First page of the Project Work

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TOPIC OF THE PROJECT WORK

EXCHANGE RATE REGIME CHOICE AND ITS IMPACT ON EXPORT VOLUME IN EMERGING NON OIL ECONOMIES OF 7 SUB-SAHARAN AFRICAN COUNTRIES (Ethiopia, Ghana, Liberia, Sierra Leone, Tanzania, Uganda, and Zambia)

Project Work Submitted to the Indira Gandhi national Open University in partial fulfilment of the requirements for the award of Degree-Master of Arts (Economics). I hereby declare that this work has been done by me and has not been submitted elsewhere.

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Acronyms

ADF	Augmented Dicky Fuller
CPI	Consumer Price Index
DF	Dicky Fuller
GDP	Gross domestic Product
ECM	Error Correction model
ECT	Error correction term
EU	European Union
FMOLS	Fully Modified Least square Model
IFS	International Financial Statistics
IMF	International al Monetary Fund
IPS	Im, Pesaran and Shin W-stat
LLC	Levin, Lin & Chu
OLS	Ordinary Least Square
SSA	Sub-Sahara Africa
VAR	Vector Auto regression
VECM	Vector Error Correction Model
WB	World Bank
WDI	World Development Indicator

Chapter One

1.1 Introduction

1.1.1 Background

Economic theory provides a relatively little guidance on the relationship between exchange rate and commercial policies. Exchange rate policy is considered as one of the powerful tools of economic regulation and the regulation of the external sector in particular and in most emerging countries, the exchange rate regime choice is a contentious policy discussion topic.

Over the last two decades manufactured exports have become a major factor of economic growth in developing countries. Initially most of the developing world's manufactured exports originated in a small number of countries in East Asia, namely South Korea, Hong Kong, Singapore, and Chinese Taipei. Subsequently, however, more developing countries have successfully entered world markets for manufactured goods. Malaysia, Mexico, Indonesia, Thailand, and Turkey are examples of countries which experienced a sustained increase in their manufactured exports since the beginning of the 1980s.

Despite the global economic slowdown in 2012, growth in Sub-Saharan Africa remained robust supported by resilient domestic demand and still high commodity prices. In 2012, the region's growth was estimated at 4.7 percent. Excluding South Africa, the region's largest economy, the remaining economies grew at a robust 5.8 percent—higher than the developing country average of 4.9 percent. About a quarter of countries in the region grew at 7 percent or better, and several African countries are among the fastest growing in the world. Medium-term growth prospects remain strong and should be supported by a pick-up in the global economy, high commodity prices, and investment in the productive capacity of the region's economies. Overall, the region is forecast to grow at more than 5 percent on average over the 2013-15 period: 4.9 percent in 2013, gradually strengthening to 5.2 percent by 2015. Increased investment flows are supporting the region's growth performance, with investment to-GDP ratios increasing by an average of 0.5 percentage points per annum over the past decade.

Robust export growth has underpinned Sub-Saharan Africa's economic expansion. However, much of the region's export growth has been driven by natural resources. Between 2000 and 2011, total Sub-Saharan exports increased from $100 billion to $420 billion, with the resource sector, including petroleum, ores, base metals and gold, accounting for three quarters of exports. Among manufacturing exporters, South Africa is the regional powerhouse, accounting for 70 percent of total regional manufacturing exports. A few smaller countries have developed manufacturing capacity that drives exports, such as Lesotho, Madagascar and Mauritius. During the same period, the region's manufactured goods increased from $13 billion to $33 billion. The EU's dominance as Sub-Saharan manufacturing exports destination has decreased significantly, from importing 39 percent of total Sub-Saharan African manufacturing exports in 2000 to 29 percent in 2011. Since 2000, the overall growth of Sub-Saharan exports to emerging markets, including those of China, Brazil and India, and to countries in the region has surpassed that to developed markets. Total exports to Brazil, India and China were larger than to the EU market in 2011. Geographic characteristics of export diversification are also noteworthy. Intra-regional exports, though still in a nascent stage, are most diversified, with manufactured goods and agricultural products accounting for 46 percent of total exports. In contrast, manufacturing and agriculture account only for 5 percent of total exports to Brazil, India and China; 10 percent to the United States; and 30 percent to the EU. (Africa's Pulse 2013)

A number of African countries have been obliged to undertake substantial exchange-rate policy reform during the 1980s and the 1990s. The macroeconomic background against which these reforms were undertaken was characterized by rapid demand expansion during the 1970s, due to the boom in most primary commodities prices, and by failure to adjust to declining terms of trade during the 1980s successfully. Rather than attempt to stabilize the economy, most SSA governments responded to the deteriorating economic environment by increasing trade protection and exchange controls in order to avoid balance-of-payments crisis, while maintaining the unsustainable trend in aggregate demand. The worsening macroeconomic imbalances led to capital flight, to substantial real exchange-rate overvaluation, and to the emergence of parallel markets for foreign exchange.

There are two sides to this issue. One side is arguing against flexible exchange rate regime because it brings higher exchange rate variability hence depressing trade. The other side argues against fixed and pegged exchange regime where they restrict trade in which they limit the available adjustment mechanisms to deal with balance-of-payments disequilibria and hence force governments to resort to protectionism. (Fountas et. al. 2003)

1.2 Problem Statement

Exchange rate volatility is defined as the risk associated with unexpected movements in the exchange rate. Economic fundamentals such as the inflation rate, interest rate and the balance of payments, which have become more volatile in the 1980s and early 1990s, by themselves, are sources of exchange rate volatility. More recently, increase cross-border flows that have been facilitated by the trend towards liberalization of the capital account, the advancement in technology, and currency speculation have also caused exchange rate to fluctuate (Hook and Boon 2000).

The impact of increased exchange rate variability on foreign trade has been investigated in a large number of empirical and theoretical studies for emerging nations in Asia and South America countries. The issue is particularly important for countries that switched from a fixed to a flexible exchange rate regime due to the higher degree of variability associated with flexible exchange rates.

The high degree of volatility and uncertainty of exchange rate movements since the beginning of the generalized floating in 1973 have led policy makers and researchers to investigate the nature and extent of the impact of such movements on the volume of trade. The breakdown of the Bretton woods system in the 1970s led to the adoption of the floating exchange rate regime. Exchange rates started to fluctuate widely. Primarily the very wide fluctuations in exchange rate are triggered by economic fundamentals such as inflation rate, interest rate and balance of payments. However other reasons attributed to exchange rate fluctuation include increase in cross border flows witnessed by the increase in capital flows, the advancement in technology and currency speculation.

In fact the structural adjustment program led to the adoption of the flexible exchange rate regime and many of the sub Sharan African countries have moved to a flexible exchange rate regime during 1980s and 1990s and this resulted in huge surge in exchange rate ranging from 0.04% in 1973 to a staggering 150% in 2006 averaging 95% for the 1973-2006 periods. The export growth for Africa after the introduction of those changes plummeted from an annual average of 13.35% in 1970-79 to 4.26% in 1990-2006 (Omojimite et al 2010) and hence one can perceive a link between the raise in exchange rate fluctuation and the decline on the growth in exports.

With respect to this, Africa in general and sub Saharan Africa in particular have not seen much research on how their export markets respond to changes in the exchange rate volatility. Although there were attempts to do some using sample of SSA countries (Omojimite and Akpokodje 2010, Olayungbo et al 2011) the sample countries selected, the methodology used and the time/ study period covering those studies was not enough to make any conclusive remark on how SSA agricultural exports respond to changes in Exchange rate.

The high degree of fluctuation and uncertainty of exchange rate movements since the beginning of the generalized floating in 1973 have led policy makers and researchers to investigate the nature and extent of the impact of such movements on the volume of trade though, almost no study was conducted ever to show results for group of countries considered to be best performing in their economic growth among non-oil exporting countries in sub Saharan African nations.

However, the absence of intensive research and studies to analyze the relationship between exchange rate variability and foreign trade for Sub Saharan countries specifically in the recently best performing non-oil exporting economies like; Ethiopia, Ghana, Liberia, Sierra Leone, Tanzania, Uganda, and Zambia, the exchange rate regime choice has been and is being a contentious policy discussion topic. Whether a certain type of exchange rate regimes are prone to various economic vagaries? How does export perform under different types of exchange rate regimes? Does exchange rate pegging superior export performance in vulnerable economies? These are some of the questions policy makers have been debating and dealing since the 90s.

Therefore, the purpose of this paper is to close this gap of very limited studies on the matter on these countries and provide estimates of the short- and long-run impact of exchange rate variability on export flows of those Non-oil Best performing economies of sub-Saharan African countries: Ethiopia, Ghana, Liberia, Sierra Leone, Tanzania, Uganda, and Zambia.

1.3 Objectives

1.3.1 General Objective

The main objective is to understand the effect of exchange regime choice on export volume in the emerging economies of Sub-Saharan African countries namely: Ethiopia, Ghana, Liberia, Sierra Leone, Tanzania, Uganda, and Zambia for the period of 1974-2014 (Post Bretton wood Era)

1.3.2 Specific Objectives

The specific objectives will have an aim to understand:

a. To understand Whether a certain type of exchange rate regimes are prone to various economic vagaries or not
b. To understand export performance under different types of exchange rate regimes
c. To understand and see the comparative effects of different exchange rate regime types among the Emerging Sub-Saharan African Economies
d. To assess the policy implication of those uncertainties to the countries and To draw policy recommendation based on the findings

1.4 Methodology of the study and data

To address the problem of the research and accomplish the objective as well, both descriptive and empirical analysis will be undertaken. Under the descriptive section the study will attempt to see the trends in the real and the effective exchange rate, the pattern of export volume across the countries of interest to capture the real image of the sector in the highly competitive world market. Thus the study will use plot chart, tables will also be used to support the graphic presentation.

The econometric methodology utilized applies econometrics of non-stationarity time series in order to estimate long run export function. The analysis covers a balanced panel of 7 sub-Saharan African countries to include the period of 1974 to 2014 (POST-BRETTON WOODS ERA).

In managing the time series panel data, different tests need to be conducted to check stationarity and non-stationarity characteristics. I deployed a model which is an extension of Chowdhury (1993) and Fountas et al (2003) of the long-run export function. The dynamic panel model portrays a simple and a standard long-run relationship between real export volume and real domestic income (as suggested by gravity model), domestic and exchange regime type

To accomplish the aforementioned objectives secondary data will be used for analysis. The major source data collected for analysis is from the International Financial Statistics (IFS) published by the IMF and World Development Indicators (2015) and from IMF e-library collected for the countries: Ethiopia, Ghana, Liberia, Sierra Leone, Tanzania, Uganda, and Zambia for the period of 1974 to 2014(POST-BRETTON WOODS ERA).

Levi-Yeyati (2005) is the source for 3- way de facto classification (float, interim and fix) is used for analysis.

STATA version 13 used for managing work file data and to create new calculated variables while EVIEW version 9 -student lit used for analyzing the panel time series data.

1.5 Significance of the study

Conventionally, it was believed that exchange rate volatility dampens international trade. The uncertainty in exchange rate creates income uncertainty due to the risk aversion behavior and irreversible capital expenditure or both (Ethier 1973, Demers 1991, Sercu 1992).Contrary to this, there were evidences which showed that the relation between exchange rate volatility and trade flows were analytically indeterminate DeGlauI (1988). A number of previous studies on the response of trade flows to changes in exchange rate found out varying results. There are a number of studies which assert that the volatility in exchange rate has led to reduced flow of international trade (Arize et al 2005, Tenreyeo 2004, Kenen and Rodrik 1986, Clark et al 2004).

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Chapter Two

2.1 Literature Review

2.1.1 Literature review on the debate on appropriate exchange-rate regimes

The standard theory of choosing an exchange rate regime is mainly based on the theory of optimal currency areas of Mundell (1961) and Poole (1970). These models of choosing an exchange rate regime typically evaluate such regimes by how effective they are in reducing the variance of domestic output in an economy with sticky prices.

Calvo and Mishkin (2003) discuss the standard theory of choice between exchange rate regimes and its weaknesses which arise when applied to emerging market economies. They try to establish a relationship between a range of institutional characteristics of a country and choice of its exchange rate regimes. They investigate if there is causality between the development of successful fiscal, financial and monetary institutions and the country-specific fact that whether a floating or fixed exchange rate is preferred.

Empirical research based upon *de facto* rather than *de jure* exchange-rate regime classification indicates that for low-income countries (although not for emerging transitional economies), a hard peg might be the most suitable regime in terms of achieving low inflation levels without sacrificing growth (Husain et al., 2005; Bleany and Fielding, 2002; Ghosh et al., 1997, 2003), whereas floating rates induce volatility, which may damage growth (Rogoff, 1999).

These empirical findings have received support from a number of developments in literature. Theoretical literature reveals suggests that, for developing countries, pegs or an exchange rate anchor allow policy makers in countries with a high propensity to inflation to import credibility and low inflation (Dornbusch, 2001; Edwards, 2001). Alongside these developments in research literature, developing countries themselves have been moving towards less flexible exchange rate regimes, with an increase in such regimes over the past decade. In particular, a greater number of low-income countries have shifted towards less flexible than towards more flexible regimes (Husain et al., 2005: 42).

Harrigan (2006) reviews evidence suggesting that for low-income countries with good fiscal discipline, it is a fixed rate which is likely to bring the biggest benefits in terms of economic performance. The counter-argument that such a regime distorts a key price variable which is an important determinant of both exports and imports is not strong in the context of low income countries. Econometric work shows that for developing countries, the domestic output levels are much more important determinants of exports and imports than the real effective exchange rate.

In general, empirical literature has not yet developed a strong position on which exchange rate system developing countries should adopt. Frankel (1999 and 2004) and Mussa *et al* (2000) emphasize that “no single currency regime is right for all countries or at all times". Nonetheless, Rogoff *et al* (2003) summarize their review of the evidence of the impact of the exchange rate regime on developing countries' economic performance thus: "relatively rigid regimes – pegs and intermediate flexibility arrangements – appear to have enhanced policy credibility and thus helped achieve lower inflation at little apparent cost in terms of lost growth, higher growth volatility, or more frequent crises."

Mussa *et al* (2000) provide a list of factors that would favor a country pegging its rate: (i) low capital mobility; (ii) a high share of trade with the country to which it is pegged; (iii) the shocks it faces are similar to those facing the country to which it pegs; (iv) it already relies extensively on its partners' currency; (v) fiscal policy is flexible and sustainable; (vi) its labor markets are flexible; (vii) it has high international reserves.

In other words, to sustain a pegged rate a developing economy should have the capacity to perform well and flexibly, and maintain low inflation. Otherwise it would be advised to adopt a floating exchange rate regime, thereby allowing the exchange rate to act as an extra shock absorber. Of course, the requirements listed by Mussa *et al. (2007)* are also those that, together with a strong financial system, would enable the country successfully to maintain a flexible exchange rate system. Mussa *et al (2007)* also note that as countries develop and become more financially sophisticated and more integrated into global markets, they should consider more flexible exchange rate regimes.

Proponents of the bipolar view, including Obstfeld and Rogoff (1995) and Eichengreen (1998), predict that countries that have integrated, or are integrating, their domestic capital markets with global capital markets will be unable to sustain intermediate regimes and will be forced to choose one of the two extremes: either a hard fix or a freely floating exchange rate regime. In their opinion, the middle ground—made up of adjustable (soft) pegs—will eventually vanish for countries that are open to international capital flows.

Harrigan, J (2006) analysis of exchange rate theories on the effects of exchange rate regimes on macro policy, inflation and trade performance suggest that the most appropriate exchange rate regime for any given developing country is likely to be contingent on a number of country-specific factors. These include the degree of exposure to global capital markets, the maturity of the domestic financial sector, the attitude of the authorities towards fiscal and monetary policy discipline, and the price elasticities of imports and exports. The implication is that for low-income, small, open economies, which have limited exposure to international capital flows, an undeveloped financial sector, a tendency towards expansionary fiscal monetary policies and inelasticity in tradable markets, perhaps the most appropriate regime is a fixed exchange rate. With regard to international trade and exchange rate regime, it is strongly argued that if a country is a price taker in world markets or if its export competitiveness is dependent and on non-price factors, depreciation will not have any effect on export competitiveness.

2.1.2 Evolution of exchange rate regimes for African countries

From 1946 to 1973, exchange rate policy was dominated by the Bretton Woods Agreement of 1944, with its commitment to currencies convertible for current account transactions and fixed exchange rates (beyond a narrow band of permissible flexibility) but adjustable if necessary.

The Bretton Woods arrangement came under strain in the late 1960s, and in March 1973, the practice of fixing exchanges was generally abandoned by the major countries of Europe and Japan. Countries entered another period of floating exchange rates. Many countries, however, chose to fix their currencies to some major currency e.g. the United States dollar.

The advent of IMF and World Bank Stabilization and Structural Adjustment Programmes in the early 1980s signaled a change in developing countries' approaches to exchange-rate regimes. For many countries with severe balance-of-payments difficulties reflected in sizeable payments arrears, the IMF recommended the adoption of floating exchange rates (Quirk et al., 1987).In this respect the Fund was influenced by the neoclassical advocacy of floating exchange-rate regimes (Friedman, 1953; Frankelhttps://www.researchgate.net/publication/269893718_The_Monetary_Approach_to_the_Balance_of_Payments?el=1_x_8&enrichId=rgreq-19ae2e353bc34e8d5905009780ed5b5a-XXX&enrichSource=Y292ZXJQYWdlOzQ0MjA2MzAyO0FTOjk4NjUyMDUxNzM4NjI5QDE0MDA1MzE4OTA1NTY=and Johnson, 1976). By the 1990s the majority of World Bank and IMF policy packages in developing countries addressed the question of exchange-rate management. The World Bank (1994) argued that most African countries required a real depreciation to compensate for worsening terms of trade in the 1990s, and that countries with flexible exchange rates which, either devalued from time to time or had a crawling peg or managed float, could achieve real depreciation quickly. The case for floating was comprehensively summarized by Krugman and Obstfeld (1994: 559).

Table a shows the evolution of exchange rate arrangements for selected African countries. This classification system is based on members' actual, *de facto*, arrangements as identified by IMF staff. In 2000, out of the 35 countries in the sample, almost half (16 countries) had floating exchange rate regimes. This was a marked rise from a mere five in 1995. However, by 2008, the number of floating regimes had dropped to 8 while the numbers of countries with pegs had risen to 26 (about threequarters the countries). Thus, during the past decade, the majority of sub-

Country	*1975*	*1980*	*1985*	*1990*	*1995*	*2000*	*2005*	*2008*

Saharan African countries have been moving back towards less flexible exchange rate regimes. In particular, a greater number of low-income countries have shifted towards less flexible than towards more flexible regimes.

Table 1: Evolution of exchange rate regimes for selected African countries

Southern Africa Angola Botswana Malawi South Africa Lesotho Zambia Mozambique Namibia Swaziland ***East Africa*** Uganda Kenya Tanzania Ethiopia Eritrea Rwanda ***West Africa*** Nigeria Ghana Senegal Togo Benin Burkina Faso Cote d'Ivoire Mali Sierra Leone Niger Guinea Bissau Guinea Liberia ***Central Africa*** C .African Rep Cameroon Gabon DRC Chad Equator. Guinea Rep. of Congo	N/A Fix Fix Float Fix Fix N/A N/A Fix Fix Fix Fix Fix N/A Fix internFix Fix Fix Fix Fix Fix Fix Fix Fix N/A Fix Fix Fix Fix Fix Fix Fix Fix Fix	N/A Fix Fix Fix Fix Fix N/A N/A Fix Fix Fix Fix Fix N/A Fix Float Fix Fix Fix Fix Fix Fix Fix Fix Fix N/A Fix Fix Fix Fix Fix Interm Fix Fix Fix	N/A Fix Fix interim Fix Interim N/A N/A Fix Float Fix Float Fix N/A Fix Float Fix Fix Fix Fix Fix Fix Fix Interm Fix N/A Fix Fix Fix Fix Fix Fix Fix Fix Fix	N/A[1] Fix Fix Fix Fix Interim N/A Fix Fix Fix Fix Interim Fix N/A Fix Fix Interm Fix Fix FixFixfix Fix Interm Fix Fix Fix Fix Fix Fix Fix Interm Fix Fix Fix	Interim[3] Conven. peg managed float[4] Fix Fix Fix Float Fix Fix Fix Interim Fix Float N/A Interim Float Fix Fix Fix Fix Fix Fix Interm Fix Fix Float Fix Fix Fix Fix Fix Interim Fix Fix Fix	Float Conventional peg Managed float Float Conventional peg Independent float Independent float Conventional peg Conventional peg Conventional peg Managed float Independent float Managed float Independent float Independent float Managed float Independent float Currency board[2] Currency board Currency board Currency board Currency board Currency board Independent float Currency board Currency board Independent float Independent float Conventional peg Currency board Currency board Independent float Currency board Currency board Currency board	Conventional peg[3] Conventional peg Independent float Independent float Conventional peg Managed float Managed float Conventional peg Conventional peg Independent float Managed float Independent float Managed float Conventional peg Managed float Managed float Managed float Currency board Currency bard Conventional peg Conventional peg Currency board Conventional peg Independent float Currency board Currency board Conventional peg Independent float Conventional peg Conventional peg Currency board Independent float Currency board Currency board Currency board	Conventional peg Crawling peg[4] Conventional peg Independent float Conventional peg Independent float Managed float Conventional peg Conventional peg Managed float Managed float Managed float Crawling peg Conventional peg Conventional peg Managed float Conventional peg Conventional peg Conventional peg Conventional peg Conventional peg Conventional peg Conventional peg Conventional peg Conventional peg Conventional peg Conventional peg Managed float Conventional peg Conventional peg Conventional peg Independent float Conventional peg Conventional peg Conventional peg

[1]This means not available [3] This stands for intermediate regime between fixed and flexible exchange rate [4] The monetary authority influences the movement of the exchange rate through active intervention in foreign exchange market without specifying, or pre-committing to, a pre-announced path for the exchange rate
[2]

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A monetary regime based on explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfillment of its obligations
[3] The country (formally or de facto) pegs its currency at a fixed rate to another currency or a basket of currencies where the exchange rate fluctuates within a narrow margin.
[4] The currency is adjusted periodically in small amounts at a fixed rate in response to changes in selective quantitative indicators

Conventionally, it was believed that exchange rate volatility dampens international trade. The uncertainty in exchange rate creates income uncertainty due to the risk aversion behavior and irreversible capital expenditure or both (Ethier 1973, Demers 1991, Sercu 1992).Contrary to this, there were evidences which showed that the relation between exchange rate volatility and trade flows were analytically indeterminate. DeGlauI (1988) A number of previous studies on the response of trade flows to changes in exchange rate found out varying results. There are a number of studies which assert that the volatility in exchange rate has led to reduced flow of international trade (Arize et al 2005, Tenreyeo 2004, Kenen and Rodrik 1986, Clark et al 2004).

On the other hand, there are studies which found out that volatility in exchange rate has resulted in even to improved trade flows(Mackenzie 1998 , Frankel 1992, Kasman and Kasman 2005). Many researches however, have failed to establish any significant link between the exchange variability and volume of international trade flow sear (Bahmani-Oskooee 1991, Kumar 1992, Aristoloues 2001) ;(Illhan, 2006).

Emerging market countries in Latin America, East Asia, and Eastern Europe entered the 1990s with widely varying fundamentals. To over-generalize, Latin American countries before the 1990s traditionally had low national savings rates, profligate fiscal and monetary policies, and overvalued currencies, together with a large and growth inhibiting role of the government in the economy; however, most took very large steps in the right direction in the 1990s. East Asian countries had, already for some time, exhibited high national savings rates, greater monetary and fiscal discipline, and appropriately valued currencies, together with institutions of financial structure and government intervention that, though they differed from textbook market economics, appeared to be, if anything, more successful than western-style capitalism, until the 1990s. Eastern European countries all entered the 1990s with institutions that had become universally discredited, but varied widely in their ability to establish macroeconomic stability and to make the transition to capitalist institutions.

Although these countries varied in their fundamentals—and varied further within the geographic groupings—all ended the 1990s as victims of severe financial turbulence in emerging markets. To name only the most spectacular cases, currency and financial crises hit Mexico in 1994; Thailand, Republic of Korea, and Indonesia in 1997; Russia in 1998; Brazil in 1999; and Turkey and Argentina in 2001. In most of these cases, the crisis had severe negative effects on economic growth. The causes of these crises have been widely debated, but it is difficult to attribute them solely to profligate monetary and fiscal policies because the East Asian countries had a strong record on this score, and Argentina had also moved very far to establish macroeconomic discipline in the 1990s.

2.2 Classification of Exchange rate regimes

Regimes can be classified according to either the publicly stated commitment of the central bank (a de jure classification) or the observed behavior of the exchange rate (a de facto classification). Neither method is entirely satisfactory. A country that claims to have a pegged exchange rate might in fact initiate frequent changes in parity. On the other hand, a country might experience very small exchange rate movements, even though the central bank has no obligation to maintain parity. Hence, the approach taken is to report results according to the stated intention of the central bank and to supplement these results by categorizing the non-floating regimes according to whether or not changes in parity were frequent.

Levi-Yeyati (2005) is the source for 3- way de facto classification (float, interim and fix) is used for analysis. Table 2 shows the distribution of the different regime type in the countries of interest. 60 percent of the total observation identified as fixed exchange rate regime type while 20 percent float and about again 20 percent of the total observation has interim exchange rate regime.

Index-3	*Percent of Total observation*
Float	16.13
Interim	17.20
Fix	66.67

Table 2: De Facto three-way Classification of Exchange Rate Regimes of the research countries

Chapter Three

3.1 Data Source and Model Specification

3.1.1 Data Source

For analyzing the impact of exchange rate regime choice and its volatility on export volume, the study relied on secondary data sources. The data type will be arranged in a panel set up for 7 in emerging non-oil economies of the sub-Saharan African countries (Ethiopia, Ghana, Liberia, Sierra Leone, Tanzania, Uganda, and Zambia) for the period, 1974-2014 (Post-Brest wood Era). The study has a limitation due to data paucity problem specifically to obtain a 3 way de-facto classification of exchange rate regimes data after the year 2010 and there was a missing data on variables for some countries on the course of the years. The data sets are obtained from the United Nation Commodity Trade Statistics (UNCOMTRADE) web site, the World Bank (WB) World Development Indicator (WDI) and International Financial Statistics (IFS) as main sources. In order to fill out some missing values, countries web sites are also used. Further elaboration on data source is provided along with model specification

3.1.2 Model Specification

3.1.2.1 Econometric Model

The model used for the purpose of this study is an extension of Chowdhury (1993) and Fountas et al (2003) long-run export function. The dynamic panel model portrays a simple and a standard long-run relationship between real export volume and real domestic income (as suggested by gravity model), domestic and exchange regime type. So, the original model needed some modification to accommodate our panel approach. To this effect, foreign real income was replaced by world real income net of domestic real income (in order to account for the change in foreign export demand through income effect) and world price level.

I also adopted a similar method as Fountas et al (2003) to derive an operational measure of an exchange rate uncertainty. Hence, I constructed time-varying measure of exchange rate volatility by having the moving-sample standard deviation and expressed as

$$V_{t+m} = sqrt\left[\frac{1}{m}\sum_{i=1}^{m}(R_{t+i-1} - R_{t+i-2})^2\right] \quad (1)$$

Where R is the log of real effective exchange rate and m=5 is the order of the moving average.

The modern empirical literature on the estimation of export functions uses the following long-run export function (see, e.g., Chowdhury, 1993, and Arize, 1995) which I have augmented with two dummy variables to take into account differences in the exchange rate regime across time:

The following equation is long run export function used in this study.

$$\ln X_{it} = \delta_0 + \delta_1 \ln Y_{it} + \delta_2 \ln Y_{it}^{*} + \delta_3 \ln PR_{it} + +\delta_4 V_{it} + \delta_5 D_{1it} + \delta_6 D_{2it} + u_{it} \; \dots\dots\dots\dots (2)$$

$\ln X_{it}$: log export volume of country i at time t

$\ln Y_{it}$: log domestic income of country i at time t (expected sign + or -)

$\ln Y_{it}^{*}$-log World income net of domestic income (expected sign +)

$\ln PR_{it}$ –log Relative price at time t proxies as country i Consumer Price Index (CPI) divided by the world's CPI (expected sign -)

V_{it}- Volatility of foreign exchange rate (expected sign + or -)

D_{1it}- Dummy for floating exchange regime

D_{2it}- Dummy for managed floating (interim)

u_{it}: Disturbance Term

Equation (2) can be considered as the solution to a system of behavioral export demand and export supply equations. Economic theory suggests that the impact of real foreign income on real exports should be positive and the impact of relative price on real exports negative. It is anticipated that the effect of change in world incomes and price level on individual country should be positive. I also expect to observe a positive relationship between own GDP level and export volume as the former act as supply side proxy.

Traditional trade theory suggests that exchange rate volatility would depress trade because exporters would view it as an increase in the uncertainty of profits on international transactions, under the assumption of risk aversion. On the other hand, a number of authors such as De GrauI (1988), Giovannini (1988), Franke (1991), Sereu and Vanhulle (1992) and Viaene and de Vries (1992) illustrate, in the context of theoretical models, that exchange rate volatility might benefit trade. Hence, the sign of δ_5 in equation (2) is ambiguous from a theoretical point of view.

The international empirical evidence on the influence of volatility on exports is also mixed. IMF (1984), Cote (1994) and McKenzie (1999) provide comprehensive reviews of the empirical literature. However, all existing studies, with the exception of Pozo (1992), do not consider the impact of the exchange-rate regime on trade flows. Pozo's (1992) approach is unsatisfactory for a number of reasons: First, by choosing the Gold Standard (1900-1914) to be the reference period, she does not take into account other periods of fixed exchange rate regimes included in her sample (i.e., 1926-1931) in her comparison with the managed float period. Second, she concentrates on the early part of this century, thus, not including in her analysis two very interesting periods associated with the Bretton Woods system and the more recent managed float regime. Third, she does not consider the potential non-stationarity of the involved time-series variables when performing the econometric analysis. Brada and Mendez (1988) also purport to analyse empirically the impact of the exchange rate regime on bilateral trade flows among 30 countries using cross-sectional data from the mid-1970s. The authors, using a gravity model, find that bilateral trade flows among countries with floating exchange rates are higher than those among countries with fixed rates.

On the basis of the Levi-Yeyati (2005) I use a 3- way de facto classification (float, interim and fix) is used for analysis and hence I define the dummy variables in equation (2) as follows: D1 takes the value 1 during the free float period. The second dummy D2 takes the value 1 during managed float (interim) regimes.

3.1.2.2 Tests

The first procedure implemented is testing for stationarity of export volume and its covariates mentioned in equation (2). To this effect, unit root test to be conducted.

Prior to the statistical specification of the model it is necessary to test whether the relevant variable are stationary and to determine the orders of integration of the variables. The first procedure to be implemented is testing for stationarity of export volume and its covariates mentioned above in equation (2).

The second procedure is conducting cointegration tests. To this end, two main tests are implemented, namely Pedroni (1997,1999 and 2004) and Johansen-Fisher test by Maddala and Wu (1999). Pedroni (1997,1999 and 2004) is an extension of Engle-Granger framework to test involving panel data. While Johansen-Fisher test is an alternative approach to testing for cointegration in panel data by combining tests from individual cross-sections to obtain at test statistic for the full panel.

Chapter Four

4.1 Econometric Analysis of the Data and results

4.1.1 Descriptive Analysis, Summary Statistics and Graphical Inspection

Before I go through the econometric study, I first need to describe the details of the data using simple graphical and statistical tools. Graphical inspections provide us the picture on how our variables of interest behave over time.

To begin with the exchange rate regimes, on the chart below (Fig 1), I can see the transformation of favorability of exchange rate regimes in four selected years from each decade of our sample space. It is evident that the fixed exchange rate regime lost ground since 1974 and going to 1984 and again gaining momentum to the year 2004 while interim exchange rate regime gained popularity in 1984 and lose ground in 1994. However, in 1994 the float exchange rate regime increased by higher margin than any other time in comparison and fixed regime also regained some momentum as well.

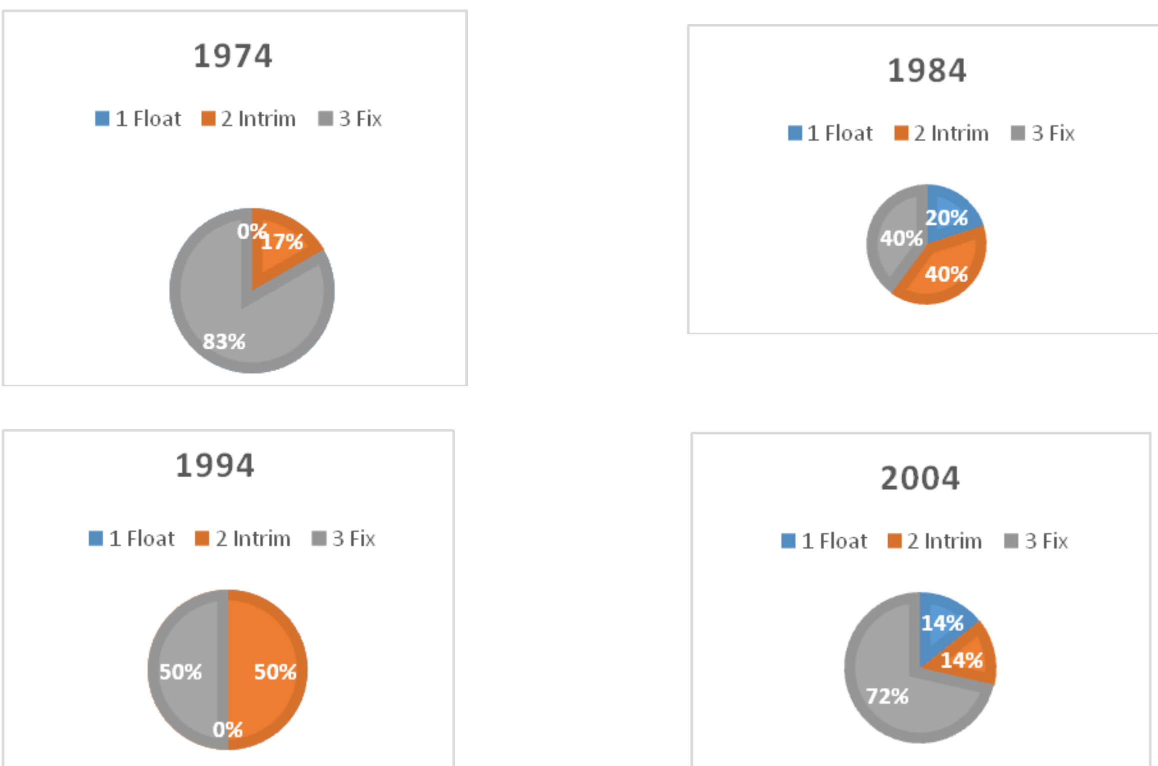

Figure 1: Share of exchange rate regime across all the study countries

Scatter diagrams showing the exchange rate volatilities of the study countries shown below.

When the volatilities of the study countries official exchange rate is drawn against the time period 1974 to 2010, almost all countries in the study exhibit a rise in exchange rate pattern in the 1990s. Uganda among all countries exhibited the highest increase in exchange rate 140 while Liberia and Sierra Leone also exhibited their highest exchange rate during this decade. This has to do with the fixed and managed floating exchange rate regime of the study countries that anchors their currencies against a basket of major international currencies in the 1990s.

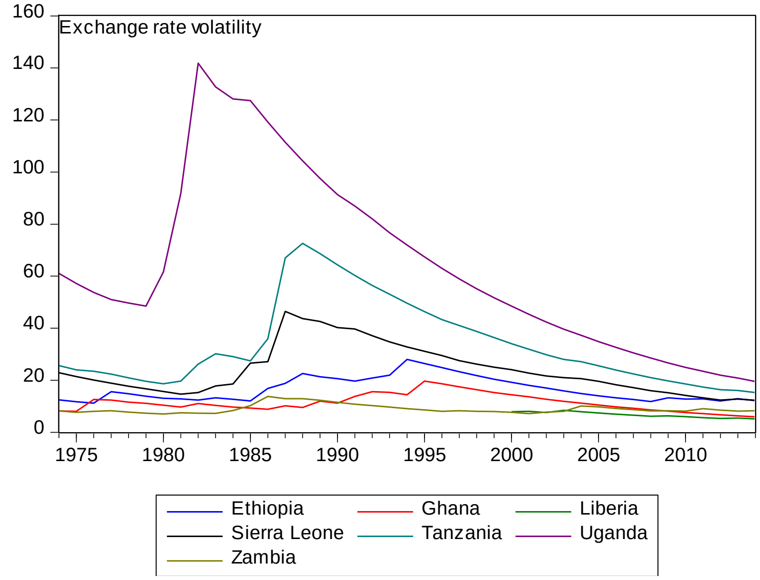

Figure 2: Exchange rate volatility

Selected major variables are discussed below using chart plots.

Fig 3 showing the natural logarithm of real GDP of the study countries plotted below depict a trend that is following a similar pattern for almost all countries of which a growing pattern observed after 1995. It is observed in the graph that all countries in this study suffered decline in their domestic income in the early 90s. Liberia suffered the great decrease in its Real GDP in the 90s which could be justified by the ugly war continued for a decade in that country.

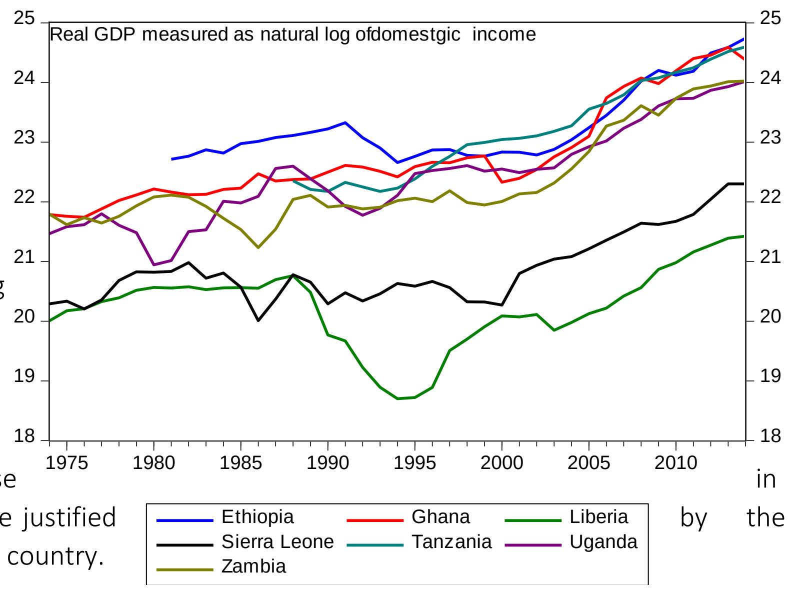

Figure 3: real GDP of the study countries during the period

In Fig 4 I tried to depict the natural logarithm of export volume of the study countries over the period of 1974-2014. It is evident that all countries except Sierra Leone, exhibited a significant increase in their export volume over the period of which Ghana is a champion of export over the period compared to the others.

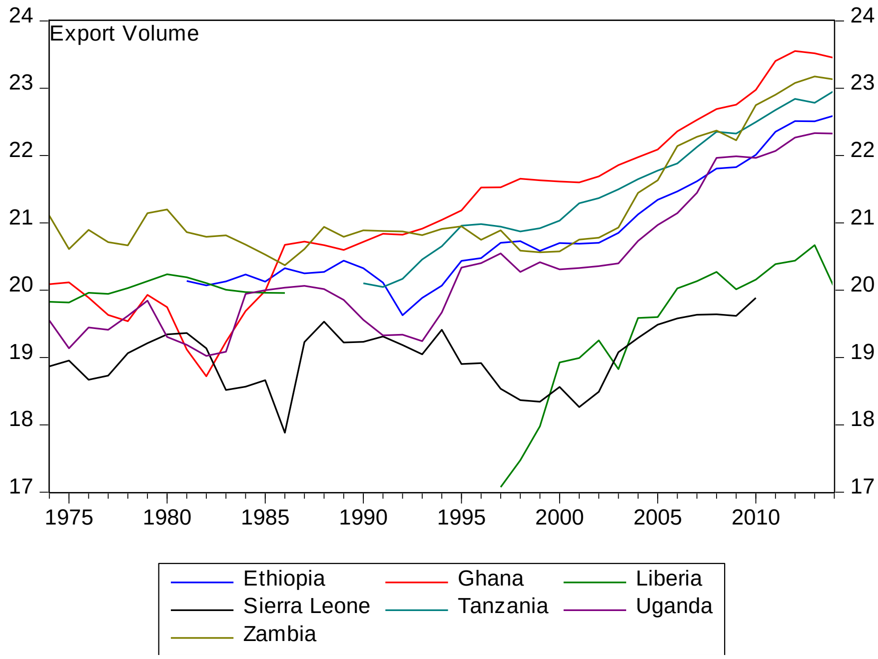

Figure 4: Export volume trend over the years

In the Fig 5, I observed the trend of the relative consumer price index which is expressed as the ratio between domestic CPI to World CPI over the years of the study countries. In the figure it clearly shown that the index stayed within a range of -4 to 3.5 which in fact could be considered as an outlier for Uganda (-4) and 3.5 of Zambia which unless stayed between -2 and 2 for other countries over the period.

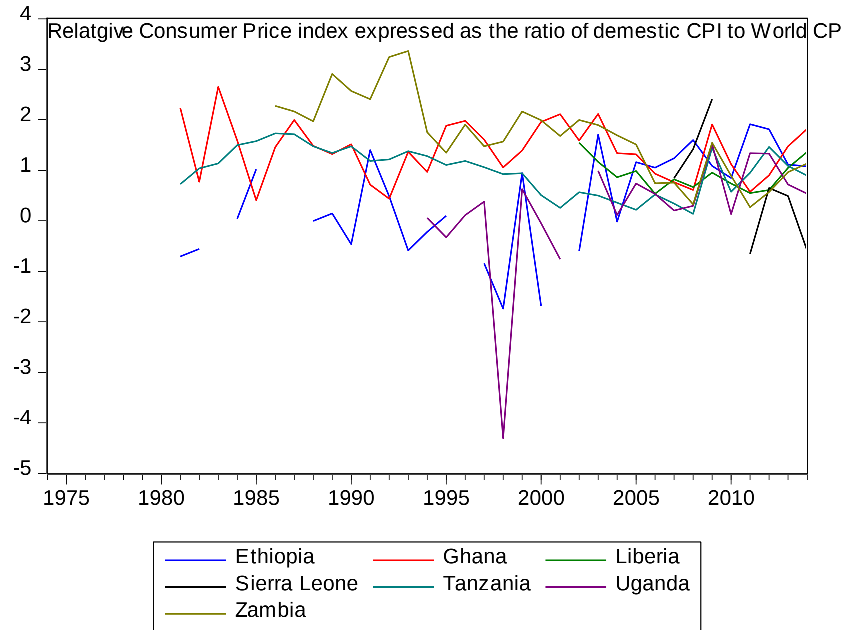

Figure 5: Relative consumer price index

4.1.2 Test Applied

During the whole process of the analysis I followed the following flowchart of tests.

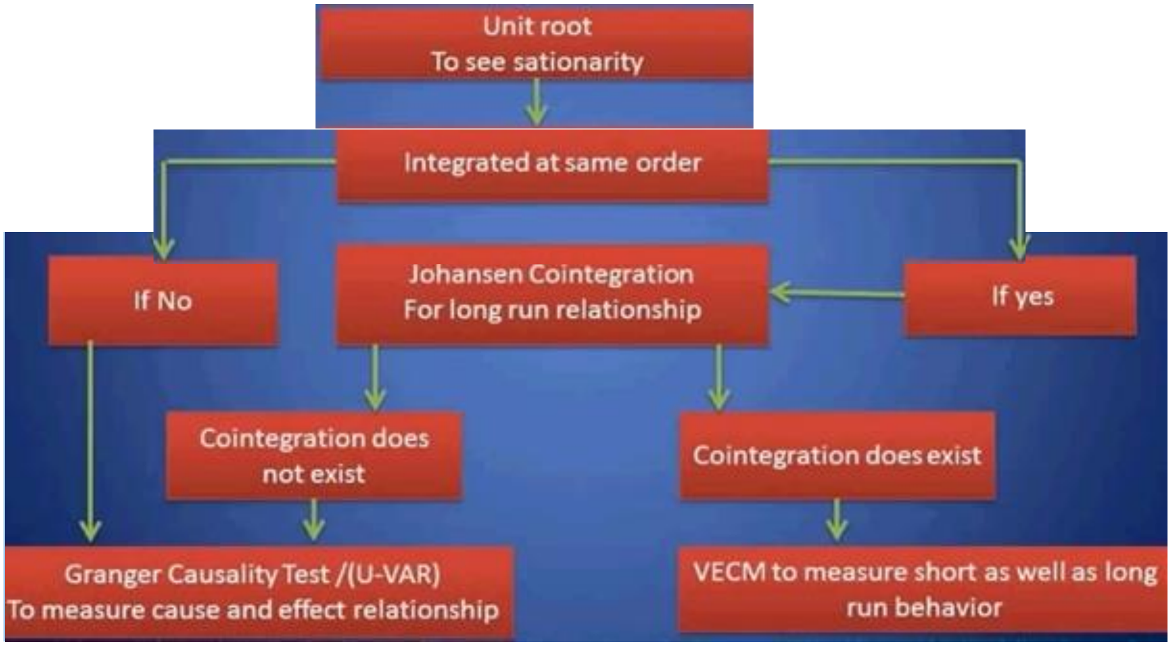

Figure 6: Flowchart for conducting Tests

4.1.2.1Panel Unit Root Tests

When dealing with panel data, because the procedure is more complex, the ADF and DF tests can result in inconsistent estimators. Thus, the stationarity of the series should be tested by using three different types of tests, namely LLC (Levin,et.al.,2002), IPS (Im,et.al., 2003) and Hadri(2000). The LLC and IPS model tests the hypothesis of non-stationarity, i.e. the presence of unit roots. While Hadri tests the absence of unit roots, i.e. variance of the random walk equals to zero. Consequently, the order of integration of individual series is determined using the same tests.

The LLC and IPS model tests -At Level				
Variable	Situation	Common Unit Root		Individual Unit Root
		LLC	Hadri	IPS
Export Volume *(lnexpvol)*	Individual Intercept and Trend	-0.68327 (0.2472)	5.59470 (0.0000)	-0.52943 (0.2983)
Real GDP *(lndincome)*	Individual Intercept and Trend	1.0803 (0.8600)	6.08012 (0.0000)	1.66550 (0.9521)
Relative CPI *(lnrprice)*	Individual Intercept and Trend	-3.68973 (0.0001)	4.57717 (0.0000)	-1.67591 (0.0469)
World Income net Domestic Income *(lnwndincome)*	Individual Intercept and Trend	-1.33219 (0.0914)	5.17720 (0.0000)	-1.05084 (0.1467)
Volatility *(vol)*	Individual Intercept and Trend	8.59743 (1.0000)	4.8845 (0.0000)	-1.38522 (0.0830)

Table 3: Panel Unit root test at level

- The Null hypothesis under Levin, Lin & Chu test (LLC): There is a Unit root (assumes common unit root process)
- The Null hypothesis under Im, Pesaran and Shin W-stat (IPS) : There is Unit root (assumes individual unit root process)

- The Null hypothesis under Hadiri test : There is Stationarity on the series

The first thing I have to do is testing for the existence of Unit root test for which all variable

I re treated at a level without a difference. The panel unit root tests, including LLC (2002), IPS (2003) and Hadri (2000), are implemented as intercept and trend for all the series except for the exogenous exchange rate regime dummy variables. LLC process tests the common unit root process under the null of non-stationarity. Table 2 show that the presence of unit root could not be rejected if I take the common unit root test of LLC and the individual unit root test. If I take the probability value under both the common unit root test of LLC and individual unit root test of IPS, except for the relative price variable the probability value of all variables under consideration are grater that the significance P-value of 5% for the relative price the probability value 0.01% under the LLC common unit root test and 4.679% under the IPS individual unit root test in both cases the values are less than 5% of the P-Value for which I can conclude that I accept the null hypothesis that there is unit root implying the variables are Non-stationary. Our results are also justified or supported by the Hadiri test for which the Null hypothesis is series is stationary and based on the result I can conclude to reject the null hypothesis that all probabilities of the variables under investigation have less than 5% for which I reject the null hypothesis that the series of all variables including the relative price index are stationary.

In all the series I applied for both LLC and IPS unit root test: Automatic selection of maximum lags, Automatic lag length selection based on SIC: 0 to 2 and Newey-West automatic bandwidth selection and Bartlett kernel. For the Hadiri test I applied: Individual effects, individual linear trends and Newey-West automatic bandwidth selection and Bartlett kernel.

Now I observed that all our variables are non-stationary under level without difference and the next step is to see the variables with a first difference. However, when one takes the first difference of the variables (table 4), it can be noted that all of the variables show stationarity where I reject the null hypothesis the presence of unit root in intercept and trend situations(or in Hadri test, I fail to reject the null hypothesis no unit root).

Panel Unit Root Tests- 1st Differenced Case

Variable	Situation	Common Unit Root		Individual Unit Root
		LLC	Hadri	IPS
Export Volume *D(lnexpvol)*	Individual Intercept and Trend	-7.71363 0.0000	0.81202 0.2084	-9.45548 0.0000
Real GDP *D(lndincome)*	Individual Intercept and Trend	-7.42870 0.0000	1.24258 0.1070	8.10414 0.0000
Relative CPI *D(lnrprice)*	Individual Intercept and Trend	-8.89743 0.0000	10.4504 0.0000	-9.52807 0.0000
World Income net Domestic Income *D(lnwndincome)*	Individual Intercept and Trend	-8.52086 0.0000	1.08632 0.1387	-5.19454 0.0000
Volatility *D(vol)*	Individual Intercept and Trend	25.7786 1.0000	1.09266 0.1373	-6.86940 0.0000

Table 4:Panel Unit Root Tests 1st Differenced Case

In the analysis, Modified-Swartz criteria's automatic selection of lags is used. The numbers in brackets represents probabilities and the others represent critical statistics

4.1.2.2 Cointegration tests

Most of the previous empirical research on the estimation of export functions used classical regression analysis and did not examine the integration properties of the relevant time series. These studies can be criticized along the following lines. First, the conventional statistical tests employed are inappropriate if the individual series are non-stationary as the OLS estimators are not consistent and the standard t and F statistics do not follow the Student's t and F distributions. Second, even if the non-stationary series are cointegrated, classical statistical inference is invalid since the estimated standard errors are inconsistent (Stock, 1987).

In agreement with developments in the econometrics of non-stationary time series, I start by estimating a long-run relationship between exports and its determinants implied by equation (2). I have decided to use the Johansen multivariate cointegration approach. Our choice is justified by Phillips (1991) who finds that the Johansen approach is optimal in terms of symmetry, unbiasedness and efficiency. A Monte Carlo study by Gonzalo (1994) supports the superior properties of the Johansen technique relative to several other single and multivariate techniques. In the Johansen framework, all variables, including exchange rate uncertainty, are treated as endogenous.

Once I found out all the series have similar integration level of 1, I can proceed with the cointegration test. To this regard to test whether there is cointegration or not among I applied the Pedroni test for panel data and Johansen Fisher Panel cointegration test using Eview statistical application.

In both tests the null hypothesis stated as below:

Null Hypothesis: No Cointegration

Table 5 shows seven statistics of Pedroni test with the null of no cointegration among series. For all seven series, by allowing heterogeneous intercepts and trend coefficients across cross-sections, the null hypothesis is rejected. Thus the cointegrated variables share common stochastic trends.

Pedroni Residual Cointegration Test
Series: LNDINCOME LNEXPVOL LNWNDINCOME VOLT
Date: 03/19/17 Time: 22:09
Sample: 1974 2014
Included observations: 287
Cross-sections included: 7
Null Hypothesis: No cointegration
Trend assumption: Deterministic intercept and trend
Automatic lag length selection based on asymptotic t-statistic (p=0.1)
with lags from 1 to 9
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	0.530368	0.0029	0.141110	0.0044
Panel rho-Statistic	1.161095	0.0087	0.842558	0.0083
Panel PP-Statistic	0.027737	0.0051	-0.756602	0.0022
Panel ADF-Statistic	-2.034079	0.0002	-2.303604	0.0010

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.146953	0.0095
Group PP-Statistic	0.058124	0.0053
Group ADF-Statistic	-1.614498	0.0005

Table 5: Group cointegration test (Pedroni)

Pedroni Residual Cointegration Test
Series: LNDINCOME LNEXPVOL LNWNDINCOME VOLT
Date: 03/19/17 Time: 22:09
Sample: 1974 2014
Included observations: 287
Cross-sections included: 7
Null Hypothesis: No cointegration
Trend assumption: Deterministic intercept and trend
Automatic lag length selection based on asymptotic t-statistic (p=0.1)
with lags from 1 to 9
Newey-West automatic bandwidth selection and Bartlett kernel

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	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	0.530368	0.0029	0.141110	0.0044
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Panel ADF-Statistic	-2.034079	0.0002	-2.303604	0.0010

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.146953	0.0095
Group PP-Statistic	0.058124	0.0053
Group ADF-Statistic	-1.614498	0.0005

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
Ethiopia	0.651	0.019771	0.011188	7.00	33
Ghana	0.636	0.028206	0.028206	0.00	40
Liberia	0.018	0.009074	0.008132	1.00	14
Sierra Leone	0.429	0.020664	0.010390	14.00	36
Tanzania	0.555	0.004658	0.005468	1.00	24
Uganda	0.631	0.022323	0.022490	4.00	40
Zambia	0.368	0.008679	0.005270	5.00	40

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
Ethiopia	0.476	0.015661	1	7	32
Ghana	0.404	0.023814	4	9	36
Liberia	0.018	0.009074	0	1	14
Sierra Leone	0.429	0.020664	0	8	36
Tanzania	0.555	0.004658	0	4	24
Uganda	0.422	0.013932	5	9	35
Zambia	-0.080	0.007004	3	9	37

Similarly, Johansen-Fisher panel cointegration test indicate that I reject the null at most 3 cointegration relationships in which strengthening the above finding.

Johansen Fisher Panel Cointegration Test
Series: LNDINCOME LNEXPVOL LNRPRICE LNWNDINCOME VOLT
Date: 03/07/17 Time: 00:11
Sample: 1974 2014
Included observations: 287
Trend assumption: Linear deterministic trend (restricted)
Lags interval (in first differences): 1 1

Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	98.86	0.0000	57.68	0.0000
At most 1	80.68	0.0000	57.20	0.0000
At most 2	33.84	0.0002	24.93	0.0055
At most 3	19.61	0.0332	15.09	0.1288
At most 4	12.58	0.2480	12.58	0.2480

* Probabilities are computed using asymptotic Chi-square distribution.

Individual cross section results

Cross Section	Trace Test Statistics	Prob.**	Max-Eign Test Statistics	Prob.**
Hypothesis of no cointegration				
Ethiopia	141.9524	0.0000	64.1296	0.0000
Ghana	125.0758	0.0000	48.2845	0.0027
Liberia		Dropped from Test		
Sierra Leone		Dropped from Test		
Tanzania	133.9698	0.0000	54.5213	0.0003
Uganda	NA	0.5000	NA	0.5000
Zambia	114.1330	0.0002	37.8539	0.0566
Hypothesis of at most 1 cointegration relationship				
Ethiopia	77.8228	0.0022	38.1069	0.0082
Ghana	76.7913	0.0028	33.7634	0.0312
Liberia		Dropped from Test		
Sierra Leone		Dropped from Test		
Tanzania	79.4485	0.0014	36.3344	0.0143
Uganda	111.7731	0.0000	58.1913	0.0000
Zambia	76.2790	0.0032	34.2599	0.0269
Hypothesis of at most 2 cointegration relationship				
Ethiopia	39.7159	0.1008	21.1341	0.1845
Ghana	43.0279	0.0487	16.8071	0.4741
Liberia		Dropped from Test		
Sierra Leone		Dropped from Test		
Tanzania	43.1141	0.0477	18.1529	0.3656
Uganda	53.5818	0.0031	40.2910	0.0003
Zambia	42.0191	0.0613	18.1158	0.3684
Hypothesis of at most 3 cointegration relationship				
Ethiopia	18.5818	0.3061	15.2860	0.1786
Ghana	26.2208	0.0453	13.9711	0.2561
Liberia		Dropped from Test		
Sierra Leone		Dropped from Test		
Tanzania	24.9612	0.0646	16.9320	0.1097
Uganda	13.2908	0.7153	11.1727	0.4957
Zambia	23.9033	0.0862	14.6664	0.2124
Hypothesis of at most 4 cointegration relationship				
Ethiopia	3.2958	0.8397	3.2958	0.8397
Ghana	12.2497	0.0554	12.2497	0.0554
Liberia		Dropped from Test		
Sierra Leone		Dropped from Test		
Tanzania	8.0291	0.2493	8.0291	0.2493
Uganda	2.1182	0.9610	2.1182	0.9610
Zambia	9.2369	0.1663	9.2369	0.1663

**MacKinnon-Haug-Michelis (1999) p-values

Table 6: Johansen fisher Cointegration Test

Dependent Variable: LNEXPVOL
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 03/22/17 Time: 20:52
Sample (adjusted): 1982 2014
Periods included: 33
Cross-sections included: 4
Total panel (unbalanced) observations: 110
Panel method: Pooled estimation
Cointegrating equation deterministics: C
First-stage residuals use heterogeneous long-run coefficients
Coefficient covariance computed using default method
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)
Warning: one more more cross-sections have been dropped due to estimation errors

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDINCOME	0.800857	0.055331	14.47401	0.0000
LNRPRICE	0.026995	0.030483	0.885562	0.3780
LNWNDINCOME	0.666508	0.060180	11.07519	0.0000
VOLT	0.000282	0.003397	0.082880	0.9341
D1IT	0.074830	0.063457	1.179228	0.2412
D2IT	-0.103806	0.075636	-1.372432	0.1731

R-squared	0.920925	Mean dependent var	21.39081
Adjusted R-squared	0.911143	S.D. dependent var	1.015544
S.E. of regression	0.302723	Sum squared resid	8.889180
Long-run variance	0.039615		

Table 7:FMOLS Test

Taking the export volume (lnexpvol) as the dependent variable and applying the Panel Fully Modified Least square Model (FMOLS) using the cointegration equation deterministic of constant (c) to see the long-run covariance estimates I can conclude with a value of R^2=0.92 implying that 92% of export volume is explained by the variables stated. However only the RGDP and net world domestic income are significantly affecting the export volume. Clearly from the table I can see that probabilities of the real GDP and real world net domestic income (LNDINCOME and LNWNDINCOME) have less than the 5% P-value.

There are 4 cointegrating relationship from the above as I reject all cointegrating equation relationship starting from none until utmost 4

The following table and graphs shows that there are 4 different cointegration relations derived

Date: 03/22/17 Time: 22:44
Sample (adjusted): 1984 2014
Included observations: 119 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: LNEXPVOL LNDINCOME LNRPRICE LNWNDINCOME VOLT D1IT D2IT
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.430980	223.8243	134.6780	0.0000
At most 1 *	0.356719	156.7274	103.8473	0.0000
At most 2 *	0.324946	104.2277	76.97277	0.0001
At most 3 *	0.196718	57.46516	54.07904	0.0242
At most 4	0.137659	31.39826	35.19275	0.1213
At most 5	0.079764	13.77389	20.26184	0.3053
At most 6	0.032096	3.882065	9.164546	0.4300

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

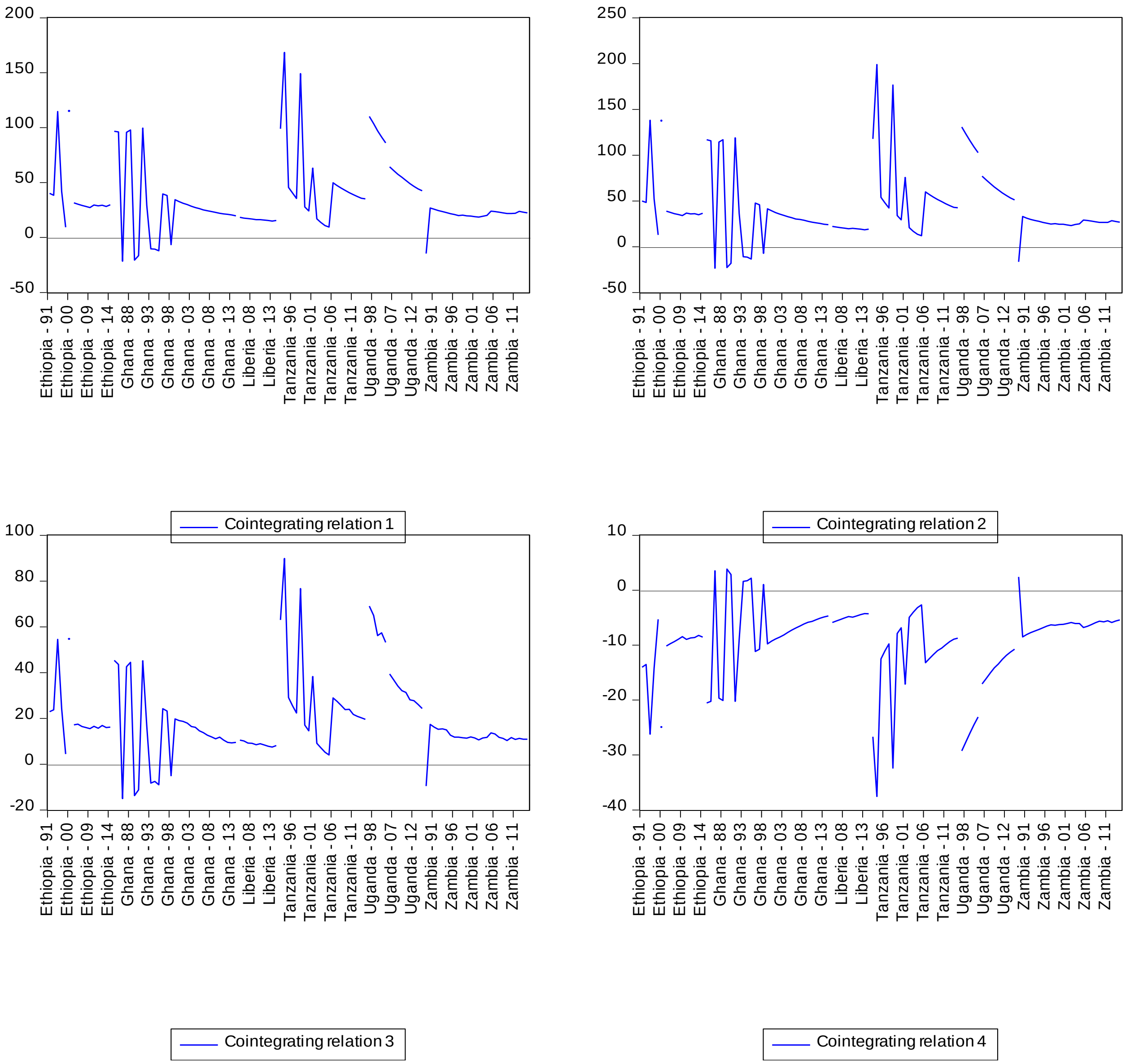


Figure 7: Cointegration relations

Vector Auto regressions (VARs)

The vector autoregression (VAR) is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. The VAR approach sidesteps the need for structural modeling by treating every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system.

Hence I run the estimates for Vector auto-regression (VAR) estimates with 2 lags to see specifically the effects of the dummy variables (The float and interim) exchange rate regimes on the dependent variable Export volume and the focus is on the coefficients of the dummy variables where to be interpreted as differential coefficients from the benchmark in this case the excluded pegged regime.

Each column in the table 8 below corresponds to an equation in the VAR. For each right-hand side variable, EViews reports the estimated coefficient, its standard error, and the t-statistic.

The results are computed separately for each equation using the appropriate residuals and are displayed in the corresponding column. The numbers at the very bottom of the table are the summary statistics for the VAR system as a whole.

From Table 7, I have got results of the vector auto-regression estimates where I presented a separate 5 equations in which the dependent variables are represented in each column all regression variables were lagged to 2 periods and I have a total of 65 of these 5 represents coefficients for the constants. Here I can see the VAR estimate table where I have coefficient value, standard error and t-statistics.

*LNEXPVOL = C(1)*LNEXPVOL(-1) + C(2)*LNEXPVOL(-2) + C(3)*LNDINCOME(-1) + C(4)*LNDINCOME(-2) + C(5)*LNRPRICE(-1) + C(6)*LNRPRICE(-2) + C(7)*LNWNDINCOME(-1) + C(8)*LNWNDINCOME(-2) + C(9)*VOLT(-1) + C(10)*VOLT(-2) + C(11) + C(12)*D1IT + C(13)*D2IT*…….Equation 1

*LNDINCOME = C(14)*LNEXPVOL(-1) + C(15)*LNEXPVOL(-2) + C(16)*LNDINCOME(-1) + C(17)*LNDINCOME(-2) + C(18)*LNRPRICE(-1) + C(19)*LNRPRICE(-2) + C(20)*LNWNDINCOME(-1) + C(21)*LNWNDINCOME(-2) + C(22)*VOLT(-1) + C(23)*VOLT(-2) + C(24) + C(25)*D1IT + C(26)*D2IT*…….Equation 2

*LNRPRICE = C(27)*LNEXPVOL(-1) + C(28)*LNEXPVOL(-2) + C(29)*LNDINCOME(-1) + C(30)*LNDINCOME(-2) + C(31)*LNRPRICE(-1) + C(32)*LNRPRICE(-2) + C(33)*LNWNDINCOME(-1) + C(34)*LNWNDINCOME(-2) + C(35)*VOLT(-1) + C(36)*VOLT(-2) + C(37) + C(38)*D1IT + C(39)*D2IT*…….Equation 3

*LNWNDINCOME = C(40)*LNEXPVOL(-1) + C(41)*LNEXPVOL(-2) + C(42)*LNDINCOME(-1) + C(43)*LNDINCOME(-2) + C(44)*LNRPRICE(-1) + C(45)*LNRPRICE(-2) + C(46)*LNWNDINCOME(-1) + C(47)*LNWNDINCOME(-2) + C(48)*VOLT(-1) + C(49)*VOLT(-2) + C(50) + C(51)*D1IT + C(52)*D2IT*…….Equation 4

*VOLT = C(53)*LNEXPVOL(-1) + C(54)*LNEXPVOL(-2) + C(55)*LNDINCOME(-1) + C(56)*LNDINCOME(-2) + C(57)*LNRPRICE(-1) + C(58)*LNRPRICE(-2) + C(59)*…….Equation 5

Hence to see the significance of theses coefficient I obtained the P values for all of these 65 coefficients to compare with the significance p-value of 5%.

If I took equation (1) of the VAR estimates that is with the dependent variable of Export volume (LNEXPVOL), there are 13 coefficients and I found that only C1 and C11 to be significant in explaining the export volume. These coefficients represents, the 1st lagged variable of export volume-LNEXPVOL(-1) and the constant C. The dummy variables of exchange regimes are not significant to impact the export volume. However, from the table clearly I can see that the interim or managed float regime to perform better than the other regime types while even the float regime has negative relationship with export volume.

Table 8: Export volume Vector Auto regression for seven African emerging nations

	Ethiopia	Ghana	Liberia	Sierra Leone	Tanzania	Uganda	Zambia
LNRPRICE(-1)	-0.004763 (0.00733) [-0.65026]	-0.093731 (0.16525) [-0.56722]	0.156784 (0.16567) [0.94636]	0.106035 (0.36268) [0.29236]	0.000955 (0.07012) [0.01362]	0.176886 (0.17743) [0.99692]	0.860826 (1.18122) [0.72876]
LNEXPVOL(-1)	0.247283 (0.0092) [.85000]	-0.819903*** (0.41281) [-2.04821]	0.546790*** (0.43765) [1.24937]	0.823714*** (0.21220) [3.88184]	0.317929*** (0.16410) [1.93737]	0.572810*** (0.50391) [1.13674]	1.413121*** (0.67639) [2.08922]
LNDINCOME(-1)	-1.249273*** (0.51694) [-2.41667]	-1.156302 (1.26935) [-0.91094]	-0.546765*** (0.19763) [-2.76660]	-0.049165 (0.31601) [-0.15558]	0.097822 (0.37357) [0.26186]	-0.577406*** (0.22624) [-2.55213]	-0.987616* (0.89469) [-1.10386]
LNWNDINCOME(-1)	3.548573*** (0.99535) [3.56516]	3.202224** (2.13462) [1.50014]	0.863412 (0.29765) [2.9007]	0.907905*** (0.52275) [1.73678]	5.209996*** (1.57256) [3.31307]	0.895912 (0.34743) [2.57867]	-0.100084 (1.22540) [-0.08167]
VOLT(-1)	-0.017746 (0.03560) [-0.49847]	0.585944* (0.58068) [1.00907]	-0.048212 (0.21543) [-0.22379]	0.029160 (0.67773) [0.04303]	1.792627*** (0.30964) [5.78932]	-0.051144 (0.22395) [-0.22838]	-1.575982** (1.10605) [-1.42488]
C	-55.95284*** (17.6135) [-3.17671]	-47.63760** (31.2649) [-1.52368]	5.449876 (19.3219) [0.28205]	-22.34592** (14.7491) [-1.51507]	-140.7528*** (51.4312) [-2.73672]	6.885193 (21.2071) [0.32466]	14.04347 (30.1934) [0.46512]
D1IT	0.090711** (0.05928)	0.004397 (0.07142)	0.059453 (0.08654)	0.080798** (0.05307)	-0.069101** (0.04542)	0.069520 (0.09519)	-0.029663 (0.07881)

	[1.53033]	[0.06157]	[0.68700]	[1.52237]	[-1.52133]	[0.73031]	[-0.37637]
D2IT	0.028534 (0.04283) [0.66626]	0.025532 (0.06051) [0.42194]	0.072345** (0.04216) [1.71596]	0.156785*** (0.05243) [2.99049]	-0.078569* (0.05597) [-1.40371]	0.074752** (0.04178) [1.78901]	-0.015057 (0.05678) [-0.26518]
R-squared	0.988392	0.992612	0.934157	0.996892	0.997560	0.994177	0.994786
Adj. R-squared	0.980929	0.983112	0.930051	0.994740	0.994422	0.991071	0.991435
Log likelihood	38.32365	34.04787	38.41234	38.53061	41.10383	38.40327	35.63420
Akaike AIC	-2.360304	-2.829161	-2.340271	-2.480923	-3.659274	-2.450272	-2.136183

Table 9 provides a mix of results as to the effect of regime type on export volume. Our focus is on the coefficients of the dummy variables where to be interpreted as differential coefficients from the benchmark in this case the excluded pegged regime. In Tanzania and Zambia, fixed or pegged regime to perform better than the other regime types. While in Ethiopia, Uganda, Liberia and Sierra Leone, fixed regime type has inferior performance. On the other hand, I have insignificant coefficients for Ghana.

I also run the VAR estimates (VAR) with 2 lags on the first difference of all variables and including the 2 dummy variables to see what the relationship looks like specifically when I took D(LNEXPVOL) as dependent variable. I also analyzed and compared the coefficients the float and interim exchange regimes against the left out pegged exchange regime.

Hence I found the following 5 equations like the previous VAR estimates at levels.

*D(LNEXPVOL) = C(1)*D(LNEXPVOL(-1)) + C(2)*D(LNEXPVOL(-2)) + C(3)*D(LNDINCOME(-1)) + C(4)*D(LNDINCOME(-2)) + C(5)*D(LNRPRICE(-1)) + C(6)*D(LNRPRICE(-2)) + C(7)*D(LNWNDINCOME(-1)) + C(8)*D(LNWNDINCOME(-2)) + C(9)*D(VOLT(-1)) + C(10)*D(VOLT(-2)) + C(11) + C(12)*D1IT + C(13)*D2IT*

*D(LNDINCOME) = C(14)*D(LNEXPVOL(-1)) + C(15)*D(LNEXPVOL(-2)) + C(16)*D(LNDINCOME(-1)) + C(17)*D(LNDINCOME(-2)) + C(18)*D(LNRPRICE(-1)) + C(19)*D(LNRPRICE(-2)) + C(20)*D(LNWNDINCOME(-1)) + C(21)*D(LNWNDINCOME(-2)) + C(22)*D(VOLT(-1)) + C(23)*D(VOLT(-2)) + C(24) + C(25)*D1IT + C(26)*D2IT*

*D(LNRPRICE) = C(27)*D(LNEXPVOL(-1)) + C(28)*D(LNEXPVOL(-2)) + C(29)*D(LNDINCOME(-1)) + C(30)*D(LNDINCOME(-2)) + C(31)*D(LNRPRICE(-1)) + C(32)*D(LNRPRICE(-2)) + C(33)*D(LNWNDINCOME(-1)) + C(34)*D(LNWNDINCOME(-2)) + C(35)*D(VOLT(-1)) + C(36)*D(VOLT(-2)) + C(37) + C(38)*D1IT + C(39)*D2IT*

*D(LNWNDINCOME) = C(40)*D(LNEXPVOL(-1)) + C(41)*D(LNEXPVOL(-2)) + C(42)*D(LNDINCOME(-1)) + C(43)*D(LNDINCOME(-2)) + C(44)*D(LNRPRICE(-1)) + C(45)*D(LNRPRICE(-2)) + C(46)*D(LNWNDINCOME(-1)) + C(47)*D(LNWNDINCOME(-2)) + C(48)*D(VOLT(-1)) + C(49)*D(VOLT(-2)) + C(50) + C(51)*D1IT + C(52)*D2IT*

*D(VOLT) = C(53)*D(LNEXPVOL(-1)) + C(54)*D(LNEXPVOL(-2)) + C(55)*D(LNDINCOME(-1)) + C(56)*D(LNDINCOME(-2)) + C(57)*D(LNRPRICE(-1)) + C(58)*D(LNRPRICE(-2)) + C(59)*D(LNWNDINCOME(-1)) + C(60)*D(LNWNDINCOME(-2)) + C(61)*D(VOLT(-1)) + C(62)*D(VOLT(-2)) + C(63) + C(64)*D1IT + C(65)*D2IT*

The VAR estimates for the first differenced variables presented on the table 9 and subsequently, the P-values of all coefficients are also presented on this table. AS in the previous analysis of the VAR estimates without a difference, I found here also only C2 and C11 to be significant in explain the export volume. These coefficients represents, the 2nd lagged variable of export volume-LNEXPVOL(-2) and the constant C. The dummy variables of exchange regimes are not significant to impact the export volume. However, from the table clearly I can see that the interim or managed float regime to perform better than the other regime types while even the float regime has negative relationship with export volume.

Vector Autoregression Estimates
Date: 03/24/17 Time: 21:07
Sample (adjusted): 1984 2014
Included observations: 119 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	D(LNEXPVOL)	D(LNDINC...	D(LNWNDI...	D(LNRPRICE)	D(VOLT)
D(LNEXPVOL(-1))	0.161685	0.201239	-0.027987	-0.104508	-0.772623
	(0.11047)	(0.08090)	(0.02972)	(0.43327)	(0.63722)
	[1.46367]	[2.48751]	[-0.94171]	[-0.24121]	[-1.21250]
D(LNEXPVOL(-2))	0.233415	0.096563	0.007603	0.319514	-0.846748
	(0.10332)	(0.07567)	(0.02780)	(0.40525)	(0.59601)
	[2.25909]	[1.27614]	[0.27351]	[0.78844]	[-1.42068]
D(LNDINCOME(-1))	-0.245797	0.080206	0.012833	-0.500054	0.295112
	(0.14408)	(0.10552)	(0.03876)	(0.56512)	(0.83114)
	[-1.70593]	[0.76010]	[0.33105]	[-0.88486]	[0.35507]
D(LNDINCOME(-2))	-0.007451	0.022871	0.006822	-0.077549	-1.017491
	(0.13974)	(0.10234)	(0.03759)	(0.54808)	(0.80607)
	[-0.05332]	[0.22349]	[0.18147]	[-0.14149]	[-1.26228]
D(LNWNDINCOME(-1))	0.270115	0.009617	0.362294	0.342826	4.077366
	(0.39307)	(0.28786)	(0.10575)	(1.54168)	(2.26740)
	[0.68720]	[0.03341]	[3.42595]	[0.22237]	[1.79826]
D(LNWNDINCOME(-2))	-0.555840	0.036851	-0.173539	-0.439163	1.056952
	(0.40492)	(0.29654)	(0.10894)	(1.58816)	(2.33576)
	[-1.37272]	[0.12427]	[-1.59301]	[-0.27652]	[0.45251]
D(LNRPRICE(-1))	-0.032692	0.008668	0.002979	-0.720057	-0.111614
	(0.02233)	(0.01636)	(0.00601)	(0.08760)	(0.12883)
	[-1.46379]	[0.52993]	[0.49572]	[-8.22016]	[-0.86636]
D(LNRPRICE(-2))	-0.014967	0.001015	0.001603	-0.442767	0.048678
	(0.02271)	(0.01663)	(0.00611)	(0.08906)	(0.13099)
	[-0.65912]	[0.06103]	[0.26237]	[-4.97132]	[0.37161]
D(VOLT(-1))	0.010368	0.001636	0.003965	0.000235	0.119465
	(0.01572)	(0.01151)	(0.00423)	(0.06164)	(0.09066)
	[0.65972]	[0.14211]	[0.93766]	[0.00381]	[1.31778]
D(VOLT(-2))	0.007121	-0.004389	0.002499	0.011131	0.544317
	(0.01602)	(0.01173)	(0.00431)	(0.06282)	(0.09240)
	[0.44461]	[-0.37413]	[0.58000]	[0.17718]	[5.89108]
C	0.113066	0.050334	0.051340	0.048904	-0.153582
	(0.03960)	(0.02900)	(0.01065)	(0.15531)	(0.22842)
	[2.85536]	[1.73569]	[4.81913]	[0.31488]	[-0.67237]
D1IT	-0.022704	-0.066327	0.010959	-0.222656	-0.326521
	(0.05090)	(0.03728)	(0.01369)	(0.19964)	(0.29362)
	[-0.44604]	[-1.77928]	[0.80026]	[-1.11527]	[-1.11204]
D2IT	0.054675	-0.090276	0.026814	0.020278	0.199020
	(0.07497)	(0.05491)	(0.02017)	(0.29405)	(0.43248)
	[0.72927]	[-1.64420]	[1.32938]	[0.06896]	[0.46019]
R-squared	0.120369	0.171353	0.160675	0.408569	0.507983
Adj. R-squared	0.020788	0.077544	0.065657	0.341614	0.452283
Sum sq. resids	3.630811	1.947343	0.262803	55.85455	120.8165
S.E. equation	0.185075	0.135540	0.049792	0.725899	1.067604
F-statistic	1.208753	1.826611	1.690994	6.102189	9.119993
Log likelihood	38.78152	75.84945	195.0169	-123.8495	-169.7551
Akaike AIC	-0.433303	-1.056293	-3.059108	2.299992	3.071514
Schwarz SC	-0.129701	-0.752692	-2.755506	2.603594	3.375115
Mean dependent	0.106056	0.087367	0.060529	-0.029646	-0.706583
S.D. dependent	0.187030	0.141122	0.051512	0.894615	1.442554

Determinant resid covariance (dof adj.)	5.49E-07
Determinant resid covariance	3.08E-07
Log likelihood	47.86241
Akaike information criterion	0.288027
Schwarz criterion	1.806035

Table 9:Vector Autoregressive Estimates at First difference

VECM

A vector error correction (VEC) model is a restricted VAR designed for use with nonstationary series that are known to be cointegrated. I have tested for cointegration using the Johansen Cointegration Test and I found there are 4 cointegration equations.

The VEC has cointegration relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments

According to the Granger representation theorem (Engle and Granger, 1987), if the variables in equation (2) are cointegrated, then it can be shown that the error correction model (ECM) for exports will be of the following form:

$$\Delta X_t = \alpha_0 + \alpha_1 R_{t-1} + \alpha_2 D_{1t} + \alpha_3 D_{2t} + \sum_{k=1}^{n} \beta_i \ln Y_{t-k} + \sum_{k=1}^{n} \theta_i \Delta Y^*_{t-k} + \sum_{k=1}^{n} \varphi_i PR_{it-k} + \sum_{k=1}^{n} \sigma_i V_{t-k} + \varepsilon_t$$

.... (3)

where Δ is the first-difference operator, R_{t-1} is the error-correction term (ECT), i.e., the one-period lagged error term in the cointegration regression, D_{1t}, D_{2t}, Xt, Yt,Y*t PRt and Vt are as defined earlier, and εt is an error term This ECM allows us to estimate the short-run relationships between exports and its determinants. The parameter α1 measures the response of real exports in each period to departures from the long-run equilibrium. With the cointegration equation normalized on exports, α1 is expected to have a negative sign and be statistically significant.

If I took one of the cointegrated equations, our correction model will have the form of the following equations which takes LNEXPVOL as dependent variable and 2 period lagged endogenous variables including the two dummy variables of exchange rate regimes.

D(LNEXPVOL) = C(1)(LNEXPVOL(-1) - 0.779030381368*LNDINCOME(-1) - 0.551062459064*LNRPRICE(-1) - 1.14135062514*LNWNDINCOME(-1) - 0.0588227340493*VOLT(-1) + 33.6644302587) + C(2)*D(LNEXPVOL(-1)) + C(3)*D(LNEXPVOL(-2)) + C(4)*D(LNDINCOME(-1)) + C(5)*D(LNDINCOME(-2)) + C(6)*D(LNRPRICE(-1)) + C(7)*D(LNRPRICE(-2)) + C(8)*D(LNWNDINCOME(-1)) + C(9)*D(LNWNDINCOME(-2)) + C(10)*D(VOLT(-1)) + C(11)*D(VOLT(-2)) + C(12) + C(13)*D1IT + C(14)*D2IT*

In the Vector error correction estimates which is displayed in the table 10 below, I am showing the long-run relationships between the dependent variable and the independent, endogenous lagged variables.

Vector Error Correction Estimates
Date: 03/07/17 Time: 22:11
Sample (adjusted): 1984 2014
Included observations: 119 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LNEXPVOL(-1)	1.000000
LNDINCOME(-1)	-0.779030 (0.08708) [-8.94589]
LNRPRICE(-1)	-0.551062 (0.13583) [-4.05689]
LNWNDINCOME(-1)	-1.141351 (0.15210) [-7.50372]
VOLT(-1)	-0.058823 (0.01322) [-4.44949]
C	33.66443

Error Correction:	D(LNEXPVOL)	D(LNDINC...	D(LNRPRICE)	D(LNWNDI...	D(VOLT)
CointEq1	-0.090669	-0.011109	0.216285	0.017967	0.612935
	(0.02857)	(0.02187)	(0.11538)	(0.00785)	(0.16180)
	[-3.17401]	[-0.50785]	[1.87458]	[2.28814]	[3.78814]
D(LNEXPVOL(-1))	0.113701	0.195359	0.009957	-0.018478	-0.448238
	(0.10709)	(0.08201)	(0.43255)	(0.02944)	(0.60660)
	[1.06170]	[2.38228]	[0.02302]	[-0.62771]	[-0.73894]
D(LNEXPVOL(-2))	0.273632	0.101491	0.223580	-0.000366	-1.118620
	(0.09997)	(0.07655)	(0.40378)	(0.02748)	(0.56626)
	[2.73710]	[1.32577]	[0.55371]	[-0.01333]	[-1.97546]
D(LNDINCOME(-1))	-0.236791	0.081309	-0.521537	0.011048	0.234231
	(0.13832)	(0.10591)	(0.55865)	(0.03802)	(0.78345)
	[-1.71197]	[0.76769]	[-0.93356]	[0.29059]	[0.29898]
D(LNDINCOME(-2))	-0.068390	0.015405	0.067818	0.018898	-0.605534
	(0.13548)	(0.10374)	(0.54721)	(0.03724)	(0.76740)
	[-0.50479]	[0.14849]	[0.12393]	[0.50745]	[-0.78907]
D(LNRPRICE(-1))	-0.060341	0.005280	-0.654102	0.008458	0.075297
	(0.02314)	(0.01772)	(0.09345)	(0.00636)	(0.13106)
	[-2.60793]	[0.29801]	[-6.99934]	[1.32980]	[0.57455]
D(LNRPRICE(-2))	-0.028362	-0.000626	-0.410815	0.004257	0.139227
	(0.02220)	(0.01700)	(0.08966)	(0.00610)	(0.12574)
	[-1.27762]	[-0.03684]	[-4.58184]	[0.69766]	[1.10726]
D(LNWNDINCOME(-1))	0.546645	0.043498	-0.316823	0.307496	2.207972
	(0.38718)	(0.29648)	(1.56382)	(0.10643)	(2.19307)
	[1.41186]	[0.14671]	[-0.20260]	[2.88924]	[1.00679]
D(LNWNDINCOME(-2))	-0.626991	0.028133	-0.269437	-0.159440	1.537943
	(0.38927)	(0.29808)	(1.57226)	(0.10700)	(2.20491)
	[-1.61068]	[0.09438]	[-0.17137]	[-1.49006]	[0.69751]
D(VOLT(-1))	0.026770	0.003645	-0.038891	0.000714	0.008584
	(0.01594)	(0.01221)	(0.06440)	(0.00438)	(0.09031)
	[1.67899]	[0.29857]	[-0.60392]	[0.16298]	[0.09505]
D(VOLT(-2))	0.036105	-0.000838	-0.058007	-0.003244	0.348385
	(0.01788)	(0.01369)	(0.07222)	(0.00491)	(0.10128)
	[2.01922]	[-0.06118]	[-0.80321]	[-0.66001]	[3.43986]
C	0.152076	0.055114	-0.044152	0.043610	-0.417297
	(0.03994)	(0.03059)	(0.16133)	(0.01098)	(0.22624)
	[3.80738]	[1.80195]	[-0.27368]	[3.97196]	[-1.84447]
D1IT	-0.073177	-0.072511	-0.102255	0.020961	0.014687
	(0.05138)	(0.03934)	(0.20751)	(0.01412)	(0.29100)
	[-1.42434]	[-1.84316]	[-0.49278]	[1.48425]	[0.05047]
D2IT	0.043933	-0.091592	0.045902	0.028943	0.271636
	(0.07203)	(0.05516)	(0.29095)	(0.01980)	(0.40802)
	[0.60988]	[-1.66048]	[0.15777]	[1.46169]	[0.66574]

R-squared	0.197377	0.173383	0.427721	0.200538	0.567141
Adj. R-squared	0.098005	0.071040	0.356868	0.101557	0.513549
Sum sq. resids	3.312948	1.942571	54.04579	0.250322	106.2901
S.E. equation	0.177628	0.136017	0.717441	0.048826	1.006125
F-statistic	1.986237	1.694138	6.036696	2.026027	10.58256
Log likelihood	44.23278	75.99542	-121.8908	197.9121	-162.1331
Akaike AIC	-0.508114	-1.041940	2.283879	-3.090960	2.960220
Schwarz SC	-0.181158	-0.714984	2.610835	-2.764005	3.287176
Mean dependent	0.106056	0.087367	-0.029646	0.060529	-0.706583
S.D. dependent	0.187030	0.141122	0.894615	0.051512	1.442554

Determinant resid covariance (dof adj.)	3.93E-07
Determinant resid covariance	2.10E-07
Log likelihood	70.62298
Akaike information criterion	0.073563
Schwarz criterion	1.825112

Table 10: Error Correction model

First the existence of long run relationship among variable of interest requires the coefficients on the error correction tem to be negative and a limit of 0 and -2 and according to Bannerjee et.al (1998)

From table 9, we clearly see that the error correction term -0.090669 which is telling us that it is significant and this confirms the existence of the long run relationship among the variables with their significant lags and tells us that the speed at which our model returns to equilibrium following exogenous shocks.

If we see the first column of table 12 to see the coefficients of the endogenous variables and the dependent variable in our case of the export volume, I understand all variables exhibited different speed in getting away or coming back to the equilibrium.

In our dummy variable D1it, which is the float exchange rate regime, the error correction coefficient =-0.073177 (negative) which implying that the deviation of the modelin the long-term corrected by 7.3% by the following year. While In our dummy variable D2it, which is the interim exchange rate regime, the error correction coefficient =0.043933 (positive) which implying that the model in the long-term will be dragged back from the equilibrium by 4.4% in the following year.

Chapter Five

5.1 Conclusion

The findings of this study proved that there is no conclusive evidence to show the choice of different exchange rate regimes would impact export volumes in either way.

The study also focused on the coefficients of the dummy variables where to be interpreted as differential coefficients from the benchmark in this case the excluded pegged regime. However, with the inconclusive results, I have seen that for some countries fixed exchange regime to perform better and for some the floating regime. In Tanzania and Zambia, fixed or pegged regime to perform better than the other regime types. While in Ethiopia, Uganda, Liberia and Sierra Leone, fixed regime type has inferior performance. On the other hand, I have found insignificant coefficients for Ghana.

Hence the mix results that for some countries hard pegged exchange regime to perform better and for some freely floating regime. Nevertheless, some had superior performance in interim exchange rate regime. We obtained inconclusive results and further investigations are appropriate.

Even though I obtained inconclusive results but it was also observed in the long run relationship, the float regime can have a positive impact to return equilibrium of the model back during exogenous shock seasons which was described on the Error correction model. In the same token I concluded that the interim regime has a negative impact to drag the model away from the equilibrium.

Thus, for a broad range of developing and emerging market economies, the choice of appropriate exchange rate regime remains an important policy challenge, particularly in the face of intensifying globalization and increasing access to the global capital markets. Hence there appears to be no clear-cut formula for a developing or emerging market economy to choose an appropriate exchange rate regime. An appropriate exchange rate regime may thus tend to vary depending on the specific circumstances of the country in question in relation to the various factors and criteria identified in the literature as determinants of exchange rate regime choice.

5.2 Recommendations

The adverse effect of exchange rate volatility on exports calls for policy actions to tackle rising exchange rate volatility. Especially monetary policy instruments should be used to curtail these shortcomings. The monetary authorities should adopt a mechanism that will lead to the stability of the exchange rate.

The design and implementation of trade and exchange-rate policies in sub-Sahara African countries should benefit from knowledge of both the existence and the degree of foreign exchange-rate volatility. It is clear that policy actions aimed at stabilizing the export market are likely to generate results that are, at best, uncertain, if policy makers ignore the stability, as well as the level, of exchange rate.

This study tried to see the bulk of export volume to changes in the level and uncertainty of exchange rates. Therefore studies should concentrate on further disaggregating export types and considering specific trading partners. Moreover, exchange rate volatility is one of the least researched areas in the sub region hence given its significance on the trade and economic performance of countries it is a fertile topic for further studies.

Finally, some ideas lingered while doing this study but not fully addressed are the following. First, the non-stationary econometrics approach should further developed to see the panel VAR and ECM analysis. Second, robustness test should also be conducted in order to strengthen all the evidences. Third, some of the contradictory test statistically results should properly be addressed.

5.3 References

1. Andrew Berg (2000). *Exchange Rate Regimes in an Increasingly Integrated World Economy*. IMF Occasional Paper 193.
2. Arize, Augustine, Osang, Thomas and Slottaje, Daniel (2000),"Exchange rate volatility and foreign trade: Evidence from thirteen LDCs" 155-180
3. Bleany, M. and Fielding, D. (2002) 'Exchange Rate Regimes, Inflation and Output Volatility in https://www.researchgate.net/publication/222648607_Exchange_rate_regimes_inflation_and_output_volatility_in_developing_countries?el=1_x_8&enrichId=rgreq-19ae2e353bc34e8d5905009780ed5b5a-XXX&enrichSource=Y292ZXJQYWdlOzQ0MjA2MzAyO0FTOjk4NjUyMDUxNzM4NjI5QDE0MDA1MzE4OTA1NTY=Developing Countries', *Journal of Development Economics* 68 (1): 233-45.
4. Calvo, G. A. and Reinhart, C. M. (2000) *Fear of Floating.* NBER Working Paper 8006. Cambridge, MA: National Bureau of Economic Research.
5. Dornbusch, R. (2001) *FeI r Monies, Better Monies.* NBER Working Paper 8324. Cambridge, MA: National Bureau of Economic Research.
6. Edwards, S. (2001) Exchange Rate Regimes, Capital Flows and Crisis Prevention. NBER Working https://www.researchgate.net/publication/5196501_Exchange_Rate_Regimes_Capital_Flows_and_Crisis_Prevention?el=1_x_8&enrichId=rgreq-19ae2e353bc34e8d5905009780ed5b5a-XXX&enrichSource=Y292ZXJQYWdlOzQ0MjA2MzAyO0FTOjk4NjUyMDUxNzM4NjI5QDE0MDA1MzE4OTA1NTY=Paper 8529. Cambridge, MA: National Bureau of Economic Research.
7. Eichengreen, B. (1994) International Monetary Arrangements for the 21st Century. Washington, DC: https://www.researchgate.net/publication/24139121_International_Monetary_Arrangements_for_the_21st_Century?el=1_x_8&enrichId=rgreq-19ae2e353bc34e8d5905009780ed5b5a-XXX&enrichSource=Y292ZXJQYWdlOzQ0MjA2MzAyO0FTOjk4NjUyMDUxNzM4NjI5QDE0MDA1MzE4OTA1NTY=The Brookings Institution.

8. Frankel, J. A. (1999) *No Single Currency Regime is Right for all Countries or at all Times*. Princeton Essays in International Finance No. 215. Princeton, NJ: Princeton University Press.
9. Friedman, M. (1953) 'The Case for Flexible Exchange Rates', in *Essays in Positive Economics*. Chicago: University of Chicago Press.
10. Ghosh, A., Gulde, M., Ostry. J, and Wolf, H. (1996), "Does Nominal Exchange rate Regime Matter?"NEBER Working Paper 5874.
11. Goldstein, M. (1995) *The Exchange Rate System and the IMF: A Modest Agenda.* Washington, DC: Institute of International Economics.
12. Harrigan, J., Banda, W. and Nixson, F. (2001) 'The Determinants of Export Performance: Results of a 1997 Survey of Malawian Exporters', *Journal of African Business* 2 (3): 33-64.
13. Harrigan, J (2006) 'Time to Exchange the Exchange Rate Regime: Are Hard Pegs the Best Options for Low-income', *Development Policy Review* 24 (2): 205-223
14. Husain, A., Mody, A. and Rogoff, K. (2005) 'Exchange Rate Regime Durability and Performance in Developing Versus Advanced Economies', *Journal of Monetary Economics* 52(25): 35-64.
15. Levy-Yayati, E. and Sturzenegger, F. (2003) 'To Float or to Fix: Evidence on the Impact of ExchangeRate Regimes on Growth', American Economic Review 93 (4): 1173-93.

16. McKinnon, R. and Pill, H. (1999) 'Exchange Rate Regimes for Emerging Markets: Moral Hazard and https://www.researchgate.net/publication/5216070_Exchange-Rate_Regimes_for_Emerging_Markets_Moral_Hazard_and_International_Overborrowing?el=1_x_8&enrichId=rgreq-19ae2e353bc34e8d5905009780ed5b5a-XXX&enrichSource=Y292ZXJQYWdlOzQ0MjA2MzAyO0FTOjk4NjUyMDUxNzM4NjI5QDE0MDA1MzE4OTA1NTY=International Over-borrowing', Oxford Economic Review 15: 19-38. Time to Exchange the https://www.researchgate.net/publication/5216070_Exchange-Rate_Regimes_for_Emerging_Markets_Moral_Hazard_and_International_Overborrowing?el=1_x_8&enrichId=rgreq-19ae2e353bc34e8d5905009780ed5b5a-XXX&enrichSource=Y292ZXJQYWdlOzQ0MjA2MzAyO0FTOjk4NjUyMDUxNzM4NjI5QDE0MDA1MzE4OTA1NTY=Exchange-Rate Regime 223https://www.researchgate.net/publication/5216070_Exchange-Rate_Regimes_for_Emerging_Markets_Moral_Hazard_and_International_Overborrowing?el=1_x_8&enrichId=rgreq-19ae2e353bc34e8d5905009780ed5b5a-

XXX&enrichSource=Y292ZXJQYWdlOzQ0MjA2MzAyO0FTOjk4NjUyMDUxNzM4NjI5QDE0MDA1MzE4OTA1NTY=

17. Milner, C. and Zgovu, E. (2003) *Export Response to Trade Liberalization in the Presence of High Trade Costs: Evidence for a Landlocked African Economy*.
18. Mussa, Michael (2007). "IMF Surveillance over China's Exchange Rate Policy", Peterson Institute for International Economics, Washington, DC.
19. Obstfeld, M. and Rogoff, K. (1995) 'Mirage of Fixed Exchange Rates', *Journal of Economic Perspectives* 9: 73-96. Polak, J. J. (1957) 'Monetary Analysis of Income Formation', *IMF Staff Papers* 6, November.
20. Reinhart, C. M. and Rogoff, K. (2004) 'The Modern History of Exchange Rate
21. Arrangements: A Reinterpretation', *Quarterly Journal of Economics* 119 (1): 1-48. Reserve Bank of Malawi (2005) 'Evolution of Exchange Rate Determination in Malawi:
22. Stilianos Fountas& Kyriacos Aristotelous, 2000. "Does the Exchange Rate Regime Affect Export Volumes? Evidence from Bilateral Exports in the US-UK trade: 1900-1998," Working Papers 0043, National University of Ireland Galway, revised 2000
23. Yeyati, Eduardo Sturzenegger, Federico and Reggio, Iliana , 2009, "On the Endogeneity of Exchange Rate Regimes", Universidad Carlos III de Madrid Working Paper 09-83

Annex: Additional Tables

Date: 03/22/17 Time: 22:44
Sample (adjusted): 1984 2014
Included observations: 119 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: LNEXPVOL LNDINCOME LNRPRICE LNWNDINCOME VOLT D1IT D2IT
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.430980	223.8243	134.6780	0.0000
At most 1 *	0.356719	156.7274	103.8473	0.0000
At most 2 *	0.324946	104.2277	76.97277	0.0001
At most 3 *	0.196718	57.46516	54.07904	0.0242
At most 4	0.137659	31.39826	35.19275	0.1213
At most 5	0.079764	13.77389	20.26184	0.3053
At most 6	0.032096	3.882065	9.164546	0.4300

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.430980	67.09697	47.07897	0.0001
At most 1 *	0.356719	52.49967	40.95680	0.0017
At most 2 *	0.324946	46.76252	34.80587	0.0012
At most 3	0.196718	26.06690	28.58808	0.1015
At most 4	0.137659	17.62437	22.29962	0.1981
At most 5	0.079764	9.891826	15.89210	0.3443
At most 6	0.032096	3.882065	9.164546	0.4300

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNEXPVOL	LNDINCOME	LNRPRICE	LNWNDINC...	VOLT	D1IT	D2IT	C
0.147975	-0.111061	-0.424831	-0.701404	-0.132704	2.732021	-2.982490	22.67646
-1.560575	1.193727	0.831157	1.411973	0.021451	-0.074500	-3.801163	-40.30482
-1.904818	1.469984	0.260043	-0.042763	-0.021916	-0.511747	-4.694354	9.786014
-3.177004	2.818668	0.505597	1.923957	-0.087909	1.071714	2.008411	-56.15329
-0.102520	0.290479	-0.510206	-0.614278	-0.043222	-2.555834	1.415926	15.10083
-0.130677	0.333874	-1.039748	1.054642	-0.013680	-0.306454	0.281546	-35.41585
-0.421858	0.355413	-0.627939	-0.385496	0.029469	2.057431	-1.665232	12.44977

Unrestricted Adjustment Coefficients (alpha):

D(LNEXPVOL)	-0.031720	0.004696	0.042962	0.044631	-0.033535	0.018877	-0.007742
D(LNDINCOME)	0.019409	0.014697	0.006353	-0.011657	-0.025416	0.009320	-0.016957
D(LNRPRICE)	0.123116	-0.068800	0.011542	-0.057698	0.086777	0.150643	0.040611
D(LNWNDIN...	7.12E-05	-0.021830	0.016802	0.003670	-0.005980	-0.001433	-0.002421
D(VOLT)	0.360241	-0.085650	-0.002930	0.208087	0.187379	-0.038937	-0.054730
D(D1IT)	-0.145325	-0.021512	0.012221	-0.030525	0.051904	0.002475	-0.013864
D(D2IT)	0.060012	0.064178	0.097838	-0.007311	0.002945	-0.007201	0.010971

Vector Autoregression Estimates
Date: 03/24/17 Time: 21:44
Sample (adjusted): 1983 2014
Included observations: 129 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LNEXPVOL	LNDINCOME	LNRPRICE	LNWNDINC...	VOLT
LNEXPVOL(-1)	0.934864	0.138826	0.107877	-0.000950	-0.163593
	(0.10721)	(0.07797)	(0.41744)	(0.02720)	(0.55165)
	[8.72023]	[1.78056]	[0.25843]	[-0.03494]	[-0.29655]
LNEXPVOL(-2)	-0.118045	-0.099663	0.169321	0.009339	-0.280337
	(0.10272)	(0.07471)	(0.39999)	(0.02606)	(0.52859)
	[-1.14915]	[-1.33403]	[0.42332]	[0.35830]	[-0.53035]
LNDINCOME(-1)	-0.082295	1.098137	-0.582979	0.004061	-0.321411
	(0.14064)	(0.10229)	(0.54764)	(0.03568)	(0.72372)
	[-0.58513]	[10.7360]	[-1.06453]	[0.11379]	[-0.44411]
LNDINCOME(-2)	0.226146	-0.135680	0.357335	-0.009820	0.749657
	(0.13755)	(0.10004)	(0.53559)	(0.03490)	(0.70780)
	[1.64410]	[-1.35632]	[0.66718]	[-0.28139]	[1.05914]
LNRPRICE(-1)	-0.003323	0.013051	0.210890	-0.004622	-0.096674
	(0.02296)	(0.01670)	(0.08940)	(0.00583)	(0.11815)
	[-0.14474]	[0.78158]	[2.35890]	[-0.79337]	[-0.81825]
LNRPRICE(-2)	0.043307	-0.004521	0.325197	-0.001289	0.071266
	(0.02164)	(0.01574)	(0.08425)	(0.00549)	(0.11133)
	[2.00161]	[-0.28731]	[3.86007]	[-0.23476]	[0.64011]
LNWNDINCOME(-1)	0.523782	0.212364	0.505156	1.235093	2.756051
	(0.39231)	(0.28532)	(1.52758)	(0.09954)	(2.01873)
	[1.33511]	[0.74431]	[0.33069]	[12.4081]	[1.36524]
LNWNDINCOME(-2)	-0.389766	-0.207333	-0.518639	-0.261891	-2.967452
	(0.38245)	(0.27815)	(1.48919)	(0.09704)	(1.96800)
	[-1.01912]	[-0.74541]	[-0.34827]	[-2.69885]	[-1.50785]
VOLT(-1)	0.023143	-0.000804	0.005376	-0.002340	0.867823
	(0.01836)	(0.01336)	(0.07151)	(0.00466)	(0.09450)
	[1.26020]	[-0.06018]	[0.07518]	[-0.50216]	[9.18352]
VOLT(-2)	-0.023588	0.000713	-0.012868	0.001605	0.044355
	(0.01686)	(0.01226)	(0.06565)	(0.00428)	(0.08675)
	[-1.39915]	[0.05813]	[-0.19602]	[0.37524]	[0.51129]
C	-3.474651	-0.085023	0.291358	0.847173	6.899107
	(1.13984)	(0.82897)	(4.43830)	(0.28921)	(5.86531)
	[-3.04836]	[-0.10257]	[0.06565]	[2.92931]	[1.17626]
D1IT	-0.009967	-0.016576	-0.023422	0.007881	0.415247
	(0.05377)	(0.03911)	(0.20938)	(0.01364)	(0.27670)
	[-0.18535]	[-0.42387]	[-0.11187]	[0.57768]	[1.50074]
D2IT	0.013627	-0.032259	0.756837	0.009312	-0.313896
	(0.07483)	(0.05442)	(0.29137)	(0.01899)	(0.38505)
	[0.18210]	[-0.59277]	[2.59753]	[0.49046]	[-0.81521]
R-squared	0.967819	0.983652	0.398377	0.996075	0.995066
Adj. R-squared	0.964490	0.981961	0.336140	0.995668	0.994556
Sum sq. resids	4.130097	2.184472	62.61876	0.265880	109.3587
S.E. equation	0.188691	0.137228	0.734722	0.047876	0.970952
F-statistic	290.7172	581.6317	6.400987	2452.876	1949.710
Log likelihood	38.93443	80.01620	-136.4259	215.8587	-172.3890
Akaike AIC	-0.402084	-1.039011	2.316680	-3.145097	2.874248
Schwarz SC	-0.113886	-0.750813	2.604878	-2.856898	3.162446
Mean dependent	21.34074	22.88571	1.052277	31.14030	17.96297
S.D. dependent	1.001325	1.021723	0.901748	0.727430	13.15959

Determinant resid covariance (dof adj.)	4.13E-07
Determinant resid covariance	2.43E-07
Log likelihood	67.18636
Akaike information criterion	-0.033897
Schwarz criterion	1.407094

Table 11: Vector Autoregressive Estimates at Levels

System: UNTITLED
Estimation Method: Least Squares
Date: 03/24/17 Time: 21:47
Sample: 1983 2014
Included observations: 135
Total system (unbalanced) observations 669

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.928341	0.104624	8.873121	0.0000
C(2)	-0.100451	0.100737	-0.997154	0.3191
C(3)	-0.042554	0.137177	-0.310211	0.7565
C(4)	0.178036	0.133734	1.331270	0.1836
C(5)	-0.000160	0.021237	-0.007557	0.9940
C(6)	0.035567	0.020945	1.698131	0.0900
C(7)	0.440821	0.375558	1.173778	0.2409
C(8)	-0.333209	0.366186	-0.909945	0.3632
C(9)	0.020691	0.017985	1.150474	0.2504
C(10)	-0.021486	0.016521	-1.300534	0.1939
C(11)	-2.684773	0.980107	-2.739266	0.0063
C(12)	-0.012224	0.052765	-0.231670	0.8169
C(13)	-0.001054	0.069528	-0.015164	0.9879
C(14)	0.144187	0.075213	1.917056	0.0557
C(15)	-0.102020	0.072419	-1.408747	0.1594
C(16)	1.099538	0.098615	11.14984	0.0000
C(17)	-0.139972	0.096140	-1.455919	0.1459
C(18)	0.012216	0.015267	0.800148	0.4239
C(19)	-0.006775	0.015057	-0.449933	0.6529
C(20)	0.157084	0.269984	0.581827	0.5609
C(21)	-0.158860	0.263247	-0.603464	0.5464
C(22)	-0.001177	0.012929	-0.091066	0.9275
C(23)	0.001045	0.011877	0.088028	0.9299
C(24)	0.136311	0.704587	0.193462	0.8467
C(25)	-0.019199	0.037932	-0.506146	0.6129
C(26)	-0.033144	0.049983	-0.663107	0.5075
C(27)	0.107877	0.417438	0.258425	0.7962
C(28)	0.169321	0.399985	0.423318	0.6722
C(29)	-0.582979	0.547639	-1.064532	0.2875
C(30)	0.357335	0.535591	0.667178	0.5049
C(31)	0.210890	0.089402	2.358897	0.0186
C(32)	0.325197	0.084246	3.860075	0.0001
C(33)	0.505156	1.527582	0.330690	0.7410
C(34)	-0.518639	1.489191	-0.348269	0.7278
C(35)	0.005376	0.071507	0.075178	0.9401
C(36)	-0.012868	0.065645	-0.196022	0.8447
C(37)	0.291358	4.438301	0.065646	0.9477
C(38)	-0.023422	0.209376	-0.111866	0.9110
C(39)	0.756837	0.291368	2.597526	0.0096
C(40)	-0.005186	0.026729	-0.194031	0.8462
C(41)	0.003589	0.025736	0.139460	0.8891
C(42)	0.000605	0.035046	0.017265	0.9862
C(43)	0.000810	0.034166	0.023708	0.9811
C(44)	-0.002927	0.005426	-0.539433	0.5898
C(45)	-2.35E-05	0.005351	-0.004388	0.9965
C(46)	1.238585	0.095947	12.90909	0.0000
C(47)	-0.255118	0.093553	-2.726999	0.0066
C(48)	-0.001727	0.004595	-0.375863	0.7072
C(49)	0.000991	0.004221	0.234828	0.8144
C(50)	0.574727	0.250396	2.295277	0.0221
C(51)	0.008011	0.013480	0.594258	0.5526
C(52)	0.009029	0.017763	0.508320	0.6114
C(53)	-0.391660	0.567814	-0.689768	0.4906
C(54)	-0.062879	0.546720	-0.115011	0.9085
C(55)	0.112627	0.744484	0.151283	0.8798
C(56)	0.327838	0.725800	0.451692	0.6517
C(57)	-0.025469	0.115260	-0.220972	0.8252
C(58)	0.013437	0.113672	0.118211	0.9059
C(59)	2.375346	2.038225	1.165400	0.2443
C(60)	-2.714022	1.987365	-1.365639	0.1726
C(61)	0.851191	0.097606	8.720681	0.0000
C(62)	0.058861	0.089661	0.656478	0.5118
C(63)	10.84066	5.319228	2.038014	0.0420
C(64)	0.401913	0.286367	1.403490	0.1610
C(65)	-0.530452	0.377340	-1.405768	0.1603

1 Cointegrating Equation(s):	Log likelihood	70.24745					

Normalized cointegrating coefficients (standard error in parentheses)

LNEXPVOL	LNDINCOME	LNRPRICE	LNWNDINC...	VOLT	D1IT	D2IT	C
1.000000	-0.750539	-2.870962	-4.740009	-0.896799	18.46269	-20.15533	153.2449
	(0.83318)	(1.29456)	(1.48793)	(0.12256)	(3.41441)	(5.47702)	(50.5975)

Adjustment coefficients (standard error in parentheses)

D(LNEXPVOL)	-0.004694
	(0.00262)
D(LNDINCOME)	0.002872
	(0.00190)
D(LNRPRICE)	0.018218
	(0.00978)
D(LNWNDIN...	1.05E-05
	(0.00077)
D(VOLT)	0.053307
	(0.01300)
D(D1IT)	-0.021505
	(0.00361)
D(D2IT)	0.008880
	(0.00331)

2 Cointegrating Equation(s):	Log likelihood	96.49729					

Normalized cointegrating coefficients (standard error in parentheses)

LNEXPVOL	LNDINCOME	LNRPRICE	LNWNDINC...	VOLT	D1IT	D2IT	C
1.000000	0.000000	-124.8444	-204.7928	-46.95853	979.0208	-1198.548	6799.607
		(68.5882)	(79.5667)	(6.53519)	(182.563)	(290.200)	(2510.95)
0.000000	1.000000	-162.5144	-266.5455	-61.37151	1279.824	-1570.061	8855.448
		(89.6866)	(104.042)	(8.54547)	(238.721)	(379.468)	(3283.35)

Adjustment coefficients (standard error in parentheses)

D(LNEXPVOL)	-0.012022	0.009129
	(0.02776)	(0.02123)
D(LNDINCOME)	-0.020064	0.015389
	(0.02000)	(0.01530)
D(LNRPRICE)	0.125586	-0.095802
	(0.10305)	(0.07881)
D(LNWNDIN...	0.034077	-0.026067
	(0.00742)	(0.00568)
D(VOLT)	0.186971	-0.142252
	(0.13706)	(0.10482)
D(D1IT)	0.012067	-0.009540
	(0.03806)	(0.02911)
D(D2IT)	-0.091274	0.069946
	(0.03359)	(0.02569)

3 Cointegrating Equation(s): Log likelihood 119.8785

Normalized cointegrating coefficients (standard error in parentheses)

LNEXPVOL	LNDINCOME	LNRPRICE	LNWNDINC...	VOLT	D1IT	D2IT	C
1.000000	0.000000	0.000000	-49.01328	22.12361	-593.4893	677.6871	1652.214
			(61.7179)	(4.69902)	(141.434)	(224.709)	(1938.16)
0.000000	1.000000	0.000000	-63.76165	28.55517	-767.1685	872.3007	2154.903
			(79.8772)	(6.08162)	(183.048)	(290.826)	(2508.43)
0.000000	0.000000	1.000000	1.247790	0.553346	-12.59576	15.02858	-41.23046
			(1.06650)	(0.08120)	(2.44402)	(3.88304)	(33.4920)

Adjustment coefficients (standard error in parentheses)

D(LNEXPVOL)	-0.093857	0.072282	0.028551
	(0.04240)	(0.03260)	(0.01665)
D(LNDINCOME)	-0.032166	0.024728	0.005622
	(0.03144)	(0.02417)	(0.01235)
D(LNRPRICE)	0.103601	-0.078836	-0.106486
	(0.16215)	(0.12468)	(0.06369)
D(LNWNDIN...	0.002072	-0.001368	-0.013805
	(0.01093)	(0.00840)	(0.00429)
D(VOLT)	0.192551	-0.146559	-0.224992
	(0.21569)	(0.16585)	(0.08472)
D(D1IT)	-0.011211	0.008425	0.047037
	(0.05983)	(0.04600)	(0.02350)
D(D2IT)	-0.277638	0.213766	0.053289
	(0.04709)	(0.03621)	(0.01850)

4 Cointegrating Equation(s): Log likelihood 132.9120

Normalized cointegrating coefficients (standard error in parentheses)

LNEXPVOL	LNDINCOME	LNRPRICE	LNWNDINC...	VOLT	D1IT	D2IT	C
1.000000	0.000000	0.000000	0.000000	1.650095	-42.70344	74.62282	-14.14933
				(0.33663)	(10.4858)	(15.2999)	(6.39813)
0.000000	1.000000	0.000000	0.000000	1.921055	-50.64798	87.77093	-12.87752
				(0.40579)	(12.6402)	(18.4434)	(7.71270)
0.000000	0.000000	1.000000	0.000000	1.074565	-26.61777	30.38151	1.192130
				(0.18159)	(5.65643)	(8.25334)	(3.45139)
0.000000	0.000000	0.000000	1.000000	-0.417714	11.23748	-12.30410	-33.99819
				(0.08566)	(2.66842)	(3.89351)	(1.62819)

Adjustment coefficients (standard error in parentheses)

D(LNEXPVOL)	-0.235648	0.198080	0.051116	0.112909
	(0.06678)	(0.05641)	(0.01815)	(0.04130)
D(LNDINCOME)	0.004869	-0.008129	-0.000271	-0.015561
	(0.05105)	(0.04312)	(0.01387)	(0.03157)
D(LNRPRICE)	0.286907	-0.241466	-0.135658	-0.295000
	(0.26337)	(0.22246)	(0.07156)	(0.16289)
D(LNWNDIN...	-0.009586	0.008976	-0.011949	-0.024531
	(0.01776)	(0.01500)	(0.00483)	(0.01098)
D(VOLT)	-0.468542	0.439969	-0.119784	0.026865
	(0.34168)	(0.28860)	(0.09284)	(0.21133)
D(D1IT)	0.085766	-0.077615	0.031603	0.012306
	(0.09678)	(0.08174)	(0.02630)	(0.05986)
D(D2IT)	-0.254412	0.193160	0.049593	0.030276
	(0.07673)	(0.06481)	(0.02085)	(0.04745)

5 Cointegrating Equation(s): Log likelihood 141.7242

Normalized cointegrating coefficients (standard error in parentheses)

LNEXPVOL	LNDINCOME	LNRPRICE	LNWNDINC...	VOLT	D1IT	D2IT	C
1.000000	0.000000	0.000000	0.000000	0.000000	-29.76867	-25.10311	-48.05351
					(14.4806)	(22.0838)	(8.10631)
0.000000	1.000000	0.000000	0.000000	0.000000	-35.58920	-28.33083	-52.34905
					(16.6233)	(25.3515)	(9.30577)
0.000000	0.000000	1.000000	0.000000	0.000000	-18.19447	-34.56138	-20.88674
					(10.4050)	(15.8682)	(5.82474)
0.000000	0.000000	0.000000	1.000000	0.000000	7.963107	12.94104	-25.41551
					(3.81306)	(5.81513)	(2.13456)
0.000000	0.000000	0.000000	0.000000	1.000000	-7.838808	60.43647	20.54680
					(12.3780)	(18.8772)	(6.92927)

Adjustment coefficients (standard error in parentheses)

D(LNEXPVOL)	-0.232210	0.188339	0.068226	0.133509	0.000895
	(0.06544)	(0.05546)	(0.01962)	(0.04168)	(0.00273)
D(LNDINCOME)	0.007474	-0.015512	0.012696	5.16E-05	-0.000276
	(0.05004)	(0.04241)	(0.01500)	(0.03187)	(0.00209)
D(LNRPRICE)	0.278010	-0.216259	-0.179932	-0.348305	-0.016745
	(0.26115)	(0.22132)	(0.07829)	(0.16632)	(0.01089)
D(LNWNDIN...	-0.008973	0.007239	-0.008899	-0.020858	-0.000910
	(0.01760)	(0.01492)	(0.00528)	(0.01121)	(0.00073)
D(VOLT)	-0.487752	0.494399	-0.215386	-0.088237	-0.075970
	(0.33345)	(0.28259)	(0.09996)	(0.21236)	(0.01390)
D(D1IT)	0.080445	-0.062538	0.005122	-0.019577	0.018996
	(0.09455)	(0.08013)	(0.02834)	(0.06022)	(0.00394)
D(D2IT)	-0.254714	0.194016	0.048090	0.028467	-0.008216
	(0.07674)	(0.06504)	(0.02301)	(0.04887)	(0.00320)

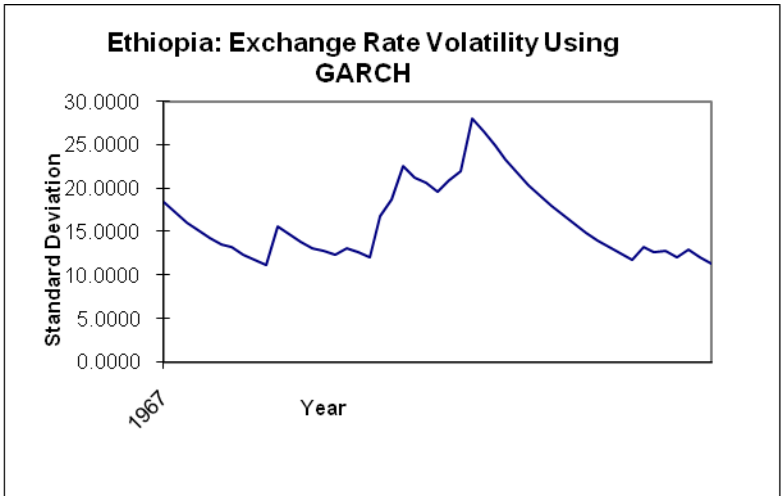
6 Cointegrating Equation(s): Log likelihood 146.6701

Normalized cointegrating coefficients (standard error in parentheses)

LNEXPVOL	LNDINCOME	LNRPRICE	LNWNDINC...	VOLT	D1IT	D2IT	C
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	38.69010	-19.62477
						(6.39437)	(2.44141)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	47.93559	-18.36176
						(8.29931)	(3.16872)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	4.428728	-3.511222
						(2.09623)	(0.80035)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	-4.123620	-33.02019
						(1.42191)	(0.54289)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	77.23476	28.03278
						(23.5708)	(8.99945)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	2.142965	0.954989
						(0.80659)	(0.30796)

Adjustment coefficients (standard error in parentheses)

D(LNEXPVOL)	-0.234677	0.194642	0.048599	0.153417	0.000636	0.018761
	(0.06504)	(0.05535)	(0.02573)	(0.04477)	(0.00272)	(0.06361)
D(LNDINCOME)	0.006256	-0.012400	0.003005	0.009881	-0.000404	0.098289
	(0.04992)	(0.04249)	(0.01975)	(0.03436)	(0.00209)	(0.04883)
D(LNRPRICE)	0.258324	-0.165964	-0.336563	-0.189430	-0.018806	0.005787
	(0.25423)	(0.21637)	(0.10057)	(0.17499)	(0.01063)	(0.24867)
D(LNWNDIN...	-0.008786	0.006760	-0.007409	-0.022369	-0.000890	0.012878
	(0.01760)	(0.01498)	(0.00696)	(0.01212)	(0.00074)	(0.01722)
D(VOLT)	-0.482664	0.481399	-0.174901	-0.129302	-0.075437	0.748098
	(0.33326)	(0.28363)	(0.13183)	(0.22940)	(0.01393)	(0.32598)
D(D1IT)	0.080122	-0.061712	0.002548	-0.016967	0.018962	-0.567812
	(0.09460)	(0.08051)	(0.03742)	(0.06511)	(0.00396)	(0.09253)
D(D2IT)	-0.253773	0.191612	0.055577	0.020873	-0.008117	0.095949
	(0.07673)	(0.06530)	(0.03035)	(0.05281)	(0.00321)	(0.07505)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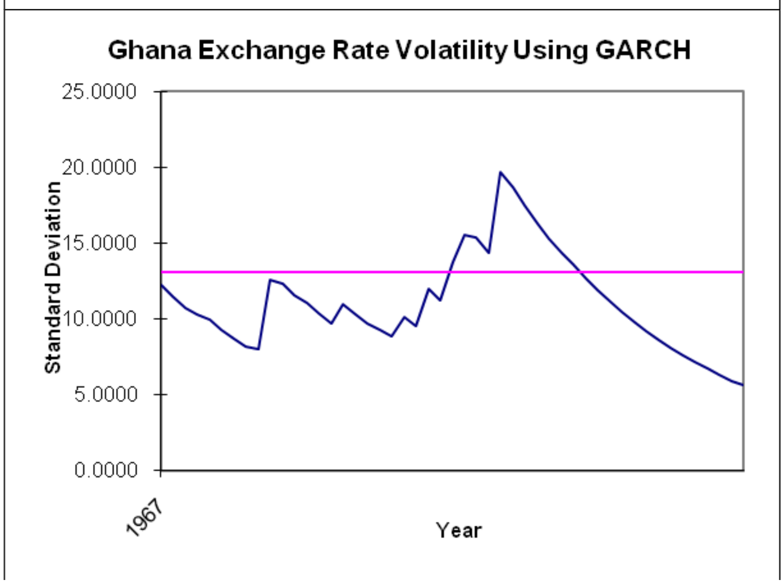
10.0000
5.0000
0.0000
Standard Deviation
1967
Year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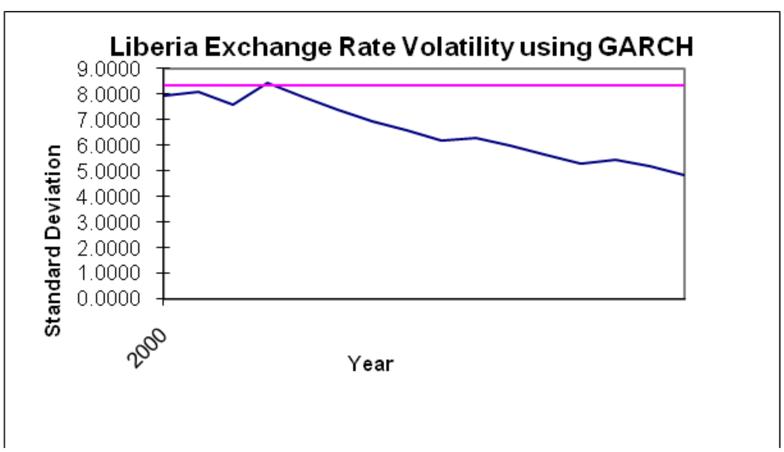
Standard Deviation
1967
Year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Standard Deviation
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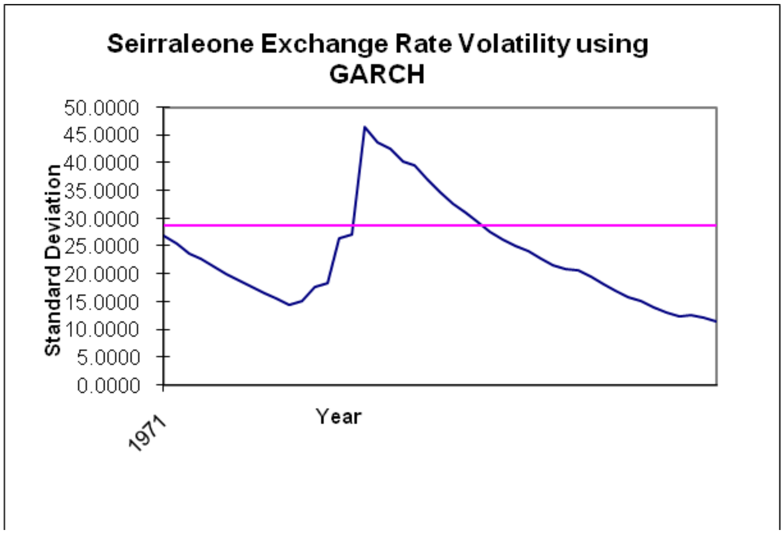
Year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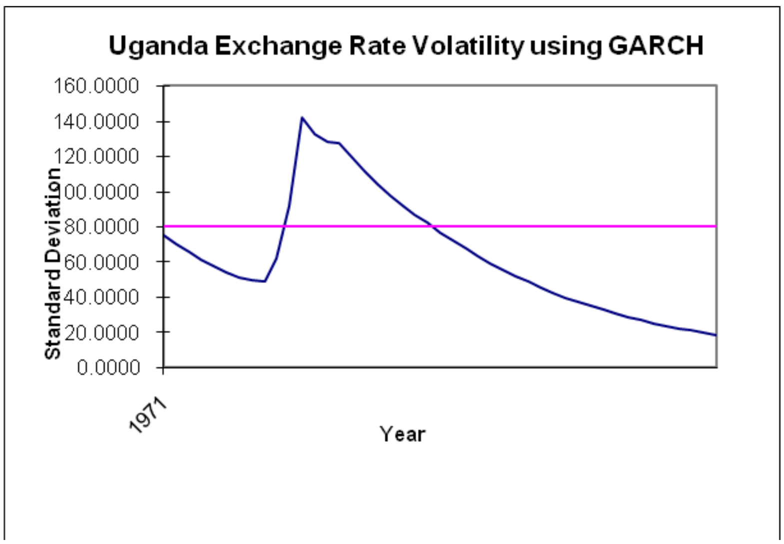
10.0000
5.0000
0.0000
1971
Year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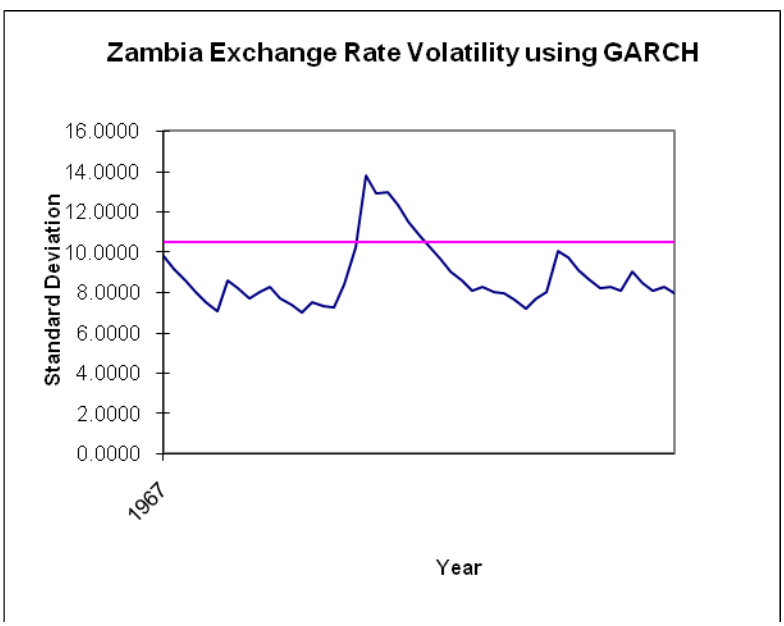
Year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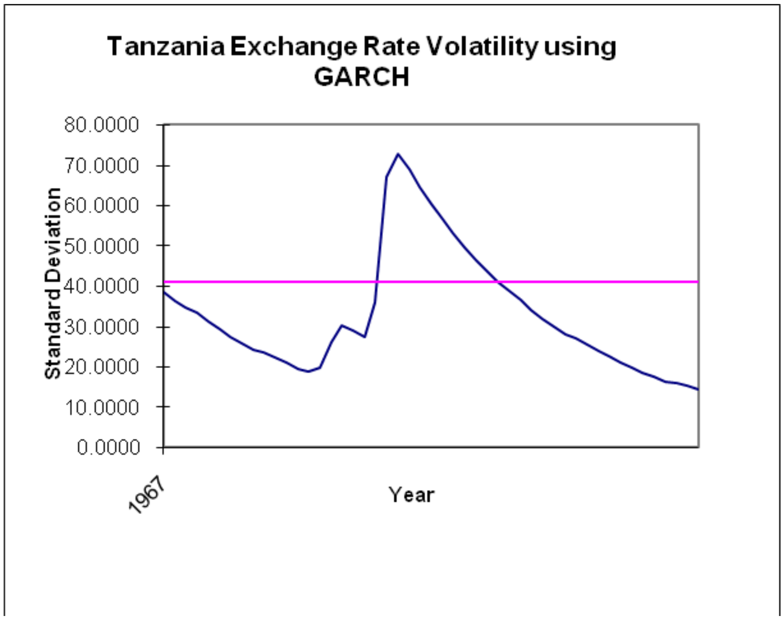
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Standard Deviation
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Year