THE MACROECONOMIC DETERMINANTS OF TEA EXPORTS SECTOR PERFORMANCE IN KENYA

BY

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DECLARATION

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DEDICATION

This work is dedicated to all my family members for all their support they gave me in writing this thesis. God bless you all.

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ABSTRACT

Exports are crucial in the developing and middle-income countries to reduce disequilibrium in the balance of payments. Kenya needs to increase its annual earnings because it has a large youthful population, with a general growth rate of up to 2.28% recorded in the year 2020 hence many needs such as employment for the high number of the youths. The key objective of the study is to determine the major factors influencing the performance of tea exports sub sector in Kenya, which it is believed, has a major impact on the growth of the economy of the country. Recently the Kenya institute for public policy research and analysis (KIPPRA) report has raised an alarm in the industry as more tea export market segments continue to record a decline. In 2013, Kenya exported 131 tons more than Sri Lanka but earned 0.3 billion US dollars less than Sri Lanka. The Kenya tea development agency (2009) has raised concern that small-scale tea holders' bonuses would decline following a 21% decrease in the value of the beverage because of decreased prices on the global market. Furthermore, there is need for increased exports especially from tea for the country to cushion itself against high indebtedness to the World Bank and other multilateral lending organizations. The study is focused on tea as it is the country's major agricultural export. More than three quarters of the population in Kenya reside within the countryside, and Kenya, like most developing countries depend on agricultural production to generate incomes for its citizens. The objectives of the study are to determine the effect of price variations, the real interest rates, incomes from foreign trading partners and the real exchange rate volatility on tea exports performance in Kenya. The study adopted the international trade theories of opportunity cost, Comparative cost, and Modern theory of international trade employing the explanatory research design. The main sources of data were the statistical bulletin of the central bank of Kenya, statistical abstracts of the Kenya national bureau of statistics, East African Tea Trade Association, and the World Bank development indicator publications. Time series data used covered the period of 1985 to 2019. The Johansen co-integration technique was applied to establish the short run and long run behavior of the variables in the study. Co-integration and vector error correction model were used in the study. Augmented Dickey Fuller (ADF) and Phillips Peron unit root tests for stationarity were employed. Results showed that the data had unit root at levels but attained stationarity property after first difference. Cointegration was present and this prompted the use of VEC to test for hypothesis. Interest rate and exchange rate volatility significantly affected the tea exports in the short run while in the long run, tea prices variability($\beta = -0.1763, \mathbf{p} = \mathbf{0.016} < \mathbf{0.05}$),interest rate $(\beta = -0.0148, \mathbf{p} = \mathbf{0.000} < \mathbf{0.05})$ and exchange rate volatility $(\beta = -0.0126, \mathbf{p} = \mathbf{0.000} < \mathbf{0.05}$) has been shown to affect tea exports in Kenya for the period 1985-2019. Foreign income did not affect tea exports over the period under study. Kenyan tea exports adjust towards long run equilibrium path after a shock or partial adjustments caused by uncertainties such as prices, interest rates and volatilities in exchange rate. This implies that strategies that can help tea exporters cope in the short run should be put in place since Kenyan tea exports go back to long run equilibrium after partial adjustments that took at least 1 year and 2 months. Based on these results, the study recommends that policy makers should forecast the possible effect of price volatility on each tea importing country and provide pricing incentives that will encourage tea farmers to produce more at affordable cost. It is also vital for policy makers to consider the existence and degree of exchange rate volatility that causes uncertainties when implementing policies for Kenya's tea export demand. The central bank of Kenya should influence the interest rate through monetary policy instruments such as regulating foreign reserves and money supply because changes in real interest rates lead to changes in spending on durable goods, which are a component of aggregate expenditures. Influencing interest rates lead to influence in exchange rates, which in turn lead to changes in net exports of tea in Kenya.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACBF   - African Capacity building foundation

CPDA   **-**Christian partners development Agency

EATTA   - East African Tea Trade Association.

ELG   - Export- Led –Growth.

EPA   - Economic Partnership Agreements.

EPPO   - Export Promotion Programs Office.

EPZ   - Export Processing Zones.

FAO   - Food and Agriculture Organization of United Nations

FDI   - Foreign Direct Investment

GAIN   - Global Agricultural Information Network

GDP   - Gross Domestic Product

GNP   - Gross National Product

GOK   - Government of Kenya.

KETA   - Kenya Export Trade Authority.

KIPPRA   - Kenya Public Policy Research and Analysis

KNBS   - Kenya National Bureau of Statistics

KTDA   - Kenya Tea Development Authority.

MENA   - Middle East and North African Countries

MOA   - Ministry of agriculture.

MUB   - Manufacture under Bond.

OCA   - Optimum Currency Area.

PRSP   - Poverty Reduction Strategy Paper.

RER   - Real Exchange Rate

TBK   - Tea Board of Kenya.

TRFK   -Tea Research Foundation of Kenya.

WTO   - World Trade Organization.

OPERATIONAL DEFINITION OF TERMS

Agriculture- Is the Business of cultivating soils, Business of producing crops for sale, and commercial raising of livestock.

Autarky – state of a country being self-sufficient in production and consumption of all commodities

Balance of payments- The remainder of foreign exchange value after total payments for imports are deducted from the total receipts from exports.

Economic Development- the increase in net exports of a nation in addition to total gross output

Economic Growth- the increase in total output of a nation within a given period such as one financial year

Economic Impact – effect on an economy of a nation.

Excess Supply – situation where more commodities than required are brought to the market for sale

Exchange Rate –value of one currency in relation to another on the international market.

Export Compensation- policies aimed at encouraging production for exports

Export Earnings- Income from sale of goods abroad by a country.

Export incentive schemes. /**Export Promotions**-Policies to encourage more exports in a country. Tea Exports

Export led Growth Hypothesis- A theory that argues for more exports in countries in order to realize growth and development in a country.

Foreign Income- the income of tea importing countries

Import Substitution – alternatives to reduce imports in to a country

Johansen Co integration Technique-procedure for testing co integration relationship of several time series data permitting more than one co integrating relationship.

Price Variability of tea – fluctuations in international market prices

Real Exchange Rate- How much the goods and services in the domestic market can be exchanged with goods and services in a foreign country.

Tea Exports- Quantity Kenya is able and willing to offer on the international market for sale as tea at a given price in dollars.

Terms of Trade – a comparison of value of commodities exported against those imported in to a country

Tradable-Ability of a good or a service to be sold in another location far from where it was produced

Value Addition- Processing raw materials into more useful products in order to fetch higher prices on both the domestic market and the international market.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter provides an in-depth insight into the study by discussing the following main areas: background to the study, problem statement, justification of the problem, objectives, hypotheses and the scope of the study.

1.1 Background of the Study

The need for increased exports from Kenya to foreign nations cannot be over emphasized from both a theoretical perspective and a policy prescription perspective. From a theoretical perspective, it has been suggested that there is a direct relationship between change in export rates and a change in the gross national output. The growth of Export sector, therefore, is oftenly believed to be a main determinant of growth in production and employment in an economy which is shown in the Gross national product expansion (Ramos, 2001). The most important and crucial aim of the developing nations and with a special focus to Kenya is to have an equilibrium in the overall balance of payments of the economy. Such equilibrium would enhance a rapid economic growth and development and exports are generally perceived as an important catalyst for economic growth and development. The need for rapid economic growth in developing countries can be achieved through more exports and trade with other nations. There are a number of empirical and theoretical studies in regards to the significance of exports in raising the economic growth and development of a country. The classical economists among them, Adam smith and David Ricardo have suggested that international trade is the major source of economic growth and more economic benefits are attained from specialization in various lines of production. According to the export led growth hypothesis, exports being the main

contributor to the sources of economic growth have many reasons that can be theoretically be justified. (Noula A. *et.al, 2013)*

In the First argument in Keynesian theory, it is suggested that more exports can generate more revenue growth through foreign exchange multiplier in the short-run. Secondly, more exports leads to more foreign income which is utilized to import commodities such as machinery, electrical, transport equipment, fuel and food which are the enhancing factors for the growth and development of a nation. Thirdly exports, though indirectly, can promote economic growth via increased competition, economies of scale, technological development and raised capacity of resource utilization. Fourthly a variety of positive externalities like more efficient management or reduction of organizational wastages/inefficiencies, better production methods through improved technical know-how, positive benchmarking from foreign competitors and technical expertise about product quality, add to the stock of growth of the economy due to more exports leading to higher economic growth. (Amin. A, 2002).

Besides coffee and Horticulture, Tea is a major agricultural commodity export from Kenya to destinations such as Japan and European nations. Tea production in Kenya is affected by various factors such as climate, topography, transport network, population settlement, and natural calamities. Kenya experiences a deficit in its balance of trade mainly due to exportation of inexpensive goods that saturate the global market but do little to substantially raise the level of income which adds to the GDP of the nation. Economic performance of Kenya heavily depends on agriculture, hence the need to increase tea exports. However, the performance of the tea sub-sector is vulnerable to world price fluctuations, prolonged drought, poor governance and corruption, (G.o.K, 2013).

From independence, Kenya has been promoting rapid economic growth through public investment, encouragement of small-holder agricultural production and incentives for foreign industrial investment. Gross domestic product grew at an annual average of 6.6% from 1963 to 1973 during the 1970s. Agricultural production grew by4.7% annually during this same period. This growth in agriculture was stimulated by redistributing estates and opening up new areas for cultivation. In 1997 adverse weather conditions slowed down agricultural production. Generally earnings from agricultural production have not been stable over the period due to the reasons mentioned. Kenya was the leading exporter of black tea around the globe, and the United States is the world's third largest importer of tea, (GAIN, 2013.).

Tea exports earned the country $1.45 billion in 2012 a 4% increase from the previous year. Production stood at 395.5 million kilograms in 2012 from a cultivated area of about 1800000 hectares and exports at 429.6 million kilograms and there had been a noted increase in production over a period of five years, (GAIN, 2013). Tea cultivation and manufacturing is present in 15 counties of Kenya and impacts a large proportion of the country's 45 million people. Tea earns income and provides employment opportunities to more than 600000 small holder households and 150,000 workers at tea estates. The most of the tea is auctioned by factory name and grade at the public Mombasa tea auction Centre hence resulting to a direct feedback in market prices to factories and farmers. Tea that is purchased at the auction is sold directly by estates or is exported by containers to processing facilities, where it is blended with tea around the world. There has been an increase in the volume of tea sold at the auction since 1980 to 300,000 mega tones in 2011 which is attributed to introduction of high-yielding plants and especially extension of land, by small holders and estates, due to rising prices. However, it is postulated by East Africa Tea Trade Association

(EATTA) that prices are likely to drop in the future due to excess supply as a result of increased yields, (GAIN 2013).

Table 1. 1: Top World Tea Exporters

Rank	Country	Quantity(MT)	Value(1000 USD)
1	Kenya	417,661	1,165,137
2	Sri Lanka	312,908	1,365,966
3	China	305,857	806,954
4	India	234,560	694,661
5	Vietnam	136,515	199,979

Table 1. 2: Top world Tea Importers

Rank	Country	Quantity(MT)	Value(1000USD)
1	Russian Federation	181,619	563,106
2	United Kingdom	149,821	420,716
3	United States of America	126,868	400,729
4	United Arab Emirates	64,224	267,216
5	Pakistan	94,463	266,639

Source, GAIN 2010

Kenya has experienced mixed results over the years in the agricultural sector, but despite this, agriculture remains the mainstay of the Kenyan economy. It further indicates that cross country estimates show that GDP growth which originates from agriculture is at least twice as effective in reducing poverty as GDP originating from outside agriculture. Kenya vision 2030 (2007) strategy has identified agriculture as one of the six key economic sectors expected to drive the economy to a projected 10 percent economic growth annually over the next two decades through promotion of an innovative ,commercially-oriented and modern agriculture. Kenyan exports have been facing difficulties caused by unfavorable international terms of trade. Developed

countries have continued to put in place prohibitive tariff and non-tariff barriers. This includes decreasing commodity prices, biased trade agreements, and the use agricultural subsidies in favor of developed countries. Additionally international trade negotiations such as those under world trade organization (WTO) and the economic partnership agreements (EPAs) have been slow and have achieved little progress. Kenyan farmers export semi-processed, low-value produce which accounts for 91 percent of total agriculture-related exports. (G.o.K, 2009)

Were.*et.al (2002*) also asserts that Kenya's exports are still dominated by primary agricultural products. Kenyan tea is exchanged on the world market in bulk where it is used to blend lower quality teas from other countries. This has resulted to lower prices for Kenyan tea. Kenya is the largest producer of tea in Africa. The biggest buyers are Pakistan, the UK, and Egypt. Tea exports from Kenya accounts for about 22% of the world export share. Tea is therefore considered to be a major export earner for the country and contributes greatly to the country's GDP (TRFK, 2009). The graph below shows substantial contribution of tea exports to Kenya's GDP from 1980 to 2010. The lowest contribution was in 1981 at 1.97 % and the highest contribution was in 1993 at 5.6%. *(WER, 2015)*

Figure1.1: Graph of percentage GDP Growth against Tea exports in Kenya,

1980 to 2011
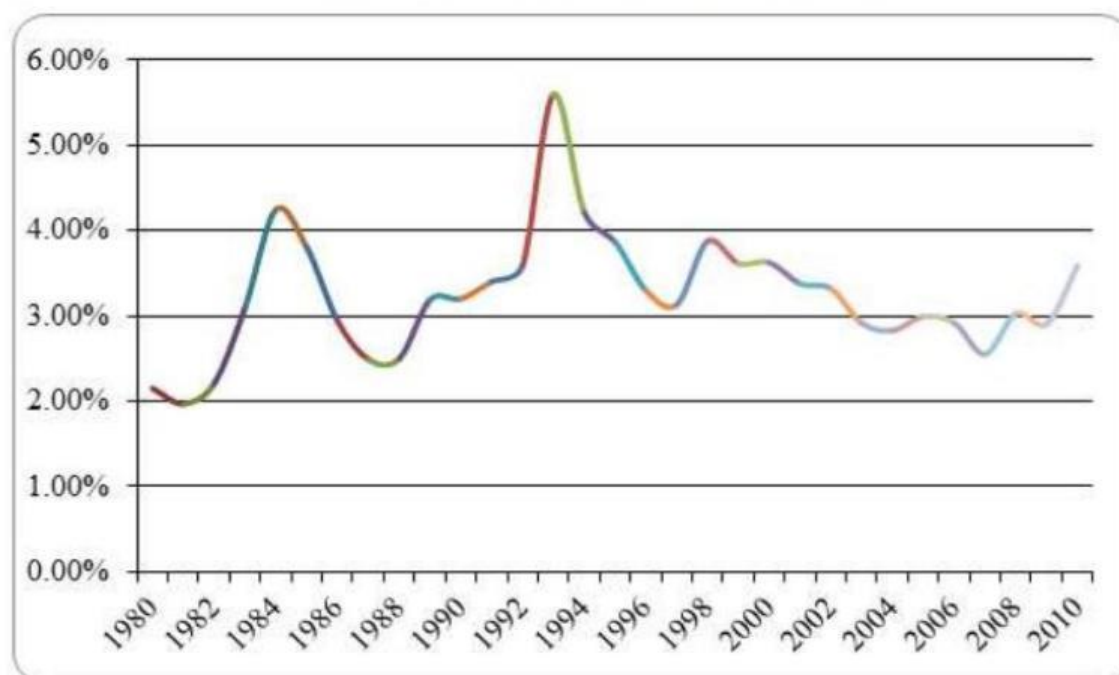
Source: Journal of World Economic Research, 2015.

According to the same research, tea export earnings over the period kept on fluctuating but with an upward trend. This in turn could affect the profitability of firms in the sector and therefore the farmer's earnings (bonuses). There is therefore dire need for stabilizing the exchange rates on the international market for farmers to enjoy stable earnings that would encourage producing more for export market, hence the need for this study. The study will delve in to the various factors determining the performance of tea exports sector in Kenya. Given economic variables such as prices fluctuate a lot, the objective would be to investigate the impact of such fluctuations to tea exports performance, given that tea is the chief foreign exchange earner to the Kenyan economy (WER, 2015).

Exports of agricultural products in Kenya has faced restrictions due to poor packaging and low value addition, damage during transportation, poor handling and infections

due to lack of code of conduct for exporters and quality control.(G.o.K,2009). The study will employ a quantitative approach to assess the determinants of tea exports in Kenya. Policy makers in many developing countries are disturbed with the decision on whether to concentrate on formulation of policies that could be designed to be export promotion oriented or import substitution oriented. If more exports could contribute to more economic growth, then export promotion policies should be advocated for. (Oskooee *et al..,*2005); Branchi *et al.,* (1999); Ogun(1998);Klaasen (1999)Alemayehu(1999); Whitly,(1994);Balasa *et al.,* (1989);McKay *et al*., (1998) all cited in Were *et al*., (2002).

Kenya is the number three largest producer of tea in the world after India and China, but it is the number one global exporter in terms of volumes, yet strikingly, Kenya earns less from tea than Sri Lanka, the second largest exporter, why… because of the bottlenecks hampering the progress and efficiency of Kenya's tea industry *(WER, 2015)*. Tea growing in Kenya was introduced by the colonial government in 1903, though actual commercialization started in 1924. Tea has continued to play a significant and increasing function in Kenya's social economic development and it is the leading industrial crop in terms of contribution to GDP, (ACBF, 2017.)

In the year 2016, tea contributed up to 40% of Kenya's marketed agricultural production and further accounted for 25% of total export earnings in the country. In addition tea provides a means to better livelihoods to over 600000 small-holders who contribute about 60% of tea output. Sadly, only about a paltry 14% of tea exported from Kenya is estimated to be value added. The rest is exported in bulk form leading to a loss of $12 per kilo of beverage because of low level of value addition (KIPPRA and ACBF, 2017).

There is need to focus on tea value chain, because tea is not just only a leading foreign exchange and household earner, but also a large country employment provider. The same assessment adds in its report that, the main areas of concern in tea marketing in Kenya are low use of the beverage domestically, excessive control by a few multinational companies at the Mombasa tea Auction, availability of few numbers of export destinations and the declining trend of the present markets. That Kenya needs to blend and brand its own teas to realize more revenue instead of leaving it to international buyers. Kenyan government needs to fast track the adoption of a national tea policy (NTP) to provide guidelines that will ensure the tea industry is sustainable and competitive *(ACBF,2016)*

1.2 Statement of the Problem

Since there is no country which is self-sufficient and in a state of autarky, one nation has to trade with many other nations so as to obtain and enjoy commodities or products and services with which it has comparative disadvantages in their production, *(Noula Armand et al (2013)*, this is the case with Kenya and other African countries where agriculture is their mainstay economic activity and in Kenya tea is the chief export commodity. Majority of Kenya's labor is employed in the agricultural sector while a few others are employed in the manufacturing sector and tertiary sectors in the country. Tea production provides employment to many Kenyans. Kenya has a large labor force, good soils and a favorable climatic condition; hence it has a comparative advantage in the production and exportation of agricultural commodities such as tea to countries such as USA, United Kingdom and Japan

From time immemorial most agricultural exports from Kenya and other African nations have witnessed a substantial drop in revenue due to fluctuations in world prices, *(*Noula Armand *et. al 2013.*)They asserted that these products have become

less competitive as compared to manufactured goods from other countries, thus leading to unfavorable terms of trade. This issue has limited their contribution to economic growth in the country despite that they take up a big proportion of Kenya's exports. It would therefore be of interest to study the chief agricultural export crop in Kenya, (tea) both past and present trends and its contribution to economic growth and development. The focal point of the research therefore is to examine the determinants of tea exports subsector performance in Kenya. Export performance in Kenya has improved but has continued to fall below the expectations of the ambitions of vision 2030. The level of the Kenyan shilling exchange rate has continued to be influenced by the forces of demand and supply in the foreign exchange market (Aggrey Otieno, 2013). Practical evidence on the impacts of agricultural exports on economic growth is not universal albeit a robust economic growth in East-Asia's economies and the wave of growth of the economies in the four tigers of Hong Kong, South Korea, Singapore and Taiwan. The case of these countries has been utilized to support the argument that carefully managed liberalization to trade through export –led –Growth hypothesis could be a roadmap for achieving faster economic growth (Giles and Williams 2000).The supportive evidence in favor of ELG and global trends towards liberalization appears to have influenced Kenya to adopt an export –led strategy. ELG is envisaged in Kenya's poverty reduction strategy paper (PRSP) as a strategy towards being industrialized (G.o.K 2001). In this era of trade liberalization and globalization, the importance of exports cannot be over emphasized (KIPPRA, 2002). And according to the same paper, ELG would lead to technology transfer, efficient allocation of resources imposed by international competition and cost-efficient allocation of resources. These effects provide a further impetus to growth beyond what openness can provide through dynamic interactions in the economy. (Ndung'u

and Ndung'u, 1998) Kenya adopted various trade policies since independence to realize growth. The first decade of independence recorded faster and higher economic growth in Kenya's economic history. There was expansion of output and employment propelled by expansionary fiscal policy (Wagacha, 2000). By the 1980s Kenya had achieved a reasonable level of industrialization by regional standards (Lall and Pietrobellis, 2002) .However that notwithstanding import substitution and industrialization policies failed to achieve the intended objectives despite protection and government patronage that the industries enjoyed.

In general, the policy structure was heavily biased against exports characterized by high effective rates of protection, price controls, foreign exchange controls and import licensing leading to difficulties in accessing imported inputs, bureaucratic and cumbersome administrative procedures and an over-valued currency (Lall and Pietrobelliss, 2002). There is over whelming evidence that the relatively rapid economic growth in the 1970s, particularly in the last half centuary was mainly due to the sharp increase in international prices of tea. The break –up of the EAC adversely affected the quantity of processed tea exported to the region. The policy of full liberalization began in the 1980s and there was a shift from import substitution to export promotion strategies. The major turning point in policy was in sessional paper number one of 1986 on economic management for renewed growth in which the Kenyan government committed itself to liberalize the economy and adopt an outward looking strategy. The Kenyan government therefore established the export compensation schemes among other export promotion programs such as manufacturing under bond (MUB) and the establishing of the Export processing zones in 1988 and 1990 respectively (KIPPRA 2002). Other export incentive schemes were Green channel, Export guarantee and credit scheme, the revival of Kenya export trade

authority (KETA), export promotion council and the export promotion programs office (EPPO) for tax rebates on imported inputs for exports. These strategies have not been so successful in boosting exports and therefore economic growth. There is need for more to be done to establish the tea export function, tea being a major cash crop export in Kenya that could boost economic growth as a result of increased exports. This thesis therefore sought to find out the determinants of tea exports subsector performance in Kenya.

1.3 General Objectives of the Study

The general objective of the study was to examine the major determinants of the tea exports sector performance in Kenya.

1.3.1 Specific Objectives

The specific objectives of this study were,

1. To analyze the effect of price variability on tea exports performance in Kenya

2. To analyze the effect of change in real interest rates on tea exports performance in Kenya.

3. To analyze the effect of foreign income earnings on tea exports performance in Kenya

4. To determine the effect of change in real exchange rates on tea exports performance in Kenya

1.4 Hypotheses

$H01$: Price variability has no significant effect on tea exports performance in Kenya.

H02: Change in real interest rates has no significant effect on tea exports performance in Kenya.

H03: Foreign income has no significant effect on tea exports performance in Kenya.

H04: Real exchange rate instability have no significant effect on tea exports performance in Kenya.

1.5 Justification for the Study.

With the recent increase in Kenya's foreign debt, there is need for the country to put in place measures that could encourage researches of this kind, so as to help increase export earnings, thereby improving the balance of payments situation in the country, and leading to economic growth in the country. Mainly, Kenya exports primary products with little or no transformation of the products. This shows that it may be very difficult for the country to realize economic growth. This study will add to the knowledge accumulated on the matters of international economics and also assist solve problems facing exports in Kenya. The research will also be useful to individuals and organizations that will have an interest to carry out further research in this area to add on the much that has been researched so far, on how tea exports affect economic growth over time, using time series data. Also, this work could be a guide to further solutions facing trading blocs in Africa. The agricultural sector in Kenya, where tea is a sub-set could be improved if research studies of this nature are intensified. Additionally, the research will be useful in providing a road map to the policy making process in the country's tea sector, thus work towards the welfare for all. The study will offer solutions to policy makers specifically through statutory measures so as to be able to improve the state of the balance of payments of the country and sustain economic growth in Kenya. This study could also be important to other sectors such as coffee and horticulture, which could use policy

recommendations that will be raised to address their problems. The research may also be a tool to increasing exports of other commodities, both manufactured and primary commodities in the country, to attain a favorable balance of payment.

1.6 Scope of the Study

The study used time series data spanning from 1985 to 2019. The study focused on tea exports since Kenya is the world's leader in exportation of black tea by weight, tea being one of the leading export earners in the country, a superlative it claimed in the years, 2010 and 2012. Tea is one of the main cash crops cultivated in the Kenyan highlands, and agriculture continues to dominate Kenya's economy not just in the tea production and export sub-sector, but also in other crop exports such as horticulture and coffee. The main variables under study are tea price volatility, foreign incomes of Kenya's trading partners, real interest rates, and the real exchange rates.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the relevant theoretical literature that pertains to tea output in Kenya, factors influencing performance of tea exports in the country, effect of tea exports on GDP of the country, the empirical literature, theoretical literature and the conceptual framework of the study.

2.1 Agricultural commodity Exports and Kenya's Economic Growth; Macroeconomic Outlook

According to a report by the World Bank, (2005), about two thirds of the world's population poor are concentrated in rural areas. Rural areas are generally agriculture-oriented. Agricultural sector in Kenya employs more than 75% of the country's total population. Therefore in order to eradicate poverty in Kenya, and raise the standards of living of such populations, there is need to focus on agricultural production and exports. In the Kenyan economy agriculture is a useful ingredient to economic growth and contributes about 35% of the GDP and further produces over 40% of the export earnings despite that about half of total production is subsistence production hence not marketed. Agricultural production and exports establishes the framework for industrialization through provision of raw materials for industries, generating employment to the population through earning of foreign exchange hence raising the living standards of individuals, (IMF, 2015). Large foreign earnings from exports may lead to formation of capital in the country, when capital goods are bought in to the country with the earned foreign exchange. More encouragements on exports dealings help direct investments in the more efficient sectors of the economy therefore increasing production of commodities. Efficiency is enhanced further by production

for international markets since this allows for greater economies of scale and pushes firms to hold down on their production costs so as to remain and be more competitive in the international markets. Profitable export industries can trigger an addition to investment, stimulate increased flow of new technology and managerial skills, and encourage increased aggregate consumption in an economy (IMF, 2015)

The Growth of exports is important because of its impact on internal trade and economic stability. Rate of economic growth and incomes distribution in a country is closely related to economic growth. Also, if exportation increases at a higher multiplier than imports can, then anything is possible for an economy to be a developed one, but if there is lack of stability in exports of a country, this can adversely affect the process of development of an economy. Lower exports mean low foreign exchange and then low foreign exchange means a small purchasing capacity of a nation in the international markets. Fluctuations in export earnings introduce uncertainties in the economy which in turn affects level and efficiency of investment and in turn has an effect of imposing a declining trend on growth of the economy of a nation. (Emery Robert, 1967).Export instabilities on average act as a hindrance to the stability and growth of LDCs as it infringes on investment, raises borrowing costs, because export fluctuations tend to cause balance of payment complexities,(Amugongo, 2017).

The government of Kenya is regarded generally as an investment friendly nation and has instituted a number of reforms to regulate and to remove bureaucracy in both foreign and local investment including the creation of export processing zones which are expected to grow rapidly through input of foreign direct investment, (Wikipedia, free encyclopedia, 2013). The principal exports of Kenya are tea, horticulture and coffee. Horticulture accounted for 23% and tea 22% of the total export earnings and

coffee has declined in its importance due to depressed world prices accounting for just 5% of the total export earnings in 2005. Kenya trades with the USA under the AGOA terms but is struggling to hold ground against Asian competition and also runs a trade deficit with the United States of America, caused by Kenya's exportation of inexpensive products that saturate the global market and do little to substantially raise the amount of income coming in to the country. (KNBS, *2015)*

Kenya depends heavily on a few agricultural exports such as tea and horticulture which are vulnerable to world price fluctuations, prolonged drought, high population growth rates that outstrips rate of economic growth, deteriorating infrastructure, high income inequalities among citizens, among other challenges. Further, cases of corruption, bribery and fraud are also problems facing the export sector in the country, hence dragging the Kenya's economy behind. (G.o.K, 2005)

2.2 Theoretical Framework

2.2.1 The Theory of Absolute Advantage

Propounded by the classical economists, Adam Smith (1776) advocated for the laissez-faire economic policy and argued that the wealth of a nation would expand rapidly if the government would check the mercantilist controls over foreign trade. According to Smith division of labour was the way to go and that every person would be skilled in his or her particular field if done consciously. He said that if free trade is done with honesty, every country would be better off trading with each other. The principle of comparative advantage refers to a situation where one country is able to produce maximum goods and services than its competitors using the same amount of resources. In his book," the wealth of nations" Adam Smith postulated that under free trade each country should specialize in the production of those goods that it could

produce most efficiently and some of which could be exported in exchange for what is costly to produce at home Bloomfield A,(1994). However this theory is based on various assumptions such as;-

Cost of production of the two countries is absolutely different; there are only two countries involved; both countries produce only two goods; labour is the only factor of production and is homogeneous; labour is mobile domestically in a country but immobile internationally; labour is used in fixed proportions in both the countries; no transportation cost is incurred; technology is constant; cost of production is constant; only barter trade is involved on the international market. The theory however fails to answer the question of what if one country has absolute advantage in both the two commodities. Bloomfield A, (1994)

2.2.2 Comparative Cost Theory

Was propounded by David Ricardo in the 19th centuary(1817), and the theory argues that even if a country does not have comparative advantage in production of a particular commodity over the other country, international trade would still be beneficial bringing gains from international trade to all the participating countries. The theory is a refinement of Smiths theory. It argued that if one country is efficient in production of both commodities as compared to the other still the countries can benefit from trading with one another on the basis of cost of production which is not explained in the absolute advantage model.

The following theories are more detailed and tried to eliminate unrealistic assumptions put forward by Smith and Ricardo. They were put forward by economists such as Haberler, Leontief, Lerner, Marshall, Edge Worth and Meade. Their model is

more applicable to returns to scale conditions in production and is more comprehensive. The Neo classical theories include the following;-

2.2.3 Opportunity Cost Theory

This theory was put forward by Haberlers in 1936. In this theory Haberler re-stated Ricardo's theory of comparative costs in terms of opportunity costs. The theory states that if a country can produce either commodity X or commodity Y, the opportunity cost of commodity X, is the amount of the other commodity Y that must be given up in order to get one additional unit of commodity X, thus the exchange ratio between the two commodities can be expressed in terms of their opportunity costs. But the comparative cost theory was based on the labour theory of value that believed the value of a commodity is equal to the amount of labour time used up in the production of that commodity, which means according to Ricardo's theory, labour is the only factor of production of the commodity and labour is homogeneous and is used in fixed proportions in the production of all commodities. Haberlers opportunity cost theory overcomes these shortcomings by explaining the doctrine of comparative cost in what is called the substitution curve or production possibility curve or transformation curve or production frontier Bloomfield A(1994). The following were Haberler's assumptions;-

Only two countries participate in trade; only two commodities are produced and two factors of production are used; the supply of the factors is fixed; there is full employment; free trade exists between two countries; the price of each factor of production is equal to its marginal value productivity in each employment. In this theory heavy gains from trade can be determined by different cost conditions which include;-

- Trade under constant opportunity costs.

- Trade under increasing opportunity costs.

- Trade under decreasing opportunity costs.

2.2.4 Modern Theory of International Trade

The classical theory of international trade was bitterly criticized by Bertil Ohlin in his famous book interregional and international trade in 1933 and then generated the general equilibrium or factor endowment theory of international trade. This theory is also called the modern theory of international trade or the Hecksher-Ohlin (H-O) Theorem. This theory was first proposed by Ohlin's teacher, Eli Hecksher in 1919 who said that trade between different countries results due to differences in factor endowments. Ohlin carried the theory forward to build the modern theory of international trade. According to the theory, some countries are Labour abundant while others are Capital abundant. The theory argues that countries rich in Labour or Labour abundant should export goods that are Labour intensive in production and countries that are capital abundant should export commodities that are capital intensive in production. Ohlin stated that the main cause of trade between regions is the difference in prices of the commodities. It was acknowledged that some commodities can be imported easily than be produced locally, even at very high prices, trade then becomes beneficial Bloomfield A(1994). This theory was based on the following assumptions;-

Two countries, two commodities and two factors of production, labour and capital; there is perfect competition in commodity and factor markets; production functions differ for each commodity; each commodity is produced at constant returns to scale; transport and insurance costs are zero; factors of production are mobile within the

countries but immobile between countries; there is full employment of factors of production in the two regions; there is free trade between the countries; technology is constant in the two countries; there are identical demand patterns and preferences of consumers in both countries or regions.

2.3 Empirical literature.

If export growth could increase economic growth in a country ,then developing countries should concentrate on formulating policies that are designed to be export – promotion oriented (Oskooee *et al*,.2005).Ogun (1998); Klaasen (1999); whitley,(1994);Ndung'u and Ngugi ,(1999), Alemayehu,(1999) Balasa *et al*,..(1989) Branchi *et al* (1999), McKay *et al*,. (1998); as cited in Were *et al*.(2002) and in the journal of world economic research, (2015) by Agnes Muthamia and Willy Muturi. More exports from the country could lead to higher incomes which would lead to increased economic growth. This is an argument by the world food summit of 1996. The summit concluded that, as the incomes grew, the proportion of expenditure on food decreased and the probabilities of entering in to food insecurity became minimized. The summit added that trade enhanced more contributions to higher income growth through enabling countries to harvest the benefits of comparative advantage; avail opportunities for increased production and expansion of growth; and increased mobility of capital and highly skilled labour, more so through foreign direct investment in the country. It further asserts that export growth allows firms to reap the benefits of economies of scale. That exposure to foreign competition is also helpful in removing inefficiencies and gaining exposure to ideas, knowledge and new technologies.

According to the food and agriculture organization of the United Nations (FAO,2015), production and exports of more tea earns a country foreign exchange

and leads to employment generation and also provides a level foundation for national economic growth; in particular exports make significant contribution to food security by helping to cover food import bills. FAO adds that in the year 2011, tea exports earnings cleared for a 51% and a 71% of Kenya and Sri Lanka's bills of food import respectively. From this it is evident that monitoring and analyzing international tea exports trade is useful for those involved in policy formulation as regards to food security, trade and rural development in the less and medium developed countries. The same organization, FAO, asserts that the major catalysts of international prices are trends and changes in per capita consumption, trade preferences, and possible effects of natural catastrophes such as pests and diseases on production and the volatility in dynamics among retailers, wholesalers and multinationals. International tea prices as measured by the FAO tea composite price, remained stable up to 2013 for five years, despite minor downturns due to market adjustments in late 2011 and the second last quarter of 2013. Demand continued to be flourishing, and it was led by a high level of consumption in developing countries. The increase in the prices of teas led to an approximated 6 percent increase in export revenue earnings in 2012 to USD5.2 billion on the international level.

Kenya is the number three highest in rank in production of tea across the globe, with output hitting an all-time high of 432400 tons in 2013. Export earnings arising from the 494300 of the productions shipped in the same year totaled kshs114.4 billion. Over 60 percent of the proportion of tea grown in Kenya is grown by small holders who almost purely belong to the Kenya tea development agency (KTDA) which is an agent for the Kenya tea small holders, created upon privatization of Kenya tea development authority in 2000, June. KTDA is a private company and the leading tea management agency of Kenya (Kaisonchang, 2015). The KTDA was established for

provision of services to small scale tea farmers on production, processing and marketing of high quality tea, supplying farm inputs commodities and extension services; inspecting and collecting green leaf tea and many others. The organization also gives credit facilities to small scale farmers for the purchase of equipment and tools needed in production and marketing of high quality teas as well as planting materials made available through nurseries/seedbeds commissioned by KTDA. (Kaisonchang, 2015). The general situation of smallholders continues to be problematic because the cost of production tends to be higher than the prices they receive for fresh tea leaves, if the cost of labor is factored. (FAO, 2015)

Dawson. P. (2005) in his study on the contribution of agricultural exports to economic growth in less developed countries found out that there was need for more exports to boost foreign exchange earnings hence GDP of the nation. Two theoretical models were used in the analysis; the first model was based on agricultural production function including both agricultural and non-agricultural exports as inputs. In the second model was a dual economy model i.e. agricultural and non-agricultural where each sector was sub -divided in to exports and no export sector. Fixed and random effects were estimated for each model using panel data for sixty two less developed countries for the period 1974-1995. The findings supported the theory of export led growth. There is an increasing interest in the relationship between exports and economic growth. Neo-classical economists emphasize on trade between economies so as to foster growth, this is done through international trade which is considered to be an import stimulator. It provides worldwide economies with products and services which if not possible economies would have been constrained by their limited size of their markets. It acts as a vent of surplus production and equally widens its markets

which lead to induced investments and savings this in turn enhances the enlargement of countries

Johnston and Mellor (1961) discussed the role of agricultural sector in the process of economic development in different ways. They emphasized that expanding agricultural exports were the main source of rising incomes and increasing foreign exchange earnings in developing countries. Levin and Raut (1997) investigated the effect of exports of primary and manufactured goods on economic growth. Primary goods included mainly agricultural products, metals and oil. They concluded that manufactured goods were the main source of economic growth and the exports of primary goods had insignificant impact on economic growth of Asian countries using the time series data of 1960 to 1997. Results of the study further showed that there is a bi-directional causality between export growth and economic growth in most Asian developing countries. Also, there existed strong evidence for long run Granger causality in all countries studied.

In his study on the relationship between economic growth and major exports in Pakistan, Aurangzeb (2006) basing on analytical frame work developed by (Feder, 1983) tested the applicability of the hypothesis of high exports leading to high economic growth of a country. Using the time series from 1973-2005, it was found that exports had a positive impact on the social welfare of the citizens. Hence the study suggested that there was need for an export oriented and outward looking approach in order to realize high economic growth in Pakistan.

A study conducted by Kwa and Bassoume(2007) on the linkage between agricultural exports and sustainable development, provided case studies of different countries involved in agricultural exports. Nadeem. M. (2007) provided the empirical analysis

of the dynamic influences of economic reforms and liberalization of trade policy on the performance of agricultural exports in Pakistan. He examined the effect of both domestic supply side factors and external demand on the performance of agricultural exports. Of the findings, the major one was that export diversification and trade openness contributed more to agriculture domestic side factors performance. The study concluded that agricultural export performance is more elastic to change in domestic factors.

Using panel co integration technique to estimate the impact of tea exports on economic growth in developing countries, Sanjuan-Lopez and Dawson, (2010) found out that there was a long run relationship and the agriculture export elasticity of GDP was 0.07.The non-agriculture export elasticity of GDP was 0.13. Based on empirical results, the study, using 42 underdeveloped countries, suggested that poor countries should adopt balanced export promotion policies to realize economic growth.

2.3.1 Exchange Rate Volatility and Tea Exports Performance

McKinnon. I. (1963) furthered the theory of (optimum currency areas) OCAs by considering the implications of different sizes and structures of economies on the optimal exchange rate regime. Primarily, where economies are relatively open, variable exchange rates have a significant effect on internal price levels since the ratio of tradable to non-tradable is high and devaluation increases the cost of a tradable. Given the conflicting aims of employment maximization, external balance, internal price stability, an open economy with variable exchange rates may be able to control the former two but the rising cost of tradables will impact on the latter aim: thus open economies have less to lose from moving from variable exchange rates to a single currency.

As Musa S (1984) pointed out, the key issue of exchange rate policy is to set relative prices between tradables and non-tradables, and therefore there are three important instruments through which government policies can affect domestic relative prices. The first is through subsidies. The second is through existence of market imperfections, which cause rigidities in nominal prices of goods entering in to international trade, and of stickiness of returns to factors employed in production of these goods. Consequently the relative protection accorded these industries may differ depending on the nature of the market imperfections. In such a case, the domestic currency costs of earning a unit of foreign exchange or of replacing a unit of foreign currency spent on imports will differ among industries as they do in a multiple exchange regime. The third method is government influence over the distribution of expenditures among goods or the level of spending relative to income. This amounts to conduct of macroeconomic policies and in addition to these, the conduct of exchange policy, which is self-evident. while this is predictable, this type of exchange rate volatility is costly since it amplifies the domestic impact of disturbances arising in foreign markets, exacerbating fluctuations in domestic growth and unemployment. Second flexible exchange rates may be too volatile if they are primarily influenced by factors unrelated to fundamental economic variables. In this case exchange rate movements would be largely unpredictable, especially in the short run. Furthermore, the short term independence of exchange rates from fundamental variables can lead to long term exchange rate misalignment. Volatility could also have an impact on growth, theoretical and empirical work shows that a volatile economic environment, for example the volatility of the terms of trade, exchange rates, money supply, and productivity can have a harmful effect on economic performance (Frenkel and Goldsten, 1987).

Similarly, a study done by Brada and Mendez (1988) examined the effect of foreign exchange fluctuations on the volume of international trade found that bilateral trade flows between countries with floating exchange rates are greater than those in countries with fixed exchange rates .The study concluded that while exchange rate risk does reduce the volume of trade among countries regardless of the nature of exchange rate regime, the greater risk faced by traders in floating exchange-rate countries is more than offset by trade reducing effects of restrictive commercial policies imposed by fixed exchange rate countries .This not only shows the direct economic impact an exchange rate regime can have on economic growth, but more specifically, the underlying problems associated with fixed exchange rate countries that also affect their trade , which is of their strict policies outside their currency regulations.

Bilateral trade between two countries depend upon, among other things, exchange rates and the relative price levels of the two partners (Todani and Munyama, 2005)

According to the journal of world economic Research, volume 2 pp12, globally there is over production and over supply of tea on the international markets. This together with cheap and poor quality teas from other countries has led to a drop in world tea prices. Kenya being a leading producer and exporter has directly been affected (CPDA, 2008). Visor (1995) indicates that devaluation makes the domestic price rise and resistance against devaluation is often based on the fear of accelerating inflation. Pilbeam (1998) argued that exchange rates are not simply determined by monetary policy stance, but on complex and in the manner upon which the monetary policy/fiscal policy mix operates and also the interactions of these macroeconomic policies between countries.

Ndung'u (1993) estimated a six variable VAR money supply, domestic price level, exchange rate index, foreign price index, real output and rate of interest in an attempt to explain the inflation movement in Kenya . He observed that the rate of interest and inflation explained each other. A similar conclusion was also made in an extended version of this study (Ndung'u, 1997). Increased economic impact of tea exports and price variability would , for instance , increase the uncertainty of profits on contracts dominated in a foreign currency, and would therefore reduce economic growth to levels lower than would otherwise exist if uncertainty were removed (Cote,1994).

Economic contraction occurs through the following channels. First, a nominal depreciation of the currency leads to a rise in general price level. This lowers aggregate demand, which in turn, causes economic contraction. The second channel works through income redistribution. It is argued that a real depreciation can help transfer income from individuals with a high marginal propensity to consume to those with a low marginal propensity. This lowers aggregate demand, which in turn, causes output to fall. The aggregate supply, on the other hand purports that the depreciation of the real exchange rate increases the cost of production and helps redistribute income in favor of the rich. It is contended that a real depreciation can reduce aggregate supply. This is so because a real depreciation causes the cost of raw materials to go up. This reduces the importation of raw materials and therefore lowering the level of aggregate supply. (Papazoglou, 1999).

Eduardo and berg (2000) show the higher the level of dollarization or currency substitution in a country, the less effective will be the traditional set of monetary policies of the central bank. Actions on the part of monetary authority relating to money market rates, reserve requirements and refinancing may turn out to have insignificant effect on real GDP and inflation. Ndungu(2001)suggest that there may

not be one single solution applied to all situations and that the effect of exchange rate should be examined on a country to country basis, balance how large the impact is and when the impact occurs. The optional choice of exchange rate system is a longstanding problem in open economic system.

2.3.2 Foreign Incomes and Tea Exports Performance

It is argued that the GDP of a trading partner, or its disposable income can be used to determine foreign demand for goods produced in one country, higher foreign incomes would lead to higher demand for exports leading to more earnings at the home country, hence economic growth (Ragoobur and Emamdy, 2011).

Arora and Vamvakidis (2004) stated that industrial countries benefit from trading with developing countries which grow rapidly, while developing countries benefit from trading with industrial countries which have relatively high incomes. According to Agnes K, *et.al* (2015) in their conclusion, they found out that an increase in income of major trading partners of Kenya led to a low demand for tea. This leads to a decrease in tea earnings in the country hence lowering the GNP of Kenya. They suggested the need to increase value addition in the tea sector so as to ensure sustainability in the long run and hence economic growth. They added that institutions such as tea board of Kenya in partnership with the government institutions in charge of promoting international trade should play the role of marketing tea originating from Kenya to countries of Pakistan, Egypt, and United Kingdom among others. This promotion should be done particularly when these countries are experiencing a boom in their trade cycles and their GDP is high. Value addition would also enhance farmer's earnings and also open up new market niches for Kenyan tea.

Rutto Reuben and Alala Ondiek (2014) further in their study on the impact of foreign exchange volatility on tea exports found out that foreign income has strong impact on tea exports in Kenya. They found that there was a negative impact on tea exports if foreign income increased. They argued that tea export growth could be influenced by factors which could be beyond the control of the local policy makers.

2.3.3. Tea Price Variability and Tea Export Performance

Theoretically, we would argue that higher prices of exports on the international market would enable the exporting country experience higher earnings from the same which in turn would lead to a higher Gross national product for the country. If the earnings are distributed fairly among the farmers, it would enhance their wellbeing through more profitability, easier access to bigger loan facilities and better standards of living to their families.

Omondi B. (2012) studied the impact of tea price variability on foreign direct investment in Kenya. From the data that was collected, it was found that periods where there were low price fluctuations had higher net capital inflows in to the country (1987-2002),but periods with high price fluctuations created more uncertainties on the international market hence discouraging foreign direct investment leading to low capital inflows in to the country (1993- 2010). These points out the strong relationship between the two variables. However inferential analysis found out a weak relationship between price variability and foreign direct investments. Hence the conclusions drawn from inferential study findings suggest that there is no significant impact of tea price variability on foreign direct investment and hence economic growth of a country. There is an increasing interest in the relationship between exports and economic growth. Neo-classical economists emphasize on trade between economies so as to foster growth, this is done through international trade

which is considered to be an import stimulator. It provides worldwide economies with products and services which if not possible economies would have been constrained by their limited size of their markets. It acts as a vent of surplus production and equally widens its markets which lead to induced investments and savings this in turn enhances the enlargement of countries

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The law of supply states that the higher the price, the greater the supply and vice versa. It therefore follows that fair prices on the international market would encourage farmers to produce more exports which would in turn lead to increased export earnings in the country. The earnings would lead to higher GNP. Prices may fluctuate due to excess supply or excess demand on the international market. (FAO, 2015)

According to report published by Global Agricultural Information Network (GAIN) (2013) volume of tea exported increase during a period of rising prices (1990-2000).

Farmers were more willing to extend land under tea cultivation. The report said that prices vary depending on grades of tea and the season in which it is exported. Other tea producers in Africa include Tanzania, Uganda, and Malawi. Most of the tea in East Africa is sold through the Mombasa tea auction. The GAIN report adds that the Africa tea brokers plants overseas limits farmers' ability to obtain higher prices. Kenya faces stiff completion from Sri lanka, china, India and Vietnam. EATTA's most recent five year strategic plan is expansion in to new markets, such as the United States and Russia where tea could be exported at higher prices. To ensure stable supply, the Kenya export promotion council plans to open a warehouse at Dubai Tea Trading Centre.

2.3.4 Interest Rate Volatility and Tea Export Performance

The impact of interest rate on investments conclusions have been made differently. In a monetary utility function model, when investment is added as an endogenous variable, the investment is found to influence interest rates (Qing and Chong2004). Changes in interest rates can also have both positive and negative impacts on investment (Alvareand and Koskef, 2004). In the Diffusion Model of short term rates it was revealed that uncertainty of interest rates may restrict the best investment and the size of an enterprise (Luis H.R Alvarez, 2010). Volatile interest rates have greater impact on investment decisions across all sectors (Andrea Beccarini, 2007). Evidence from 21 developing countries, 1971 to 1980 on the analysis of investment in financial assets revealed that there was a positive relationship between real interest rates growth and financial assets (Lanyi and Seracoglu, 1983).

In the long run, rate of interest and investment have a positive relationship. According to a study conducted in Jiansu province in China, if interest rate is reduced there would be more investment, although the same investment is affected by other factors

such as market price, economic development level, investment environment and preferential policies (WuhanLi Suyuan and Adnan Khurshid,2015)

In the 1990s when over valuation was decreased Nabli and Veganzones- Varoudakis (2002) studied the middle East and North African countries (MENA) characterized by having over valuation of their currencies throughout the 1970s and 1980s. They were able to compute this over valuation through the use of an –indicator of misalignment. A panel of 53 countries was used and ten of these were MENA countries. Their research showed that manufactured exports were within the MENA countries overall, there was a continuous rise in the diversification of manufactured exports affecting the GDP of such countries. Through any of these methods the government can affect domestic relative prices and therefore the competitiveness of domestic industries.

Calvo and Mishkin (2003) argued that success in emerging market countries can be produced through good fiscal, financial and monetary institutions with less emphasis on flexibility of an exchange rate regime. They asserted that when choosing an exchange rate regime, a country should consider their needs, economy, institutions, political situation, religion and culture of the people. Fountas and Aristotelous*(2003)* in their paper titled impact of different exchange rate regimes throughout the twentieth century on bilateral exports between the united kingdom and the united states concluded that fixed exchange rate regimes and managed floating exchange rate regimes are favorable to trade but , more importantly, freely floating exchange rate regimes produce more trade.

Fred Hu (2004) in his study that focused on china on their need to liberalize currency and reduce capital outflows, found out a negative relationship between fixed exchange rate regime and economic growth. He concluded that China needed to go through a

gradual process that would ultimately lead them to a more liberalized overall system. First they must remove the currency peg causing them to have a free floating exchange rate. This would cause them to enter a more balanced trading field among their major trading partners. Second they needed a sound banking reform program which would stabilize their domestic financial system.

Egert and Zumaquero *(2005)* analyzed the impact of exchange rate volatility and changes in the exchange rate regimes on export volumes for ten Central and Eastern European transition economies. The first group of countries started their transition with pegged regimes and then moved towards flexibility. The second group of countries experienced no major changes in their exchange rate regimes in the past ten years. Their results indicated that an increase in exchange rate volatility decreases exports. However, Kiptoo (2007) says that the objectives of liberalizing foreign exchange market in Kenya have not been realized and there is no any evidence realization of those objectives. Large volatilities in nominal exchange rates have since characterized Kenya's financial market.

Modern analysts argued that flexible exchange rates are preferable to fixed exchange rates because flexible exchange rates provide greater insulation from foreign shocks. By the end of 1998 many countries had accepted to float currencies against others. That is, the currencies were not formally pegged to other currencies. Despite this, exchange rate policy is still a source of exasperation and appropriate choice is by no means clear (Frankel, 2007). Kiptui and kipyegon *(2008)* on their study on external shocks and real exchange rate movement in Kenya found out that, though external shocks have major effects on the real exchange rate, domestic shocks also play a role. The results show that the interest rate differential has significant negative (appreciating) effects in the short and long run. On the other hand, government

spending has significant positive (depreciating) effects on real exchange rate in the short run and long run, while real GDP growth has positive (depreciating) effects in the short run but negative (appreciating) effects in the long run.

Musyoki and Pundo *(2012)*on the study of impact of real exchange rate,(RER) volatility on economic growth in Kenya, adduced evidence that the conditional volatility of the RER depended on both external shocks and domestic shocks to RER fundamental and macroeconomic changes. Overall, however, Kenya's RER generally exhibited an appreciating and volatility trend, implying that in general, the country's international competitiveness deteriorated over the study period, hence, impacting negatively on the economic growth of Kenya.

According to Milton Friedman, when exchange rates appreciate in the home country , there would be an increase in the country's export earnings hence economic growth, on the other hand, if there is a depreciation in the exchange rates depreciate in the home country ,the export earnings would reduce there by lowering the GNP of the country. Therefore, appreciation of the currency may lead to economic growth as the value of exports may be higher than the value of imports hence favorable balance of payments. Depreciation of a currency may lower the earnings from exports hence may lead to unfavorable balance of payments lowering the GNP of a country.

2.4 Critique of the Past Studies

The related researches covered so far such as those of United Nations conference on Trade and Development, UNCTAD, have concentrated more on the general exports of a country, their determinants, and their contribution to economic growth. It is therefore important to examine performance of individual exports and their contributions to economic growth so as to be able to look in to specific policy

measures that can be adopted to enhance exports of a given commodity. This research will bridge this research gap by assessing the economic Determinants of tea exports performance in Kenya. And again a larger number of recent studies only placed their focus on effects of exchange rate volatility but other determinants of tea exports have not been researched on, and hence the need for this study. Arize (1995), Arize et al (2004).

2.5 Conceptual Framework

This section gives a summary on the relationship existing between the independent variable(s) and the dependent variable. The main variables believed to influence the performance of the tea export sub sector in Kenya are; foreign incomes from trading partners, price Variability on the international market, changes in real exchange rates and real interest rates. This has been summarized in the chart below.

Figure 2.1: Conceptual Framework

Independent Variables   **Dependent**

Variable

```
┌─────────────────────┐
│        Price        │
│                     │ ─────────┐
│ variability/volatility│          │
└─────────────────────┘          ↓
                              ┌──────────────────────┐
┌─────────────────────┐       │                      │
│                     │       │  Performance of the  │
│  Real interest Rates│ ────→ │                      │
│                     │       │  Tea export in Kenya │
└─────────────────────┘       │                      │
                              └──────────────────────┘
┌─────────────────────┐       ↑
│                     │ ──────┘
│   Foreign incomes   │
│                     │
└─────────────────────┘

┌─────────────────────┐
│ Real exchange rate  │ ─────┘
│                     │
│     volatility      │
└─────────────────────┘
```
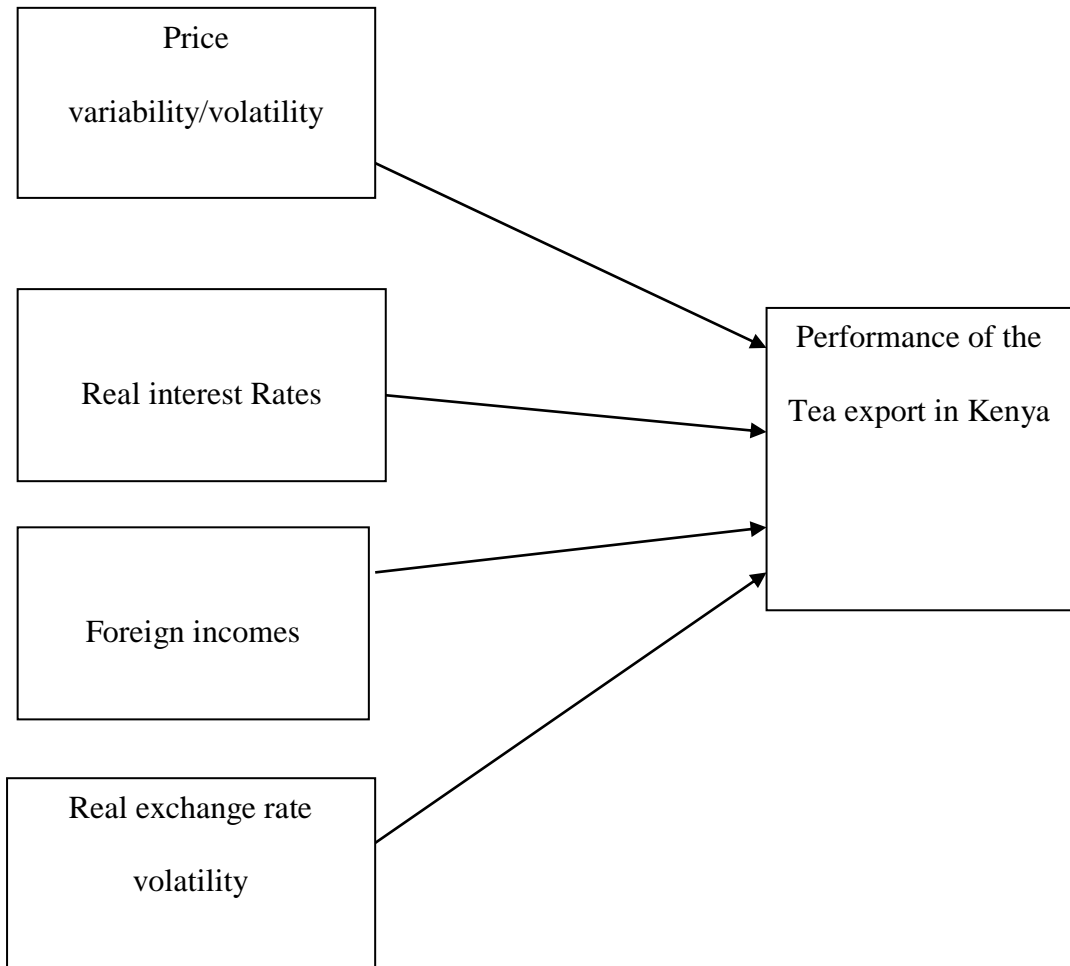
Source; Author 2020.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction.

The chapter discusses the research design, the research area, target population, sampling design, data analysis and model specification for the research. The chapter gives a blueprint for the collection and analysis of data.

3.1 Research Design

The study used explanatory research design to examine and explore descriptive characteristics of variables affecting the performance of tea exports in Kenya. In particular, the study sought to understand the effect of price instability, change in interest, trading partner's incomes, and rates of exchange rates on tea exports performance in Kenya. Time series data on tea exports was collected from the Kenya national bureau of statistics (KNBS), Foreign trade publications, the Central Bank of Kenya (CBK), the East African Tea Trade Association (EATTA) and the World Bank. Secondary data was used in the study as it is readily available hence saved on time used in data collection and analysis.

3.2 Target Population.

The study populations were majorly companies that deal in marketing and exportation of tea in Kenya at the Mombasa Tea Auction between 1985-2019. They include Export Processing Council, Kenya Tea Development Agency and East African Tea Trade Association. Mugenda and Mugenda (2003) describe population as the entire groups or individual, events or objects having common characteristics about which the researcher wants to make generalizations. Companies that market Tea include

Global Tea and Commodities ltd, James Finlay Mombasa, Unilever Kenya ltd and Lutex ltd.

3.3 Data Sources

Data on tea exports was collected from secondary recorded sources. The main sources were Kenya National Bureau of Statistics, Central Bank of Kenya, the EATTA, and the World Bank periodic publications.

3.4 Data analysis.

Johansen co-integration technique was applied to annual time series data for the period 1985-2019 to recognize the long run and short run behavior of variables in the study. Johansen test by Johannsen (1988) and Julius (1990). Vector Error Correction model was adopted in the study. Augmented Dicky-Fuller (1979) and Phillips Perron (1988) tests were used for stationarity tests.

3.5 Model specification.

To assess the relative impact of various factors on the performance of the tea export sector in Kenya, a multiplicative model was adopted. According to Mwongera. M, (2015), multiplicative model is a mathematical model in which the joint effect of two or more independent variables on a dependent variable is the product of their effects if they each, act alone.

This model was first used by Goldstein and Khan (1978) and has been used in other studies, for example Kiptui.M, (2008). This export demand framework depicts a long-run relationship between tea exports on one hand and foreign economic incomes, variability in prices, exchange rate volatilities and changes in interest rates on the other hand. The model readily accommodates percentage adjustments and easily calibrates non-linearity. Also, the dependent variables range is reduced since the

model is in a logarithmic format leading to equal weight given to each independent variable and thus reducing the effect of outliers.

In this study the model used took the form below;

$$Y_t = \alpha_0 R_t{}^{\alpha 1} X_t{}^{f\,\alpha 2} P_t{}^{\alpha 3} . I_t{}^{\alpha 4} . \lambda t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (3.1)}$$

Where; Y_t = Quantity of tea exports in tones in a given period of time t, $\alpha_{1\dots}\alpha_4$ = Regression coefficients, R_t = Real exchange rate over time t, $x_t{}^f$= per capita income from foreign trading partners over time t, P_t = Price variations over the time period of study t, I_t = Interest rate over time t and λ_t = Stochastic error term of disturbance,

So, introducing logarithms on both sides of the equation, we arrive at the following equation;

$$Ln(Y_t) = \alpha_0 + \alpha_1 \ln[(R]_t) + \alpha_2 \ln[(X]_t) + \alpha_3 \ln[(P]_t) + \alpha_4 \ln(I_t) + \lambda t \dots\dots\dots \text{ (3.2)}$$

The coefficients are the elasticity or the percentage change in dependent variable due to changes in the independent variables. Logarithms reduce the effect of outliers. Independent variables have been chosen based on theoretical aspects of economics and specifically in relation to international trade.

Explanations of the variables.

1. Real exchange rate.

2. Foreign income

3. Price variability

4. Real interest rate

Real exchange rate

This is the ratio of the price level abroad and the domestic price level, where the foreign price level is converted in to domestic currency units through the current nominal exchange rate.

$$R = E.P^*/P\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\ldots\ldots\ldots\ldots\ldots. (3.3)$$

Where E-----Nominal exchange rate, R-----Real exchange rate, P*---Foreign price level of tea importing countries, such as United States of America.

P---Domestic price level. A decrease in R is termed an appreciation of the real exchange rate; whereas an increase of R is depreciation. Real exchange rate tells us, how many times more or less goods and services can be purchased abroad (after conversion in to domestic currency) than in the domestic market for a given amount.

Nominal exchange rate is the number of units of the domestic currency that can purchase a unit of a given foreign currency. A decrease in this variable is called nominal appreciation of the currency. Under the fixed exchange rate regime a downward adjustment of its rate is called revaluation. An increase is called nominal depreciation of the currency. Under the fixed exchange rate regime, an upward adjustment of its rate is called devaluation. Real exchange rate should be monitored when assessing the effect of exchange rates on international trade or export competitiveness of a country. Real exchange rate is therefore a comparison of the relative prices of two countries consumption baskets.

Foreign income

This is the inflow /addition to Gross domestic product from the trading partners. Changes in disposable income of a trading partner can affect tea exports. A country may import more if its income rises. Increased foreign income may lead to more demand for exports. (Theodore Panagiotidis, 2017)

Price variability

This is also called price volatility. It is the instabilities in prices of commodities in the market. It includes fluctuations in prices. This may have a negative impact on growth

of production due to uncertainties created in the market. Uncertainties lower the additions to the stock of capital which hinders further production and growth, IMF, (2012). Primary commodity abundant countries re greatly affected by price instabilities of their produce. This leads to high volatility in the terms of trade, lowered foreign direct investment and a decreased rate of economic growth, Blattman et.al, (2007).

Real interest rate

Actual cost of credit to finance trade. Variability of interest rates on loans and savings over time is known to affect producers of commodities since they have an impact on borrowing costs and investment earnings, high interest rates on savings encourage more savings than investments. Potential investors shy away from borrowing due to high borrowing rates. This may reduce productivity of a country. High interest rates may be as a result of the monetary policy to discourage borrowing and control money in circulation (KTDA, 2019). Real interest rate was described by Fishers equation as equal to nominal interest less inflation rate.

3.5.1 Vector Error Correction Model (VECM)

If the variables under study are stationary and are co-integrated, it requires fitting, estimation, and interpretation of the vector error correction to investigate the magnitude of short- term and long-run relationship. The vector error correction model is one of examples of a short-term dynamic model usually used in modeling of economic and financial longitudinal focusing. They are normally expressed in first difference.

$$(\Delta y_t = y_t - y_{t-1})\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.. \quad (3.4)$$

In exception of the error correction term, can also be based on the autoregressive dynamic lag model (ARDL). The derivation can also be from ARDL model with addition of specific restriction.

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_{it} + \beta_3 x_{it-1} + v_t \dots \dots (3.5)$$

To produce the error correction model, first y_{t-1} term is subtracted from both sides of the ARDL equation:

$$y_t - y_{t-1} = \Delta y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_{it} + \beta_3 x_{it-1} - y_{t-1} + v_t \dots \dots (3.6)$$

Where, $i = 1$, 2, and 3 whereby, 1, 2, and 3 represent our dependent variables,

Then x is expressed in a first difference form. It involves addition and subtraction of $\beta_2 x_{it-1}$ from the righthand side of the equation 3.6.

$$\Delta y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_{it} - \beta_2 x_{it-1} + \beta_3 x_{it-1} - y_{t-1} + \beta_2 x_{it-1} + v_t \dots \dots (3.7)$$

Collecting terms gives:

$$\Delta y_t = \beta_0 + \beta_2 x_{it} + (\beta_1 - 1)y_{t-1} + (\beta_2 + \beta_3)x_{it-1} + v_t \dots \dots (3.8)$$

To produce the error correction model, there is an assumption that the coefficient of y_{t-1} is equal to less the coefficient of x_{it-1} . This implies that:

$$\beta_1 - 1 = -(\beta_2 + \beta_3) \dots \dots (3.9)$$

$$\beta_1 + \beta_2 + \beta_3 = 1$$

For an application of error correction (ECM) model to be justified, the total sum of the coefficient excluding the constant must be equal to sum to the one in the ARDL model. Usually, the ECM is written with τ as the coefficient on the error correction term. That is;

$$\Delta y_t = \beta_0 + \beta_2 \Delta x_{it} - \tau(y_{t-1} - x_{it-1}) + u_t \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (3.10)}$$

$$\tau = -(\beta_1 - 1) = (\beta_2 + \beta_3) \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3.11)}$$

The above ECM is the representation of the short-run relationship between dependent variable y and each of the independent variable x. The long-run relationship will be formed, it is assumed that the variables grow at a constant rate g instead of assuming all differenced terms equal 0, this gives:

$$g = \beta_0 + \beta_2 g - \tau(y^* - x^*) \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3.12)}$$

$$\tau(y^* - x^*) = \beta_0 + (\beta_2 - 1)g \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3.13)}$$

$$y^* = \frac{\beta_0 + (\beta_2 - 1)g}{\tau} + x^* \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3.14)}$$

If the original model is: $y_t^* = kx_t^*$ which in logs form is; $\log y_t^* = \log k + \log x_t^*$. Thus, anti logging the above long-run expression becomes:

$$k = \exp\left(\frac{\beta_0 + (\beta_2 - 1)g}{\tau}\right) \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3.15)}$$

The k term is interpreted as the long-run relationship between dependent variable y and some independent variable x. i.e. y in this study is the tea exports, while x represents tea prices volatility, interest rate, foreign income and exchange rates, k would be the average propensity to export tea.

3.6 Diagnostic Tests of Multivariate Linear Regression Assumptions

The multivariate linear assumptions tested in this study are normality, multicollinearity, autocorrelation and heteroskedasticity.

3.6.1 Normality Test.

Normality test is used to determine whether the data sets are normally distributed (Saunders *et al.,* 2007). Normality hold that the distribution of the test is bell- shaped with 0 (zero) mean, with 1 (one) standard deviation and thus produces a symmetric bell-shaped curve. It is assumed that the residuals of variables are normally distributed. The study used Skewness-Kurtosis test to determine whether the data is normally distributed or not.

3.6.2 Autocorrelation/ Serial Correlation Test

Autocorrelation sometimes referred as serial correlation is a term used in time series when the error term occurring at one period crosses over into another period. It occurs when the error term relating to any observation is influenced by the error term relating to any other observation. This study used Lagrangian Multiplier (LM) test. An error term is assumed to be independent of each other. This test is useful where there is a linear correlation between the error term for one observation and the next. This is more relevant to time series data where data is sequenced by time.

3.6.3 Multicollinearity Test

Multicollinearity occurs where there are high correlations between two or more independent variables. One variable can be used to predict the other. This causes redundant information skewing the results in a regression model. Multicollinearity is calculated by correlation coefficients for all independent variables. In this study, multicollinearity was examined using Variance Inflation Factors (VIF). For VIF values greater than 10, Multicollinearity is deemed to be present (Nachtscheim, 2004). The VIF are calculated as shown below. Variance Inflation Factors VIF= $1/1$-R^2, Where VIF= variance inflation factor, R^2= coefficient of determination, 1/VIF= tolerance.

3.6.4 Heteroskedasticity Test

The opposite of heteroscedasticity is homoscedasticity which indicates that the dependent variable variability is equal across values of independent variables (Schutzenmeister *et al.,* 2012). Heteroscedasticity takes place when the variance of the error term keeps changing for all the values of independent variables. The error term can vary from one observation to another meaning the variance of error term is dependent on the magnitude of the independent variables. Heteroscedasticity is minimized or eliminated by ensuring that data used in testing hypothesis is normal and accurately transformed. The study used VEC Residual Heteroskedasticity Tests to test this assumption.

CHAPTER FOUR

RESULTS, INTERPRETATION AND DISCUSSION

4.0 Overview

This section presents the results and discussion. Results entail descriptive and inferential statistics. Descriptive results include mean, variance, standard deviations, skewness, kurtosis and correlation analysis, while inferential statistics presented are the results for vector error correction model. Results were presented using tables and graphs. The stationarity property of the data was tested using two tests: Philip-Perron and Dickey Fuller test. Cointegration test was performed by estimating Johansen test. Since cointegration was present, vector error correction model was used to test the hypotheses of the study.

4.1 Summary Statistics

The study summarized the descriptive statistics in form of tables to describe the measures of central tendency such as mean, minimum, maximum, skewness, and kurtosis. Further, the study used graphical plots to observe the trending behaviors of the variables under investigation.

Table 4. 1: Summary Statistics

	T_EXP	T_PRICES	INTRATE	F_INCOME	EXR
Mean	323703.8	2020.840	8.529025	7.62E+08	107.0111
Median	312389.0	1908.400	8.635859	5.54E+08	76.05556
Maximum	502930.0	3209.500	21.09633	2.82E+09	113.411
Minimum	188070.0	841.8000	-8.009867	50914430	22.91477
Std. Dev.	93866.25	636.5913	7.046620	7.67E+08	193.1089
Skewness	0.318530	0.120339	-0.332672	1.312448	5.100615
Kurtosis	2.008836	2.049075	2.741174	3.954213	27.38075
Jarque-Bera	1.735315	1.202730	0.637093	9.750749	873.1075
Probability	0.419934	0.548063	0.727205	0.007632	0.000000
Observations	34	34	34	34	34

Source: Author, 2020

The results presented in table 4.1 are descriptive summary and it gives an understanding of the general overview of the data used. From the table 4.1 the average value of the total tea exports in Kenya for the entire period of the study has been reported to be 323703.8 tonnes. The minimum amount of exports experienced was 188070 with maximum 502930.0 tonnes. The value for skewness in exports was 0.32 and this positive value implies that majority of the exports has been distributed more above the means while kurtosis of 2.01 indicates that the peak of the distribution was quite below the standard normal value of 3 which indicates a normalized standard distribution. The figure 4.1 shows how tea has been performing in Kenya from 1985 to 2019.
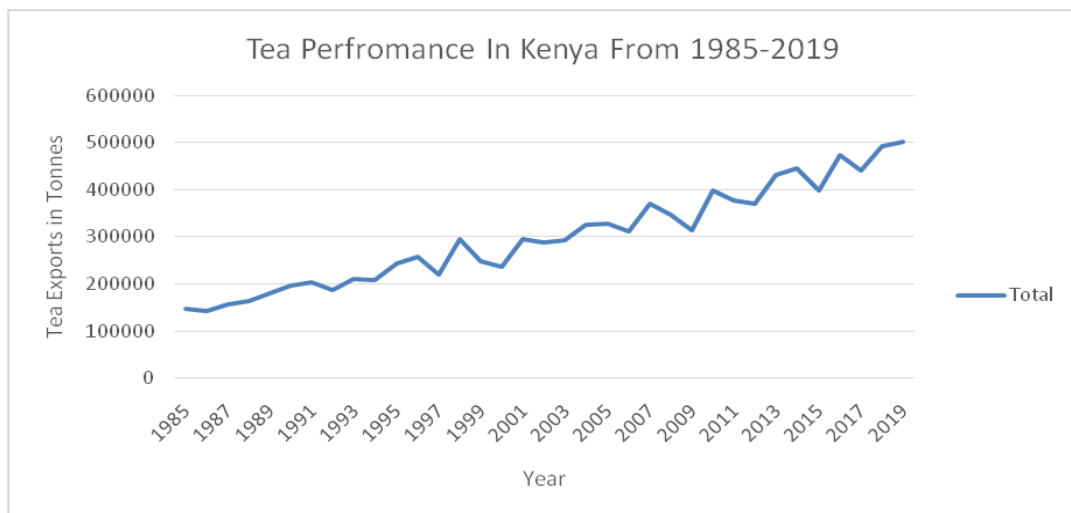
Figure 4.1: Tea Performance in Kenya from 1985-2019
Source: Author, 2020

The price variability of tea in terms of USD per tonne had a mean of 2020.84 with a maximum value of 3209.50 US dollars for every one tonne. The skewness and kurtosis were 0.12 and 2.05, respectively. The mean is approximately close to its maximum indicating that majority of the prices have been fair and had distributed

normally as   shown by Jarque Bera test (under the null hypothesis of normal distribution is accepted, p-value = 0.55 > 0.05).
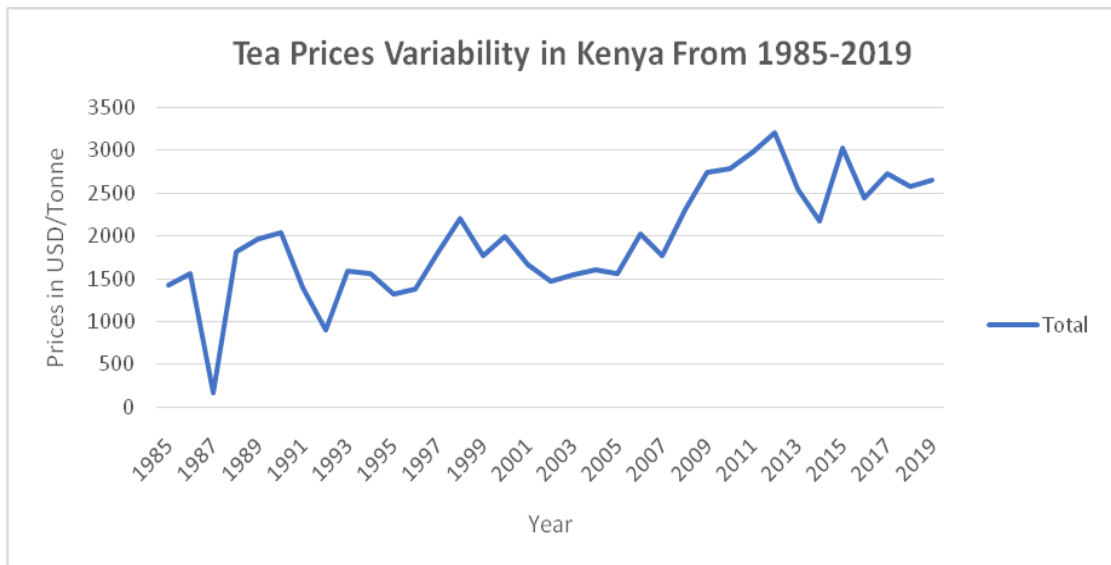
Figure 4. 2: Tea Prices Variability in Kenya from 1985-2019

Source: Author, 2020

Interest rate have been left skewed (negative skewness) and mean and maximum value of 8.53 and 21.10. The descriptive analysis further indicated that Kenya has been receiving good amount of money from foreign countries/Nations.
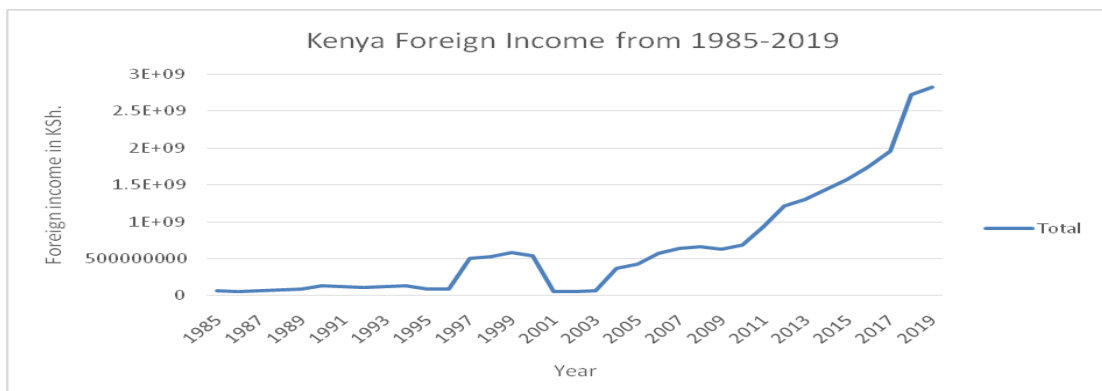
Figure 4.3: Kenya Foreign Income from 1985-2019
Source: Author, 2020

It is evident that throughout the entire period of study, Kenya has received approximate 762 million US Dollars with the least amount being USD 50.9 million and a maximum of USD 2.82 billion. This is an indication that Kenya has been performing better in the sector in terms of tea exports since there is an increasing trend in the amount of income earned from foreign Nations

Moreover, the exchange rate which is Kenya shilling against US Dollar had an average of 107 Kenyan shillings compared to 1 USD. The skewness of 5.10 and Kurtosis of 27.38 implies that Kenyan shilling has been weak against the dollar because the distribution behavior of the Kenyan currency which has non normal distribution.
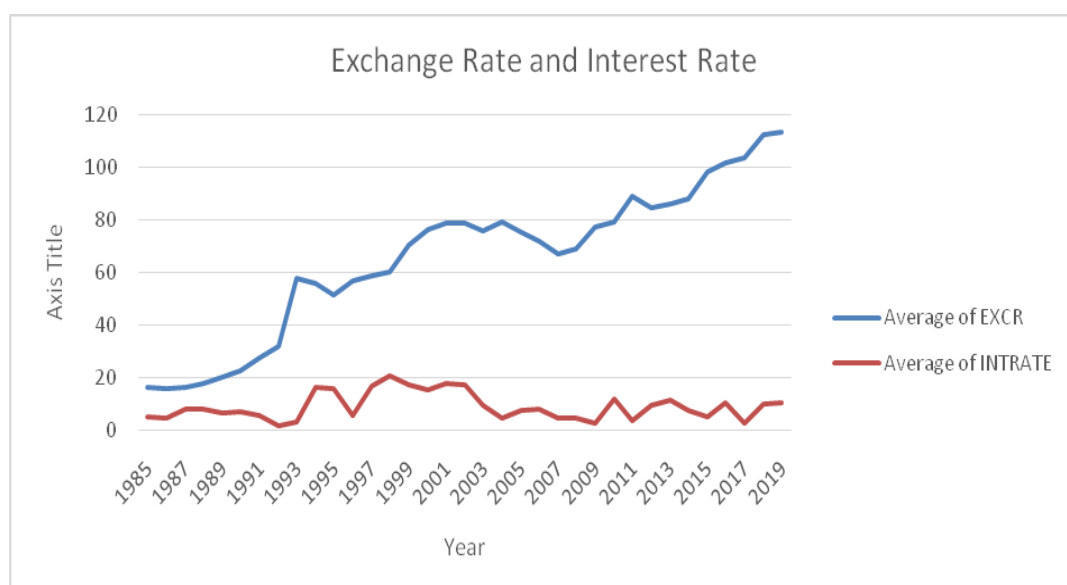
Figure 4. 4: Exchange Rate and Interest Rate from 1985-2019
Source: Author, 2020

4.2 Correlation Analysis

Correlation relationship between variables gives an understanding of the degree and the direction of causation. It determines how variables are related to one another, and the direction and strength of their associations. There are several ways in which one

can determine the correlation analysis such as using Pearson correlation coefficient, or by determining Spearman or Kendall correlation coefficients. This study estimated correlation using Pearson correlation (ρ). Correlation coefficient (ρ) ranges from -1 and +1. When the value for ρ is +1 then variables have perfect positive association, -1 implies perfect negative association. Values close to zero are said to be weak correlation otherwise strong correlation.

Table 4. 2: Results of Correlation Matrix

	TEXP	TPRICES	INTR	FINCOME	EXR
T_EXP	1.000				
T_PRICES	0.754*	1.000			
	(0.000)				
INTR	-0.077	-0.034	1.000		
	(0.685)	(0.851)			
F_INCOME	0.874*	0.710*	-0.030	1.000	
	(0.000)	(0.000)	(0.877)		
EXR	0.446*	0.268	0.063	0.576*	1.000
	(0.014)	(0.152)	(0.740)	(0.001)	

Source: Author, 2020

The results presented above shows a diagonal correlation matrix of coefficients (ρ) as shown in table 4.2. Tea exports performance and tea price volatility are positive and significant correlation. The coefficient of $\rho = 0.754$ is a strong positive indicating that performance of tea exports in Kenya over the period 1990 to 2019 have been determined by the prices in the market. Tea exports performance negatively correlated with the interest rates. Further, foreign income and exchange rates have shown to have a significantly and positive correlation to performance of tea. It is also observed that foreign income had a positive and significant correlation with tea prices and exchange rate with respective coefficient $\rho\,0.710$ and 0.576 respectively meaning an increase in foreign income led to an increase in the volume of tea exports in the country.

4.3 Tests for Stationarity

William Greene (2005) explained that time series data contains unit roots meaning that mean and variance of the data changes over time. Series containing unit root are differenced of any order until they attain this stationarity property. Stationarity or sometimes referred to as integration of a time series variable is an essential phenomenon in econometrics and statistics analysis because it influences the behavior

of the data (Ansari *et al,.*2011). This study tested this property using two conventional

tests, Augmented Dicky Fuller and Philip-Perron tests.

4.4.1 Augmented Dickey Fuller Test

The first test that used was the Augmented Dickey Fuller or ADF test, suggested by

Dickey & Fuller (1979). Its null hypothesis is that variables contain unit root against

the alternative hypothesis if the data are stationary.

Table 4.3: Augmented Dickey Fuller Test Results

			Number of Obs. = 35	
			New-West lags = 3	
Stationarity Test at Levels				
Variable	**Test statistic z(t)**	**5% Critical value**	**p-value**	**Remarks**
T_EXP	-0.673	-2.989	0.854	Non-Stationary
T_PRICES	-2.144	-2.989	0.227	Non-Stationary
INTR	-3.929	-2.989	0.002	Stationary
F_INCOME	2.078	-2.989	0.999	Non-Stationary
EXR	1.982	-2.989	0.999	Non-Stationary
Stationarity Test after First Difference				
T_EXP	-9.769	-2.992	0.000	Stationary
T_PRICES	-8.049	-2.992	0.000	Stationary
INTR	-7.908	-2.992	0.000	Stationary
F_INCOME	-4.090	-2.992	0.001	Stationary
EXR	-3.766	-2.992	0.011	Stationary

Note: Test uses Mackinnon z- statistics, z(t). The Augmented Dickey Fuller test critical values are as follows at levels -3.723 at 1%, -2.989 at 5% and -2.625 at 10%. At first difference, these critical values are -3.730 at 1%, -2.992 at 5% and -2.626 at 10%
Source: Research Data, 2020

The results of Augmented Dickey Fuller (ADF) depicted in table 4.3 showed that all

the study variables except interest rate had unit root. In other words not integrated at

levels (all p-values > 0.05 level of significance). The probabilities were less than 5

percent for z (t)-statistic probabilities and this prompted the null hypothesis, "changes

in interest rate had no significant effect on tea exports in Kenya" to be rejected and alternative hypotheses accepted. In conclusion, the data became stationary after first difference.

4.4.2 Phillips Perron Test

The second stationarity test used was Philips Perron test suggested by Phillips & Perron (1988). This test was carried out on the finite sample properties to improve and to accommodate more modelling framework (Greene, 2008 and Magee, 2008). In a situation where there is high degree of auto correction the Augmented Dickey Fuller test cannot be able to distinguish clearly between non-stationary and stationary series and is quite sensitive to breaks (Im and Lee, 2009). To overcome this limitation and to supplement the ADF test when the data used shows the presence of serial correlation amongst them and are also time dependent, the semi-parametric Phillips-Perron test, which gives robust estimates is used.

Table 4.4: Phillips Perron Test

			Number of Obs. = 35	
			New-West lags = 3	
Stationarity Test at Levels				
Variable	**Test statistic z(t)**	**5% Critical value**	**p-value**	**Remarks**
T_EXP	0.078	-2.989	0.965	Non-Stationary
T_PRICES	-2.043	-2.989	0.268	Non-Stationary
INTR	-3.990	-2.989	0.002	Stationary
F_INCOME	2.509	-2.989	0.999	Non-Stationary
EXR	2.548	-2.989	0.999	Non-Stationary
Stationarity Test after First Difference				
T_EXP	-13.801	-2.992	0.000	Stationary
T_PRICES	-8.303	-2.992	0.000	Stationary
INTR	-9.326	-2.992	0.000	Stationary
F_INCOME	-4.090	-2.992	0.001	Stationary
EXR	-3.719	-2.992	0.012	Stationary

Note: Test uses Mackinnon z- statistics, z(t). Philip Perron test critical values are as follows at levels -3.723 at 1%, -2.989 at 5% and -2.625 at 10%. At first difference, these critical values are -3.730 at 1%, -2.992 at 5% and -2.626 at 10%
Source: Research Data, 2020

The null hypothesis of the test is H0: All the data has unit root against alternative hypothesis that all the data are stationary. For the data to be stationary, the probabilities should be less than 0.05 critical value or the value of the z(t) should be greater than the absolute critical value at 5 percent. Results in table 4.4 indicates that interest rate was stationary at levels whereas tea exports, tea prices, foreign income and exchange rate all had unit roots at levels. This is because their probabilities are above 0.05 level of significance or the absolute value of z(t) statistic were less than critical value at 5 percent. It is also clear that all the data attained stationarity after first differences as shown in the lower part of the table and further concurs with the results of ADF test. The study was concluded by using the data at after differencing once.

4.5 Determination of Optimum Lags

It is always a necessity to determine the optimum number of lag lengths before VAR models. This is because using more lags consumes degrees of freedom and using very few lags introduces correlation and multicollinearity (Gujarati, 2013). Interpretations of the estimates are substantively influenced by different lag orders, especially when the differences are too large enough. Therefore, selection of the correct lag order for each VAR was the first and vital step in this study. These lag orders are selected by some pre-specified information criterion and are based on the construction of vector autoregressive estimates. To make decision on this, the following selection criteria were used as shown in table 4.5. Results indicates that optimum lags to be selected is one suggested by Final Prediction Error (FPE), Hannan-Quinn (HQIC) and Schwarz Information Criterion (SBIC) while Likelihood Ratio (LR) test and Akaike Information Criterion (AIC) suggests maximum of 4 lags as indicated by (*). Since

the suggestion by majority of selection criterion was one and in order to conserve the

degrees of freedoms, then one lag was selected.

Table 4.5: Determination of Optimum Lags

				Selection-Order Criteria				
Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-1496.39				8.0e+35	96.86	96.94	97.10
1	-1380.1	232.59	25	0.000	2.3e+33*	90.97	91.43*	92.36*
2	-1359.46	41.27	25	0.022	3.5e+33	91.26	92.09	93.80
3	-1325.83	67.27	25	0.000	2.9e+33	90.70	91.90	94.40
4	-1297.79	56.09*	25	0.000	6.0e+33	90.50*	92.09	95.36

*Indicates the suggested lag order selection criteria.
Source: Research Data, 2020

4.6 Johansen tests for Co-integration

According to Cameron and Trivedi (2005), there are two approaches used in cointegration test; trace statistic and maximum eigenvalues are normally used in determination of Johansen cointegration.

Table 4. 6: Co-integration Test Results using Johansen Tests

	Johansen tests for cointegration				
Maximum rank	Parameters	LL	Eigenvalues	Trace statistic	5% critical value
0	5	-1566.98	.	87.62	68.52
1	14	-1539.70	0.80	33.05*	47.21
2	21	-1531.36	0.39	16.38	29.68
3	26	-1525.87	0.28	5.41	15.41
4	29	-1524.07	0.10	1.81	3.76
5	30	-1523.17	0.05		

*Indicates the trace statistic at which maximum rank is chosen, LL-Log likelihood, Parms- Number of parameters. Lags = 1
Source: Research Data, 2020

Based on Johansen's maximum likelihood procedure, cointegration test results presented in table 4.6 indicates there is at most one cointegrating relationship as suggested by trace statistic (*) among the variables. This confirms long run relationship among the variables and prompts estimation of VEC model (the restricted VAR). Figure 4.5 shows graphical representation of the cointegrating relation.
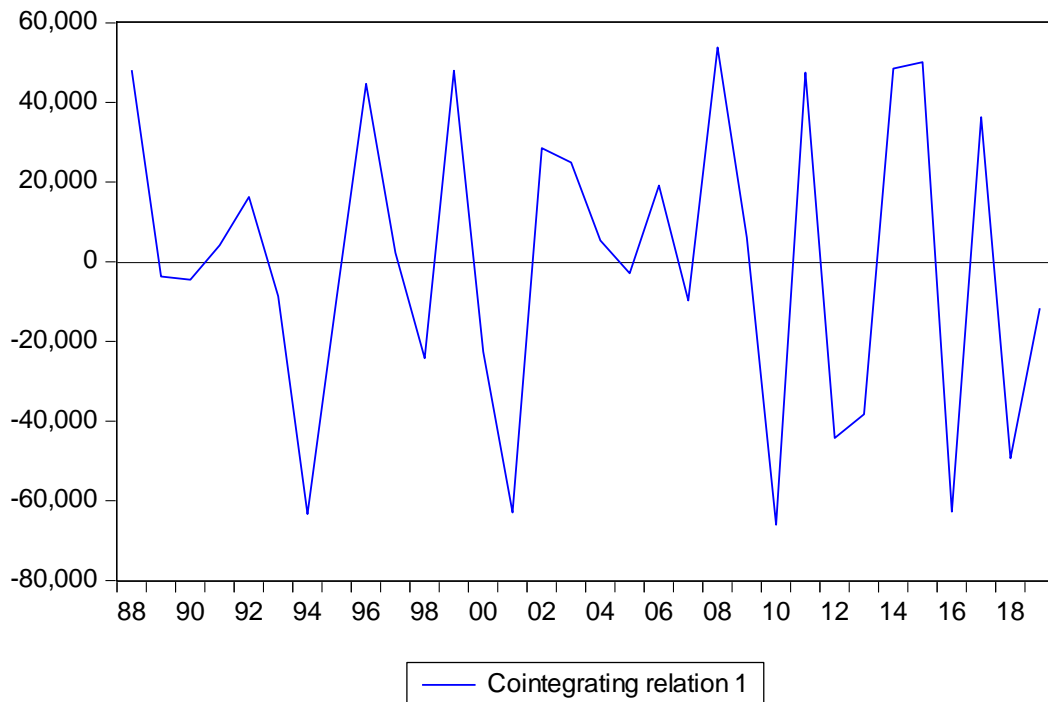
Figure4.5: Cointegrating Relation, Joint effect of the independent variable on tea exports

Source: Research Data, 2020

4.7 Testing the Multivariate Linear Regression Assumptions

The study tested the following multivariate linear regression assumptions before testing for hypotheses. This is to confirm that the data followed normal distribution, have no multicollinearity, no autocorrelation and the variance are homogeneous (no heteroscedasticity).

4.7.1 Normality Test

Normality test helps to determine how likely it is for a random variable underlying the data sets to be normally distributed. The study carried a Skewness-Kurtosis test. Skewness is a measure of symmetry of the probability distribution of a random variable about its mean. It represents the amount and the direction of skew while kurtosis represents the peak of the distribution. The null hypothesis residuals are multivariate normal. The results confirmed that the data followed a normal distribution since all the p-values for chi-square tests for both skewness and kurtosis on individual components are greater than 0.05, the threshold to accept the null hypothesis as presented by table 4.7 below.

Table 4. 7: VEC Residual Normality Tests

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Sample: 1985 2019

Component	Skewness	Chi-sq	df	Prob.
1	0.457626	1.116915	1	0.2906
2	-0.442457	1.044095	1	0.3069
3	0.842958	3.789747	1	0.0516
4	-0.052091	0.014472	1	0.9042
5	1.127826	6.783959	1	0.0902
Joint		12.74919	5	0.0258
Component	**Kurtosis**	**Chi-sq**	**df**	**Prob.**
1	3.071534	0.006823	1	0.9342
2	3.843858	0.949462	1	0.3299
3	4.306343	2.275376	1	0.1314
4	2.846335	0.031484	1	0.8592
5	5.326892	7.219238	1	0.0702
Joint		**10.48238**	**5**	**0.0627**

Source: Research Data, 2020

4.7.2 Autocorrelation/Serial Correlation Test

Autocorrelation also known as serial correlation is a term used in time series when the error term occurring at one period crosses over into another period. It may also occur when the error term relating to any observation is influenced by the error term relating to any other observation. The error term in the linear regression requires that successive values of the error term be sequentially independent (Mukras, 1993). This study used vector error Lagrangian Multiplier (LM) test to check for the presence of autocorrelation and results are as shown in table 4.8. The null hypothesis is no serial correlation at lag order. According to the results in table 4.8 for the two lags (1, 2), the probability test for LM in both lag 1 and lag 2 were greater than 0.05. This confirms that the null hypothesis is accepted and concluded that no serial correlation/autocorrelation meaning the error term relating to any observation is not influenced by the error term relating to any other observation.

Table 4. 8: VEC Residual Serial Correlation LM Tests

VEC Residual Serial Correlation LM Tests

Null Hypothesis: No serial correlation at lag order h

Sample: 1985-2019

Lags	LM-Stat	Prob
1	15.96860	0.9158
2	23.82718	0.5294

Source: Research Data, 2020

4.7.3 Multicollinearity Test

In this study, multicollinearity was examined using Variance Inflation Factors (VIF). For VIF values greater than 10, Multicollinearity is deemed to be present (Nachtscheim, 2004). The VIF are calculated as shown below. Variance Inflation

Factors VIF= $1/1\text{-}R^2$, Where VIF= variance inflation factor, R^2= coefficient of determination, 1/VIF= tolerance, The VIF values for multicollinearity tests are as shown in table 4.9 below showed that there was no Multicollinearity between the independent variables. This is because all the variables had a VIF values less than 10 (Nachtscheim, 2004).

Table 4. 9: VIF Results for Multicollinearity Test

Variable	Variance Inflation Factors (VIF)	Tolerance (1/VIF)
T_PRICE	1.02	0.9803
INTR	1.05	0.9507
F_INCOME	1.05	0.9522
EXCR	1.00	0.9996
Mean VIF	**1.03**	

Source: Research Data, 2020

4.7.4 Heteroscedasticity Test

Heteroscedasticity takes place when the variance of the error term keeps changing for all the values of independent variables. The error term can vary from one observation to another meaning the variance of error term is dependent on the magnitude of the independent variables. The unbiased character of the OLS estimator is not affected by the presence of heteroscedasticity though it renders it inefficient. This is because in small samples ordinary least squares estimator will not have the minimum variance among the class of unbiased estimators and in large samples is asymptotically inefficient.

This study used VEC Residual Heteroskedasticity Tests to check for the presence of heteroscedasticity (Gujarati, 2012). The result obtained is shown in table 4.10. Heteroscedasticity is checked by observing the Prob> chi-square value. From the table 4.10 it can be observed that the Prob > chi-square value is 0.5321>0.05 therefore

indicating that heteroscedasticity is absent hence the null hypothesis of variance of residuals are homoscedastic is accepted.

Table 4. 10: Heteroscedasticity Test

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Sample: 1985-2019

Joint test:

Chi-Square	Prob.
327.2700	0.5321

Source: Research Data, 2020

4.8 Vector Error Correction Model

According to results presented in table 4.11 below, the coefficient value of _ce1 was -0.8308523 and significant at 0.001. This confirms that a co-integrating relationship between the study variable was present during the study period, and Hussain (2009) argued that this implies that there was an error correction that gradually corrects the endogenous variables to a long run relationship through series of partial short run adjustments. It further indicates that any form of short-term fluctuations between the tea exports, price variability, interest rates, exchange rate and foreign income gave rise to a stable and a long run relationship. Therefore, this presence of long run relationship and partial adjustments prompt the use of Vector Error Correction Model (VECM) to test the hypotheses of the study. VECM also referred to as restricted VAR (it is restricted because of the lags selection due to presence of cointegration) is part of VAR where there is cointegration (Greene, 2008). The magnitude of the error term (-0.8309) coefficient indicates the speed of adjustment with which the variables converge overtime and its reciprocal (1/-0.8309 =1.20) shows it takes approximate 1

year 2 months these partial adjustments take to come back to equilibrium (Lutkepohl, 2005; Hamilton, 1994; Floyd, 2005 and Tsay, 2010).

Results presented by table 4.11 are for the short run relationship. It shows that interest rate $(\beta = 0.008, p = 0.000)$ and exchange rate $(\beta = -0.007, p = 0.020)$ significantly affects the tea exports on a short run while foreign income and price variability did not. In the long run relationship as shown in table 4.12 both the interest rate $(\beta = 0.015, p = 0.000)$, exchange rate $(\beta = -0.013, p = 0.000)$ and price variability $(\beta = -0.176\ p = 0.016)$ showed to influence tea exports in Kenya over the study period. The root means square error (RMSE) is small (0.0819) meaning the model is fit for the data used. RMSE serves to aggregate the magnitudes of the standard errors in predictions for various times into a single measure of predictive power. RMSE is a measure of accuracy in comparing the forecasting errors of different models for a dataset and not between datasets. The value for R square is 0.7224 meaning that the variation of interest rate, foreign income, exchange rate, and price variability explained 72.24 percent effects on the tea exports in Kenya.

Table 4. 11: Short Run Relationship

Equation	Parms	RMSE	R-Square	Chi2	p>chi2
D. T_EXP	7	0.0819	0.7224	14194	0.0960
	Coef.	Std. Error	z	p>|z|	
_ce1	-0.8309	0.2424	-3.43	0.001	
T_EXP	-0.1146	0.2141	-0.54	0.593	
T_PRICES	-0.1260	0.1182	-1.07	0.286	
INTR	0.0086	0.0022	3.91	0.000	
F_INCOME	0.0058	0.0281	0.21	0.836	
EXCR	-0.0072	0.0031	-2.32	0.020	
CONSTANT	0.1018	0.0225	4.53	0.000	

Source: Research Data, 2020

Table 4. 12: Long Run Relationship under Johansen Normalization Restriction Imposed

Beta	Coef.	Std. Error	z	p>|z|
_ce1				
T_EXP	1	.	.	.
T_PRICES	-0.1763	0.0732	-2.41	0.016
INTR	-0.0148	0.0016	-9.51	0.000
F_INCOME	0.0003	0.0161	0.02	0.983
EXCR	-0.0126	0.0010	-13.04	0.000
CONSTANT	-10.4692	.	.	.

Source: Research Data, 2020

4.8.1 Test of Hypothesis, Interpretation and Discussion

The relationship between independent variables and the dependent variable can be illustrated by one cointegrating relationship as shown below.

$$T_{EXP} = -10.469 - 0.1763_{Price}\text{Variability} - 0.0148_{Interest}\text{rate} + 0.0003_{Foreign}\text{Income} - 0.0126_{Exchange}\text{Rate}$$

Hypothesis $H01$: Price variability has no significant effect on tea exports performance in Kenya.

The first hypothesis $(H01)$ stated that price variability has no significant effect on tea exports performance in Kenya. Results from long run relationship in table 4.12, tea prices variability negatively $(\beta = -0.1763$) and significantly $(p = 0.016$) affected tea exports in Kenya from the period 1985 to 2019. This means that the H01 was therefore rejected. This can be articulated that a price creates uncertainties to tea farmers and thus discourages farmers to produce which consequently affects the total exports. Random price variability adversely affects the welfare of consumers and producers of tea. According to Zheng et al. (2008) and Apergis and Rezitis (2011)

prices variability (low prices) reduces welfare of both consumers and producers by exposing them to uncertainties and risks. Price variability when becomes low, creates uncertainty at farm level and variability in profit margins and thus lessens the incentive to invest. The effects are more pronounced in developing countries where opportunities for hedging against price risks are non-existent (Chepng'eno, 2018). Tea dependent households and economies are vulnerable to price volatility. Tea producers face dynamic and confusing price signals. Price movements can be viewed simply as indications of a well-functioning market, but even if there are no market distortions, tea producers may not respond in the short term to the price movements. Although, farmers of other crops face similar situations, tea producers face greater constraints on their ability to adjust production levels than farmers who grow annual crops and do so in an environment with no hedging options, unlike farmers in developed countries.

Kenyan farmers have no influence on prices levels even through deliberate reduction in supply. Price variability in the world tea prices have a secondary effect along the tea value chains that implicitly affect tea producers. Tea buyers may require large margins to minimize exposure to risk and thus reduces farmers' margin further. Tea production decisions are made well in advance of product sales, and there generally exists an uncertainty about the price that would be received for products when sold in the market at a future date (OECD, 2009). Stable prices and by extension incomes are critical for planning reasons and that is why many governments in developing countries intervened in pricing of agricultural commodities prior to adoption of market and economic reforms in general. According to FAO (2014) also acknowledges the role that tea production and export play in food security by covering food import bills in tea producing countries. FAO (2014) further noted that, tea export earnings paid for 51% of Kenya's food import bills confirming that there is

need for careful monitoring and analysis of international tea trade by policy makers concerned with food security, trade and rural development in Kenya.

Hypothesis $H02$: **Change in real interest rates has no significant effect on tea exports performance in Kenya**

The second hypothesis of the study stated that change in real interest rate has no significant effects on tea exports performance in Kenya. As per the results presented by table 4.12 above clearly shows that interest rate negatively influences the tea exports in Kenya by a magnitude of -0.0148 and significance level of probability of 0.000 which is in tandem with economic theory. This implies that a one percent increase in interest rate causes 0.0148 decreases in tea exports, *ceteris paribus*. This can be explained by the fact that an increase in interest rate causes an increase in the cost of borrowing and reduction in disposable incomes of the consumers, reducing confidence of borrowers and thus limiting investment expenditure.

Increasing interest rate implies also that, or causes a rise in inflation which depresses tea exports. When commercial bank and other lending institutions increase their interest rate, there is an increase in the cost of borrowing which discourages business owners from borrowing to finance their activities. This will eventually lead to decrease in aggregate demand and thereby leading to a low aggregate productivity in tea industry and hence decreases tea exports. The negative relationship can also be explained by the fact that tea industry in Kenya is capital intensive and hence increase in interest rate will impact negatively on the level of exports. The findings agree with previous findings of (Meme, 2015).

Hypothesis $H03$: Foreign income has no significant effect on tea exports performance in Kenya

The third objective was hypothesized as foreign income from tea importing countries has no significant effect on tea exports performance in Kenya. This hypothesis was tested, and results found no sufficient evidence that foreign income overt the entire period 1985-2019 did not affect the tea export. In conclusion, the hypothesis failed to be rejected. The research did not find any other finding on the effect of foreign income earnings on tea exports of a country.

Hypothesis $H04$: Real exchange rate fluctuations have no significant effect on tea exports performance in Kenya

The fourth hypothesis $H04$ stated that real exchange rate fluctuations have no significant effect on tea exports performance in Kenya. According to the findings of the study, exchange rate fluctuations in Kenya from the year 1985 to 2019 negatively affected tea exports. The evidence is as shown in table 4.12 that the magnitude of this effect was -0.0126 and probability 0.000. From the results, it can be argued that higher exchange rates lead to higher cost for risk-averse traders and to less foreign trade. This is since exchange rate is agreed on at the time of the trade contract, but payment is not made until the future delivery takes place. If changes in exchange rates become unpredictable, it will create uncertainties about the profits to be made and, hence, reduces the benefits of international trade (Ozturk, 2006). Further, exchange rate risk for all country is generally not hedged because forward markets are not accessible to all traders. Even if hedging in the forward markets were possible, there are limitations and costs. For example, the size of the contracts is generally large, the maturity is relatively short, and it is difficult to plan the magnitude and timing of all international transactions to take advantage of the forward markets.

Excess exchange rate volatility reduces the level of economic growth by creating uncertainty about the profits and unemployment. Exchange rate is also known to restrict the flow of international capital by reducing both the financial portfolio investment and direct investment in foreign operating facilities. Finally, increased exchange rate fluctuations may lead to higher prices of internationally traded goods by causing traders to add a risk premium to cover unanticipated exchange rate fluctuations (McKinnon and Ohno, 1997).

Chege (2014) opined that the impact of exchange rate is unpredictable on fares and can be clarified by two schools of thought as traditional and risk portfolio paradigms. The traditional school speculations that higher exchange rate unpredictability builds hazard and therefore hoses exchange while the risk portfolio school holds that higher risks presents more noteworthy open doors for benefit and would subsequently advance exchange. As indicated by the traditional school of thought, the instability of profits would bring about the hazard disinclined and hazard unbiased makers reallocating assets from the high hazard outside business sectors to the lower chance residential advertises successfully bringing down global exchange Ozturk (2011).

Kenya during the fixed exchange rate regime in 1970s like many developing countries had to devalue its currency in attempt to reduce the negative effects of real exchange rate volatility on the economy. The adoption of a floating exchange rate system in 1993 marked the climax of efforts to make the real exchange rate more aligned to the market determined equilibrium and this tried to eliminate exchange rate volatility. Large volatilities in nominal exchange rates have since characterized Kenya financial market (Kiptoo 2007). The shift from a fixed to a flexible exchange rate regime has been one that many developing countries in recent years have been adopting.

According to Were (2001), exchange rate regimes determine the ability of an economy to effectively respond and adjust to exogenous shocks. In developed countries the shift in exchange rate regimes occurred in the 1970's after the collapse of the Bretton Woods System which had been in existence since the end of World War II

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter presents the summary of study findings, conclusions from the findings based on the study objectives and recommendations. In the last part of this chapter, suggestions for further research and limitations of the study studies are also discussed.

5.1 Summary of Findings

The study aimed at determining the factors that affect tea exports in Kenya for the period 1985-2019. These selected factors are, tea prices variability, interest rate, foreign income and exchange rate. The study utilized secondary data sourced from World Bank, Kenya national bureau of statistics, Central bank of Kenya and the East African Tea Trade Association. The study checked for the stationarity of the data using ADF and Philip-Perron test and found that under ADF test, all the variables except interest rate had unit root at levels but became stationary after first difference. Like ADF test, Philip-Perron test confirmed the same results. The optimum number of lags selected was one as suggested by different information criterion such as Final Prediction Error (FPE), Hannan-Quinn (HQIC) and Schwarz Information Criterion (SBIC).

The selected model employed in testing the hypotheses was VECM. This is because there was presence of long run relationship between the selected independent variables in question and the tea exports. This is after evaluation of Johansen's test of cointegrating relationship. From the results, the average quantity of the total tea exports in Kenya for the entire period of the study has been reported to be 323703.8 tons. The minimum amount of exports experienced was 188070 with maximum

502930.0 tons. The value for skewness in exports was 0.32 and this positive value implies that majority of the exports has been distributed more above the means while kurtosis of 2.01 indicates that the peak of the distribution was quite below the standard normal value of 3 which indicates a normalized standard distribution.

The prices of tea variability per ton had a mean of 2020.84 with a maximum value of 3209.50 US dollars. Interest rate have been left skewed (negative skewness) and mean and maximum value of 8.53 and 21.10. The descriptive analysis further indicated that Kenya has been receiving good amount of money from foreign tea importing countries. It is evident that throughout the entire period of study, Kenya has received approximate 762 million US Dollars with the least amount being USD 50.9 million and a maximum of USD 2.82 billion. An indication that Kenya has been performing better in the sector in terms of tea exports. Further, after evaluation of VECM, tea price variability, interest rates and exchange rates negatively and significantly affected tea exports in Kenya while foreign exchange did not have any influence on tea export performance.

5.2 Conclusion

Based on the findings and in the long run relationship, three variables prices variability, interest rates and exchange rates volatility were statistically significant in determining the performance of Kenyan tea exports over the period 1985-2019. The study further concluded that exchange rate, tea prices variability and interest reduce performance of Kenya's tea exports in the long run. This implies these variables have become a serious problem for the Kenyan tea sector. Price variability was significant in both the short run and in the long run relationship and can be concluded that prices variabilities creates uncertainties to tea farmers and thus discourages farmers to produce which consequently affects the total exports. Varying prices creates market

distortions and tea producers may not respond in the short term to the price movements.

Increasing interest rate causes an increase in the cost of borrowing and reduction in disposable incomes of the consumers, reduces confidence of borrowers and thus limits consumer spending. The significance of exchange rate risk variable suggests that it has significant negative long run effect on tea exports. If changes in exchange rates become unpredictable, it creates uncertainties about the profits to be made and, hence, reduces the benefits of international trade. Further, exchange rate risk for all country is generally not hedged because forward markets are not accessible to all traders.

In general, Kenyan tea exports adjust towards long run equilibrium path after a shock or partial adjustments caused by uncertainties such as prices, interest rates and volatilities in exchange rate. This implies that strategies that can help tea exporters cope in the short run should be put in place since Kenyan tea exports go back to long run equilibrium after partial adjustments that take at least 1 year and 2 months.

5.3 Recommendations

Considering the evaluation of the factors determining the performance of tea exports in Kenya, the study made the following recommendations.

i. That policy makers should be able to forecast the likely impact of price volatility on each tea importing country and make policies that will improve demand for Kenyan tea in the world market by providing pricing incentives that will encourage tea famers hence increase the performance of exports.

ii. It is vital for policy makers to factor in the existence and degree of exchange rate volatility that causes uncertainties when implementing policies for Kenya's tea export demand.

iii.   The central bank of Kenya should influence the interest rate through monetary policy instruments such as regulating foreign reserves and money supply. Changes in real interest rates lead to changes in spending on durable goods, which are a component of aggregate expenditures. Influencing interest rates lead to influence in exchange rates, which in turn lead to changes in net exports of tea in Kenya.

5.4 Suggestion for Further Studies

1. Since the study did not cover all the macroeconomic variables that determine tea exports performance in Kenya. The study suggests a further future researcher to consider money supply, credit facilities, foreign direct investments, and inflation.

2. Future researcher should consider other models such as autoregressive distributed lag and generalized method of moments and GARCH models that captures variable heterogeneity.

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APPENDIX I: VECTOR ERROR CORRECTION RESULTS

```
vec  lexp intrate lfin2 excr lprcs

cointegrating

Vector error-correction model

Sample: 1993 - 2016                         No. of obs    =       24

                                            AIC           =  12.99195

Log likelihood = -116.9034                  HQIC          =  13.49983

Det(Sigma_ml) =  .0117086                    SBIC          =  14.90629


Equation          Parms    RMSE     R-sq     chi2     P>chi2
-------------------------------------------------------------

D_lexp              7     .081903   0.7224   44.23229   0.0000

D_intrate           7     6.74741   0.6066   26.21458   0.0005

D_lfin2             7     .746972   0.2274   5.002608   0.6596

D_excr              7     5.77108   0.5430   20.20091   0.0052

D_lprcs             7     .185411   0.4166   12.14194   0.0960

-------------------------------------------------------------


-------------------------------------------------------------------------
            |   Coef.   Std. Err.     z    P>|z|    [95% Conf.Interval]
------------+------------------------------------------------------------
D_lexp      |

      _ce1  |

      L1.   |  -.8308523  .2424433   -3.43  0.001   -1.306033  -.3556721

      lexp  |

      LD.   |  -.1145605  .2140688   -0.54  0.593   -.5341276   .3050066

    intrate |

      LD.   |   -.008608  .0021988   -3.91  0.000   -0142985   -.0129176

     lfin2  |

      LD.   |   .0058174  .0280812    0.21  0.836   -.0492207   .0608556

      excr  |
```

```
       LD. |  -.0072463   .0031263    -2.32   0.020   -.0133737   -.0011189
     lprcs |
       LD. |  -.1260427   .1182034    -1.07   0.286   -.3577171    .1056318
     _cons |   .1017734   .0224753     4.53   0.000    .0577225    .1458243
-------------+----------------------------------------------------------------
D_intrate   |
       _ce1 |
        L1. |  -37.55812   19.97324    -1.88   0.060   -76.70494    1.588704
      lexp |
       LD. |   11.22346   17.63565     0.64   0.525   -23.34178     45.7887
    intrate |
       LD. |  -.1761939   .1811439    -0.97   0.331   -.5312294    .1788416
     lfin2 |
       LD. |   1.572998   2.313415     0.68   0.497   -2.961213    6.107209
      excr |
       LD. |   .2403458   .2575526     0.93   0.351    -.264448    .7451396
     lprcs |
       LD. |   2.656382   9.737966     0.27   0.785   -16.42968    21.74244
     _cons |   .6776849   1.851589     0.37   0.714   -2.951363    4.306733
-------------+----------------------------------------------------------------
D_lfin2     |
       _ce1 |
        L1. |   1.603569    2.21114     0.73   0.468   -2.730186    5.937323
      lexp |
       LD. |   .4325148   1.952357     0.22   0.825   -3.394035    4.259065
    intrate |
       LD. |  -.0384745   .0200536    -1.92   0.055   -.0777787    .0008298
     lfin2 |
       LD. |    .125773    .256107     0.49   0.623   -.3761875    .6277334
      excr |
       LD. |  -.0044168   .0285124    -0.15   0.877   -.0603001    .0514665
     lprcs |
```

```
       LD. |   .5702182   1.078043      0.53   0.597   -1.542707    2.683143

     _cons |   .0141796   .2049804      0.07   0.945   -.3875746    .4159339
------------+------------------------------------------------------------------
D_excr      |
       _ce1 |
       L1.  |   48.75213   17.08319      2.85   0.004    15.26969    82.23458
       lexp |
       LD.  |  -31.03455   15.08385     -2.06   0.040   -60.59835   -1.470749
     intrate |
       LD.  |   -.189392   .1549332     -1.22   0.222   -.4930554    .1142715
      lfin2 |
       LD.  |  -1.359578   1.978674     -0.69   0.492   -5.237708    2.518553
       excr |
       LD.  |   .4432723   .2202859      2.01   0.044     .01152    .8750246
      lprcs |
       LD.  |    .011999   8.328924      0.00   0.999   -16.31239    16.33639
     _cons |   .5233568   1.583672      0.33   0.741   -2.580583    3.627297
------------+------------------------------------------------------------------
D_lprcs     |
       _ce1 |
       L1.  |   .8836312    .548841      1.61   0.107   -.1920773     1.95934
       lexp |
       LD.  |  -.7757047   .4846069     -1.60   0.109   -1.725517    .1741075
     intrate |
       LD.  |  -.0057066   .0049776     -1.15   0.252   -.0154626    .0040493
      lfin2 |
       LD.  |   .0489883   .0635699      0.77   0.441   -.0756065    .1735831
       excr |
       LD.  |   .0099867   .0070772      1.41   0.158   -.0038844    .0238579
      lprcs |
       LD.  |  -.2730844   .2675878     -1.02   0.307   -.7975469    .2513781
     _cons |  -.0005125   .0508795     -0.01   0.992   -.1002345    .0992094
```

```
--------------------------------------------------------------------------

Cointegrating equations


Equation             Parms    chi2     P>chi2

-------------------------------------------

ce1                    4     754.984   0.0000

-------------------------------------------



Identification:  beta is exactly identified


                 Johansen normalization restriction imposed
--------------------------------------------------------------------------

      beta |    Coef.   Std. Err.     z     P>|z|    [95% Conf.
Interval]

-------------+------------------------------------------------------------

ce1         |

      lexp |        1         .      .      .         .           .

   intrate | -.0147963   .0015557   -9.51  0.000    .0117472    .0178455

     lfin2 |  .0003343   .0161435    0.02  0.983   -.0313063     .031975

      excr |  -.012604   .0009668  -13.04  0.000    -.014499   -.0107091

     lprcs | -.1763411    .073282   -2.41  0.016   -.3199711   -.0327111

     _cons | -10.46918         .      .      .         .           .
```

APPENDIX II: PHILIP PERRON RESULTS AT LEVELS

```
. pperron intrate

Phillips-Perron test for unit     root        Number of obs   =        29
        Newey-West lags =          3


         ---------- Interpolated Dickey-Fuller ---------
Test                1% Critical        5% Critical       10% Critical
Statistic           Value              Value             Value

Z(rho)        -22.412    -17.472         -12.628         -10.280
Z(t)           -3.990     -3.723          -2.989          -2.625

MacKinnon approximate p-value    for Z(t) = 0.0015


. pperron  finc2

Phillips-Perron test for unit     root        Number of obs   =        29
        Newey-West lags =          3


         ---------- Interpolated Dickey-Fuller ---------
         Test        1% Critical        5% Critical       10% Critical
         Statistic   Value              Value             Value

Z(rho)         3.472    -17.472         -12.628          -10.280
Z(t)           2.509    -3.723          -2.989           -2.625

MacKinnon approximate p-value    for Z(t) = 0.9991


. pperron   excr

Phillips-Perron test for unit     root        Number of obs   =        29
        Newey-West lags =          3


         ---------- Interpolated Dickey-Fuller ---------
Test  1% Critical        5% Critical       10% Critical
Statistic    Value              Value             Value

Z(rho)       114.330    -17.472         -12.628          -10.280
Z(t)           2.548    -3.723          -2.989           -2.625

MacKinnon approximate p-value    for Z(t) = 0.9991


. pperron    texp

Phillips-Perron test for unit     root        Number of obs   =        29
        Newey-West lags =          3


         ---------- Interpolated Dickey-Fuller ---------
Test  1% Critical        5% Critical       10% Critical
Statistic    Value              Value             Value

Z(rho)         0.053    -17.472         -12.628          -10.280
Z(t)           0.078    -3.723          -2.989           -2.625

MacKinnon approximate p-value    for Z(t) = 0.9645
```

```
. pperron     tprices

Phillips-Perron test for unit     root          Number of obs   =     29
        Newey-West lags =          3


        ----------- Interpolated Dickey-Fuller ---------
Test   1% Critical        5% Critical       10% Critical
Statistic     Value              Value              Value


Z(rho)          -5.765    -17.472             -12.628             -10.280
Z(t)            -2.043    -3.723              -2.989              -2.625


MacKinnon approximate p-value    for Z(t) = 0.2679
```

APPENDIX III: PHILIP-PERRON UNITROOT TESTS AT FIRST DIFFERENCE

```
. pperron   dintr


Phillips-Perron test for unit root              Number of obs   =       28
                                                Newey-West lags =        3


                            ---------- Interpolated Dickey-Fuller -------
                  Test          1% Critical      5% Critical    10% Critical
                Statistic          Value            Value          Value
------------------------------------------------------------------------------
 Z(rho)         -34.047          -17.404          -12.596          -
10.260
 Z(t)            -9.326           -3.730           -2.992          -
2.626
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000


. pperron   dfinc


Phillips-Perron test for unit root              Number of obs   =       28
                                                Newey-West lags =        3


                            ---------- Interpolated Dickey-Fuller -------
                  Test          1% Critical      5% Critical    10% Critical
                Statistic          Value            Value           Value
------------------------------------------------------------------------------
 Z(rho)         -21.774          -17.404          -12.596        -10.260
 Z(t)            -4.090           -3.730           -2.992         -2.626
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0010


. pperron   dexr


Phillips-Perron test for unit root              Number of obs   =       28
                                                Newey-West lags =        3


                            ---------- Interpolated Dickey-Fuller -------
                  Test          1% Critical      5% Critical    10% Critical
                Statistic          Value            Value           Value
------------------------------------------------------------------------------
 Z(rho)         425.309          -17.404          -12.596        -10.260
 Z(t)             2.719           -3.730           -2.992         -2.626
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9991
```

```
. pperron    dexp
```

Phillips-Perron test for unit root   Number of obs   =   28
                                                  Newey-West lags =   3

```
                          ---------- Interpolated Dickey-Fuller -------
              Test        1% Critical    5% Critical    10% Critical
            Statistic        Value          Value          Value
-----------------------------------------------------------------------------
 Z(rho)      -38.077        -17.404        -12.596        -10.260
 Z(t)        -13.801         -3.730         -2.992         -2.626
-----------------------------------------------------------------------------
```
MacKinnon approximate p-value for Z(t) = 0.0000

```
. pperron    dpric
```

Phillips-Perron test for unit root   Number of obs   =   28
                                                  Newey-West lags =   3

```
                          ---------- Interpolated Dickey-Fuller -------
              Test        1% Critical    5% Critical    10% Critical
            Statistic        Value          Value          Value
-----------------------------------------------------------------------------
 Z(rho)      -37.696        -17.404        -12.596        -10.260
 Z(t)         -8.303         -3.730         -2.992         -2.626
-----------------------------------------------------------------------------
```
MacKinnon approximate p-value for Z(t) = 0.0000

APPENDIX IV: ADF UNIROOT TEST AT LEVELS

```
. dfuller intrate

Dickey-Fuller test for unit root                  Number of obs   =         29

                         ---------- Interpolated Dickey-Fuller ---------
               Test        1% Critical       5% Critical      10% Critical
             Statistic         Value             Value             Value
------------------------------------------------------------------------------
 Z(t)          -3.929           -3.723            -2.989            -2.625
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0018

. dfuller   finc2

Dickey-Fuller test for unit root                  Number of obs   =       29

                         --------- Interpolated Dickey-Fuller ---------
               Test        1% Critical       5% Critical      10% Critical
             Statistic         Value             Value             Value
------------------------------------------------------------------------------
 Z(t)           2.078           -3.723            -2.989            -2.625
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9988

. dfuller   excr

Dickey-Fuller test for unit root                  Number of obs   =         29

                         ---------- Interpolated Dickey-Fuller ---------
               Test        1% Critical       5% Critical      10% Critical
             Statistic         Value             Value             Value
------------------------------------------------------------------------------
 Z(t)           1.982           -3.723            -2.989                -
2.625
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.9986

. dfuller    texp

Dickey-Fuller test for unit root                  Number of obs   =         29

                         ---------- Interpolated Dickey-Fuller ----------
               Test        1% Critical       5% Critical      10% Critical
             Statistic         Value             Value             Value
------------------------------------------------------------------------------
 Z(t)          -0.673           -3.723            -2.989            -2.625
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.8536

. dfuller    tprices

Dickey-Fuller test for unit root                  Number of obs   =         29

                         ---------- Interpolated Dickey-Fuller -------
               Test        1% Critical       5% Critical      10% Critical
             Statistic         Value             Value             Value
------------------------------------------------------------------------------
 Z(t)          -2.144           -3.723            -2.989            -2.625
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.2273
```

APPENDIX 1: ADF UNITROOT TEST AT FIRST DIFFERENCE

```
. dfuller      dintr

Dickey-Fuller test for unit root      Number of obs   =          28
--------- Interpolated Dickey-Fuller --  Test
                    1% Critical   5% Critical    10% Critical
 Statistic          Value         Value          Value
------------------------------------------------------------------------
 Z(t)              -7.908        -3.730             -2.992
 .626
```

MacKinnon approximate p-value for Z(t) = 0.0000

```
. dfuller      dfinc

Dickey-Fuller test for unit root              Number of obs   =        28

                          ---------- Interpolated Dickey-Fuller ---------
                 Test        1% Critical      5% Critical      10% Critical
              Statistic        Value            Value            Value
------------------------------------------------------------------------
 Z(t)          -4.090          -3.730           -2.992           -2.626
------------------------------------------------------------------------
```

MacKinnon approximate p-value for Z(t) = 0.0010

```
. dfuller      dexr

Dickey-Fuller test for unit root              Number of obs   =      28

                          ---------- Interpolated Dickey-Fuller -------
                 Test        1% Critical      5% Critical     10% Critical
              Statistic        Value            Value            Value
------------------------------------------------------------------------
 Z(t)           0.766          -3.730           -2.992          -2.626
------------------------------------------------------------------------
```

MacKinnon approximate p-value for Z(t) = 0.9911

```
. dfuller      dexp

Dickey-Fuller test for unit root              Number of obs   =     28

                          ---------- Interpolated Dickey-Fuller ---------
                 Test        1% Critical      5% Critical     10% Critical
              Statistic        Value            Value            Value
------------------------------------------------------------------------
 Z(t)          -9.769          -3.730           -2.992          -2.626
------------------------------------------------------------------------
```

MacKinnon approximate p-value for Z(t) = 0.0000

```
. dfuller      dpric

Dickey-Fuller test for unit root              Number of obs   =     28

                          ---------- Interpolated Dickey-Fuller -------
                 Test        1% Critical      5% Critical     10% Critical
              Statistic        Value            Value            Value
------------------------------------------------------------------------
 Z(t)          -8.049          -3.730           -2.992          -2.626
------------------------------------------------------------------------
```

MacKinnon approximate p-value for Z(t) = 0.0000