INFLUENCE OF EXCHANGE RATE VOLATILITY ON COFFEE EXPORTS IN TANZANIA: 1996-2016

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT FOR THE REQUIREMENTS OF THE DEGREE OF MASTER OF SCIENCE IN ECONOMICS OF THE OPEN UNIVERSITY OF TANZANIA

2018

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Open University of Tanzania a thesis entitled, influence of Exchange Rate Volatility on coffee exports in Tanzania from 1996 to 2016, in fulfillment of the requirements for degree of Masters of Science in Economics of the Open University of Tanzania.

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Prof. Deus D. Ngaruko

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.....

Date

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DECLARATION

I, Henry Desdery Tumaini, do hereby declare to the Senate of Open University of Tanzania that this research is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

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Signature

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Date

DEDICATION

This thesis is dedicated to the Almighty God who gave me strength amidst much lot of challenges I encountered. To my wife Martha, my son Ryan whom I understand had to endure some lonely times while I was busy preparing this work. To my father Desdery Mboya, my mother Emelda John and all my friends for their support which enabled me to reach this milestone.

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ABSTRACT

This research broadly examines the influence of ERV on coffee exports in Tanzania due to the fact that the contribution of coffee to the Tanzanian economy has shown a fluctuating as well as a declining trend. The research was guided by two specific objectives: The first objective was to examine the volatility of real exchange rate of the currency of Tanzania and its influence on coffee exports between 1996 and 2016. The second objective was to determine the responsiveness of coffee exports to changes in other determinants of coffee exports apart from the exchange rate volatility. The gravity model was used to analyse the relationship. Econometric methods were used to estimate the gravity model using time series data for the period 1996-2016. The empirical results of the study in general indicate that in the long-run, variations in coffee exports are caused by variations in the ERV, nominal GDP of Tanzania, the real exchange rate and terms of trade for Tanzania. While short-run findings of this study show that, variations in coffee exports can be explained only by variations in ERV or real exchange rate or both. The study draws the following conclusion; stable exchange rate could be effective policy instrument for promoting coffee exports in Tanzania. ERV could be reduced by putting in place policies which are directed in strengthening and deepening the capital, financial and currency market. The exchange rate movements should be in line with the performance of the economy both domestically and externally. Improvement of terms of trade for Tanzania and the nominal GDP of Tanzania has a positive influence of coffee exports in the long-run. Therefore policies directed to improve the terms of trade and promote economic growth will likewise improve the quantity of coffee exports.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Coffee is one of Tanzaniaôs traditional agricultural export commodities accounting for about 3.3% of total exports value and 18.4% of total traditional exports value ranking third, the second by rank in the traditional exports is Cashwenut which accounts for about 23.5% of total traditional exports value and the first by rank in the traditional exports is Tobacco which accounts for 36.3 % of total traditional exports value. Coffee industry generates export earnings averaging US$ 150 million annually though this amount has been fluctuating for the last 30 years (BoT, 2017). The industry provides income to some 4.5 million Tanzanians engaged in its cultivation, research, processing, handling and Transportation. It is also a source of revenue to the government through taxation. More than 90% of coffee produced in Tanzania is exported, the rest is consumed in the domestically (Tanzania Coffee Industry development strategy, 2012).

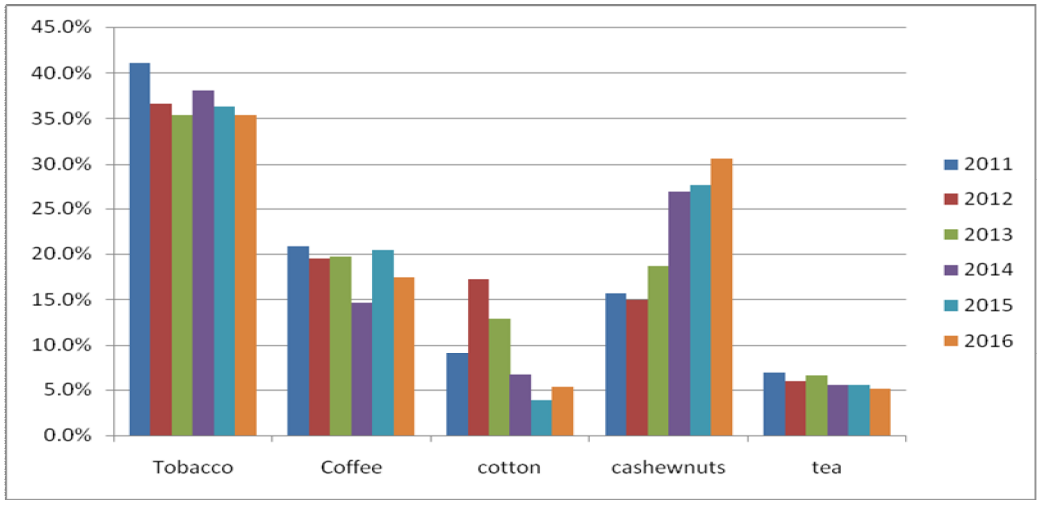

Figure 1.1: Coffee as it Features among Traditional Export Crops
Source: Bank of Tanzania (2017)

Tanzania is the home of the worldôs finest coffees. Over 90% of Tanzanian coffees are grown on farms of smallholders, the remainder comes from estates. According to the BoT data, average production of coffee is 54,000 tonnes annually(BoT, Economic Bulletin for the quarter ending March, 2018).Tanzania produces two varieties of coffee, Arabica (70%) and Robusta (30%). Arabica type of coffee is grown in the Northern, Southern and Western Highland regions including, Kilimanjaro, Arusha, Manyara, Iringa, Mbeya, Rukwa, Ruvuma, Tanga, Kigoma and Mara.

Kigoma region is reputed to produce some of Tanzaniaôs most highly-prized coffee. The Arabica type of coffee produced in Tanzania is exceptional. It has fine acidity and fully flavor, it is highly demanded both as a ñpureò coffeeof the highest quality and often used as a component of the best blends in Japan, Europe and North America.Itôs quality is superior over coffee produced in large coffee producing countries, Brazil and Vietnam just to mention. Robusta type of coffee is grown in the western part of the country along Lake Victoria in Mwanza, Kagera and Morogoro regions.

Generally, the coffee industry has four key prices: the farmgate price (which is the price paid to the farmer before the price of transport and other costs have been added); the auction price (which is the price paid to the farmer when coffee is sold at the auction); the International Coffee Organisationôs (ICO) indicator price which is a composite price used by international coffee traders, providing information on the general wholesale market for coffee; and last key price is the consumer price, which is the price paid for coffee-whole beans, ground or instant, or cups of coffee, sold at

retail outlets. Within the coffee industry there is a very wide gap between the price paid to farmers for their beans and prices paid by consumers for a cup of the final product. Oxfam estimates that the price of coffee is inflated by 7000% before reaching the British consumer.

Currently, owing to the policy changes in the traditional export crops, we only have two marketing system in the Tanzanian coffee industry. The Farm gate market being one. In this marketing system a farmer sales the raw coffee, ungraded and unprocessed (parchment for Arabica and dry cherry for Robusta) to a cooperative. The second available marketing system in the Tanzanian coffee industry is the auction market. The coffee auction is conducted every Thursday at Tanzania Coffee Board Headquarters located in Kilimanjaro at Moshi town. This is the place where cooperatives sell raw, processed and graded coffee to the highest bidder. A bidder (either private or cooperatives) in the auction must have a license from Tanzania Coffee Board to buy coffee. In the auction coffee is traded in dollars per bag of 50 kg and the price of coffee is dependent on its quality. Usually prices are quoted in reference to the prices in the two terminal markets; the New York and London Coffee Exchange Markets.

Tanzania Coffee is available to buyers through out the world from the licensed Coffee export companies in Tanzania who purchase the coffee at auctions organized by Tanzania Coffee Board at Moshi Kilimanjaro. For the last three years, over 70% of the countryôs Arabica Coffee has gone to buyers in Japan and Germany while Robusta Coffee has been sold mainly to Italy, the Netherlands and Belgium. Tanzania coffee is also sold to other nations including, Russia, Australia, Canada,

South Korea and Saudi Arabia. There is also another portion of Tanzania coffee which is made available to buyers outside Tanzania via smuggling channels. This portion is not captured in the exports and thus the country looses foreign earnings that it would otherwise earn had this portion been traded legally. Most of Tanzania smuggled coffee is sold to Uganda, some to Burundi and Rwanda.

A close assessment shows that, the coffee production and export in Tanzania has experienced a fluctuating declining trend from 1990ôs as compared to 1980ôs where it was a leading traditional export crop and assured a sustainable contribution to the GDP out of its exportation.It is indeed important to note here that, in the same period (i.e 1990ôs) like many developing countries Tanzania also shifted to a managed floating exchange rate system following the breakdown of the Bretton Woods system in the early 1970ôs. The adoption of the floating exchange rate system produced a significant volatility and uncertainty in exchange rates. There has been a debate both theoretically and empirically among researchers and policy makers on the influence of exchange rate volatility on international trade. This debate seems to have no consensus and in most cases the conclusion drawn is that, the impact of exchange rate volatility on international trade is rather an empirical phenomenon.

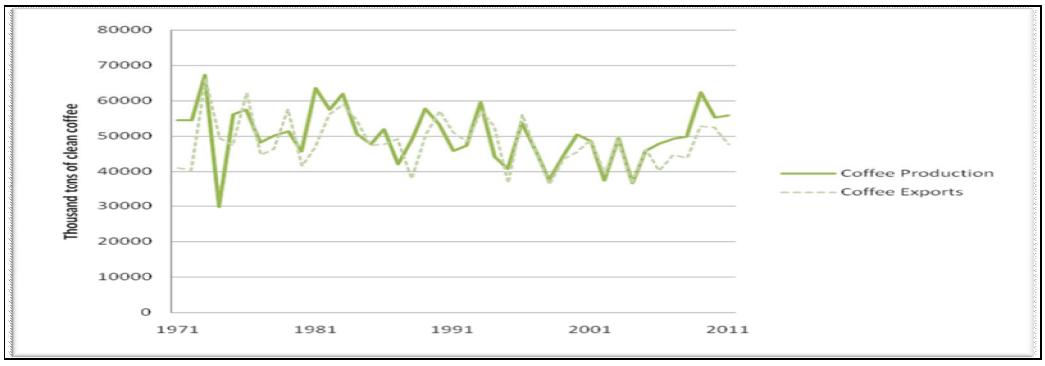

Figure 1.2: Tanzania coffee Exports (1971 – 2011)
Source: USDA figures 2011

1.2 Statement of the Problem

Coffee exportation in Tanzania is experiencing a fluctuating declining trend (see Fig 1.2) despite different policy reforms and initiatives taken such as licensing the establishment of coffee factories and encouraging cooperatives to spread ownership of factory to private operators in order to ensure that they are properly maintained and operate efficiently, the government has divestedits nationalized estates in the traditional coffee growing areas in order to increase production and productivity. The government has also instituted a levy on coffee auction sales to finance coffee research and seedling production programs. Furthermore, the government encouraged private sector, farmers association and cooperatives to invest in proper primary processing methods in order to improve quality of the coffee. Despite the fact that these initiatives have been taken a closer assessment shows that still there has been sluggish responses in coffee exports growth.

Like many developing countries Tanzania moved to a managed floating exchange rate system early 90ôs. However, this shift is associated to likely cause volatility and misalignments in exchange rate both of which interfere with the flow of international trade in exchange rates and investments. The consequences of these fluctuations in coffee exportation are loss of foreign revenue which previously Tanzania earned from a sustainable growth and exportation of coffee. Furthermore, planning for development is made more difficult because when exports are high, development projects are started that use imported equipment but when export earnings subsequently decline foreign exchange is not available to complete and operate the projects resulting in waste and failure in planning process. Thus, large fluctuations in

export income lead to shortage in foreign exchange which will in turn limit the capacity to import capital goods, a situation which will lead to a decline in investment and consequently reduce the overall economic growth.

Moreover, fluctuations in coffee exports cause a fall in living standards of coffee producers who previously derived their livelihood from coffee. To help mitigate any adverse future influences that could preclude achievement of national development goals, including but not limited to income generation and poverty reduction there exists a strong case to assess the influence of key economic determinants Tanzaniaôs coffee export performance. The study of Maureen, et. al,(2002) which was conducted in Kenya and that of Hussien (2015) in which was done in Ethiopia on the determinants of coffee export supply, found out that real exchange rate has a profound effect on export performance both in the short and long run . In both studies they used the error correction model to examine both short run and long run elasticities.

Tanzania coffee production, consumption and exportation processes differ from those of Kenya and Ethiopia. In Tanzania over 90% of coffee production is done in smallholder farms the rest is done in estates, in Kenya 30% of coffee is produced in estates and 70% from smallholder farms. Less than 10% of Tanzaniaôs coffee is consumed within the country, compared to more than 40% of Ethiopiaôs coffee drunk locally. Annual consumption of coffee per person is 1.4 kilograms in Ethiopia, in Tanzania, however, annual consumption per person is negligible. The exportation of coffee accounts for more than 50% (866 million USD) of Ethiopiaôs export earnings, in Tanzania it only accounts for less than 4% (150 million USD) of

Tanzaniaגs export earnings. Cognizant of these facts, this study is set out to examine the influence of the major determinants of the volume of coffee exports in Tanzania with a particular focus on the Exchange Rate Volatility.

1.3 Research Objectives

1.3.1 General Research Objective

The general objective of this study is to examine the influence of exchange rate volatility on coffee exports supply in Tanzania.

1.3.2 Specific Research Objective

i. To examine the volatility of real exchange rate of the currency of Tanzania and its influence on coffee exports between 1996 and 2016.
ii. To determine the responsiveness of coffee exports to changes in other determinants of coffee exports apart from the exchange rate volatility.

1.4 Research Hypothesis

i. H_0: Exchange Rate Volatility has no significant influence on coffee exports.
ii. H_0: Changes in other determinants of coffee have no significant influence on coffee exports.

1.5 Significance of the Study

The findings of this study will provide relevant information by knowing the extent to which exchange rate has influence on the fluctuations in coffee exports. In turn the information will enable the coffee stakeholders and the Government at large to make informed decisions on what policy to pursue in order to ensure a sustainable growth

and income from coffee exports. The study will also add to the existing literature on coffee production in Tanzania.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter presents both theoretical and empirical literature review. This chapter is sub-divided into two main parts; theoretical literature review and empirical literature review.

2.2 Definition and Measurement of Variables

2.2.1 Coffee Exports

Hussein (2005) defines coffee exports as he quantity of coffee exported from nation to the other. Kwame (2017) defines coffee exports as the value of the flow of Coffee exports from one nation to another. This study will adopt Kwameôs definition of coffee exports. Thus, coffee exports is the value of the flow of Coffee exports from Tanzania. It will be measured by using quantity of coffee exports in metric tonnes multiplied by U.S dollar value per metric tonne for the period between 1996 and 2016.

2.2.2 Exchange Rate

This is a price at which the national currency is valued in relation to a foreign currency. Exchange rate serves as an indicator for external competitiveness. The traditional arguments involved in choosing between fixed and flexible exchange-rate regimes. Today the basic typology of exchange-rate arrangements currently in operation in developing countries involves classifying them as pegged regimes, flexible régimes, and band regimes. (Agenor & Montiel, 2008).

2.2.3 Exchange Rate Volatility

Exchange Rate Volatility is defined as the risk associated with unexpected movements in exchange rate. (Ulan et al. 2008). Exchange Rate Volatility refers to the tendency of the domestic currency to appreciate or depreciate in value in relation to foreign currencies thus affecting the profitability of foreign exchange trade. Thus, the rate at which one currency is converted into another is an exchange rate. How rapidly and unexpected the exchange rate fluctuates is its volatility. Volatility is the measure of the degree to which exchange rate change over time. The larger the magnitude or the more quickly it changes over time, the more volatile the exchange rate. (Habibullar et.al,2005 ; Hurley & Santos, 2001)

Exchange Rate Volatility has been measured in the literatures using either nominal or real (effective) exchange rates. For our case since we are covering a considerable long period of time during which values expressed in foreign-currency term are likely to vary we shall use the real exchange rates. The study will adopt both the exchange rate definition and the Exchange Rate Volatility measure similar to that used by Habibullah et.al (2005) and Hurley & Santos (2001), in their studies they constructed a time-varying volatility measure which is able to capture general movements in real exchange fluctuations. The measure was constructed by the moving sample standard deviation of the growth rate of the real exchange rate and expressed as follows:

$$n_t \left[(1/m) \sum_{i=1}^{m} (RER_{t+i-1} - RER_{t+i-2})^2 \right]^{\frac{1}{2}}$$

Where n_t is the natural logarithm of the real exchange rate; and $m = 12$ is the order of the moving average.

2.2.4 Nominal GDP of Tanzania

This is the measure of the market or money value of all final goods and services produced in the economy in a given year based on the prices prevailing when the market was produced. (Habibulah et al. 2005). Rose (2000) defines the nominal GDP as the measure of a countries ability to produce. This study will blend the two definitions to obtain the definition of nominal GDP. Thus nominal GDP of Tanzania is money value of all goods and services in a given year based on the market prices as a proxy measure of the countyôs ability to produce coffee exports. The nominal GDP of Tanzania is measured in U.S dollar value. It will be measured by converting the nominal value of the GDP of Tanzania for the period between 1996 and 2016 into U.S dollar value using the exchange rate.

2.2.5 Nominal GDP of Coffee Importers

The nominal GDP of major importers of Tanzania Coffee is calculated as a geometric average of the GDPs of the major importers for the period between 1996 and 2016 in U.S dollar value. This operational definition is adopted from the study of Kandilov (2008) and Habibula et.al 2005. The 5 countries selected are based on total volume of exports to each country under concern. They are Japan, Italy, USA, Germany and Belgium. Before we move further it should be noted that, in order to eliminate influences of changing foreign-exchange value of the dollar on affecting our GDP variables we have to convert all GDP data to U.S dollar at a set of fixed exchange rates. For our case we shall use the 1996 exchange rates.

2.2.6 Real Exchange Rate

Salvatore (2013) defines Real exchange rate as the nominal exchange rate divided by

the ratio of the consumer price index in foreign country to the consumer price index in the domestic country. Caglayan et.al (2010) defines the real exchange rate as the ratio of the price level abroad and the domestic price level, where the domestic price level is converted into domestic currency units via the current nominal exchange. For the case of this study the RER is the nominal exchange rate weighed by the consumer price index in the trading nations. RER will be calculated as the nominal exchange rate divided by the average consumer price index of the major importers of Tanzaniaô coffee to the consumer price index in Tanzania for the period between 1996 and 2016.

2.2.7 Terms of Trade

According to Cashin & Patillo (2000) Terms of trades is the ratio of the price index of the nationôs exports (P_X) to the price of its imports price (P_M) multiplied by an 100. That is:

$$I = \left({P_X}/{P_M} \right) 100 \ldots \ldots \ldots (1)$$

According to Bruno et.al (2007) Terms of trade is defined as the price index of the nationôs exports (P_X) to the price of its imports price (P_M) multiplied by volume of exports index. That is:

$$I = \left({P_X}/{P_M} \right) Q_X \ldots \ldots \ldots (2)$$

According to Pugh (2013) Terms of trade is defined as the price index of the nationôs exports (P_X) to the price of its imports price (P_M) multiplied by productivity index in the nationôs export sector. That is:

$$I = \left({}^{P_X}/_{P_M} \right) Z_X \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

This study will adopt the terms of trade definition provided by Cashin & Patillo (2000). That is, Terms of Trade (commodity/net barter TOT) are measured as the ratio the price index of Tanzania exports to the price of its imports expressed in percentage for the period between 1996 and 2016.

2.3 Theoretical Literature Review

In this section we shall examine the development of trade theory from the classicals (17^{th} century) through the Post-Neoclassicals (20^{th} century) and exchange rate regimes. It must be pointed out that, these theories were developed one after another, each theory designed to address what was left unexplained by its predecessor.

All trade theories which will be explained in this section seek to provide answers to to the following questions:

i. What is the basis for trade and how are the gains from trade generated?
ii. What is the pattern from trade? That is, what commodities are exported and imported by each nation?

Understanding these trade theories will put as in a good position to understand why Tanzania exports Coffee and what determines the quantity it exports. For the case of this study, we shall limit our discussion of the development of trade theories to only three trade theories. We shall begin with a brief discussion of the theory of comparative advantage, then the Heckscher- Ohlin theory and eventually the Gravity Model of trade.

2.3.1 The Classical Model of Trade

2.3.1.1 The theory of Comparative Advantage

In 1817, David Ricardo published his book on principles of political economy and taxation in which he presented the theory of comparative advantage. Ricardo began by acknowledging Smithôs idea (Ricardoôs predecessor) of trade on the basis of absolute advantage e.g trade between tropical and temperate zones) and he went further by saying that given the mobility of factors of production, gains from trade on the basis of comparative advantage can occur as well. (Salvatore, 2013)

According to the theory, even if one nation is less efficient than (has an absolute advantage with respect to) the other nation in the production of both commodities, there is still basis for mutually beneficial trade. The first nation should specialize in the production and export of the commodity in which its absolute disadvantage is smaller (this is the commodity of its comparative advantage) and import the commodity in which its absolute disadvantage is greater (this is the commodity of its comparative disadvantage. The sources of the gains from trade lie in the fact that relative commodity prices with trade differ from relative prices in autarky (without trade). (Salvatore, 2013; Appleyard & Field, 2010). Ricardo based his theory on a number of simplifying assumption:

i. Only two nations and two commodities.
ii. Free trade.
iii. Perfect mobility of labor within each nation but immobility between two nations.
iv. Constant costs of production.

v. No transportation costs.

vi. No technical change.

vii. The labor theory of value.

Of these 7 assumptions, assumption one through six can easily be relaxed, but as time went by assumption seven became obsolete. This assumption implies that the value or price of a commodity depends exclusively on the amount of labor going into the production of that commodity. Equation (1) explains this relationship:

$$P_{C,A} = W_A * L_{C,A} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

Equation (4) says that the price of commodity C is simply the cost of labour units used in its production. Thus, for trade to occur along the lines of comparative advantage it must be that when measured in the same currency the pre-trade money price of a countryôs comparative advantage good is less than or equal to the pre-trade money price of that good in the other country. The equation (5) demonstrates this condition.

$$P_{W,A} \leq S * P_{W,B} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (5)$$

Where S stands for exchange rate that translates units of country Bôs into units of country Aôs.

In 1936, Haberler came to Ricardoôs rescue by explaining the theory of comparative advantage on the basis of Opportunity Cost Theory. The Opportunity Cost Theory

postulates that, the cost of a commodity is the amount of a second commodity that must be forgone to release just enough resources to produce one additional unit of the first commodity. According to Haberler, the basis for mutual beneficial trade between two nations is that, each nation should specialize on the production and export of the commodity with the lowest opportunity cost (this is the commodity of its comparative advantage) and import the commodity whose production has high opportunity cost. (Salvatore, 2013). Haberlerôs work can be elaborated using equation (3). We start out with the two-good formulation of comparative advantage for a single economy that considers trading with the rest of the world. In this formulation, the world prices P_1^w , P_2^w are exogenous given and determine the terms of trade. The opportunity cost formulation is then:

$$if\ \frac{P_1^a}{P_2^a} < \ (>) \frac{P_1^w}{P_2^w}\ then\ T_1 < (>) 0\ and\ T_2 > \ (<) 0, \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (6)$$

Where P_1^a and P_2^a denote the economyôs autarky prices and T_1 and T_2 the corresponding net import quantities.

The major shortfalls of the Classical Model of Trade is that they did not explain the volume of trade, they only considered labor as the only factor of production and most importantly they did not explain the source of the difference in relative commodity prices which was one of the prerequisites for trade. (Salvatore, 2013)

2.3.2 The Neo-Classical Model of Trade

2.3.2.1 Heckscher – Ohlin Theory of Trade

This theory was developed by two Swedish economists, Eli Heckscher (1919) and Berlin Ohlin (1933). Ohlin was a former student of Heckscher. The H-O theory goes

much beyond the Classical Model of trade by examining the basis for the differences in relative commodity prices and the effect that trade has on factor earnings among nations involved in trade. There analysis began by examining how different relative quantities of the factors of production (factor endowment) can influence product prices and produce a basis for trade.

H-O theory postulates that, a nation will export the commodity whose production requires the intensive use of the nationôs relative abundant and cheap factor and import the commodity whose production requires the intensive use of the nationôs relative scarce and expensive factor. This implies that, the relatively labor rich nation exports the relatively labor-intensive commodity and imports the relatively capital-intensive commodity. H-O theory attributes the differences in relative commodity prices and comparative advantage to the differences in relative factor endowment among nations. It is for this reason the H-O theory is hailed because it explains the comparative advantage rather than assuming it as it was the case of Classical Model of Trade. (Salvatore, 2013; Appleyard & Field, 2010)

In addition to the assumptions made by the Classical Model of Trade, the H-O theory makes two more important assumptions critical for its analysis.

i. Factor endowments are different in each country. Relative factor abundance may be defined in two ways: the physical definition and the price definition. The physical definition explains factor abundance in terms of the physical units of two factors, for example, labor and capital, available in each of the two countries. Country I would be the capital-abundant country if its ratio of capital to labor (*K/L*) exceeded the ratio of capital to labor (*K/L*)in country II. According to the

price definition, country I would be the capital-abundant country as long asthe ratio of the price or rental rate of capital (r) to the price or wage of labor (w) in country I is less than in country II.(Appleyard & Field, 2010)

ii. Commodities are always intensive in a given factor regardless of relative factor prices. A commodity is said to be factor-x-intensive whenever the ratio of factor x to a second factor y is larger when compared with a similar ratio of factor usage of a second commodity.(Appleyard & Field, 2010)

According to H-O model, country A is capital abundant in the sense that $(^{w}/_{r})_{A} > (^{w}/_{r})_{B}$ and X is the capital-intensive commodity for all $(^{w}/_{r})$. Then internal trade is demonstrated by equation (7):

$$\left(\frac{^{X}/_{L_X}}{^{Y}/_{L_Y}}\right) < \left(\frac{P_X}{P_Y}\right) \ldots\ldots (7)$$

Equation (7) holds if and only if $\sigma_x \Theta_{kx} > \sigma_y \Theta_{ky}$, $^{X}/_{L_X}$ is the output per unit of labour, or the average productivity of labour in industry X. Θ_{ij} is the share of the factor (i) in the value of the out put of commodity (j), and σ_x and σ_y are elastisticities of factor substitution in the production of commodities X and Y respectively. Thus in the H-O framework under these conditions, each country exports the commodity for which relative average productivity of labour is higher compared to the other country before trade occurs.

2.3.2.1.1 General Equilibrium Framework of the H-O Theory

The general equilibrium nature of the H-O theory can be analyzed with the use of the diagram below. At the Right-hand corner of the diagram, distribution of income and

tastes together do influence the demand for final commodities. The demand for final commodities will create a derived demand for factors of production. The derived demand for factors together with the supply of the factors will influence the price of the factors in a competitive market. Then factor prices together with the available technology will consequently influence the commodity prices. The difference in relative commodity prices among nations then determines comparative advantage and pattern of trade (i.e. which nation exports which commodity).(Salvatore, 2013)

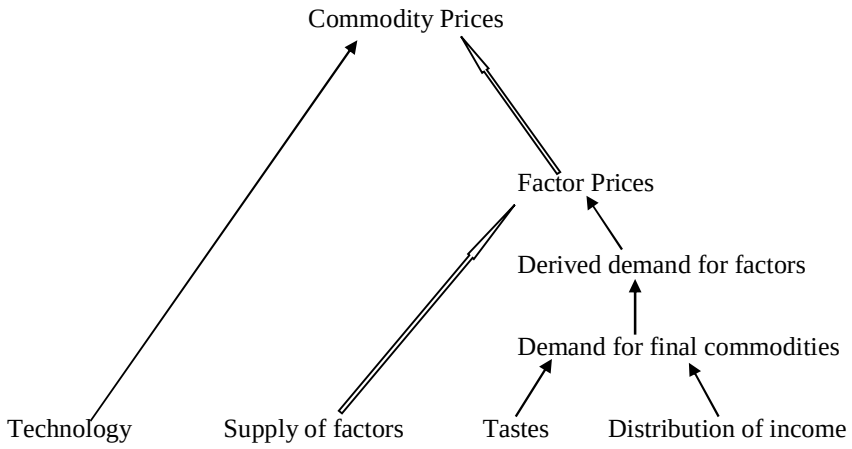

Figure 2.1: The General Equilibrium Framework of the H-O theory
Source: Salvatore (2013)

However, out of these forces (Technology, Supply of factors, Tastes and Distribution of income) working together, the H-O theory focused more on the supply of factors of production among nations to explain the difference in relative commodity prices and trade among nations. In their analysis they held the rest of the forces constant. If then the other three forces are held constant, it goes without saying that, the demands for final commodities and factors of production would be equal in different nations. Thus, it is the difference in the supply of various factors of production in different nations that is the cause of different relative factor prices and commodity prices in

different nations. (Salvatore, 2013).

However, a reflection on the relaxation of these assumptions do not invalidate the basic link between relative factor abundance and pattern of trade portrayed by the H-O model. The do however, influence the degree to which these links hold and observed (Appleyard & Field, 2010). It cannot be denied that, the initial work by Heckscher and Ohlin has had a profound effect on the development of the international trade theory. Even today, masses of trade could be empirically analyzed from the H-O theory perspective. For example, from the H-O theory perspective Tanzania exports coffee because Coffee and other agricultural crops in Tanzania requires more of the cheap and abundant factor labor. But one thing very crucial, that the H-O theory fell short is, it did not explain the volume trade. That is, if we were to analyze the determinants of the volume of trade between Tanzania and its trading partners with the H-O theory it would seem ambiguous. Nevertheless, the work of Heckscher and Ohlin was a foundation stone to most Post-Heckscher Ohlin theories including the Gravity Model of Trade which will spear head the analysis of this study.

2.3.3 The Post Heckscher-Ohlin theory

2.3.3.1 The Gravity Model of Trade

The model was developed by Walter Isard in 1954. In its simplest form, the Gravity Model Postulates that (other things equal), the bilateral trade between two countries is proportional, or at least positively related, to the product of the two countries Gross Domestic Product (GDP) and to be smaller the greater the distances between

two countries (just like in Newtonӧs law of gravity in physics). That is, the larger (and more equal in size) and the closer the two countries are, the larger the volume of trade between them is expected to be. Equation (8) is the econometric equation of the gravity model:

$$F_{ij} = A\frac{M_i^{\beta_1} M_j^{\beta_2}}{D_{ij}^{\beta_3}}\omega_{ij} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (8)$$

Where,

F_{ij} represents volume of trade from country I to country j.

M_i and M_j represent the GDPs for counties i and j respectively.

D_{ij} denotes the distance between the two countries

ω_{ij} represents the error term with expectation equal to 1.

The general implication drawn from the Gravity Model of trade is that, we would expect nations to trade with larger nation (i.e. with nations with larger GDPs) than with smaller ones, with nations that are geographically closer than with nations that are more distant (for which transportation costs would be greater), with nations with more open economic systems than with nations with less open systems, and with nations with similar language and cultural background than with nations that are more different. For real, a closer assessment will tell you this is exactly what is observed trade today. Most nations trade with other nations that are close and/or have large economies. Table 2.2 below shows Tanzania direction of trade in 2016/17.

Table 2.1: Tanzania Direction of Trade in 2016/2017

Imports – Major origins		Exports – Major destinations	
Country	**Percentage**	**Country**	**Percentage**
China	20.8	Switzerland	16.2
India	18.1	India	14.8
UAE	7.5	South Africa	13.3
South Africa	6.0	China	7.5
Japan	4.7	Kenya	6.6
Kenya	3.4	DRC	6.2
Malaysia	3.3	Belgium	6.0
United States	3.2	Comoros	3.6
Saud Arabia	2.8	Vietnam	3.1
Germany	2.4	Japan	2.9
Others	27.7	Others	19.1

Source: BoT Annual Report (2016/17)

The most important aspect of the gravity Model of trade is that, unlike many other trade theories (including the H-O theory we just analyzed) which mostly explained the pattern/ or composition of trade, the Gravity Model goes beyond by explaining the volume of trade. In 1998 Deardoff conducted a study on the determinants of bilateral trade. The main objective of his study was to see if the Gravity Model works in a Neo-classical world. The results of Deardoff study showed that, the Gravity Model is also consistent with the Neo-classical trade theory based on factor endowments. This underscores the fact that, the Gravity Model is not a replacement of the H-O theory but rather a complement, (Deardoff, 1998).

In the Gravity Model economic variables that will produce ñgood fitò are selected. That is, variables which will explain at least in a statistical sense a substantial portion of the size of trade that occurs. The variables that are nearly always used in the

Gravity equation as causes of say the flow of exports from country A to country B are:

1) GDP of country B.
2) GDP of country A (for greater income implies greater capacity to produce and hence to supply exports from country A to B).
3) Distance between country A to B (as a proxy for transportation costs from country A to B).

The Gravity Model has been used by economists to analyze the determinants of the volume of trade between nations. Despite the fact that, theoretical justification of the model is debated, the empirical tests using the Model have often been remarkably successful in analyzing the volume of trade. The econometrics encompassed in the Model have also linked the volume of trade to most important economic variables. Such work is important if we were to make headway in understanding the world economy and the volume of trade something that did not pop up in the other trade theories. It is because of this very fact that this study will use the Gravity Model in its analysis.

2.4 Exchange Rate Regimes

The traditional arguments involved in choosing between fixed and flexible exchange-rate regimes. Today the basic typology of exchange-rate arrangements currently in operation in developing countries involves classifying them as pegged regimes, flexible régimes, and band regimes. Pegged regimes come in several forms: currency boards, whereby the currency is (in principle) irrevocably fixed and the base money stock is backed by official foreign reserves; adjustable pegs, in which

the currency is fixed against a foreign currency and is seldom changed; and crawling pegs, whereby the currency is initially fixed but policymakers subsequently adjust the exchange rate at regular intervals to take into account changes in inflation differentials or the state of the trade balance. The rate of crawl can be either a well-defined (nondiscretionary) feedback rule or discretionary. In all of these regimes, the currency may be fixed against either a single foreign currency or alternative baskets of currencies (often tailor-made ones, relying on partner country trade weights), (Agenor & Montiel, 2008).

Under a pure currency board, the base money stock is fully backed by foreign reserves; the currency board only prints money against the reserve currency at a fixed exchange rate. Money issued by the currency board is also fully convertible on demand (at the fixed exchange rate) into the reserve currency, and vice versa. By definition, the ratio of the base money stock to the stock of foreign currency reserves is given by the exchange rate between the domestic currency and the reserve currency.(Agenor & Montiel, 2008).

In flexible regimes, the exchange rate is allowed to fluctuate in response to changes in demand and supply of foreign exchange. If the central bank does not intervene in the market for foreign exchange, the regime is a free float otherwise, it is a managed float. One argument against flexible exchange rates, is that, under flexible exchange rates, the exchange rate is likely to fluctuate a lot and be difficult to control through monetary policy (Agenor & Montiel, 2008). Band regimes involve the announcement of a central exchange rate together with a fluctuation band (which

may or may not be symmetric) around that rate. The central exchange rate is itself managed in some fashionð being, for instance, fixed or crawling. The implicit commitment of the central bank is to intervene actively at the margins of the band to prevent the exchange rate from moving outside the band. The implementation of a band also requires the adoption of a set of rules to guide foreign exchange market intervention, if any, within the band, (Agenor & Montiel, 2008).

On balance, it therefore appears that, from a macroeconomic viewpoint, flexible exchange rates dominate fixed exchange rates. This indeed appears to be the consensus that has emerged among economists and policy makers. The consensus goes likethis:In general, flexible exchange rates are preferable. There are, however, two exceptions: First, when a group of countries is already tightly integrated, a common currency may be the right solution. Second, when the central bank cannot be trusted to follow a responsible monetary policy under flexible exchange rates, a strong form of fixed exchange rates, such as a currency board or dollarization, may be the right solution (Blanchard & Johnson, 2013).

In Tanzania there have been changes in exchange rate policies from highly controlled exchange rate (until 1985) to a more liberalized exchange rate regime from early 90ôs. Currently the Central Bank of Tanzania is implementing a managed floating exchange rate regime. The Central Bank participates in the Interbank Foreign Exchange Market (IFEM) for liquidity management purposes and stabilization of the market in the excessive volatility.(BoT, Monetary Policy Statement, 2018).

2.5 Empirical Literature Review

2.5.1 Arguments against Exchange Rate Volatility

The argument that exchange-rate volatility reduces trade typically runs as follows. According to McKenzie (1999) and Clark, et al. (2004 In a two-country context, consider a firm located in country A that sells its product in country J (as well as in country A). For simplicity, suppose that the firm sells in a forward market in each country so that the firm knows the future price of its product at the time it incurs its costs of production. However, if there is no futures or forward market for foreign exchange, the firm has an exchange risk for the future conversion of its sales revenues from country J into the currency of country A. If the firm is risk-averse, it is willing to incur some added cost to avoid this risk, so that the risk, if not hedged, is an implicit cost.

In the presence of such a cost, this reasoning suggests that the firm's supply price at each quantity of export sales is higher than in the absence of the risk. For such firms in the aggregate, the quantity of exports supplied at a given price is smaller with this risk than without it. The same reasoning applies to firms in country B. If the risk is present for firms in both countries, the supply curve for exports from each country to the other is shifted to the left, compared with those that would exist in the absence of exchange-rate risk. Trade is reduced in a way similar to that resulting from an increase in transport.

Where there is a forward market for foreign exchange, a discount of the forward exchange rate in one direction, below the expected future rate, is a premium in the other direction. Thus, if expectations are similar in the two countries, such a discount

cannot be a deterrent to trade in both directions. However, the brokerage cost (spread) for forward is generally greater than that for spot transactions in foreign exchange, and the spread is an increasing function of the variability of the exchange rate.

Hence, the risk can be hedged only at a cost; the existence of forward or futures markets for foreign exchange does not change the thrust of the above argument although it reduces its quantitative significance. (De Grawe, 2005). The study of Aqeel & Nishat (2006) which was conducted for the purpose of determining the long-run relationship between exchange rate volatility and exports growth in Pakistan, revealed that exchange rate volatility has a negative significant impact on exports. In their analysis they used the multivariate cointegration and error-correction model techniques.

In analaysing the relationship between exchange rate volatility and exports of the five selected East Asian Economies (Indonesia, Japan, South Korea, Singapore and Thailand) Habibulah et.al (2005) concluded that exchange rate volatility has a statistically significant negative impact on real exports in most countries. This suggests that risk-averse exporters will reduce their activity, switch sources of supply and demand or change prices inorder to minimize their exposure to the influence of exchange risk. Their empirical methodology relied upon the theory of cointegration, error correction representation of the cointegrated variables and variance decomposition. Same results were reported by Arize et al., (2000) according to them, an increase to exchange rate volatility might adversely affect trade, because risk-averse exporters face greater risk and uncertainty on the profit

earned, they therefore reduce the supply of traded goods.

In the study of DellôAriccia (1999) exchange rate volatility had a small but significant negative impact on trade. In his study he used the basic OLS regression, in studying the effect of exchange rate volatility on the bilateral trade of European union members plus Switzerland over the period 1975-1994. In his conclusion he noted that, reducing volatility to zero in 1994 would have increased trade by an amount ranging from 10 to 13 per cent. The same results were obtained by Rose (2000). Unlike DellôAriccia, Rose used a gravity model, In his results without using random effects , he found that reducing volatility by one standard deviation would increase bilateral trade by about 13 per cent while by using random effect he found that reducing volatility by one-standard deviation would increase bilateral trade by four per cent.

2.5.2 Augments for Exchange Rate Volatility

The arguments, however, are not all on one side. Consider the following studies, which suggest that exchange-rate volatility can increase trade: The study of Kwame (2017) which was conducted in Ghana concluded that, exchange rate volatility had a positive on exports. In his analysis he used the gravity model to analyse the impact of exchange rate volatility on total trade, imports and exports. In analyzing the impact of exchange rate volatility on industry trade flows between Malaysia and China for the period of 1985-2010, Chua and Soleymani (2013) noted that exchange rate variability has a positive effect on majority of the industry flows between Malysia and China. The short and Long run impacts were estimated using bounds testing approach to cointegration analysis.

If firms can adjust factor inputs in response to movements in the exchange rate, increased variability may create opportunities to raise profits. That is, movements in exchange rates represent not only risk, but also potential reward. If a firm adjusts inputs to both high and low prices of exports in order to take advantage of profit opportunities when prices are relatively high, its expected (or average) profits will be higher the higher is exchange-rate volatility because the firm can sell more when the price is high and less when the price is low. If risk aversion is relatively low, the positive effect of greater price volatility on expected profits may outweigh the negative impact of higher profits stemming from the uncertainty associated with exchange-rate volatility, and the firm will produce and export more As pointed out by De Grauwe, exporting goods can be viewed as an option, the value of which, rises when the volatility of the underlying asset increases; when the exchange rate becomes more favorable, the firm exercises its option to export. (Clark et al. 2004: 4 and De Grauwe 2005).

Exporters may gain knowledge through trade that might help them anticipate future exchange-rate movements better than can the average participant in the foreign-exchange market. If so, the profitability of this knowledge could be used to offset the risk of exchange-rate volatility. If exporters wish to hedge longer-term investment or other transactions, rather than use the forward-exchange market, they can borrow and lend in local currency to offset their other commitments. For example, a plant in a foreign country can be financed mainly with local capital, so that investors limit their exchange risk in the basic investment. (Clark et al. 2004: 4 and De Grauwe 2005).

A counterargument of especially great weight is that one must specify the alternative to exchange-rate volatility. If the volatility is attributable to fundamental factors' influencing the exchange rate, intervention by the authorities to reduce it would be unsustainable and eventually disruptive. To achieve a reduction of apparent, observed volatility, authorities would have to intervene with exchange controls or other restrictions on trade and payments. That intervention could reduce the volume of trade more than would unrestrained movement of the exchange rate. (Clark et al. 2004).

For countries that hold foreign-currency balances, variability of an exchange rate does not measure the effect added amounts of that foreign currency have on the overall riskiness on the firm's asset portfolio. The latter risk effect depends on the covariance of an exchange rate with the prices of the firm's other assets as well as the own variance of the exchange rate. In particular, the firm may hold a portfolio of several foreign currencies, thereby diversifying the risk. If variations in one currency's exchange rate against the home currency are negatively correlated with the variations in others, its variability reduces portfolio risk, rather than increases it when that currency is added to the portfolio. In general, variance by itself does not measure the exchange risk. (Clark et al. 2004: 4 and De Grauwe 2005).

The study of Maureen, et. al, (2002) which was conducted in Kenya showed they found out that real exchange rate depreciation has a profound positive effect on export performance. In their study they used the error correction model to examine both short run and long run elasticities. The study of Aristotelous (2001), where he

was investigating the relationship between relationship between Exchange rate volatility, Exchange rate regime and trade volume, concluded that exchange rate volatility played no significant role in explaining trade volume.

In the light of the foregoing arguments, the issue of the relationship between exchange-rate volatility and trade appears to be ambiguous, there is yet to be a consensus on it. It seems theory alone cannot determine the sign of the relation between foreign trade and exchange rate volatility. Pugh and Haile (2013) in applying meta-regression analysis to the empirical literature reported that results of the impact of exchange rate volatility on international trade are significantly influenced both by authorôs modeling strategies and by the context of their investigation.

2.5.3 Studies in Tanzania

In 1990s the domestic coffee market in coffee producing countries was liberalized.(Mmari,2010; Ponte, 2001). In Tanzania the domestic coffee market was officially liberalized in 1994, objectively to revitalize the traditional agricultural cash crops, a situation which meant that it was now difficult to control stocks and the flow of exports as in the previous days before the liberalization process. Domestic market liberalization in producing countries meant that states cannot be considered ómarket unitsô and thus in this case price volatility is inevitable. This means that whenever price went up it called for an increase in exports and on the other hand when price went down it discouraged coffee producers consequently exports declined. (Douglas, 2009). It is reported that for the past 15 years or so coffee production in Tanzania

showed varying trends which are attributed to price fluctuations, diseases (C.B.D), insufficient use of inputs such as fertilizers and chemicals.

In 1980s backwards, these chemicals inputs were subsidized and supplied to coffee growers through cooperative system a process which ensured sustainable yield. The first reduction in input use became visible in 1992 when chemicals were supplied at market prices, by the year 1994 only a quarter of growers purchased inputs, primarily due to lack of credits. The abolition of the monopsony power of cooperative unions in 1990s, (Mmari,2010; Ponte, 2001; Harrison, 2001) made credits available only to few credit worth, usually large farmers. Lack of affordability of inputs has remained the inhibiting factor hindering input use by coffee growers in Tanzania, which in turn affect productivity and exportation. (ñCoffee Baseline Report, BACASò, 2005).

According to Parish, et al. (2005) Tanzania coffee growers face vulnerability in both world and domestic markets. He attributed this vulnerability to diminishing coffee quality, something which has much to do with small coffee growers since they are the major participants in the initial stage of harvesting, pulping, washing, drying and sorting cherries. This stage is a key determinant of the coffeeôs final quality. This study concurred with what was noted by Tanzania Coffee Industry Development Strategy (2012) that, Tanzania coffee industry faces challenges including underexploited quality potential. Other challenges noted in were low productivity, insufficient farm gate prices due to non optimal functioning of the internal marketing system as well as threats from climate change.

In 2010 Coles and Mhando reported that some Tanzanian coffee farmers may receive as low as 50% of the auction price for the coffee that they produce compared to the general situation where by coffee farmers are expected to receive an average of 65% to 70% of the F.O.B price. For this case farmers find the coffee business unprofitable and do not have any incentives to invest time and capital in order to improve productivity and quality. There has been various market interventions to address the vulnerability to wide coffee export fluctuations and declining relative prices. One of this is the fair-trade, this is a market based approach which attempts to use consumer demand as incentive to restructure global trading relationships (Parish et. al. 2005).

2.6 Research Gap

From both theoretical and empirical literature reviews, there are mixed and inconclusive results of the influence of exchange rate volatility on the volume of trade. This affirms that, the influence of ERV on trade is rather an empirical phenomenon. Cognizant of this, the researcher was moved to conduct a study in Tanzania on the influence of ERV on the volume of coffee exports using the gravity model as an analysis tool. I must acknowledge the good work done by the studies carried in Tanzania on coffee exports. These studies have mentioned factors such as farm gate prices, world prices, coffee quality, input prices and weather as influencing volume of coffee exports. However, none of these studies is helpful in understanding the effect of Exchange Rate Volatility on Coffee exports supply particularly in Tanzania from an econometric perspective.

Studies of Maureen, et. al, (2002) which was conducted in Kenya and that of Hussien (2015) in which was done in Ethiopia on the determinants of coffee export supply are most placed to explaining the effect of Exchange Rate Volatility on Coffee exports but the differences in Coffee production, consumption and exportation processes between Tanzania, Kenya and Ethiopia suggest that there is a need for a study to be conducted in Tanzania. It therefore, becomes a great interest to the researcher to examine the influence of the Exchange Rate Volatility in influencing Coffee exports in Tanzania. Having known the extent to which exchange rate volatility influences coffee exports in Tanzania, the information will assist to a great extent in issues of policy recommendations.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter provides detailed information of how data was collected and analyzed. The chapter is divided into six sections. The first section includes the research design. The second section presents the sampling design. The third section presents the theoretical framework. The fourth section presents the empirical model of this study. The fifth section presents type of Data and data sources and the last section shows how data was analyzed.

3.2 Research Design

Research design refers to the plan or procedure for gathering information, portraying when, from whom and in what situation the information will be obtained. Kothari (2004) defines research design as the conceptual structures within which the research is conducted. This is a quantitative research which analyzed secondary data. The choice of research is justified on the ground that this study involved the generation and analysis of data in quantitative form using econometric model.

3.3 Sampling Design

This study used non-probability sampling (purposive sampling). In this type of sampling the researcher selects the sample deliberately which shall yield results favourable to his point of view. Items for the sample are selected deliberately by the researcher, his choice concerning the items remains supreme, (Kothari,2004). The sample for this study was data from 1996 to 2016.

3.4 Theoretical Framework

The analytical framework proposed by the Gravity Model of Trade was adapted in this study. The choice of this theoretical tool is justified on the ground that the econometrics encompassed in the Gravity Model provides a framework which links the volume of trade and the important determinants of trade. Anderson (2011) notes that, from a modelling standpoint, Gravity is distinguished by its parsimonious and tractable representation of economic interaction in a many-country Model. Most international economic theory is concentrated on two-country cases, occasionally extended to three-country cases with special features. The tractability of gravity in the many-country cases results from its modularity. The Model is concerned with selecting economic variables that will explain at least in a statistical sense a substantial portion of the size of trade that occurs.

The variables that are nearly always used in the Gravity equation as causes of say the flow of exports from country A to country B are:

1) GDP of country B.
2) GDP of country A (for greater income implies greater capacity to produce and hence to supply exports from country A to B).
3) Distance between country A to B (as a proxy for transportation costs from country A to B).

Therefore, from theory Gravity Model of Trade our analytical framework can generally be expressed as follows;

$$X_{ij} = f\{Y_i, Y_j, D_{ij},\} \quad (9)$$

Equation (9) implies that Volume of trade from country *i* to country *j* depends on the GDP of country *i* $(Y_{i,})$, GDP of country *j* $(Y_{j,})$and the distance between country *i* and *j* $(D_{ij,})$. The general form of the econometric equation for the gravity model is given in equation (8):

$$F_{ij} = A\frac{M_i^{\beta_1} M_j^{\beta_2}}{D_{ij}^{\beta_3}}\omega_{ij} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (8)$$

Where,

F_{ij} represents volume of trade from country I to country j.

M_i and M_j represent the GDPs for counties i and j respectively.

D_{ij} denotes the distance between the two countries

ω_{ij} represents the error term with expectation equal to 1.

3.4.1 Empirical Model

The point of departure in specifying the empirical model of this study was the Gravity equation. The equation was then augmented to incorporate other important determinants of trade as the Exchange Rate Volatility as suggested by the study of Kwame (2017), Anderson (2011) and Kandilov (2008). As we have noted earlier the Gravity Model of Trade is not limited only to the three variables $\{Y_{i,} Y_{j,}\ and\ D_{ij,}\}$ but rather it is concerned more with selecting economic variables that will produce ñgood fitò i.e. economic variables that will explain at least in a statistical sense a substantial portion of the size of trade that occurs. According to Anderson (2011) the fit of the Gravity Model improved when supplemented with other proxies for trade frictions such as the effect of political borders and language.

The theoretical justification of the Gravity Model can be traced way back from studies of Linnemann (1966), Aiteken (1973), Geraci and Prewo (1977), Prewo (1978), Abrams and Japir (1981). To them the Gravity Model is a reduced form from a four-equation partial equilibrium model of export supply and import demand. Prices are always excluded since they mere adjust to equate supply and demand. However, there justifications faced criticisms because they did not provide explanations for the multicative functional form of the gravity equation.

In 1985, Jeffrey Bergstrand came at the rescue of the model by providing an explanation for the multicative functional form of the model. In his study a general equilibrium model of world trade was introduced from which gravity equation was derived as a reduced form from a partial equilibrium model with nationally differentiated products. To him the multicative functional form of the model originated from the utility and production functions in partial equilibrium subsystem of the general equilibrium model. Bergstrand also noted that, the price terms also derived from the underlying utility and production functions importantly influence trade flows and provide behavioral content to the Gravity equation. Moreover, his empirical evidence showed that, price and exchange rate variables have plausible and significant effects on aggregate trade flows. (Bergstrand, 1985).

To this end, out of the insight drawn from both theoretical and empirical studies of Bergstand (1985), DellôAriccia (1999), Habibullah et.al (2005), Kandilov (2008), Anderson (2011) and Kwame (2017), our empirical model was thus specified as:

$$X_t = \beta_0\left(Y_i^{\beta_1}\right)\left(Y_j^{\beta_2}\right)\left(RER_{it}^{\beta_3}\right)\left(TOT_{it}^{\beta_4}\right)\left(V_t^{\beta_5}\right)\mu_{ij} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

Where,

$\mathbf{X}_t$ = is the value of the flow of Coffee exports from Tanzania in U.S dollar.

$\mathbf{Y}_i$ = The nominal GDP of Tanzania in U.S dollar value.

$\mathbf{Y}_j$ = The nominal GDP of major importers of Tanzania Coffee calculated as a geometric average in U.S dollar value.

$\mathbf{RER}_t$ = Real Exchange rate.

$\mathbf{TOT}_t$ = Terms of Trade (a price index measured as export prices divided by import prices).

$\mathbf{V}_t$ = is the Exchange Rate Volatility measure.

μ_{ij} = the log-normally distributed error term with mean, $E(\log \mu_{ij}) = 0$.

б0 ï б5= Parameter Estimates.

The empirical model specified in equation (10), is actually an adaption from the common traditional gravity equation specified in equation (11):

$$X_{ij} = \beta_0 \left(Y_i^{\beta_1}\right)\left(Y_j^{\beta_2}\right)\left(D_{ij}^{\beta_3}\right)\left(A_{ij}^{\beta_4}\right)\mu_{ij} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (11)$$

Where,

$\mathbf{X}_{ij}$ = is the U.S dollar value of the flow of trade from country i to country j.

$\mathbf{Y}_i$ = The is the U.S dollar value of nominal GDP in country i.

$\mathbf{Y}_j$ = The is the U.S dollar value of nominal GDP in country j.

$\mathbf{D}_{ij}$ = is the distance (kilometers) between country i and j.

$\mathbf{A}_{ij}$ = is any other factor (s) either aiding or resisting trade between country i and j.

μ_{ij} = the log-normally distributed error term with mean, $E(\log \mu_{ij}) = 0$.

The Ordinary Least Squares estimation technique which will be used in this study requires the equation (10) to be linear (both in parameters and in variables). For this case, equation (10) was linearized by introducing log in both sides leading to the following log-log equation:

$$logX_t = \beta_0 + \beta_1 log Y_{it} + \beta_2 log Y_{jt} + \beta_3 log RER_t + \beta_4 log TOT_t + \beta_5 log ERV_t + \mu_t \ldots\ldots\ldots (12)$$

3.4.2 Expected Signs

From our equation (4), the coefficient of the nominal GDP of Tanzania (Y_i) is expected to be positive $(+)$ to reflect the positive relationship between the countries capacity to produce and the volume of exports. Also, the nominal GDP of major importers of Tanzania coffee (Y_j) is expected to be positive $(+)$ to reflect the positive relationship between demand and volume of exports. Likewise, the coefficient of the terms of trade (TOT) is expected to be positive $(+)$ owing to the fact that, an improvement in a nationôs TOT is usually regarded as beneficial to the nation in the sense that the prices that the nation receives for itôs export rise relative to the price that it pays for imports. The coefficient of the Real Exchange Rate (RER) is expected to be negative $(-)$ due to the fact general consensus in the literature indicates that, depreciation increases competitiveness of a country in international market. Nevertheless, at this juncture we cannot predict the sign for the coefficient of Exchange Rate Volatility because of the mixed and inconclusive results given in the literature.

3.5 Data Type and Data Sources

The type of data which was used in the study was secondary time series data for the

period 1996 to 2016 from secondary sources. These sources included the following: Tanzania Coffee Board (T.C.B), Tanzania Coffee Research Institute (TaCRI), Food and Agriculture Organization (FAO), National Bureau of Statistics, Tanzania Revenue Authority (TRA) and Bank of Tanzania (BoT). It is from these sources the researcher obtained data on both independent and dependent variables defined in the model.

3.6 Estimation Technique

The study used the Ordinary Least Square (OLS) estimation technique (for Linear Regression analysis) to obtain estimates of the variables affecting coffee exports. The reason for this is that the OLS estimator is extraordinarily popular. This popularity stems from the fact that, in the context of the Classical Linear Regression Model (CLR) the OLS estimator has a large number of desirable properties, making it the best appropriate estimator when the estimating problem is accurately characterized by the CLR model. Before actual estimation, summary statistics and a series of tests will be conducted such as testing normality of variables, stationarity and cointegration.(Gujarati, 2004; Kennedy, 2008)

3.7 Pre-regression Tests

3.7.1 Test of Stationarity

The tendency of variables generally trending upwards over the same period while in actuality the variables may not have a meaningful relationship. Such a picture generally indicates that such time series may be non-stationary. A stochastic process is said to be stationary if its mean and variance are constant overtime and the value of covariance between two time periods depends only on the distance or lag between

the two time periods and not on the actual time at which the covariance is computed. Running regression on time series non- stationary data can give rise to spurious results. One of the popular tests for stationarity is the unit root test, if a time series contains a unit root then that time series is said to be non-stationary. To avoid spurious regression, both Augmented Dickey-Fuller test and Phillips-Perron tests was used to test for Unit root. (Gujarati, 2004; Kennedy, 2008).

3.7.2 Cointegration Test

Two variables that is dependent and independent variable are cointegrated if they are individually non-stationary but their linear combination can be stationary. That is to say, even if the variables are non-stationary, it is quite possible that there is still a stable or equilibrium relationship between the two. If this happens to be the case such time series are said to be cointegrated. The study used the Johansen cointegration test to test for cointegration which also gives the maximum rank of cointegration (Green, 2002; Gujarati, 2004; Kennedy, 2008)

3.8 Hypothesis Testing

In this section the task is to find out whether the estimated model makes economic sense and the results obtained conform with the underlying economic theory. Therefore, after obtaining an estimate for each parameter, the next step will be to find out how good that is that estimate.

3.8.1 Testing a Single Hypothesis: The t-test

In testing the null hypothesis decision rules depend on confidence interval and the test of significance. This study used the test of significance approach. The t-test will

be used to test individual significance of each estimate in the model. The hypothesis testing will be conducted using a type I error (probability of rejecting the null) of 5%. (Green, 2002; Gujarati, 2004; Kennedy, 2008).

3.8.2 Testing a Joint Hypothesis: The F-test

The F-test is used to test if the coefficients in this case $ß_0$, $ß_1$, $ß_2$, $ß_3$,$ß_4$ and $ß_5$ are jointly equal to zero. This is different from testing whether $ß_0$, $ß_1$, $ß_2$, $ß_3$,$ß_4$ and $ß_5$ are individually equal to zero (which is done by t-test).(Green,2002; Gujarati, 2004; Kennedy, 2008).

CHAPTER FOUR

EMPIRICAL RESULTS AND INTERPRETATIONS

4.1 Overview

This chapter provides the results of the econometric analysis of the influence of Exchange Rate Volatility on coffee exports in Tanzania. The chapter is sub-divided into three sections. The first section presents summary statistics and unit root tests of the variables. The second section presents the co-integration test and the Error Correction Model (ECM). The last section provides the interpretation and comparison the results of this study with other studies.

4.2 Summary statistics and Unit root tests of the variables

4.2.1 Summary statistics

In the analysis the Real Exchange Rate and ERV were not normally distributed, the rest of the variables were normally distributed. The real exchange rate and the ERV was transformed into logarithmic form to cure the abnormality and also together with the exchange rate all the remaining variables were transformed into logarithmic form so that the estimated parameters could be interpreted as elasticities. The summary statistics for both original (at levels) and transformed variables are presented in appendices 2 and 3.

4.2.1.1 Exchange Rate Volatility trend

The average ERV from 1996-2016 was 0.06581 while the standard deviation was 0.05531. Figure 4.1 presents the ERV trend from 1996-2016.

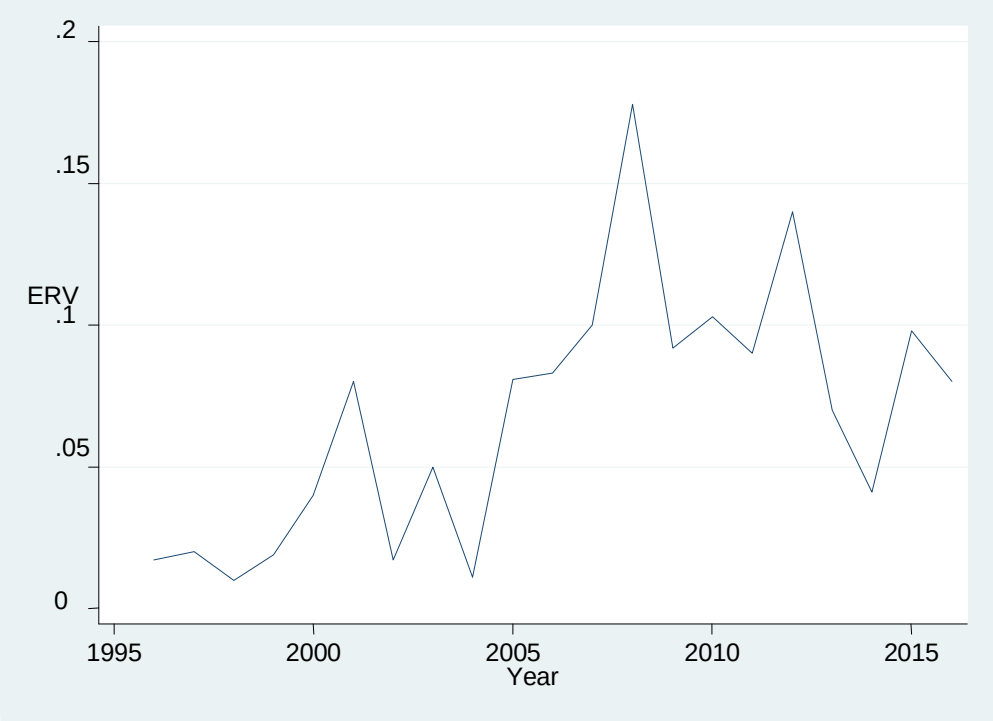

Figure 4.1: Exchange Rate Volatility Trend (1996 – 2016)

Source: Researcher

Higher volatility were observed from 2006-2011, this could be mostly due to the financial crisis which occurred in 2007/2008.

4.2.2 Unit Root Test

A test for stationarity of the variables which was used in this study was the unit root test. However, the test was performed with no constant, implying that the non-stationarity of the time series followed a random walk without drift:

$Y_t = \rho Y_{t-1} + \mu_t \ldots\ldots\ldots (13)$ (no intercept term i.e current value of the time series is equal to the previous value plus a random error). In equation (13), if $\rho = 1$, then there is presence of unit root, meaning the time series under consideration is non-

stationary. Equation (13) was then manipulated to form the following equations:

$$\Delta Y_t = (\rho - 1)Y_t + \mu_t \quad \ldots\ldots (14)$$

$$= \delta Y_{t-1} + \mu_t \quad \ldots\ldots (15)$$

Instead of estimating equation (14) we estimate and test the null hypothesis that $\delta = 0$. If $\delta = 0$ then $\rho = 1$, implying that we have a unit root.

In testing for the presence of the unit root, both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used so as to compare the results obtained from both tests. Tables 4.1 and 4.2 present the results of unit root tests.

Table 4.1: Unit Root Tests (At Levels Variables)

	Augmented Dickey-Fuller		Phillips-Perron	
Variable	Test statistics	Critical value at 5%	Test statistics	Critical value at 5%
$log\mathbf{Y}_i$	-0.072	-1.950	-0.621	-1.950
$log\mathbf{Y}_j$	-1.145	-1.950	-0.372	-1.950
$log\mathbf{TOT}_t$	-0.126	-1.950	0.037	-1.950
$log\mathbf{RER}_t$	0.587	-1.950	1.643	-1.950
$log\mathbf{ERV}_t$	0.301	-1.950	0.290	-1.950

Table 4.2: Unit root Tests (at first difference)

	Augmented Dickey-Fuller		Phillips-Perron	
Variable	Test statistics	Critical value at 5%	Test statistics	Critical value at 5%
$Dlog\mathbf{Y}_i$	-4.137	-1.950	-12.413	-1.950
$Dlog\mathbf{Y}_j$	-3.519	-1.950	-16.230	-1.950
$Dlog\mathbf{TOT}_t$	-3.369	-1.950	-4.273	-1.950
$Dlog\mathbf{RER}_t$	-3.230	-1.950	-3.252	-1.950
$Dlog\mathbf{V}_t$	-4.988	-1.950	-5.070	-1.950

From Table 4.1 both tests show that all the variables are non-stationary at 5% critical level. This is because the absolute values of the computed tau statistics $(|\tau|)$do not exceed the critical tau values as calculated by MacKinnon. Thus we accept the null

hypothesis, which states there is unit root (ŭ=0).This implies that the time series is non-stationary. The similar conclusion could be drawn from the Philips-Perron test, where by the computed absolute values of the tau statistics did not exceed the MacKinnon critical values. The results from Table 4.2 reveal that the computed absolute values of the tau statistics exceed the MacKinnon critical tau values , and thus we reject the null hypothesis (ŭ=0). Both tests showed that all the variables are stationary in first difference which means they are integrated of order one $I(1)$.

4.3 Cointegration Test

The next step was to examine whether the variables are cointegrated. The theory of cointegration postulates that, although the variables are individually non-stationary it is quite possible that their linear combination can be stationary. In other words although individually the variables may are integrated of order one I(1) it is quite possible that a particular linear combination of them may be integrated of order zero I(0). If this is the case the implication is that there seems to be a long-run or equilibrium relationship between the variables in question.

The co-integration test was conducted using the Johansen co-integration test. Table 4.3 presents the results of the Johansen co-integration test

Table 4.3: Johansen Cointegration Test

Maximum rank	Eigen value	Trace statistics	5% critical value
o	.	70.4408	68.52
1	0.64863	39.0635*	47.21
2	0.48431	19.1957	29.68
3	0.35718	5.9391	15.41
4	0.13141	1.7126	3.76

Number of obs = 19, lag = 2

From Table 4.3, the test fails to reject cointegration. Cointegration is significant where trace statistics is less than critical value at maximum rank of one. This implies that there is cointegration and there is only one maximum rank of this cointegration.

For further verifications, the residuals from the long-run equation were subjected stationarity test using Augmented Dickey-Fuller and Phillips-Perron unit root tests. The results of these tests are presented in Table 4.4.

Table 4.4: Unit Root Test for the Long-Run Relationship Residual

	Augmented Dickey-Fuller		Phillips-Perron	
	Test statistics	Critical value at 5%	Test statistics	Critical value at 5%
Residual	-6.266	-1.950	-6.418	-1.950

Since the variables are cointegrated then the regression results for longrun relationship are valid (i.e are not spurious) and they can be used for the interpretation of long-run elasticities.

Table 4.5 presents the estimation results for long-run relationships of the variables.

Table 4.5: Long-run Elasticities

Variable	coefficient	Standard error	t-value	Probability of t-value
$logY_t$	0.7503263	0.1394352	5.38	0.000
$logY_j$	-0.1356785	0.0937166	-1.45	0.160
$logTOT_t$	0.5938381	0.1798783	3.30	0.003
$logRER_t$	-0.2992534	0.0772875	-2.58	0.016
$logV_t$	-0.1692055	0.0603647	-2.80	0.010
Constant	2.333965	1.530409	1.53	0.139

No.of obs=21; F(6,14)=11.16 [0.0001] ; R-Squared=0.8271; Adj R-squared=0.7530;

Root MSE=3.084; D-W=1.950979

Generally, the results from Table 4.5 conform to apriori expectations, they show that in the long-run ERV has a direct influence on the volume of coffee exports.

4.4 Model diagnostic tests

Various model diagnostic tests were performed and the results were as follows:

4.4.1 Test for Model Specification

In this study, Ramsey RESET (Regression Specification Error Test) was used to test for whether unknown variable have been omitted from a regression specification. The results were as follows, F(3,11) = 0.94, Prob>F = 0.4525, hence we accept the null of this test (H_0 = Model has no Omitted variables).

4.4.2 Test for Heteroskedasticity

In this study, the Breusch-Pagan test was used to test for presence of heteroskedasticity in the long-run relationship of the variables. Table 4.6 presents the results of the heteroskedasticity test.

Table 4.6: Test for Heteroskedasticity in the Long-Run Relationship Of The Variables

Variable	Chi^2	Probability of Chi^2
$logY_t$	3.83	0.0541
$logY_j$	7.87	0.005
$logTOT_t$	1.15	0.2837
$logRER_t$	1.36	0.2008
$logV_t$	13.50	0.0192
Simultaneous	30.10	0.1815

H_0: Constant Variance

Generally, the the Breusch-Pagan test results from Table 4.6 showed that, Chi^2 = 30.10 and Prob>Chi^2 = 0.1815, hence we accept the null hypothesis of this test.(H_0: Constant variance). This implies that there was no heteroskedasticity.

4.4.3 Test for Multicollinearity

In this study, the inverse of the correlation matrix was used to detect multicollinearity. The diagonal elements of this matrix are called Variance Inflation Factors, VIF. Table 4.7 presents the results of the multicollinearity test.

Table 4.7: Test for Multicollinearity in the Long-Run Relationship Among Variables

Variable	VIF	1/VIF
$logY_t$	7.83	0.1364
$logY_j$	6.81	0.1468
$logTOT_t$	6.01	0.1664
$logRER_t$	7.02	0.1425
$logV_t$	6.85	0.1459
Mean VIF	6.902	0.1448

Source: researcher, 2018

As a rule of thumb, for standardized data, mean VIF>10 indicates harmful collinearity. The results from Table 4.7 showed that mean VIF was 6.902, implying that no harmful collinearity among the regressors.

4.4.4 Test for Autocorrelation

In testing for presence of autocorrelation the Durbinôs alternative test for autocorrelation was used. Table 4.8 presents the results of the autocorrelation test.

Table 4.8: Test for Autocorrelation in the Long-Run Relationship of the Variables

Lags (P)	Chi^2	Probability of Chi^2
1	0.121	0.7595

H_0 = No serial correlation

The results from Table 4.8 were, Prob>Chi^2 = 0.7595, therefore we accept the null hypothesis for the test (H_0 = No serial correlation).

4.5 Interpretation and comparison of long-run results with other studies.

4.5.1 The nominal GDP of Tanzania (Y_t)

Table 4.5, shows that the value of coffee export is responsive to the nominal GDP of Tanzania. According to the results of the study, A 1% increase in nominal GDP of Tanzania lead to a 0.7503263% increase in value of flow of coffee exported. Therefore, policies that have positive influence on economic growth will likewise influence the value of the flow of coffee exports in the same direction in the long-run. These results conform with GDP growth theory which tells us that, increase in GDP is associated with the increase in the countryôs ability to produce.

4.5.2 Real Exchange Rate (RER_t)

Table 4.5 shows that, in the long-run the value of the flow of coffee export is responsive to real exchange rate. The results depict that in the long-run a 1% exchange rate depreciation will result to a 0.2992534% increase in the value of the flow of coffee exports. Therefore, policies that are in favour of exchange rate

depreciation will influence the value of the flow of coffee exports positively. Similar results were reported by Maureen et. Al (2002) and Hussein (2005), in both studies the exchange rate was found to be negatively significant in influencing coffee exports.

4.5.3 Terms of Trade (TOT_t)

According to the results from table 4.5, the value of the flow of coffee exports is also influenced by the terms of trade positively. The results show that, in the long-run a 1% rise in the terms of trade will lead to a 0.5938381% increase in the value of the flow of coffee exports in Tanzania. Therefore policies directed to improve the terms of trade will likewise improve the value of the flow of coffee exports. The study of Pugh (2011) reported similar results on the influence of Terms of Trade on exports. This is due to the fact that, an improvement in a nationôs TOT is usually regarded as beneficial to the nation. The prices that the nation receives for itôs export rise relative to the price that it pays for imports and therefore a nationôs reserve of forex increases which consequently leads to economic growth.

4.5.4 Exchange Rate Volatility (V_t)

Table 4.5 shows that the value of the flow of coffee export is responsive to the ERV. The results reveal that, in the long-run ERV had a statistically significant negative impact on the value of the flow of coffee exports. A 1% increase ERV lead to a 0.1692055% decrease in the value of the flow of coffee export. Therefore, policies directed to reduce (stabilize) the ERV will eventually increase the value of the flow of coffee exports in Tanzania. The long-run effects of ERV on the value of the flow of coffee exports concurred with results, of the study of Habibulah et. Al (2005),

Aqueel & Nishat (2006) and De Grawe (2005) whereby ERV was found to have a statistically significant negative impact on exports in their studies. The interpretation here is that, in the long-run risk-averse exporters will either reduce their activities or increase prices in order to minimize their exposure to the influence of exchange risk. On the other hand, due to the nature of the demand function with respect to prices, an increase in price of exports will reduce the demand for exports and reduce the countries competitiveness in the international market. The average nominal GDP of major importers of Tanzania coffee (Y_j) was found to be insignificant in the long-run.

4.6 Error Correction Model (ECM)

The results obtained from Table 4.3 necessitated the run Error Correction Model. According to Granger representation theorem if variables are cointegrated, then the relationship between the variables can be expressed as Error Correction Model (ECM). The Error Correction Model, popularized by Engle-Granger corrects for disequilibrium in the short-run by using the error term obtained from the long-run relationship to tie the short-run behavior of the dependent variable to its long-run value.

The long-run relationship specified in the previous section was too static i.e its dynamic specification was not flexible enough to allow it to represent an economy which when observed is more frequently out of equilibrium than it is in equilibrium. Thus it seemed reasonable to structure an econometric model which will incorporate information from economic theory about long-run equilibrium forces and at the same time to allow for a very flexible lag structure, permitting the data to play a strong

role in the specification of the modelôs dynamic structure. This type of an econometric model is what is termed as the Error Correction Model in econometrics literatures.

The Error Correction Model (ECM) for this study was developed following the following procedures as directed by Engle and Granger:

i. First and foremost, a traditional econometric equation was specified with a generous lag structure (which was later pared down by testing procedures) on all the explanatory variables including lagged values of the dependent variable.

ii. Secondly, the lagged value of the error term from the long-run relationship was then introduced to the model. This last term is known as equilibrium error or error correction term since it reflects the current ñerrorò in achieving long-run equilibrium.

The Error Correction Model (ECM) form was as follows:

$$\Delta \log X_t = \alpha_0 + \alpha_1 \Delta \log Y_{it} + \alpha_2 \Delta \log Y_{jt} + \alpha_3 \Delta \log RER_t + \alpha_4 \Delta \log TOT_t + \alpha_5 \Delta \log V_t + \alpha_6 \mu_{t-1} + \varepsilon_t \quad \ldots\ldots (17)$$

In equation (17) q stands for the first difference operator, ε_t is the random error term, while μ_{t-1} is the equilibrium error, it is the error term originating from equation 4 (the long-run relationship) then lagged by one period. The ECM results for equation (17) are given in table 4.9.

Table 4.9: Short-Run Elasticities (ECM Results for the Influence of ERV on Coffee Exports in Tanzania)

variable	coefficient	Standard error	t-value	Probability
$\Delta log Y_{it}$	0.0624909	0.0760317	0.82	0.419
$\Delta log Y_{jt}$	0.0835834	0.0683102	1.22	0.234
$\Delta log TOT_t$	0.624623	0.5297753	1.18	0.250
$\Delta log RER_t$	0.1605245	0.0733523	2.19	0.040
$\Delta log V_t$	-0.6291375	0.0657987	-9.56	0.000
μ_{t-1}	-1.077255	0.1757063	-6.13	0.000
constant	0.0248169	0.0227765	1.09	0.288

Number of obs=20; F(6,13)=9.74 [0.0004]; R^2 = 0.8180; Adj R^2=0.7840 Root MSE=0.09955

From Table 4.9 the F-statistics test for the joint significance of the independent variables in the model was highly significant at 5% level with the probability value 0.0004. The coefficient of determination R^2 was 0.8180, implying that 81.80% of the variations in coffee exports in the short-run are explained (caused) by variations in the independent variables specified in equation (8).

4.7 Model Diagnostic Tests for the Short-Run Relationship of the Variables

Various model diagnostic tests were performed and the results were as follows:

4.7.1 Test for Heteroskedasticity in the Short-Run Relationship of the Variables

In testing for heteroskedasticity in the short-run relationship, the Breush-Pagan/cook-Weisberg test for heteroskedasticity was used. Table 4.10 presents the results for the heteroskedasticity test.

Table 4.10: Test for Heteroskedasticity in the Short-Run Relationship of the Variables

Variable	Chi^2	Probability of Chi^2
$\Delta log Y_{it}$	6.8012	0.9971
$\Delta log Y_{jt}$	8.4033	0.9532
$\Delta log TOT_t$	32.8211	0.02478
$\Delta log RER_t$	14.4317	0.6921
$\Delta log V_t$	18.2693	0.4934
μ_{t-1}	11.6319	0.6842
Simultaneous	23.8112	0.2633

From Table 4.10, $Chi^2 = 23.8112$ and $Prob>Chi^2 = 0.2633$, hence we accept the null hypothesis of this test.(H_0: Constant variance). This implies that there was no heteroskedasticity in the short-run relationship.

4.7.2 Test for Model Specification

Ramsey RESET (Regression Specification Error Test) was used to test for whether unknown variable have been omitted from a regression specification. The results showed that the model was well specified at 95% confidence interval, with Prob>F = 0.0538, hence we accept the null of this test (H_0 = Model has no Omitted variables.).

4.7.3 Test for Multicollinearity in the Short-Run Relationship of the Variables

In testing for multicollinearity, the inverse of the correlation matrix was used. Table 4.11 presents the results for the test.

Table 4.11: Test for Multicollinearity in the Short-Run Relationship of the Variables

Variable	VIF	1/VIF
$\Delta log Y_{it}$	4.27	0.2341
$\Delta log Y_{jt}$	4.16	0.2403
$\Delta log TOT_t$	7.28	0.1373
$\Delta log RER_t$	6.72	0.1488
$\Delta log V_t$	6.02	0.0017
μ_{t-1}	7.11	0.1406
Mean VIF	6.26	0.1597

Table 4.11 shows that the mean VIF was 6.26. As a rule of thumb, for standardized data, a VIF>10 indicates harmful collinearity. Therefore according to the results we conclude that there was no harmful collinearity among regressors in the short-run relationship.

4.7.4 Test for Autocorrelation

In testing for autocorrelation in the short-run relationship the Durbinôs alternative test for autocorrelation was used. Table 4.12 presents the results of the test.

Table 4.12: Test for Autocorrelation in the Short-Run Relationship of the Variables

Lags (P)	Chi^2	Probability of Chi^2
1	23.866	0.2924

H_0 = NO serial correlation

Table 4.12 shows that Prob>Chi^2 = 0.2924, thus we accept the null hypothesis for the test (H_0 = NO serial correlation).

4.8 Interpretation of Short-Run Results

ECM results (short-run the results) revealed only Real Exchange Rate (RER_t) and ERV (ERV_t) had significant influence on the volume of coffee exports. The nominal GDP of Tanzania (Y_{it}) and Terms of Trade (TOT_t) which were significant in the long-run were insignificant in the short-run. These results suggest that the volume of coffee export adjusts to changes in Real Exchange Rate (RER_t) and ERV (V_t) only in the short-run.

4.8.1 Real Exchange Rate (RER_t)

In short-run the depreciation in Real Exchange Rate (RER_t) by 1% will result to a decrease in the value of the flow of coffee exports by 0.16%. This implies that there is sluggish response in coffee exports supply to Real Exchange Rate changes. This sluggish response in coffee exports supply to Real Exchange Rate changes can be explained by the fact that there exist a lot of processes involved from the harvesting stage to the exportation process, thus making it difficult for coffee exporters in Tanzania to respond quickly to changes in the Real Exchange Rate. The short-run statistically significant and negative Real Exchange Rate effect on quantity of coffee exports in this study concurred to the results of the study of Habibulah et Al. (2005). Theory tells us that in the short-run depreciation or devaluation would lead to a contractionary (The J-curve effect). The decrease in the volume of coffee exports due to a depreciation in the short-run could be due to the expenditure-switching

effect of devaluation in the short-run that leads to a worsening of the trade balance which only improves overtime as export and import volumes adjust.

4.8.2 Exchange Rate Volatility (V_t)

Results from Table 4.9 show that, Short-run changes in ERV by 1% lead to an inverse change in the value of the flow of coffee exports by 0.6291375%. The short-run statistically significant and negative ERV effect on quantity of coffee exports in this study concurred with the results of the study of McKenzie (1999) and Clark et. Al (2004) . The argument here is that in the short run, risk-averse exporters face greater risk and uncertainty on the profit earned. Exporters who do not have a forward or futures market for foreign exchange are exposed in exchange risks the higher the risks the higher the hesitation to trade. Exporters who are risk-averse, will incur some added cost to avoid the risk, in this case the risk becomes an implicit cost and therefore the higher the volatility the higher the risk (implicit cost) and as a result exporters will reduce their trade activities.

The error term in Table 4.9 was highly significant with a negative sign. The speed of adjustment is about 108%, this implies that the rate of adjustment towards long-run equilibrium is about 108% which is relatively high rate of adjustment. This implies that short-run deviations take short-time to fine-tune back to long-run equilibrium. The negative sign on the error term suggests that changes in the quantity of coffee exports in the current period will be negative to restore the equilibrium, this implies that the quantity of coffee exports at time t is above its equilibrium value, and thus it will start falling in the next period to correct the disequilibrium.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMENDATIONS

5.1 Chapter overview

This chapter presents the summary, conclusion and recommendations basing on the major findings of the study. The chapter consists of four main sections. The first section presents the summary of the findings by each objective of the study. The second section presents the conclusion from the findings of this study, the third section presents recommendations and the last section of this chapter presents the limitation of this study and areas for further research.

5.2 Summary of Findings by Objectives

5.2.1 Volatility of real exchange rate of the currency of Tanzania from 1996 – 2016

The average ERV from 1996-2016 was 0.06581 while the standard deviation was 0.05531. Highest value of volatility was 0.178 and the min value of the ERV was 0.01 as observed from 1996 to 2016. Higher values of volatility were observed from 2007-2011 this could be mostly due to the financial crisis which occurred in 2007/2008. Findings of this study show that, in spite of the adoption of a managed floating exchange rate regime, Tanzania still experiences a substantial ERV. The findings further reveal that, ERV had a statistically significant negative impact on the quantity of coffee exports both in the short-run and long-run.

5.2.2 Responsiveness of the Value Of The Flow Of Coffee Exports To Changes In Other Determinants Of Coffee Exports Apart From ERV

This research examined the nominal GDP of Tanzania, The average nominal GDP of

major importers of Tanzania coffee, real exchange rate and the terms of trade as other factors apart from ERV likely to have influence on the value of the flow of Tanzanian coffee export. The results of the study in general indicate that in the long-run, variations in coffee exports can be explained by variations in the nominal GDP of Tanzania, real exchange rate and terms of trade. While in the short-run findings of this study show that, apart from ERV variations in coffee exports can be explained by variations in real exchange rate.

5.3 Conclusion

This study has showed that, ERV has a profound effect on the value of the flow coffee export both in short-run and long-run periods. The findings of this study suggest that a stable exchange rate could be an effective policy instrument for promoting coffee exports in Tanzania. Most of the ERV in Tanzania could be attributed to the fact that Tanzania has less developed capital, financial and currency markets. In the absence of structured hedging opportunities, most of the risk-averse exporters may compensate against the cost associated by reducing volume of exports.

This study also showed that, real exchange rate has a profound effect on the value of the flow of coffee export both in short-run and long-run periods. In the short-run a depreciation of the domestic currency (Tshs) against the foreign currency (USD) could lead to contraction of the value of coffee exports, while in the long-run a similar depreciation was observed to have expansionary effect on the value of coffee exports.

This study also showed that, improvement of terms of trade for Tanzania has a positive influence on the value of the flow of coffee exports in the long-run, while a deterioration of the terms of trade could affect the value of the flow of coffee exports negatively. This study also concluded that, nominal GDP of major importers of Tanzanian coffee had insignificant effect on the value of the flow of coffee exports both in the short and long-run periods.

5.4 Recommendations

This study has showed that, ERV has a profound effect on the value of the flow coffee export both in short-run and long-run periods. We should note that, high volatility in exchange rate could be of detrimental effect not only to coffee exports but also to other exports. Thus ERV could be reduced by putting in place policies which are directed in strengthening and deepening the capital, financial and currency markets.

This study also showed that, improvement of terms of trade for Tanzania has a positive influence on the value of the flow of coffee exports in the long-run. From a policy stand point, depreciation of the domestic currency (Tshs) increases the competiveness of Tanzania exports in international markets. However, this empirical evidence presents challenges to policy makers. For example in this study a depreciation in the short-run was observed to have adverse effects to the economy. Therefore makers have to consider both the short-run and long-run effects of a devaluation/depreciation. On the other hand policies that lead to a relatively overvalued exchange rate could also be a disincentive to exports. Therefore, the exchange rate movements should be in line with the performance of the economy

both domestically and externally.

This study also showed that, improvement of terms of trade for Tanzania has a positive influence on the value of the flow of coffee exports in the long-run. From policy perspective this implies that, policies directed to improve the terms of trade will likewise improve the value of the flow of coffee exports. Nevertheless, countries that rely on exports of primary goods (such as the case of coffee in Tanzania) for export earnings may find that the international prices of these goods do not rise as rapidly as the prices of the manufactured goods they import due in part to the differences in their income elasticities. Primary goods such as minerals and raw food products tend to have income elasticities less than 1, while manufactures tend to be characterized by an income elasticity greater than 1. For this reason policy makers should adopt policies which will strengthen domestic industries so that coffee and other products should exported as final or semi final products.

5.5 Limitations of the study and areas for further research

The data used in this study were not obtained from the same source. This could somewhat affect the results of this study due to the fact that every source has its own ways of collecting data. Time also was a constraining factor to a more detailed analysis in this study. That notwithstanding, the results of this study were the best that could be obtained under such bottlenecks.

Replication of this study for other countries (especially in the sub-saharan Africa) or using manufacturing exports would be useful for extensions of this study. Nevertheless, the researcher acknowledges that, there are other factors such as

domestic prices of coffee, production of coffee, cost of inputs like fertilizers, herbicides, pesticides, labour costs, acreage e.t.c which play a vital role in determining the quantity of coffee export. A comprehensive analysis of such areas would require either sectoral or micro studies which are beyond the scope of this study. Therefore, further research in these areas could help modify the results of this study.

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APPENDICES

APPENDIX 1: DATA USED IN THE ANALYSIS OF THE STUDY

Year	X_t	RER	TOT	Y_i	Y_j	ERV
1996	1.0E+8	790.6372	119.8	6.5E+9	3.41E+12	0.017
1997	7.4E+7	735.6172	118.2	7.68E+9	3.35E+12	0.02
1998	9.2E+7	719.059	121.2	9.35E+9	3.38E+12	0.01
1999	6.6E+7	763.0651	117.8	9.7E+9	3.59E+12	0.019
2000	7.0E+7	800.41	119.1	1.02E+10	3.70E+12	0.04
2001	3.5E+7	857.2362	119.4	1.04E+10	3.66E+12	0.08
2002	5.5E+7	951.012	114.3	1.08E+10	3.74E+12	0.017
2003	4.3E+7	1009.229	109.1	1.17E+10	4.07E+12	0.05
2004	7.9E+7	1086.655	106.6	1.28E+10	4.42E+12	0.011
2005	8.8E+7	1071.846	105.4	1.69E+10	4.60E+12	0.081
2006	9.8E+7	1152.926	107.6	1.86E+10	4.60E+12	0.019
2007	9.8E+7	1101.913	111.1	2.15E+10	4.90E+12	0.083
2008	9.9E+7	1280.3	110	2.74E+10	5.28E+12	0.178
2009	1.1E+8	1313.29	113.1	2.86E+10	5.15E+12	0.153
2010	1.0E+8	1453.54	118.4	3.14E+10	5.33E+12	0.166
2011	1.4E+8	1550	119.4	3.39E+10	5.65E+12	0.108

2012	1.9E+8	1551.83	100.1	3.91E+10	5.69E+12	0.07
2013	1.7E+8	1566.17	100.1	4.44E+10	5.65E+12	0.0169
2014	1.2E+8	1717.19	100	4.82E+10	5.77E+12	0.098
2015	1.6E+8	2137.83	100.2	4.56E+10	5.64E+12	0.13
2016	1.5E+8	2161.81	100.8	4.74E+10	5.88E+12	0.015

APPENDIX 2: SUMMARY STATISTICS

variable	X_t	ERV	TOT	RER	Y_i	Y_j
Observations	21	21	21	21	21	21
Mean	1.02E+08	0.06581	111.0333	1227.217	2.34E+10	4.64E+12
Variance	1.17E+15	0.00306	60.12634	187128.2	2.16E+20	8.53E+23
Standard deviation	4.12E+07	0.05531	7.75412	7.75419	1.47E+10	9.24E+11
Skewness	O.4817	0.70418	-0.22776	0.76347	0.49649	-0.10414
Kurtosis	2.56884	2.21964	1.57016	2.72132	1.74528	1.44352
Minimum	3.35E+07	0.01	100	719.059	6.50E+09	5.88E+12
Maximum	1.90E+08	0.178	121.2	2161.81	4.82E+10	3.35E+12

Note:

$\mathbf{X_t}$ = is the value of the flow of Coffee exports from Tanzania in U.S dollar.

$\mathbf{Y_i}$ = The nominal GDP of Tanzania in U.S dollar value.

$\mathbf{Y_j}$ = The nominal GDP of major importers of Tanzania Coffee calculated as a geometric average in U.S dollar value.

$\mathbf{RER_t}$ = Real Exchange rate.

$\mathbf{TOT_t}$ = Terms of Trade (a price index measured as export prices divided by import prices).

$\mathbf{ERV_t}$ = is the Exchange Rate Volatility proxy

APPENDIX 3: SUMMARY STATISTICS FOR TRANSFORMED VARIABLES

variable	$logX_t$	logERV	logTOT	logRER	$logY_i$	$logY_j$
Observations	21	21	21	21	21	21
Mean	18.354	-3.132	4.7075	7.0565	23.6726	29.1463
Variance	0.1894	0.9647	0.005	0.1155	0.0138	0.0422
Standard deviation	0.4349	0.9822	0.0706	0.3399	0.6713	0.2054
Skewness	-0.4607	-0.0341	-0.2815	0.2539	0.0138	-0.2332
Kurtosis	2.8577	1.4627	1.6013	2.0297	1.5414	1.4844
Minimum	17.3709	-4.6052	4.6052	6.5779	22.5951	28.8399
Maximum	19.0625	-1.726	4.7974	7.6787	24.5986	29.4026

Note:

$\mathbf{logX_t}$ = log of the value of the flow of Coffee exports from Tanzania.

$\mathbf{logY_i}$ = log of the the nominal GDP of Tanzania.

$\mathbf{logY_j}$ = log of the nominal GDP of major importers of Tanzania Coffee.

$\mathbf{logRER_t}$ = log of the Real Exchange rate.

$\mathbf{logTOT_t}$ = log of the Terms of Trade.

$\mathbf{logERV_t}$ = log of the Exchange Rate Volatility proxy.