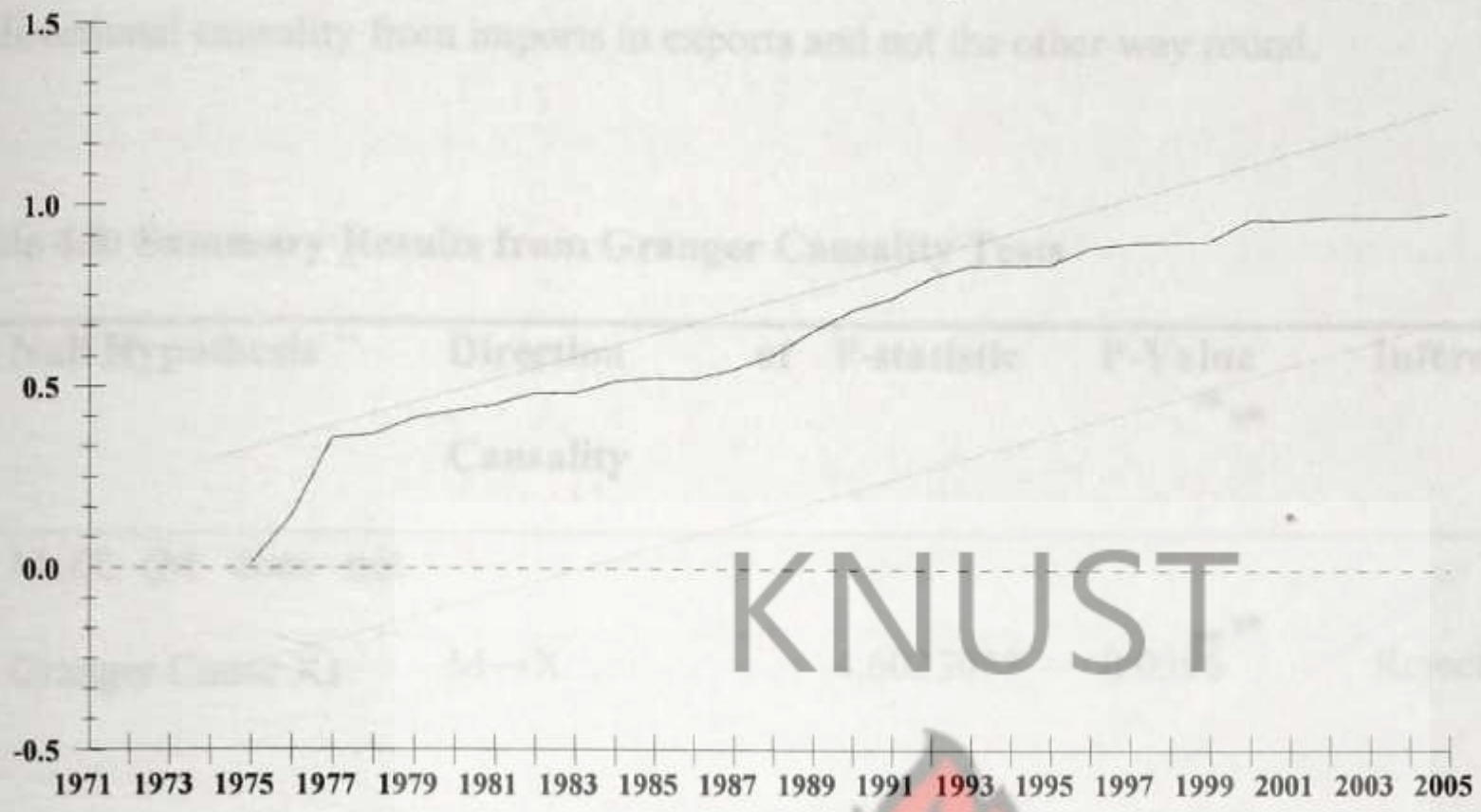
Fig 4.1: Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

The plot of the *CUSUM* indicates that the null hypothesis of parameter stability can be rejected at the 5 percent level of significance, implying that the estimated results obtained earlier are not stable over time. From the figure 4.2, the plot cuts the 5% critical bound during the 1990-1996 period. Thus, policy shifts occurred at times when the country had adopted the Structural Adjustment Programme (*SAP*) which might have affected the parameter within the estimation period. However, the plot of the *CUSUMQ* indicates that, the null hypothesis of parameter stability cannot be rejected at the 5% level of significance, implying that, the estimated results obtained are indeed stable over time.

Fig 4.2: Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

4.7 Granger Causality Test

The existence of a cointegration relationship among exports and imports suggests that there must be Granger causality in at least one direction, but it does not indicate the direction of temporal causality between the variables. Hence the justification for a bivariate Granger causality tests to be conducted to find out the direction of causality and possible feedback amongst the variables. Table 4.8 shows summary results of variable pairs for which the null hypothesis of Granger non-causality (M⊣X) is rejected. Based on the results presented in Table 4.8 below from the Granger causality tests, there is strong support for the notion that changes in the lagged values of imports cause changes in exports growth in the current year. In other words, the past values of imports can help predict more accurately the current values of export growth in Ghana. However, no causality could be found from the lagged values of export growth to the current values of import growth. That is, the null hypothesis that import does not

Granger cause growth in exports is rejected at the 5% significance level indicating a unidirectional causality from imports to exports and not the other way round.

Table 4.8: Summary Results from Granger Causality Tests

Null Hypothesis	Direction of Causality	F-statistic	P-Value	Inference
M⊣X (M does not Granger Cause X)	M→X	4.60230**	0.0396	Reject H_0
X⊣M (M does not Granger Cause X)	X⊣M	0.06225	0.8046	Do not reject H_0

** denotes rejection of null hypothesis at 5% significance levels respectively. → implies direction of causality. Number of Observation = 38

4.8 Results of the Multiple Regressions

In the preceding chapter, it was specified that apart from imports, other factors have the potential of affecting the exports of a country. Stated differently, the relationship between exports and imports outlined above seems too simplistic on the assumption that other factors affecting exports have been held constant. Hence the export model specified so far would be suffering from omitted variable bias, because some important explanatory variables have not been accounted for in the determination of the nation's exports.

As indicated in Table 4.1, all the variables of interest are integrated of order one, suggesting that we can apply the *ARDL* to our model since there is an absence of possible higher order integrated variables. Hence at the first step, the existence of cointegration amongst the variables was conducted using the bound testing procedure. The results are indicated in Table 4.9.

Table 4.9: Bounds Tests for the Existence of Cointegration

Critical Value Bounds of the F-Statistic: intercept and no trend (Case II)		
k=5	1% Critical Level	
	I(0)	*I*(1)
	2.448	3.418
Calculated F-Statistic:		
$F_X(X/M,RGDP,TOT,FDI,RER)$	3.7580***	

Notes: ***denotes statistical significance at the 1% level. *k* is the number of regressors.

The results suggest that, there exists a cointegrating relationship among the variables. Specifically, the F-statistic of 3.7580 exceeds the upper critical value of 3.418. Thus, the null hypothesis of no cointegration can be rejected at the 1% level of significance.

4.9 Results of the Long Run ARDL Model of Export in Ghana

Since real export and its determinants are cointegrated, the long-run parameters of the ARDL model are estimated and the results presented in the Table 4.10. The long-run ARDL model

was estimated based on the Schwarz Bayesian Information Criterion (SBC) using a lag of one given the annual nature and relatively short sample properties of the data.

Table 4.10: Estimated Long-Run Coefficients using the ARDL Approach

ARDL(0,0,1,0,1,0) selected based on *SBC*			Dependent variable: *lnREXP*	
Regressor	***Coefficient***	***Standard Error***	***T-Ratio***	***P-values***
Constant	8.1973	6.3542	1.2901	0.207
lnRIMP	0.61792	0.12244	5.0465***	0.000
TOT	−0.1284E	0.1639E-9	−7.8344***	0.0008
lnRGDP	0.026992	0.38841	0.069493	0.945
FDI	0.3517E-9	0.1420E-9	2.4758**	0.019
lnRER	−0.61792	0.021935	−2.0185*	0.053

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

As shown in Table 4.10 above, most of the estimated coefficients have their expected theoretical or hypothesized signs with the exception of the terms of trade variable, although not all are statistically significant. Specifically, the results confirm that the exchange rate appreciation has the potential of reducing our exports as indicated by the negative coefficient of the real exchange rate variable. This means that in the long-run a 1% appreciation of the cedi reduces real exports by 0.62%.

The results also suggest that an increase in foreign direct investment also invariably increases the exports of the country. The variable is also statistically significant at the 5% level suggesting the importance of foreign direct investment on the Ghanaian economy.

The short run dynamic results are also presented in Table 4.11 below. The results corroborate most of the results from the long-run in terms of statistical significance and a prior signs. The coefficient of the real imports in the dynamic export equation is positive and significant at 1% level of significance. This is consistent with the result of the long-run export equation.

The coefficient of the real GDP in the dynamic export equation is positive and statistically insignificant. The result is perverse in the sense that real GDP exerts a positive impact on real exports albeit statistically insignificant. Nonetheless, it is expected that, growth in real GDP will increase the propensity to export. The result is consistent with the result of the long-run export equation.

Table 4.11: Estimated Short-Run Coefficients using the ARDL Approach

ARDL(0,0,1,0,1,0) selected based on *SBC*			Dependent variable: ln*REXP*	
Regressor	***Coefficient***	***Standard Error***	***T-Ratio***	***P-values***
Constant	8.1973	6.3542	1.2901	0.207
Δln*RIMP*	0.61792	0.12244	5.0465***	0.000
Δ*TOT*	−0.7943	0.1496E-9	5.3099***	0.0009
Δln*RGDP*	0.026992	0.38841	0.069493	0.945
Δ*FDI*	0.3517E-9	0.1420E-9	2.4758**	0.019
Δln*RER*	−0.20991	0.066399	3.1614***	0.004
ECM_{t-1}	−0.48984	0.10441	4.6914***	0.000

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

*ECM = lnREXP − 0.61792*lnRIMP + 0.1284E-8*TOT + 0.026992*lnRGDP + 0.3517E-9*FDI + 0.3517E-9 − 8.1973*C*

Model Criteria/Goodness of Fit			
R^2	0.96736	$\bar{R}^2$	0.95948
S.E. of Regression	0.10032	F-stat. F(7, 29)	122.7662 [0.000]
Akaike Info. Criterion	29.0824	Schwarz Bayesian Criterion	22.6388
DW-statistic	2.1854	Residual Sum of Squares	0.29188

Diagnostics	***Test Statistic***
$F_{Auto}(1, 28)$	0.5786 [0.453]
$\chi^2_{Auto}(1)$	0.7491 [0.387]

$\chi^2_{Reset}(1)$	0.9805 [0.322]
$\chi^2_{Norm}(2)$	1.5466 [0.461]
$\chi^2_{White}(1)$	1.2056 [0.272]

χ^2_{Auto}, χ^2_{Reset}, χ^2_{Norm} and χ^2_{White} are Lagrange multiplier statistics for test of serial correlation, functional form misspecification, non-normal errors and heteroskedasticity, respectively. These statistics are distributed as Chi-square values with degree of freedom in parentheses. Values in parentheses [ ] are probability values.

From the value of the R^2 and Adjusted R^2 shows that about 97% of the independent variables are explained by the dependent variable. The model diagnostic test below shows that it has a good fit and robust. Apart from the statistical significance of the parameters, the estimated model seem to be robust to various departures from standard regression assumptions in terms of residual correlation, misspecification of functional form, non-normality and heteroscedasticity of residuals. This information is presented in Table 4.11. The results indicate that, the model does not suffer from autocorrelation, heteroscedasticity, and the residuals are normally distributed. Finally, the model is correctly specified according to the Ramsey Reset test.

CHAPTER FIVE

SUMMARY OF FINDINGS, POLICY IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

5.1 Summary of Major Findings

The study revealed a cointegration relationship between exports and imports and between exports and the other explanatory variables.

Furthermore, the long run cointegration results showed that import coefficient had the expected positive sign and statistically significant. The Wald's restriction test conducted on the coefficient suggested that the import coefficient was no different from one. In other words, the import coefficient is unity, thus confirming the sustainability of Ghana's trade deficit in the long run.

Moreover, the short run error correction model also revealed intriguing results. The coefficient of the error correction factor indicated that the speed of adjustment to long run equilibrium in the event of a shock is relatively high. It was also found that, the parameters were stable using the *CUSUMQ* test but were not when we used the *CUSUM* test.

GDP exerts a positive impact on real exports albeit statistically insignificant. Nonetheless, it is expected that, growth in real GDP will increase the propensity to export.

The results also suggest that an increase in foreign direct investment also invariably increases the exports of the country.

5.2 Recommendation, Policy Implications and Conclusion

The empirical results obtained provide essential information for policy formulation and implementation. Empirical findings obtained in the long run showed cointegration relationship for trade flows. In other words, we found strong evidence that Ghana's trade deficit is sustainable over the long run. Hence, there is no danger that the current deficit will explode. Indeed, the strong form of sustainability condition was found, suggesting that Ghana's trade with the rest of the world is on the sustainable path in governing trade flows performance.

In this paper, we estimate the impact of FDI inflows GDP, TOT, Real exchange rate on export performance in Ghana. Foreign direct investment can contribute to higher exports by increasing supply capacity and/or through FDI-specific effects as multinational enterprises may have better knowledge about foreign markets, superior technology, lower production costs, and better ties to the supply chain of the parent firm than do local firms. It is important to distinguish between these types of effects, since the supply-increasing effects may arise as a consequence of domestic investment as well, making an FDI promoting policy reluctant in the absence of FDI-specific impact.

We find that, during 1996-2004, FDI inflows contributed to higher supply capacity in the countries, leading to more exports. Our results have important implications for policymakers and other less development economies.

First, our results support the notion that the MNE has important advantage over local firms that it brings to the host economy. Hence, policymakers need to support FDI inflows by designing appropriate polices and reforms.

The results from the above analysis show that there is cointegration between exports and imports. Cointegration between imports and exports tell us about the state of the economy is working properly.

This implies that sustained external balances are the outcome of distinct markets, or 'good policy'. However, given the current global environment, the external balance is determined not only by trade balance, but also by the balance in the services and payments sector. This is more relevant to countries like Ghana, where services exports and private remittances are very significant part of the current account

We recommend that specific attention should be given to the textiles/garments, wood and wood processing, food and food processing and packaging industries for support in accessing the EDIF for rehabilitation and retooling. The government must also supports industries with export potential to overcome any supply-based difficulty by accessing EDIF and rationalise the tariff regime in a bid to improve their export competitiveness.

An important issue that we did not study in this paper is the impact of FDI inflows on import behavior. If the FDI is a substitute for imports of goods or services, it should further improve

the balance of trade of the host country by reducing imports. We believe that this is an important research agenda that we plan to tackle in the near future.

5.3 Conclusion

The aim of this study was to apply recent developments in time series econometrics to investigate whether exports and imports are cointegrated and that trade deficit in Ghana tends to be sustainable or not and further look at how best Ghana can improve on its trade balance and possible enter into surplus. The bounds testing approach to cointegration developed by Pesaran et al (2001) within an unrestricted error correction model was used to investigate the above issue. The bounds testing approach has a number of advantages over the widely used Johansen and Juselius (1988, 1990) approach in investigating whether exports and imports are cointegrated. Foremost among these, the bounds-testing approach provides robust results in small sample sizes and does not require a priori knowledge of the integration properties of the variables. Furthermore, Pesaran et al (2001) show that with the ARDL framework, the ARDL-based estimates of the long-run coefficients are super consistent in small sample sizes.

The finding of cointegration between exports and imports is an indication of 'weak' sustainability of trade deficits. Empirical evidence supporting a 'strong' form of sustainability is when there is evidence of cointegration between exports and imports and the coefficient on the import variable is unity. The results for Ghana indicate that the long-run coefficient is unity. The results suggest that for every cedi acquired by imports, exports increase by around 0.89 pesewas.

BIBLIOGRAPHY

Abena D. Oduro (2000) "Performance of the External Trade Sector since 1970"Economic Reforms in Ghana the Miracle and the Mirage

Ademola Oyejide (2006): 'African Trade Investment and Exchange Rate Regimes and Incentives for Exporting'. Frame Work Paper for the AERC Collaborative Research Project.

Apergis N, Katrakilidis KP and Tabakis NM (2000). Current Account deficit sustainability: the case of Greece. *ApplEconLett*7:599–603.

Attacking Africa's Poverty World Bank (2005) 19.Oxford Review of Economic Policy 1996 (vol, 12 no.2)

Arize, A.C (2002) "Imports and Exports in 50 Countries: Tests for Cointegration and Structural Breaks", International Review of Economics and Finance, 11, pp. 101-115.

Aryeetey E., Harrigan J. and Nissanke M. (2000): "Economic Reforms in Ghana The Miracle and The Mirage".

Baharumshah, A. Zubaidi. (2001): "The Effect of Exchange Rate on Bilateral Trade Balance: New Evidence from Malaysia and Thailand". *Asian Economic Journal*, **15**, (3):291-312.

Baharumshah, A. Z., E. Lau and S. Fountas (2003) "On the Sustainability of Current Account Deficits: Evidence from Four ASEAN Countries", Journal of Asian Economics, 14, pp. 465-grated?", International Economic Journal, 11, pp. 109-114.

Bahmani-Oskooee M. (1991): "Is there a long-run relationship between the trade balance and the real effective exchange rate o LDCs?" *Economics Letters*, 36:403- 407.

Bahmani-Oskooee, M. (1994): "Are imports and exports of Australia cointegrated?" Journal of Economic Integration, 9, 525-533.

Bahmani-Oskooee, M. and H-J. Rhee (1997): "Are Exports and Imports of Korea Cointegrated? International Economic Journal, 11, 109-114.

Bahmani-Oskooee M (2001) Nominal and real effective exchange rate of Middle Eastern Countries and their trade performance Applied Economics 33, 103-111

Bariyah, N. and Lau, E. (2008): "Long Run Sustainability of Sarawak-West Kalimantan Cross – Border Trade flows" Munich Personal RePEc Archive.

Broadman HG (2005), From disintegration to reintegration—Eastern Europe and the former Soviet Union in international trade. The World Bank, Washington.

Barrios, S., Görg, H. and Strobl, E. 2005, "Foreign direct investment, competition and

industrial development in the host country", *European Economic Review* 49, pp. 1761- 1784.

Barry, F. and Bradley J. 1997, "FDI and Trade: The Irish Host-Country Experience", *The Economic Journal* 107, pp. 1798-1811.

Brada, J., Kutan, A. M., and Yigit, T. 2006, "The Effects of Transition and Political Instability on Foreign Direct Investment Inflows: Central Europe and the Balkans", *Economics of Transition,* 14, pp. 649–680.

Centre for International Economics (2002): "Potential Economic Impacts of an HIV/AIDS Epidemic in PNG, Report Prepared for AUSaid, Canberra.Available online at http://www.ausaid.gov.au/ publications/pdf/hivaids_png.pdf.

Constantin Zamin (2004): "The Sustainability of foreign trade deficit" In case of Serbia Montenegro.

Dobell, G. (2003): "The South Pacific: Policy Taboos, Popular Amnesia and Political Failure", Pacific Economic Bulletin, 18, pp. 16-30.

Duncan, R. and S. Chand (2002): *"The Economics of the 'Arc of Instability"*, Asian Pacific Economic Literature, 16, pp. 1-9.

Duncan, R. and T. Lawson (1997) *"Cost Structures in Papua New Guinea,"* Discussion Paper No. 69, Institute of National Affairs, Port Moresby.

Engle, R.F. and C.W.J. Granger (1987) *"Cointegration and Error Correction Representation: Estimation and Testing"*, Econometrica, 55, pp. 251-276.

Erbaykal, E., and Karaca, O. (2008): *"Is Turkey's Foreign Deficit Sustainable? Cointegration Relationship between Exports and Imports"* International Research Journal of Finance and Economics ISSN 1450 2887 Issue 14

Ekholm, K., Forslid, R. and Markusen, J.R. 2003, *"Export-Platform Foreign Direct Investment"*, NBER Working Paper No. 9517.

Fan, E. X. 2002, *"Technological Spillovers from Foreign Direct Investment – A Survey"*, Asian Development Bank working Paper No. 33.

Fountas, S. and J.L. Wu (1999) *"Are the US Current Account Deficits Really Sustainable?"* International Economic Journal 13, pp. 51-58.

Frimpong, J. M. and Oteng-Abayie E. F. (2006): *"Aggregate Import demand and Expenditure Components in Ghana"* An Econometric Analysis. MPRA

Görg, H. and Greenaway, D. 2004, *"Much Ado About Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?"*, *World Bank Research Observer* 19, pp. 171- 197.

Hakkio, C.S. and M. Rush (1991a) *"Cointegration: How Short is the Long-run?"* Journal of International Money and Finance, December, pp. 571-581.

Horstmann, I.J., and Markusen, J.R. 1992, *"Endogenous market structures in international trade (natura facit saltum)", Journal of International Economics* 32, pp. 109-129.

Himarios, D. (1989) *"Do devaluation improve the trade balance?"* The evidence revisited-Economic Inquiry, 143-167

International Monetary Fund (1948-2005): "Direction of Trade Statistics" CD ROM

ISSER (1991, 1994, 2005): *"The State of the Ghanaian Economy"*, ISSER. University of Ghana, Legon (various issues).

Oduro Abena (2000), "*Performance of External Trade since 1970 in Aryeetey,Ernest,Jane Harrigan and Machileo Nissande(eds),Economic Reforms in Ghana. The Miracle and The Mirage."* Woeli Publishing Services Accra 168-184

Jebuni. C. D., Oduro A. D., Ashanti, Y. and Tsikata, G. K. (1992) *"Diversifying Exports. The Supply Response of Non-Traditional Exports to Ghana's Economic Recovery Programme"* London: Overseas Development Institute/University of Ghana.

Hakkio CS and Rush M (1991): *"Is the budget deficit "too large?" Econ Enquiry* 29: 429–445

Husted S (1992): "*The emerging U.S. current account deficit in the 1980s: a Cointegration Analysis".* Rev Econ Stat 74: 159–166

Herzer, D. and Nowak- L ehmann, F. (2006) *"Is there a long-run Relationship between Exports and Imports in Chile?"* Applied Economics letters, 13, 981- 986.

Hakkio, C.S. and M. Rush (1991b) *"Is the Budget Deficit Too Large?",* Economic Inquiry, 29, pp. 425-429.

Hansen, B.E. (1992): *"Tests for Parameter Stability in Regressions with I(1) Processes",* Journal of Business and Economic Statistics, 10, pp. 321-335.

Helpman, E., Melitz, M.J. and Yeaple, S.R. 2004, "Export Versus FDI with Heterogeneous Firms", *American Economic Review* 94, pp. 300-316.

Helpman, E. 2006, *"Trade, FDI and the Organization of Firms",* NBER Working Paper No.12091.

Keshab R. Bhattarai and Mark K. Armah (2005) "The Effects of Exchange Rate on the Trade Balance in Ghana Evidence from Cointegration Analysis"

Krueger, A.D. (1983) *"Exchange rate determination"* Cambridge University Press.

Naqvi and Kimio Morimune, (2005): *"Empirical Analysis of the Sustainability of Trade Deficit of Pakistan"* Interfaces for Advanced Economic Analysis-Discussion Paper, No 072.

Irandoust M and Ericsson J(2004). *"Are imports and exports cointegrated? an international comparison". Metroeconomica* 55: 49–64

Lori L. Leachman and Michael Thorpe (1998) *"Intertemporal solvency in the small open Economy of Australia"* The Economic Record Vol. 74, No. 226.

Lumsdaine, R.L. and Papell, DH (1997): *"Multiple trend breaks and the unit-root hypothesis". RevEconStat*79:21182–2

Markusen, J.R. 1995, *"The Boundaries of Multinational Enterprises and the Theory of International Trade", The Journal of Economic Perspectives* 9, pp. 169-189.

Markusen, J.R. and Venables, A.J. 1998, *"Multinational Firms and the New Trade Theory", Journal of International Economics* 46, pp. 183-203.

Markusen, J.R. and Venables, A.J. 1999, *"Foreign direct investment as a catalyst for industrial development", European Economic Review* 43, pp. 335-356.14

Markusen, J.R. and Venables, A.J. 2000, *"The Theory of Endowment, Intra-Industry and Multinational Trade", Journal of International Economics* 52, pp. 209-234.

Markusen, J.R. 2002, *"Multinational Firms and the Theory of International Trade,"* Cambridge: MIT Press.

Melitz, M. 2003, *"The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", Econometrica* 71, pp. 1695-1725.

Narayan P.K and Narayan S (2005). *"Are exports and imports cointegrated? Evidence from 22 least developed countries". ApplEco*

Narayan, P.K. (2003) *"A Sugarcane Production Model for Fiji, 1970-2000"*, Economic Analysis and Policy (forthcoming).

Narayan, P.K. and S. Narayan (2004) *"Determinants of Demand for Fiji's Exports: An Empirical Investigation",* The Developing Economies (forthcoming).

Narayan, P.K. and R. Smyth (2004) *"Trade Liberalisation and Economic Growth in Fiji: An Empirical Assessment Using the Bounds Testing Approach",* Journal of the Asia Pacific Economy (forthcoming).

Pesaran, M.H. and B. Pesaran (1997) *"Working with Microfit 4.0: Interactive Econometric Analysis"* (Oxford: Oxford University Press).

Pesaran, M. H. and Y. Shin (1999) *"An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis" in S. Strom, (ed.) Econometrics andEconomic.Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*" (Cambridge: Cambridge University Press).

Pesaran, M.H., Y. Shin and R. Smith, (2001)*"Bounds Testing Approaches to theAnalysis of Level Relationships",* Journal of Applied Econometrics, 16, pp. 289-326.

Perron, P. (1994): *"Trend, unit root and structural change in macroeconomic time series". In: Rao, BB (eds) Cointegration for the applied economist, pp 113–146".* St. Martin's Press, New York

Rutkowski, A., 2006, *"Inward FDI and Financial Constraints in Central and East European Countries"Emerging Markets Finance and Trade*, 42, pp. 28-60.

Stock, J.H and Watson, M.W. (1993) *"A Simple Estimator of Cointegrating Vectors in Higher Order Integrated System,"* Econometrica, 61, 783-820.

Shiller, R. and P. Perron (1985): *"Testing the Random Work Hypothesis: Power versus Frequency of Observation"*, Economics Letters, 18, pp. 381-386.

Sun, H. 2001, *"Foreign Direct Investment and Regional Export Performance in China"*, *Journal of Regional Science* 41, pp. 317-336. Journal of the American Statistical Association, 83, pp. 1097-1107.

Trehan, B. and Walsh, C.E. (1991): *"Testing intertemporal budget constraints: theory and applications to U.S. federal budget and current account deficits". J Money Credit Bank* 23: 206-223

Tang, T.C. and Mohammad Haji Alias (2005) *"Are imports and exports of OIC member countries cointegrated? An empirical study,"* Labuan Bulletin of Interntional Business and Finance 3, 33- 47

Tang, T.C. (2007) *"An Empirical Investigation On The Sustainability Of The Japan's Bilateral Imbalance,"* International Journal of Business and Society, 8, 20-37

Tang, T.C. (2006): *"A new approach on examining the sustainability of external imbalances: A case of Japan"*. Applied Economics Letters, 13, 287-292.

UNCTAD 1999, *"World Investment Report: Foreign Direct Investment and the Challenge of Development, New York and Geneva:"* United Nations.

Walkenhorst. P. 2004, *"Economic Transition and the Sectoral Patterns of Foreign Direct Investment", Emerging Markets Finance and Trade*, 40, pp. 5-26.

Zhang, K.H. and Markusen, J.R. 1999, *"Vertical Multinationals and Host-Country Characteristics", Journal of Development Economics* 59, pp. 233-252.

Zhang, K.H. and Song, S. 2000, *"Promoting Exports: The Role of Inward FDI in China", China Economic Review* 11, pp. 385-96.15

APPENDIX A

FULL RESULTS OF THE ARDL ESTIMATION

Autoregressive Distributed Lag Estimates

ARDL (1, 0) selected based on Schwarz Bayesian Criterion

****

Dependent variable is LNX

35 observations used for estimation from 1971 to 2005

****

Regressor	Coefficient	Standard Error	T-Ratio [Prob]
LNX (-1)	0.28893	0.078351	3.6876 [0.001]
LNM	0.63495	0.066465	9.5531 [0.000]
C	1.4402	0.56282	2.5589 [0.015]

****

R-Squared	0.97910	R-Bar-Squared	0.97780
S.E. of Regression	0.13741	F-stat. F (2, 32)	749.6669[.000]
Mean of Dependent Variable	20.6905	S.D. of Dependent Variable	0.92218
Residual Sum of Squares	0.60422	Equation Log-likelihood	21.3726
Akaike Info. Criterion	18.3726	Schwarz Bayesian Criterion	16.0395
DW-statistic	1.5204	Durbin's h-statistic	1.6011[0.109]

****

Diagnostic Tests

****

* Test Statistics	LM Version	F Version
* A: Serial Correlation	CHSQ (1) = 1.9002[0.168]	F (1, 31) = 1.7796 [0.192]
* B: Functional Form	CHSQ (1) = 0.075684[.783]	F (1, 31) = 0.067180 [0.797]
* C: Normality	CHSQ (2) = 0.8660[.648]	Not applicable
* D: Heteroscedasticity	CHSQ (1) = 1.2816[.258]	F (1, 33) = 1.2543 [0.271]

****

A: Lagrange multiplier test of residual serial correlation

B: Ramsey's RESET test using the square of the fitted values

C: Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values

APPENDIX B

SUMMARY STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
Lnx	36	20.68755	0.9090818	18.65912	22.08255
Lnm	36	20.91454	1.03526	18.54507	22.61187

ort value index (2000=100)	Import value index (2000=100)	Terms of trade index (2000=100)	Foreign investment, net (BoP, current U
0843978	18.96929512	155.5589683	67,800,000
6657323	22.68870449	112.6841475	30,600,000
1028475	21.60419785	117.1544758	11,500,000
7280616	18.63493615	164.0617704	14,400,000
6290737	24.56915154	158.9916824	14,270,000
2496242	23.72452291	172.0791713	70,869,955
5833671	21.37486871	145.3030526	-18,260,970
6904125	16.70708186	190.7516915	19,217,479
7175163	17.36507736	175.4772006	9,696,237
723195	25.99190262	175.9132283	-2,800,000

9938885	21.55681081	204.5728807	15,600,000
1684658	13.78968337	#187.2185596	16,263,752
304534	11.95562868	125.7186368	16,300,000
8366848	26.95979856	172.0475336	2,400,000
0337983	50.10934267	132.9160916	2,000,000
4375587	60.59319799	121.8680616	5,600,000
778317	96.24674357	135.8781733	4,300,000
8539134	94.50948602	132.1072821	4,700,000
1202451	89.39944513	125.4149228	5,000,000
1981542	87.26903772	106.360535	15,000,000
933653	98.74689477	100.0470603	14,800,000
8858524	99.36785664	102.5340143	20,000,000
97.8738806	102.0682677	95.89060615	22,500,000
4793173	102.8496499	88.91418859	125,000,000
9598141	104.2146475	94.70451975	233,000,000
1921346	105.4740648	106.3694045	106,500,000
1532641	105.7349452	107.9617187	120,000,000
2435956	100.8041713	113.3322104	81,800,000
3442615	95.11063553	124.4279999	167,400,000
6658109	93.76827992	109.4888496	243,700,000
	100	100	165,900,000
1850361	95.40540789	103.5774657	89,300,000

4454901	91.80737328	120.3013289	58,900,000
0202667	108.8183456	127.7544388	136,750,000
264302	123.9487021	113.1631874	139,270,000
3485726	143.3539952	99.29864346	144,970,000
8552732	163.9118725	103.0158893	636,010,000
1965243	165.1103203	108.5313891	970,380,000