DETERMINANTS OF NON-TRADITIONAL AGRICULTURAL EXPORTS GROWTH IN ZAMBIA: A CASE OF COTTON AND TOBACCO

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DECLARATION AND APPROVAL

DECLARATION

This thesis is my original work and has not been submitted in this or any other university for the award of any degree.

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APPROVAL

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To my late mum Grace Namweemba Mboozi and my brother Webbyster Siandula

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ABSTRACT

Exports are a vital component of a nation's balance of payments as they are source of foreign exchange and economic growth. Much of the economic growth in Zambia has been driven by copper exports, which have suffered from external shocks such as plummeting prices on the world market. It is against this background that the Government of the Republic of Zambia (GRZ) has devised a number of measures to promote export diversification to non-traditional exports with a view to reducing heavy dependency on copper and stabilise foreign exchange earnings. The non-traditional exports have recorded growth averaging about 30 percent during the period. However, the key determinants of the growth of the non-traditional exports are unknown. This study therefore endeavored to determine factors that affect the growth of two major non-traditional exports in Zambia; Cotton and Tobacco. The study employed annual time series data that spans a period of 34 years from 1980 to 2013. The Auto-Regressive Distributed Lagged (ARDL) model approach to co-integration revealed that cotton and tobacco exports are co-integrated with foreign direct investment, real effective exchange rate, real Gross Domestic Product (GDP) of trade partners, real interest rate and world price. The ARDL analysis revealed that cotton exports are affected by the real interest rate, real effective exchange rate, world price and the real income of the trading partner in the short-run. In the long-run, cotton exports are affected by real interest rate, real effective exchange rate and real GDP. Tobacco exports are significantly affected by real effective exchange rate, real income of the trading partner and foreign direct investment in the short-run while only real effective exchange rate and the real income of the trading partner affect the growth of tobacco exports in the long-run. Granger causality tests revealed that cotton and tobacco exports granger cause agricultural share of GDP. Overall, both exports are highly elastic to exchange rate movements and the importer's GDP. There is need for government to maintain a stable exchange rate and exploit available markets through increased participation in regional integration.

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LIST OF ABBREVIATIONS AND ACRONYMS

CSO	Central Statistical Office
EBZ	Export Board of Zambia
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FNDP	Fifth National Development Plan
GDP	Gross Domestic Product
IAPRI	Indaba Agricultural Policy Research Institute
MFEZs	Multi Facility Economic Zones
NTE	Non-Traditional Export
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
REER	Real Effective Exchange Rate
SADC	Southern Africa Development Community
TAZ	Tobacco Association of Zambia
TBZ	Tobacco Board of Zambia
VECM	Vector Error Correction Model
ZDA	Zambia Development Agency
ZEGA	Zambia Export Growers Association
ZNFU	Zambia National Farmers Union

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Exports are an important component of national income determination. Ideally, the higher is the level of exports relative to imports, the higher will be the level of national income. The importance of a nation's exports cannot be overemphasized. An increase in a country's exports of goods and services can reduce unemployment problems, improve the balance of payments, increase foreign exchange earnings and subsequently reduce heavy external borrowing. An increase in exports is a conduit through which a country can foster economic growth. Therefore, developing this sector can eradicate the high poverty levels being faced by developing countries like Zambia (Were *et al*., 2002).

Like most African countries, Zambia's economy was heavily controlled by the state after independence. The country pursued an import substitution strategy aimed at creating a manufacturing base that would encourage production of goods locally and discourage imports. The import substitution strategy was supported by earnings from copper exports whose prices were skyrocketing. To this effect, the Zambian government after independence in 1964 imposed exorbitant import tariffs that were as high as 150 percent. In addition, the import substitution strategy also led to a highly protective exchange rate regime (fixed exchange rate system). The overvalued Kwacha during this period had negative repercussions on other sectors of the economy such as agriculture as they reduced earnings realized by farmers from export of agricultural cash crops (World Bank, 1984). The agriculture sector was also taxed through low and unfavorable producer prices of maize offered to farmers.

Inefficient policies such as subsidies were pursued mainly to increase production of maize while producers of other agricultural crops were heavily taxed. Furthermore, the rural areas, where the maize was produced were largely isolated in terms of infrastructural development while earnings from copper were used for infrastructural development in urban areas. The agricultural sector was just seen as way of satisfying the food needs of the ever-increasing urban population. However, the country recorded moderate growth during this period, largely due to favorable copper prices on the international market. The rate of growth of Gross Domestic Product (GDP) averaged 3.4 percent during this period (Bonnick, 1997).

The plummeting copper prices in 1974 due to external oil shocks led to the state driven import substitution strategy to become impracticable, infeasible and unsustainable. The country's heavy reliance on a mono export commodity was exposed. Government could not

raise its much-needed revenue to finance its developmental projects hence resorting to external borrowing that had a negative impact on the balance of payments. The country experienced an upsurge in total external debt from US$1 billion in 1973 to US$ 3 billion in 1983 (Bonnick, 1997).

However, with a change in government in 1991, the economy was liberalized and the country reversed some of the negative growth experienced over the previous two decades. In stark contrast to the negative growth of GDP prior to liberalization, the GDP growth averaged 2.5 percent between 1991 and 1995 (Hill, 2004). There has been a reversal in trade policy since then with a view to diversifying the economy away from copper. Reforms have included liberalization of the country's external sector through abolishment of controls on both imports and exports. Non-tariff barriers have been removed while tariff barriers have been lowered to allow exporters access to inputs at world prices. Other incentives on the export side have included removal of export taxes. A duty-draw back system has been put in place where exporters are refunded the tariffs imposed on inputs used in export production (Ndulo, 2004).

The country has been active in regional integration by being a member of the Common Market for Eastern and Southern Africa (COMESA) and Southern Africa Development Community (SADC) and other ad hoc trade arrangements hence expanding its market base for its exports. SADC has been the largest bloc in terms of trade of non- traditional exports accounting for 35 percent of total trade while COMESA has accounted for about 3 percent of the total trade in non-traditional exports, the majority of which are exported to South Africa (ZDA, 2013).

The trade policy is succinctly outlined in the policy framework papers and the country's five-year development plans (GRZ, 1994). The development plans have identified establishment of Multi-Facility Economic Zones (MFEZs) through the Zambia Development Agency (ZDA) in conjunction with the Private Sector Development Programme (PSDP) (FNDP, 2006). The Multi-Facility Economic Zones (MFEZs) are industrial zones with well-developed infrastructure put in place to attract world-class enterprises in order to facilitate domestic and international trade. The zones include numerous incentives such as zero percent taxes on profits made within five years of operation, taxation of only 50 percent of profits between 6 to 8 years of operation and 75 percent between 9 and 10 years. Other incentives include: no taxes on dividends for five years from the period of first declaration of dividends and no import tariffs on all inputs such as raw materials, machinery be it motor vehicles as long as they are meant for use in the MFEZs (MCTI, 2015). The export development strategy as outlined in the Sixth National Development Plan (SNDP) has been aimed at removal of supply-

side constraints in the production of non-traditional exports and promoting non-traditional exports through attracting Foreign Direct Investment (FDI) into non-mining sectors (SNDP, 2014).

The liberalization of the economy has coincided with the growth of non-traditional exports (mostly agricultural output) such as cotton lint, cotton yarn, sugar, flowers, vegetables, tobacco and other non-agricultural products such as electrical energy, lime, gemstones and copper wire (CSO, 2015). Earnings from non- traditional exports have increased albeit their share of total exports earnings declining during some periods. For most rural households who grow export crops, Non-Traditional Exports (NTEs) are becoming an important source of income and employment. However, there has been lack of value addition to the non-traditional exports with the majority of them exported in raw form (FNDP, 2006).

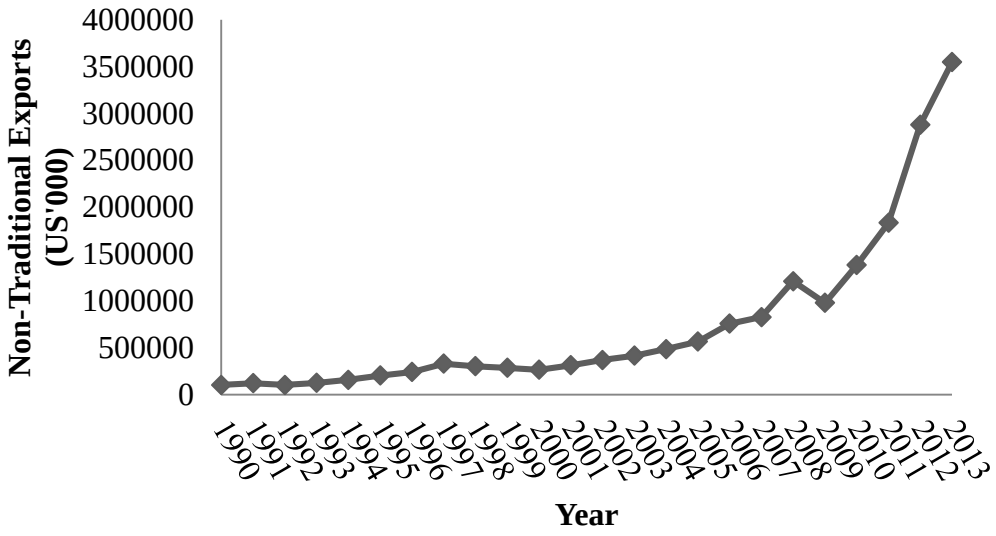

Figure 1: Trends in Non-Traditional Exports in Zambia.

Source: Author's own computation based on data obtained from EBZ, UNCTAD and ZDA (2014)

Figure 1 indicates that the value of non-traditional exports have increased from about 102 million United States Dollars in 1990 to about 3 billion United States Dollars in 2013. However, despite the increase in the trade of non-traditional exports, the composition of the export sector has not changed much with the growth in exports still largely driven by copper. Copper accounts for over 70 percent of total exports (SNDP, 2014). Occasional decline in copper prices have impacted negatively on economic growth.

1.2 Statement of the Problem

Macroeconomic policies of the Zambian government have been aimed at diversifying the economy through promotion of non-traditional exports. Despite recording significant growth, especially after 2009 (see figure 1), the key factors influencing the growth of NTEs are not known with certainty. It is therefore, against this background that this study was carried out to determine the main factors that promote growth of NTEs in Zambia to suggest policies deemed necessary to strengthen the factors and ensure sustained growth of NTEs and economic growth in general.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study was to contribute to export diversification by studying determinants of tobacco and cotton exports growth in Zambia over the period 1980 to 2013.

1.3.2 Specific Objectives

The specific objectives of this study were:

i. To evaluate the developmental trajectory of tobacco and cotton exports in Zambia over the last thirty-four years.
ii. To determine demand and supply factors that affect growth of tobacco and cotton exports.
iii. To determine if there is any causality between tobacco or cotton exports and agricultural share of GDP.

1.4 Research Question

i. There has been no growth in cotton and tobacco exports over the last thirty-four years.
ii. Demand and supply factors do not affect growth of tobacco and cotton exports.
iii. There is no causality between tobacco or cotton exports and agricultural share of GDP.

1.5 Justification of the Study

The Zambian government policy is to reduce dependence on copper exports through diversifying to agriculture. The findings of this study are crucial in informing the government the necessary steps to be undertaken to boost cotton and tobacco exports and subsequently economic growth. Knowledge on determinants of cotton and tobacco exports has ramifications

on farmers' welfare. Since the two non-traditional exports are labour intensive, expansion of the sectors would entail increased income for the more than 500,000 farmers growing the crops. Furthermore, boosting the two sectors would lead to employment creation and subsequently lift the many farmers out of the poverty trap. The study also broadens the understanding of factors that affect growth of other non-traditional exports.

1.6 Scope and Limitation of the Study

This study looks at determinants of the growth of tobacco and cotton exports between 1980 and 2014 using annual time series data. The study used data for the stated period due to lack of data in the period before 1980. For this study, only two out of the several agricultural export crops were considered; tobacco and cotton. This is because they are the leading and major agricultural export commodities in Zambia in terms of volume and total revenue. Other agricultural exports were not selected because they are also grown for domestic consumption while tobacco and cotton are grown largely for export purposes. The study was limited by non-availability of data on some variables such as infrastructural development indicators, domestic consumption of cotton and domestic producer prices that could have been useful in giving a broader picture of the determinants of tobacco and cotton exports growth in Zambia.

1.7 Definition of terms

Causality-A concept that shows the relationship between two or more variables as well as the direction of relationship that exists between those variables.

Demand factors- External factors that influence a country's ability to export goods and services. They are factors that the exporting country has no control over. The exporting country takes them as given.

Growth -Simply the percentage increase in the volume of the exports of cotton and tobacco.

Liberalization- Removal of tariff and non-tariff barriers on the trade sector of the economy.

Non-Traditional Exports- Non-traditional exports are defined as exports other than copper and cobalt. In this study, non-traditional exports referred to the volume of cotton and tobacco exports.

Supply factors- Internal or domestic factors that influence the export of goods and services. The exporting country has control over these factors and can manipulate them in order to enhance the export of goods and services that it produces.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews studies that have been conducted in the area of growth of exports and their theoretical underpinnings. The next two sections give an overview of the cotton and tobacco sectors in Zambia. The subsequent section reviews some empirical work on some of the factors that affect exports, positively or negatively. The chapter concludes by examining the theoretical backbone behind the growth of exports.

2.2 Agricultural Exports in Zambia

Zambia potential to expand its agricultural exports is immense given that it is endowed with the vast amount of resources. Of the 48 million hectares available for cultivation, only 1.5 million hectares is cultivated annually. Zambia is also richly endowed with labour and water. The country has 40 percent of Southern African waters that the country can exploit to expand agricultural production through irrigation. Using a Policy Analysis Matrix (PAM), Saasa (2000) found that Zambia has a comparative advantage in 156 out of 161 crops with only 30 percent having a Domestic Resource Cost coefficient (DRC) above 0.5. Table 1 presents selected crops and their respective comparative advantage/disadvantage as reflected by the DRCs.

Table 1: Comparative advantage of Zambia's agricultural crops

Crop	DRC
Maize	< 1
Wheat	< 1
Sorghum	< 1
Rice	>1
Sunflower	< 1
Cotton	< 1
Tobacco	< 1
Coffee	< 1

Source: Saasa, 2000.

With Zambia having comparative advantage in the production of most agricultural commodities, the agriculture sector is increasingly contributing to the growth of the economy

and accounts for about 20 percent of GDP. In terms of exports, the agriculture sector contributes about 10 percent of foreign exchange earnings (ZDA, 2011). The major agricultural export crops are maize, cotton, tobacco and sugar although maize exports have been subject to non-tariff barriers such as export bans especially when the country has produced insufficient volumes. Other agricultural exports comprise: wheat, coffee, tea, sugar, cut flowers and vegetables.

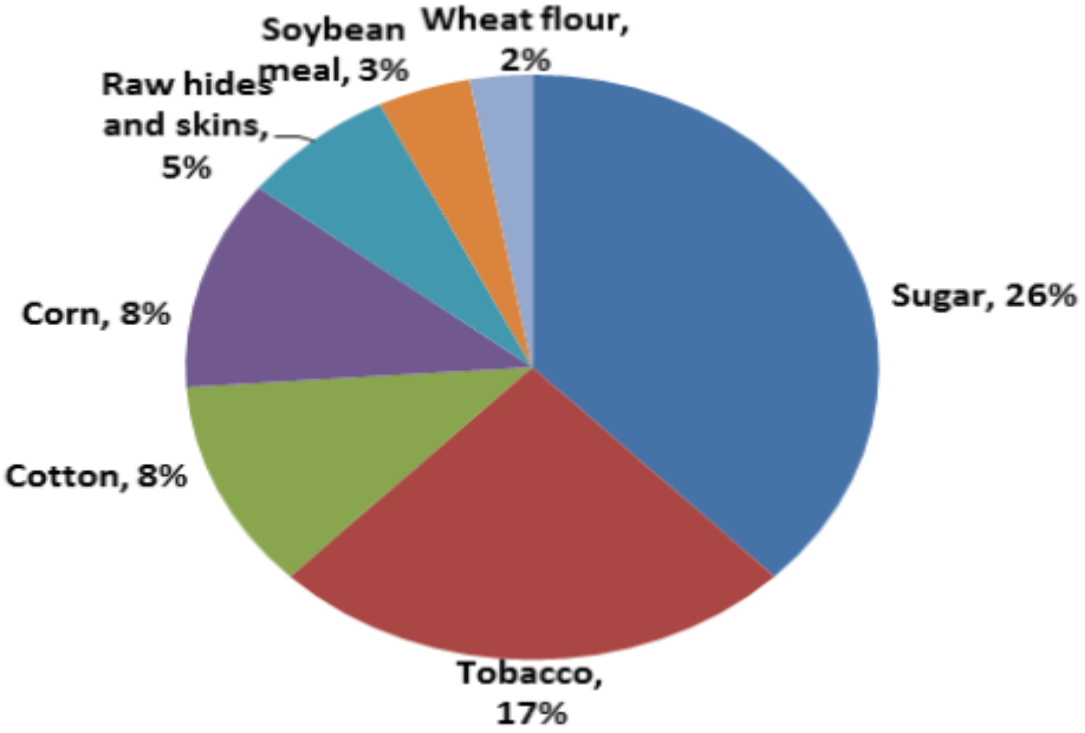

Figure 2: Composition of Non-traditional exports, 2014.

Source: USDA, 2014

The strategic location of Zambia gives it a huge advantage in terms of access to markets for its agricultural exports. It is borders 8 countries and is a member of both COMESA and SADC. Furthermore, Zambia has ad hoc trade arrangements such as Everything But Arms (EBA) and African Growth Opportunities Act (AGOA) which increases its market base for its agricultural exports to the Asia and the United States of America. However, Zambia exports limited volumes of agricultural exports to the European Union due to tariff escalations hence most of the exports are exported in raw form (ZDA, 2011). Figure 3 presents major export destinations of Zambia's non-traditional exports.

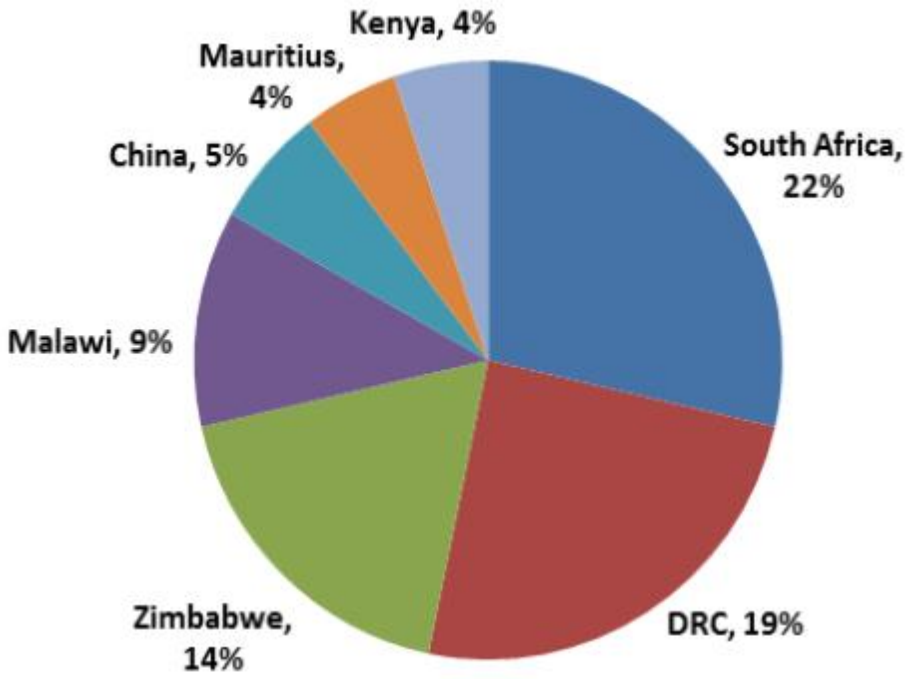

Figure 3: Major export destinations for agricultural exports.

Source: USDA, 2014.

2.3 Overview of the Cotton Sector in Zambia

Cotton is grown in agro-ecological zones I and II (refer to appendix B for description of Zambian agro-ecological zones) which constitutes mostly Lusaka, Central, Eastern and Southern Provinces. Eastern Province contributes a lion's share of the total output accounting for over 70 percent of national output (Keyser, 2007). Cotton production is dominated by small-scale farmers who are contracted to ginning companies (ACI and Agridev Consult, 2008). Two companies remain dominate the Zambian cotton sector namely; Dunavant and Cargill, and have accounted for more than 80 percent of the total market share (Tschirley and Kabwe, 2010). In terms of export volumes, Zambia is in the top 30 of the largest cotton exporters and is second in Southern Africa after Zimbabwe. The major destinations of Zambia's cotton exports include South Africa and Mauritius (ZDA, 2011). Exchange rate movements have significantly affected growth of cotton exports. In years when the Kwacha has depreciated, the country has recorded a growth in cotton exports while reduction in the volume of exports has been witnessed in years when the Kwacha appreciated.

2.4 Overview of the Tobacco sector

Like Cotton, Tobacco is grown under out grower schemes mostly comprising small-scale farmers. Small-scale farmers make up about 75 percent while large-scale farmers

comprise 25 percent of total tobacco production. Tobacco is mainly produced in Central, Eastern and Southern Provinces of Zambia. Two types of tobacco are produced in Zambia; Virginia and Burley with annual production averaging 27000 metric tons; 15000 metric tons and 12000 metric tons, respectively. Small and medium scale farmers account for larger proportion of the total production of burley tobacco while the main producers of Virginia tobacco are the large-scale farmers. Zambia is ranked among the top 10 largest exporters of tobacco in the world. The majority of the tobacco exports are in raw form. The Tobacco Association of Zambia (TAZ) is responsible for storing, grading, trading, and managing other logistics for farmers (ZDA, 2011).

2.5 Empirical Review

Determinants of export performance have received widespread attention from policy makers and researchers around the world because of the role that exports play in the growth of many economies. There is a vast amount of literature on determinants of export performance. Studies that have been done on determinants of export performance have differed on their approach in terms of variables used or their methods of analysis. This section will therefore review some of the studies that have been conducted on determinants of export performance.

2.5.1 Supply side factors and Export Performance

Studies have unanimously found that Gross Domestic Product impacts positively on exports growth. Using a gravity model approach, Eita (2009) investigated factors that determine exports of Namibia. The analysis indicated that increases in importer's GDP and Namibia's GDP cause exports to increase, while distance and importer's GDP per capita are associated with a decrease in exports. Namibia's GDP per capita did not have an impact on exports. Allaro (2010) analyzed export performance of oilseeds and its determinants in Ethiopia using time series data from 1974 to 2009. In order to evaluate the determinants of oil seed in Ethiopia, the study adopted variables used in previous studies (Mesieke *et al*., 2008; Babatunde, 2009; Abolagba *et al*., 2010; Folawewo and Olakojo, 2010), amongst others. The findings revealed that the main drivers of export growth of oil seeds in Ethiopia were the real GDP of Ethiopia and the nominal exchange rate.

Idisardi (2010) employed a gravity model to study the determinants of agricultural exports in South Africa and found that the country's GDP had a positive and significant impact on agricultural exports of South Africa. Helga (2005) on the other hand found that the GDP of the exporting country does not affect its exports in the case of Iceland. Leite (2008) also found no evidence that the GDP of Colombia affects it exports. On the contrary, Hatab (2010) applied

to examine factors that affect growth of Egyptian agricultural exports found that the GDP per capita significantly and negatively affected the volume of its exports and concluded that this may be due to the increase in consumption and demand of the domestically produced goods thereby leaving only a small amount available for export purposes. However, Egyptian exports were highly responsive to changes in its GDP. An increase in the GDP of Egypt by 1 percent increased its exports by 5.42 percent. Tien (2009) also found that Vietnam's GDP growth rate positively affected the growth of its exports although the coefficient of GDP was less than unit implying that exports were inelastic with respect to GDP.

In a study to analyze the determinants of agricultural exports in Nigeria, particularly on cocoa and rubber, Abolagba *et al*. (2010) used Ordinary Least Squares regression (OLS) to analyze determinants of Nigeria's two agricultural exports; cocoa and rubber during the period 1970 to 2005. The findings revealed that for both crops, the main determinants of export growth were domestic or supply side factors. For rubber exports, he found that domestic output of rubber, interest rate, domestic producer price and domestic consumption were important determinants of rubber exports in Nigeria. On the demand side, the real exchange rate was found to have a significant impact on export volumes of rubber. For cocoa, only supply side factors such as domestic consumption and rainfall were found to have a positive effect on export volumes. On the other hand, Folawewo and Olakojo (2010) investigated determinants of Nigeria's agricultural exports using co-integration approach and found that domestic agricultural output was the most important factor that affected growth of agricultural exports. They also found that agricultural exports were significantly affected by the world price and the real income of the trading partners. Another study in Nigeria by Yusuf (2007) examined determinants of selected agricultural exports such as cocoa, rubber and palm-kernel post liberalization using co-integration and error correction approaches. The results revealed that export growth is dominated and significantly affected by supply side factors such as previous domestic price, Nigeria's GDP, relative prices and exports in the previous period. Demand side factors such as exchange rate were only found to significant for rubber exports.

Majeed and Ahmad (2006) examined the internal determinants of export performance using annual panel data covering the period 1970 to 2004 for 75 countries. They found that export performance can be explained by factors such as official development assistance, indirect taxes, national savings and total labor force. On the contrary, foreign direct investment was found not to have a significant impact on export volumes.

In an effort to investigate factors that determine the export performance of Ethiopia, Anagaw and Demissie (2012) used econometric model such as the Johansen co-integration and

error correction approaches for the period 1970-2011. The findings of the study revealed that in the short-run, the growth of Ethiopia's exports could only be explained by openness of the current year. However, in the long-run, factors such as openness, private credit as a ratio of Gross Domestic Product (a proxy for financial development) significantly affected Ethiopia's exports. Real Gross Domestic Product of Ethiopia and infrastructural development were found to have a significant and positive effect on the export volumes. On the demand side, the real Gross Domestic Product of the trading partner and the real effective exchange rate were found to have a positive effect on Ethiopia's exports. Ethiopia's exports were more elastic to its real GDP (1.7) while they were found to be inelastic with respect to the rest of the other variables.

Teweldemedhin and Mbai (2013) used the extended gravity model that included variables such as the Gross Domestic Product of Namibia, the Gross Domestic Product per capita of Namibia, distance, exchange rates and dummy variables if the trading partner belonged to any regional organization. The focus of the study was to identify alternative markets for fresh beef, goat and sheep exports of Namibia. His findings revealed that Gross Domestic Product per capita was found to be positively related and significant in Southern and West Africa for fresh beef. Fresh beef was found significant in all cases while goat and sheep meat was only significant in East Africa. In Asian markets, per capita income was found to be significant and highly elastic, making these markets attractive export destinations. Suresh and Neeraj (2014) applied the augmented gravity model to panel data covering the period 1992 to 2012 to analyze determinants of India's manufactured exports to two sets of countries; developing (southern) and developed (northern). They found that GDP, difference in per capita income and GDP similarity were significant and positively affected India's exports for both sets of countries. On the other hand, India's exports to the developing countries were negatively affected by distance.

2.5.2 Demand Side Factors and Export Performance

The Gross Domestic Product of the importing country has also been employed by a number of studies to ascertain if it influences export performance. Tura (2002) examined the factors that affect growth of exports within the demand framework in which the GDP of the importing countries was weighted by subtracting prices of the exports and the quantity of exports of the importing country. His findings revealed that both factors did not influence exports in the short-run although the real income of the importing countries did affect growth of the exports in the long-run. Shane (2008) examined factors that affected growth of

agricultural exports of the United States of America (USA) for the period 1970 to 2006 and employed a similar approach used by Tura (2002) although the weighted real GDP was found by only subtracting exports of the importing country and did not include the relative prices as well. The findings revealed that the real GDP of the importing country was the most important factor that affected the growth of agricultural exports of the USA. A one percent increase in the real income of the importing country led to an increase in the volume of USA agricultural exports by 0.75 percent implying that USA exports are inelastic with respect to the trading partner's income. He therefore concluded that the real income of the importing country is the most important factor that affects a country's exports. On the other hand, he found a negative and significant relationship between the real exchange rate and the volume of exports. A decrease in the exchange rate by one percent against the currencies of the trading partners increased USA agricultural exports by 0.51 percent.

Using a simultaneous equation framework, Sharma (2001) investigated the determinants of Indian exports using annual time series data. On the demand side, the main variables used were relative prices and exchange rate, while the supply side factors included domestic relative prices. His findings were that a fall in export prices increased demand for Indian exports while appreciation of the Indian rupee against major currencies of the trading partners had a negative impact on Indian export volumes. On the other hand, a fall in domestic prices relative to world prices had a positive effect on exports. However, foreign direct investment and infrastructural development had no effect on India's exports.

To analyze the effect of macroeconomic variables on imports and exports, Petreski (2009) employed a vector auto-regression model and found out that exports were positively affected by REER, Unit Labor Cost and Industrial production while fiscal burden was not a significant determinant of exports. Suresh and Reddy (2010) on the other hand found no evidence of the impact of real effective exchange rates on Indian exports. Using a panel data for 9 Asian countries, Jongwanich (2009) investigated factors that affect export performance of three categories: merchandize exports, manufacturing exports and machinery equipment exports within the confines of the imperfect substitutions model. He found a significant impact of the real effective exchange rate among the countries with Philippines having the lowest elasticity. On the other hand, exports were highly elastic to real exchange rates in the case of Indonesia. Using four trade distinct weighted exchange rates; Trade-weighted Real Effective Exchange Rate (REERT), Export-weighted Real Effective Exchange Rate (REERX), Trade-weighted Nominal Effective Exchange Rate (NEERT) and the Export–weighted Nominal Effective Exchange Rate (NEERX), Suresh and Reddy (2010) failed to conclude that exchange

affected growth of Indian exports. However, their OLS results revealed that GDP had a significant impact on the growth of Indian exports. Analogously, in an attempt to examine the determinants of agricultural exports (cotton lint) in Tanzania, Kingu (2014) applied Co-integration and Error Correction model using time series data for the period 1970 to 2010. The findings revealed that cotton export earnings were mostly determined by real exchange rate.

A study by Nadeem *et al*. (2012) sought to examine the impact of various determinants on exports in Pakistan using secondary data over the period from 1981-2011. The least squares method was used after testing the data for stationarity. World Income and exchange rates were found to have a positive impact on Pakistan's volume of exports. Other factors such as industry value added, indirect taxes and national savings were also found to be significant determinants of exports in Pakistan. Kannan (2013) on the other hand found that world price and world population had a positive and significant impact on the volume of agricultural exports in India.

Using co-integration and error correction approaches, Mwansakilwa *et al*. (2013) investigated the growth and competitiveness of flower exports for Zambia to major trading partners; Netherlands, United Kingdom and Germany for the period 1990 to 2010. The variables of interest were analyzed within the confines of the demand and supply framework. On the demand side, flower production, export credit and real exchange rate were found to have a significant impact on flower exports. On the supply side, exports by other countries, population of importing countries, real GDP of the importing country, world price and real exchange rate had a significant impact on flower exports.

2.6 Summary of Empirical findings

The analysis of the literature comprises of two parts; (1) methodology employed by different studies (2) key findings of the determinants of export performance.

2.6.1 Methodology of past studies

It is evident from the literature above that factors that determine export growth or performance differ from one study to the other. Different methods have been employed to analyze export performance. Two methods are dominant from the studies above; Gravity models and vector error correction models.

Gravity models are premised on the idea that export performance is a function of Gross Domestic Product (GDP), population and the distance between the two trading nations. According to these models, export growth is envisaged to be higher, the higher the income of the importing country and lower, the longer the distance between the two trading nations. For instance, studies (Eita, 2009; Hatab, 2010; Idsardi, 2010), found that GDP of the importing

country positively affects exports growth while the distance between the two trading nations adversely affects export performance.

2.6.2 Shortcomings of the Studies

Their use of two main factors namely Gross Domestic Product and distance is highly questionable since it is highly restrictive. Export performance is a function of several other variables that are not captured by the model. The studies neglect the impact of institutional factors as well as transaction costs on export growth. For instance, trade policies such as liberalization, export tariffs, export subsidies and import tariffs have a significant impact exports but are not captured by most gravity models. In addition, distance alone as used in most of these models does not adequately capture transaction costs, as it is just a mere constant. There is need to capture other transaction costs that exporters incur such as transportation costs, negotiation costs and information costs that may affect trade performance. It is also important to categorize the population as in either the productive age or not. Certainly, children of the unproductive age should be excluded from the total population because they clearly do not affect productivity and export performance.

On the other hand, a vast amount of the literature reviewed above has employed the vector auto regressive models to analyze export performance. While the vector error correction approach by these studies can be commended because of its flexibility with regards to inclusion of other relevant variables, the accuracy and subsequently, the inferences made from their findings is highly questionable. Most of the data used have a short span usually averaging twenty years implying that there is loss in the number of degrees of freedom, especially that they have used many independent variables.

2.6.3 Key findings

As indicated earlier, different studies have employed different variables to identify the determinants of export performance. This paper has identified the dominant variables that influence export performance from the aforementioned studies.

The gross domestic product of the importing country is one key variable that influences the growth of exports of the exporting country. The higher the income (GDP) of the importing country, the more exports the exporting country will export or the more imports the importing country will demand. This is consistent with the common microeconomic theory that income is positively related to quantity demanded; the higher the income, the higher the demand. All the studies such as the ones conducted by Majeed and Ahmad (2006), Teweldemedhin (2013),

and Suresh and Neeraj (2014) have concurred that indeed GDP is an important determinant of export performance.

Another key determinant of export performance from the studies is the exchange rate. Several studies have found out that the exchange rate is one of the most important determinants of export performance (Jongwanich, 2009; Babatunde, 2009; Petreski, 2009; Abolagba, 2010). As per theory, a depreciation of a nation's currency will stimulate its exports. A depreciation of a nation's currency will entail that its exports will become cheaper to foreigners thereby increasing a nation's volume of its exports. At the same time, exporters will be stimulated to export more because they will now earn more when they convert the foreign exchange into domestic currency. Although the exchange rate has been found to be a key determinant of export growth, Suresh and Reddy (2010) could not conclusively identify the relationship between exchange rate and export performance. Other miscellaneous variables that influence export performance based on the studies above include but not limited to trade liberalization, infrastructure, transport costs, world price, population and the physical distance between the two trading nations.

2.7 Theoretical and Conceptual Framework

2.7.1 Theoretical Framework

Theoretical underpinnings of exports have evolved from Ricardo's comparative advantage in 1817 to the new trade theories. According to the theory of comparative advantage, there is still basis for trade between two nations even if a nation has absolute disadvantage in the production of both commodities if the nation with absolute disadvantage specializes in the production of the commodity in which its absolute disadvantage is smallest. The commodity in which its absolute advantage is smallest is the commodity of the country's comparative advantage. Hence, the nation will specialize in the production and export of that commodity (Salvatore, 2009).

The Heckscher-Ohlin model made popular in 1933 isolates the differences in resource endowments among nations as the basis for trade. Since nations are endowed differently with natural resources in terms of types and quantity, the theory places emphasis in a nation exporting a commodity whose production uses cheap and abundant inputs and will import the commodity whose production requires the intensive use of a nation's limited and costly inputs. Therefore, according to the Heckscher-Ohlin theory, if a nation is labor abundant, it should specialize in the export of the commodity that is labor intensive. Again, if a nation is classified

as capital abundant, it should specialize in the export of the commodity whose production utilizes capital-intensive techniques (Salvatore, 2013).

According to Fungaza (2004), the amount of exports a country makes (supply capacity) depends on the size of the sector that is exporting a given commodity (measured by the varieties of the commodity produced), the prices received by the producer (producer price) and domestic transport costs. Fungaza (2004) also stresses the role of country size in influencing the volume of exports. Country size is measured by the Gross Domestic Product (GDP) as well as the population of a particular country. Country size shows how big the market is of the country that is exporting a given commodity. If the importing country's Gross Domestic Product is large enough, that will have an effect on the total quantity of imports that it will make. The higher the Gross Domestic Product, the more likely it is to import more of a commodity. The size of a country is related to the price of exports. The larger is a country's Gross Domestic Product, the more likely it is to influence the price of a commodity that it exports since the price reflects the costs that go into the production and export of a commodity. These costs are directly linked to institutions or policies that are in place in the exporting country.

Besides country size, foreign market access also influences the supply capacity of a country. If a country has better access to international markets, its expected returns from export activities will be higher hence, it will increase the volume of its exports. Better foreign market access can also increase the volume of exports by attracting resources from abroad through foreign direct investment or through migration of labor hence increasing productivity. On the contrary, Redding and Venables (2004) argue that supply capacity and foreign market access are negatively related. If the export sector is to expand, it will demand more of factors of production. With this increase in demand on factors of production such as labor, the price of labor (wage rate) increases. This increase in the cost of production will be reflected in the producer price. The higher is the producer price, the lower will be the demand of a nation's exports hence the negative relationship between foreign market access and supply capacity. An increase in foreign market access will lead to a less than proportionate increase in the volume of exports and subsequently a lower supply capacity. This also implies that supply capacity is inelastic with respect to foreign market access (Redding and Venables, 2004).

This study adopts the analytical framework by Fugaza (2004) because it succinctly outlines factors that affect exports within the demand and supply confines. Based on the above theoretical framework, the value of a country's exports is a function of Foreign Market Access (demand capacity of importing country) and supply capacity of the exporting country, that is,

$InX_{ij} = a + \Psi InDD + \lambda InSS + e_t$ ..... (1)

Where InX_{ij}= Volume of Exports from *i* to *j*

InDD =Demand Capacity of importing country

InSS=Supply capacity of exporting country

e_t=All other factors that affect export growth

2.7.2 Conceptual Framework

Factors that affect growth of exports can be placed into two broad categories; demand factors and supply factors. Supply factors are those push factors that give a country impetus to export goods and services. They are factors that directly affect the production ability of a country. They include among many other variables; Foreign Direct Investment (FDI) and Real Interest Rates (RIR). For instance, higher interest rates would increase the cost of borrowing thereby limiting the production capacity and subsequently volume of exports of the exporting country (imports of the importing country). The existing government policies such as public expenditure on infrastructural development and taxation of the agricultural sector would give further impetus to increase production and hence the volume of exports.

On the other hand, Demand factors are those exogenous factors that pull a foreign country to import goods and services from another country. Higher incomes for instance increase the purchasing power of the importing country and this implies that they will increase their imports of goods and services. Figure 2 below illustrates the relationship between demand and supply factors and how they affect the volume of exports.

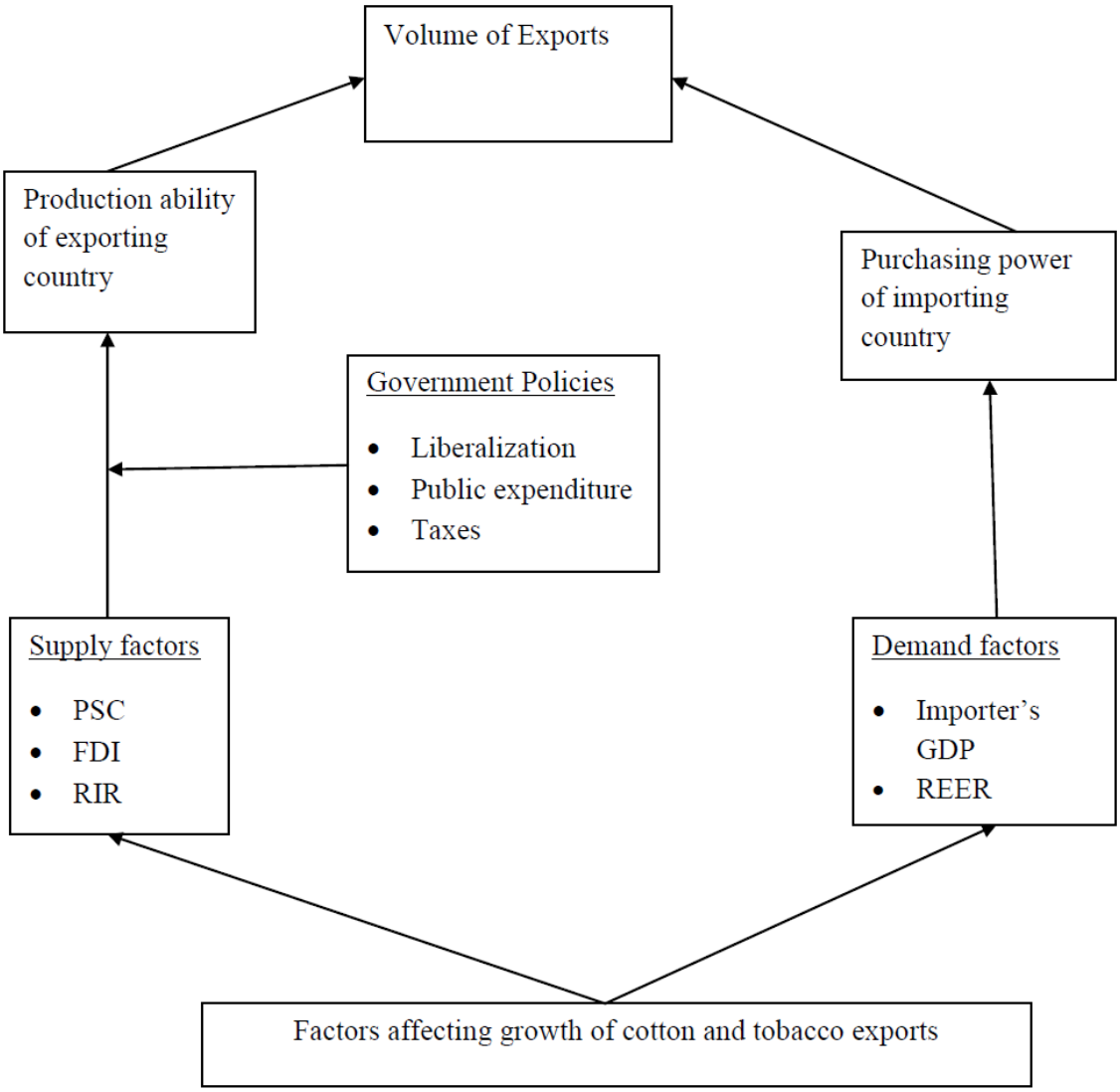

Figure 4: Conceptual Framework.

Source: Modified from Đào Ngọc Tiến (2008)

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter comprises three sections; section 3.2 contains the sources and type of data that were used in the study. The subsequent section looks at the methods of data analysis that the research used in order to achieve its objectives. Pre-estimation techniques and the models used are also presented in this chapter.

3.2 Study area

This study will cover all the cotton and tobacco producing zones in Zambia. Cotton is mainly grown in agro-ecological zone II a while tobacco is grown in agro-ecological zones II a and III (refer to appendix A and B for definition of agro-ecological zones in Zambia). These agro-ecological zones comprise mainly Southern, Eastern and Central provinces of Zambia for both crops. Copperbelt and Lusaka provinces produce negligible quantities of cotton and tobacco while the rest of the provinces do not produce any of the two crops. Total planted area for cotton and tobacco averages 200,000 and 20,000 hectares respectively per annum. About 95 percent of cotton and tobacco that is produced in Zambia is exported (CSO, 2013).

Figure 5 shows the main cotton and tobacco producing zones in Zambia.

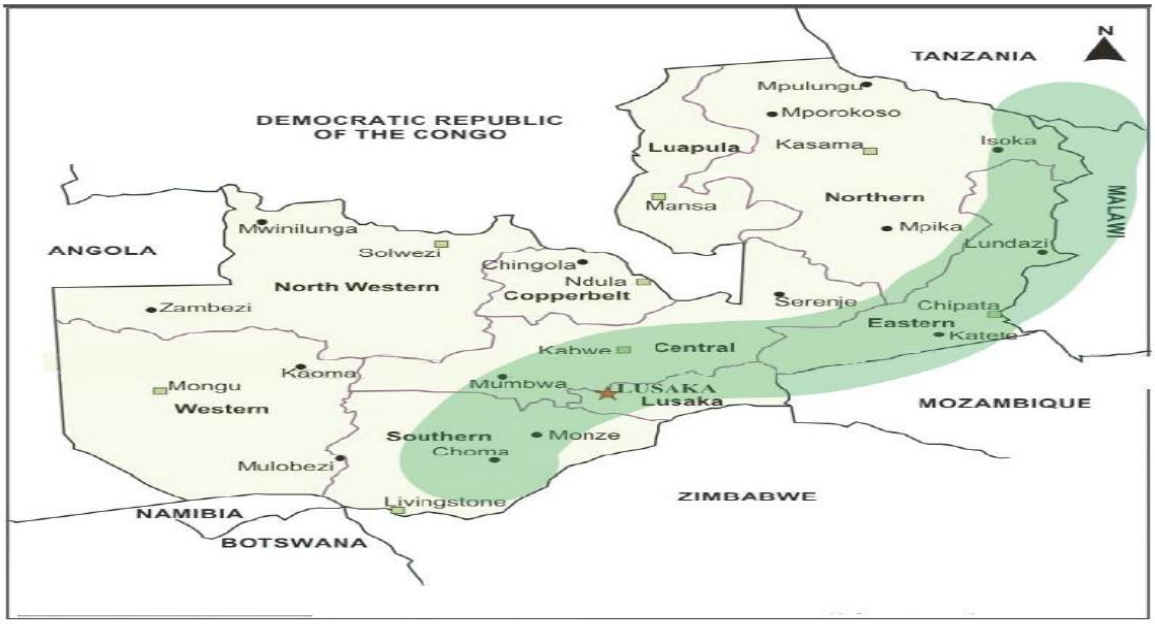

Figure 5: Provincial Boundaries and Main Cotton and Tobacco Producing Zones in Zambia.

Source: Tschirley, 2010

3.3 Data Collection

The study used time series data from Bank of Zambia (BoZ), Zambia's Central Statistical Office (CSO), Food Agricultural Organization Statistics (FAOSTAT), the World Development Indicators (WDI) of the World Bank (WB) and United States Department of Agriculture (USDA). Data on real exchange rates, foreign direct investment, real GDP of trading partners and real interest rates were obtained from BoZ and WDI while data on cotton exports, tobacco exports, and Zambia's agricultural GDP were obtained from USDA, FAOSTAT and CSO. Data on world prices of tobacco and cotton were obtained from World Bank Commodity prices of the World Bank.

3.4 Methods of Data Analysis

For objective one; to examine the developmental trajectory of tobacco and cotton exports in Zambia over the last 35 years, trend analysis was employed. Descriptive statistics such as the mean, standard deviation and the median were used. Correlation analysis was also employed to ascertain the nature of the relationship among the variables. Finally, Graphical analysis was used to examine whether the trend in cotton or tobacco exports is linear or not. Thereafter, the analytical model was specified in such a way that export volumes from either crop were regressed on time. This method was also used by Kingu (2014). If the slope coefficient in the model is positive, then there is an upward trend on the volume of exports, whereas if it is negative, it implies that there is a downward trend in export volumes on the crop under investigation.

To estimate the growth of cotton and tobacco exports, the volume of exports of either crop in natural log form were regressed on time, *t*. The growth rate model was specified as follows:

$$\mathrm{Ln}E_{tj} = \beta_1 + \beta_2 t + u_t \quad \text{..... (2)}$$

Where $\mathrm{Ln}E_{tj}$ is export volumes at time *t* of commodity *j* in natural log form, in this case either cotton or tobacco exports, β_1 is the intercept, *t* is trending variable, β_2 is the slope coefficient and u_t is error term. β_2 is expected to be positive or negative. Models like (2) above are known as semi-log models or log-lin models since one of the variables is in logarithmic form**.** The slope coefficient, β_2, measures the proportional or relative change in $\mathrm{LnE_{tj}}$ for a given absolute change in the value of the regressor, *t*, that is,

$$\beta_2 = \frac{\text{proportion al change in regressand}}{\text{absolute change in regressor}} \quad \text{..... (3)}$$

β_2 can also be interpreted as the partial elasticity of E_{tj} with respect to *t*. Multiplying (3) by 100 gives the percentage change or the growth rate in E_{tj} for an absolute change in *t*, the regressor. The coefficient of the trend variable in the growth model (2), β_2, gives the instantaneous (at a point in time) rate of growth and not the compound (over a period of time) rate of growth (Gujarati 2004).

Numerically, $\beta_2 = \frac{d(\ln Y)}{dX} = (1/Y)\,(dY/dX)$

$$= (dY/Y) \,/\, dX$$

which is the same as (3) above. To obtain the compound rate of growth of cotton and tobacco exports, the antilog of the estimated β_2 was subtracted by 1 and the difference was multiplied by 100. That is, the growth rate of cotton or tobacco exports was be given by $(e^{\beta_2}\text{-}1) \times 100$.

For objective 2 and 3; to determine demand and supply factors that affect growth of tobacco and cotton exports, the study used the Auto-Regressive Distributed Lagged (ARDL) model approach. This approach was also used by Ragoobur (2011). Therefore, use of this approach is justified because; (1) it helps in establishing the short and long-run relationships or dynamics among the variables (2) it incorporates both demand and supply factors. The model was specified as follows;

$$\text{Exp}_{tj} = \text{f}\,(\,\text{FDI}_t, \text{REER}_t, \text{FGDP}_t, \text{RIR}_t, \text{PR}) \quad \text{.....(4)}$$

The regression model was specified as follows;

$$\text{Exp}_{tj} = \alpha + \beta_1 \text{FDI}_t + \beta_2 \text{REER}_t + \beta_3 \text{FGDP}_t + \beta_4 \text{RIR}_t + \beta_5 \text{PR}_t + e_t \quad \text{..... (5)}$$

Where,

Exp_{tj}=Volume of exports from Zambia of commodity *j* in year *t*

FDI_t= Foreign direct investment in Zambia (net inflows)

REER_t= The weighted exchange rate of the Zambia Kwacha against currencies of major trading partners

FGDP_t=GDP of trading partners

RIR_t=Real interest rates

PR_{jt} =World price of commodity *j* in year *t*

e_t=error term

a=Intercept term

All variables are in logarithmic form except foreign direct investment and real interest rate.

3.4.1 The Concept of Stationarity

Most time series data are non-stationary. It means that their mean, variance and covariance are not constant over time. The regression of a non-stationary time series on another non-stationary time series may produce spurious regression results.

A stochastic process y_t is called stationary if it has time-invariant in the first and second moments (mean and variance). That is, y_t is stationary if

1. E $(y_t) = \mu_y \; \forall, t \in$ T and

2. E $[(y_t - \mu_y)(y_{t-h} - \mu_y)] = \gamma_h \forall, t \in$ T and all integers h such that $t - h \in$ T.

The first condition implies that for a stationary stochastic process, all members have the same constant mean. Hence, a time series of a stationary stochastic process should revert to its mean (must fluctuate around its mean value). The second condition means that the variances should also not depend on time, that is, variance is independent of time. For instance when h= 0, the variance σ_y^2= E $[(y_t - \mu_y)^2] = \gamma_0$ is independent of t. In addition, the covariances E $[(y_t - \mu_y)(y_{t-h} - \mu_y)] = \gamma_h$ just depend on the distance in time h of the two members of the process but independent of time, t (Maddala, 1992).

It is possible that variables can be I (1), that is, non-stationary but a linear combination of them is in fact stationary. Stochastic and deterministic trends (which have unit roots) can be made stationary by differencing and regressing on time respectively. Starting with the first-order autoregressive model;

$$Y_t = \rho Y_{t-1} + \mu_t \quad , 1 \leq \rho \leq 1 \text{..... (6)}$$

If $|\rho|$ is one, then the stochastic process Y_t is non-stationary or in other words we have a unit root. However, when $|\rho|$ is less than one, then the stochastic process Y_t is stationary. To make the process stationary when $|\rho|$ is one, equation (6) is differenced. Since $|\rho|$ is one, (6) now becomes:

$$Y_t = Y_{t-1} + \mu_t \text{..... (7)}$$

Taking the first difference, (7) becomes:

$$\Delta Y_t = Y_t - Y_{t-1} = \mu_t \text{..... (8)}$$

By taking expectations, (8) becomes:

E (ΔY_t) =E (μ_t) = 0. The variance, σ_u^2 and the covariance between Y_t and Y_{t-1}, 0, imply that the stochastic process Y_t becomes stationary after the first difference. Y_t is therefore said to be integrated of order 1. If Y_t has to be differenced twice to become stationary, then it is integrated of order 2, that is, $Y_t \sim$I (2). In general, if a stochastic process has to be differenced d times in order to become stationary, then it is integrated of order d, that is, $Y_t \sim$I (d) (Gujarati, 2004).

It is therefore imperative to test for stationarity as failure to do so would yield spurious regression results. The Augmented Dickey Fuller (ADF) was used to test the variables for stationarity. The Augmented Dickey Fuller (ADF) test is based on *t*-statistics of the coefficient α_1 obtained from Ordinary Least Squares (OLS) regressions applied on (9) (Fuller (1976) and Dickey & Fuller (1979)). This study adopted the ADF test because (1) It has the ability to capture additional dynamics left out by the DF test (2) It ensures that the error term is white noise through the inclusion of additional lag length (Okoruwa, 2003). The DF test assumes that the error term (e_t) is uncorrelated hence is inadequate for models which have serial correlation. The ADF assumes that there is serial correlation and attempts to reduce it by including several terms on the right hand side of (9). Following Engel and Granger (1987), ADF test procedure is defined as follows:

$$\Delta Y_t = a_0 + a_1 Y_{t-1} + \sum_{t=1}^{T} b_i \Delta Y_{t-1} + e_t \quad \text{..... (9)}$$

$$\Delta Y_t = a_0 + B_2 t + a_1 Y_{t-1} + \sum_{t=1}^{T} b_i \Delta Y_{t-1} + e_t \quad \text{..... (10)}$$

Equations 9 and 10 above are the augmented dickey fuller tests without trend and with trend respectively where ΔY_t is the differenced Y_t series, Y_{t-1} is first lag of Y_t series, ΔY_{t-1} is the first lag of the differenced Y_t series; b_i is the constant coefficient and e_t is the error term with mean zero and constant variance and *t* is the trend variable. The null hypothesis is that the series Y_t is nonstationary (a_1=0 in (9) and (10) or $|\rho|$ in (6) is 1) while the alternative hypothesis is that the series Y_t is stationary (a_1<0 in (9) and (10) or $|\rho|$ in (6) is less than 1). According to the ADF test, the null hypothesis of non-stationarity is rejected if the t-statistic on a_1, which is expected to be negative, is significantly different from the critical values for a given sample size (Gujarati, 2004). The number of lagged difference terms to include in (9) is often determined empirically. The series Y_t is differenced and lagged repeatedly until it becomes

stationary, that is, until the order of integration is determined. If any two series are integrated of the same order, then they can be tested for co-integration.

3.4.2 The Concept of Co-integration

If two series y_t and x_t are integrated of the same order, that is, y_t~I(1) and x_t~I (1), then y_t and x_t are said to be cointegrated if there exists a β such that y_t- βx_t is I(0). This is denoted by saying y_t and x_t are CI (1, l). This means that y_t and x_t in the regression equation (11) do not drift too far apart from each other overtime.

$$y_t = \beta x_t + e_t \quad \text{..... (11)}$$

This implies that there is a long-run equilibrium relationship between the two variables, that is, the series in (11) move together over time or I (0). Any two series which are individually I (1) yield a linear combination which is I (0) because by subtracting the regressor from the regressand, the stochastic trend which makes the series individually I (1) will be eliminated hence their linear combination will become stationary. On the other hand, If y_t and x_t are not cointegrated, that is, y_t - $\beta x_t = e_t$ is also I (1), they can drift apart from each other overtime. In other words, there is no long-run equilibrium relationship between them hence regressing y_t on x_t will yield spurious results as indicated earlier (Maddala, 1992).

The ARDL bounds testing procedure was used to test for the presence of co-integration among the variables in (5) since variables were not integrated of the same order. The first step in the bound testing procedure is modeling equation 5 as an ARDL model. The general ARDL representation was specified as follows:

$$\begin{aligned}\Delta \mathrm{Exp}_{tj} = \alpha &+ \sum_{i=1}^{m} \gamma_i \Delta \mathrm{Exp}_{tj-i} + \sum_{i=0}^{n} \lambda_i \Delta \mathrm{FDI}_{t-i} + \sum_{i=0}^{o} \Psi_i \Delta \mathrm{REER}_{t-i} + \sum_{i=0}^{p} \phi_i \Delta \mathrm{FGDP}_{t-i} \\ &+ \sum_{i=0}^{q} \mu_i \Delta \mathrm{RIR}_{t-i} + \sum_{i=0}^{r} \varphi_i \Delta \mathrm{PR}_{t-i} + \beta_1 \mathrm{Exp}_{tj-1} + \beta_2 \mathrm{FDI}_{t-1} + \beta_3 \mathrm{REER}_{t-1} \\ &+ \beta_4 \mathrm{FGDP}_{t-1} + \beta_5 \mathrm{RIR}_{t-1} + \beta_6 \mathrm{PR}_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (12)\end{aligned}$$

The terms that have the difference operator represent the short-run dynamics while the betas capture the long-run estimates. To test if there is co-integration among the variables, the

F-test was employed in which the null hypothesis that the betas are jointly equal to zero was tested, that is, $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6$=0. Pesaran *et al.* (2001) provide critical F-values; one for the lower bound and the other for the upper bound for testing whether or not there is co-integration. If the computed F value is less than the F-value for the lower bound, then the null hypothesis cannot be rejected. If the computed F-value exceeds the F-value for the upper bound, then the null hypothesis of no co-integration is rejected, otherwise the test is inconclusive.

If there is co-integration among the variables, Granger representation theorem postulates that their short-run dynamics can be described by the Error Correction Model (ECM) (Maddala, 1992). Therefore, the ECM is estimated when the residuals from the long-run linear combination of non-stationary I (1) series are themselves stationary (Okoruwa, 2003). The ECM representation was specified as follows:

$$\Delta \mathrm{Exp}_{tj} = \alpha + \sum_{i=1}^{m} \gamma_i \Delta \mathrm{Exp}_{tj-i} + \sum_{i=0}^{n} \lambda_i \Delta \mathrm{FDI}_{t-i} + \sum_{i=0}^{o} \Psi_i \Delta \mathrm{REER}_{t-i} + \sum_{i=0}^{p} \phi_i \Delta \mathrm{FGDP}_{t-i} + \sum_{i=0}^{q} \mu_i \Delta \mathrm{RIR}_{t-i} + \sum_{i=0}^{r} \varphi_i \Delta \mathrm{PR}_{t-i} + \pi \mathrm{ECM}_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (13)$$

Equation (13) above describes the variation in Exp_{tj} around its long-run trend in terms of a set of I (0) exogenous factors. The ECM is then used to analyze the impulse response of the dependent variable, annual cotton or tobacco exports in this case, to a stimulus in the explanatory variables in a dynamic setting. The error term, π in (13) shows the speed of adjustment of the dependent variable towards its long-run equilibrium position. It shows the percentage by which any deviations of the dependent variable are corrected within a particular time frame, one year in this case because the study used annual data (Mwansakilwa, 2013). The negative error term implies that the dependent variable will have to fall in the next period for equilibrium to be restored. On the other hand, if the error term is positive, the dependent variable has to rise in the next period for equilibrium to be restored.

For objective 4, Granger causality was used. Granger is premised on the idea that the future cannot cause the present or the past. If event *B* occurs before event *A*, it means *A* cannot cause *B*. The converse is also true. However, it does not necessarily imply that if *A* occurs before *B* then *A* causes *B*. Causality in its real sense simply identifies which event precedes the other. Since these two events are observable phenomena, the main task is just to identify which of the two precedes the other or if they are contemporaneous (Maddala, 1992).

Granger (1969) devised some tests for causality which proceed as follows; Consider two time series, y_t and x_t . The Series x_t fails to Granger cause y_t if in a regression of y_t on lagged *y*'s and lagged *x*'s, the coefficients of the latter are zero. The following equations were used to test for causality between tobacco and cotton exports and agricultural share of GDP:

$$CE_{t=}\alpha + \sum_{i=1}^{m} \lambda CE_{t-i} + \sum_{i=1}^{n} \gamma AGDP_{t-i} + \mu_t \quad (14)$$

$$AGDP_{t=}\alpha + \sum_{i=1}^{m} \pi AGDP_{t-i} + \sum_{i=1}^{n} \tau CE_{t-i} + \mu_t \quad (15)$$

$$TE_{t=}\alpha + \sum_{i=1}^{m} \Psi TE_{t-i} + \sum_{i=1}^{n} \varphi AGDP_{t-i} + \mu_t \quad (16)$$

$$AGDP_{t=}\alpha + \sum_{i=1}^{m} \beta AGDP_{t-i} + \sum_{i=1}^{n} \phi TE_{t-i} + \mu_t \quad (17)$$

Equations (14) and (15) above test for causality between cotton exports and agricultural share of GDP. The null hypothesis in equation (14) is that agricultural share of GDP does not granger cause cotton exports. On the other hand, the null hypothesis in equation 15 is that cotton exports do not granger cause agricultural share of GDP. Equations (16) and (17) test for causality between tobacco exports and agricultural share of GDP. For equation (16), the null hypothesis is that agricultural share of GDP does not granger cause tobacco exports. Equation (17) tests the null hypothesis that tobacco exports do not granger cause agricultural share of GDP. In each of the 4 equations, the null hypothesis is rejected if the computed F-statistic is significant at 5 percent level of significance.

3.5 Variables and expected signs

3.5.1 Exports

Exports are the dependent variables in this study. The unit of measurement is metric tons in case of tobacco exports and 1000 480 pounds for cotton exports. Cotton exports are denoted by CE while tobacco exports are denoted by TE. Both exports are expressed in logarithmic form.

3.5.2 Foreign Direct Investment

Foreign direct investment in this study is defined as the difference in new investment and disinvestment in Zambia from foreign investors. Its impact on the volume of exports was

expected to be positive or negative depending on its motive. If the motive of foreign direct investment is to meet domestic demand for goods and services, then its impact on the volume of exports is negative. However, if its motive is primarily for export purposes, then an increase in foreign direct investment has a positive impact on the volume of exports.

3.5.3 Real Effective Exchange Rate

Real effective exchange rate (REER) is the trade-weighted exchange rate against major trading partners computed as a product of nominal effective exchange rate and domestic consumer price index divided by foreign consumer price index. An increase in the real effective exchange rate makes the Zambia's exports cheaper and competitive on the international market thereby increasing the volume of exports. The converse is also true. A decrease in the real effective exchange rate makes Zambia's exports relatively expensive and less competitive on the world market. A positive relationship between real effective exchange rate and volume of exports was therefore envisaged. The real effective exchange rate was computed as follows:

$$REER = \sum_{i}^{n} \varepsilon_i \omega_i$$

Where ω_i is the country *i*'s share of trade with Zambia and ε_i is the real effective exchange rate defined as:

$$\varepsilon_i = \xi_i \times \frac{CPI_D}{CPI_F}$$

Where ξ_i is the nominal exchange rate (how much of the trading partner's currency is needed to obtain 1 Kwacha, CPI_D is the domestic consumer price index and CPI_F is the consumer price index of the trade partner.

3.5.4 Foreign Gross Domestic Product

Foreign gross domestic product is the average of the real GDPs of the major importers of cotton and tobacco. It is denoted as RIC in case of cotton and RIT for tobacco exports. A positive relationship was expected between foreign gross domestic product and volume of tobacco and cotton exports based on the demand theory. The higher the income of the importing country, the higher the amount of cotton or tobacco exports it demands. The converse is also

true. An increase in the income of the trading partner would decrease the quantity of cotton and tobacco exports supplied.

3.5.5 Real Interest Rate

Real interest rate is defined as the nominal lending rate adjusted for inflation. The higher the real interest rate, the less resources are invested in the production of both crops and the less the volume of exports. A negative relationship therefore was expected between tobacco or cotton exports and the real interest rate. The real interest rates were computed using Fisher's equation as follows:

RIR = LR – INF

Where RIR= real interest rate, LR= nominal lending rate and INF is the inflation rate

3.5.6 International Price

International price is the return that exporters realize after supplying cotton or tobacco exports. The higher the return, the more quantity of tobacco or cotton exports supplied. Therefore, a positive relationship was expected between cotton or tobacco exports and international price. The international price of cotton is denoted by CP while that of tobacco by TP.

Table 2: Variables and expected signs.

Variable	Variable name	Measurement	Expected sign

REER_t	Real effective exchange rate	The trade weighted exchange rate between the Zambian Kwacha against currencies of major trading partners	+
RIR_t	Real interest rate	Percentage (continuous)	-
FDI_t	Foreign direct investment in Zambia (net inflows)	United States Dollars	+/-
RIT_t	Real GDP of importers of tobacco	Weighted GDP of importers of tobacco (United States Dollars)	+/-
RIC_t	Real GDP of importers of cotton	Weighted GDP of importers of cotton (United States Dollars)	+/-
TP_t	World price of tobacco	United States Dollars	+
CP_t	World price of cotton	United States Dollars	+
TE_t	Tobacco exports	Metric ton	
CE_t	Cotton exports	1000 480 lbs	
AGDP	Agricultural share of GDP	Percentage	

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the estimates of the determinants of cotton and tobacco exports growth. The immediate section that follows provides a summary of the variables using descriptive statistics. The subsequent sections give results of the stationary tests and determine

the existence of co-integration tests using the upper bounds test by Pesaran *et al*. (2001). The chapter concludes by giving estimates of the short-run and long-run determinants of cotton and tobacco exports growth.

4.2 Trend Analysis of Independent Variables

Between 1980 and 1995, real interest rates were negative. During this period, the country's productive capacity was low as plummeting copper prices deprived the government of the much revenue. As a result, the country was faced with critical food shortages that culminated into high demand-pull inflation hence the observed negative interest rates. However, with liberalization of the economy and introduction of Structural Adjustment Programs (SAPs), inflation began to decline significantly hence the observed positive trend in real interest rates. Figure 6 shows the trends in real interest rates.

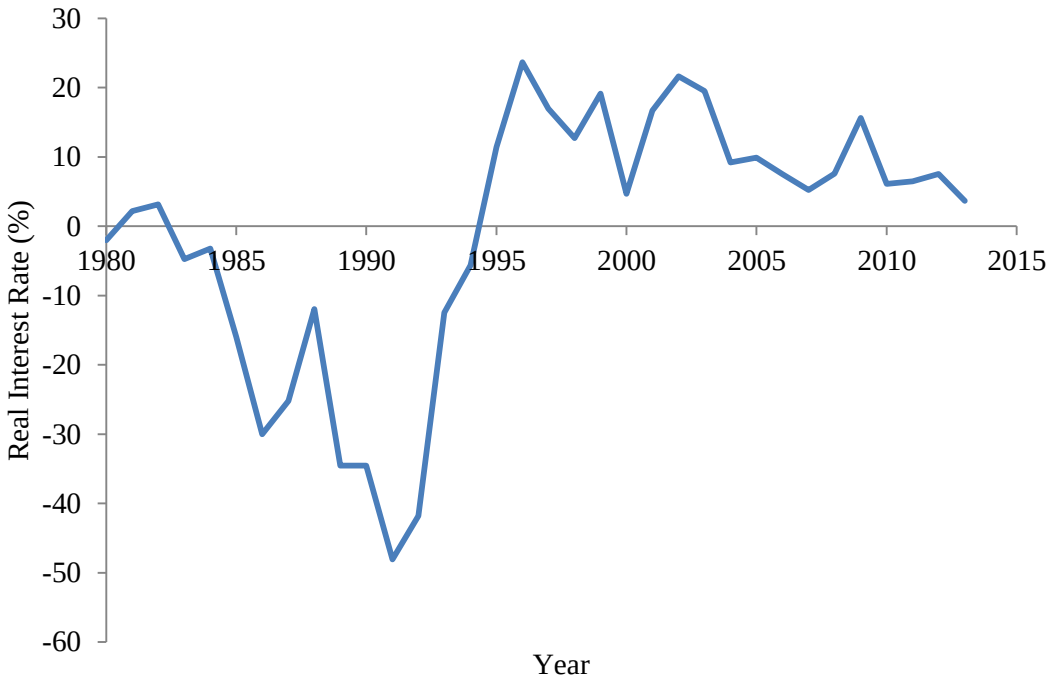

Figure 6: Trends in real interest rates in Zambia, 1980-2013.

Inflow of foreign direct investment have increased overall from 1980 to 2013 although FDI the flows have been fluctuating. Although most of the FDI was concentrated in the mining and services sector in the earlier periods, there has been an increase in FDI in the agriculture sector with most farmers involved in production of cash crops such as cotton and tobacco contracted to foreign companies. The huge swing in FDI between 1990 and 1995 may have

been due to uncertainty brought by the privatization process. The trends in FDI are shown in figure 7.

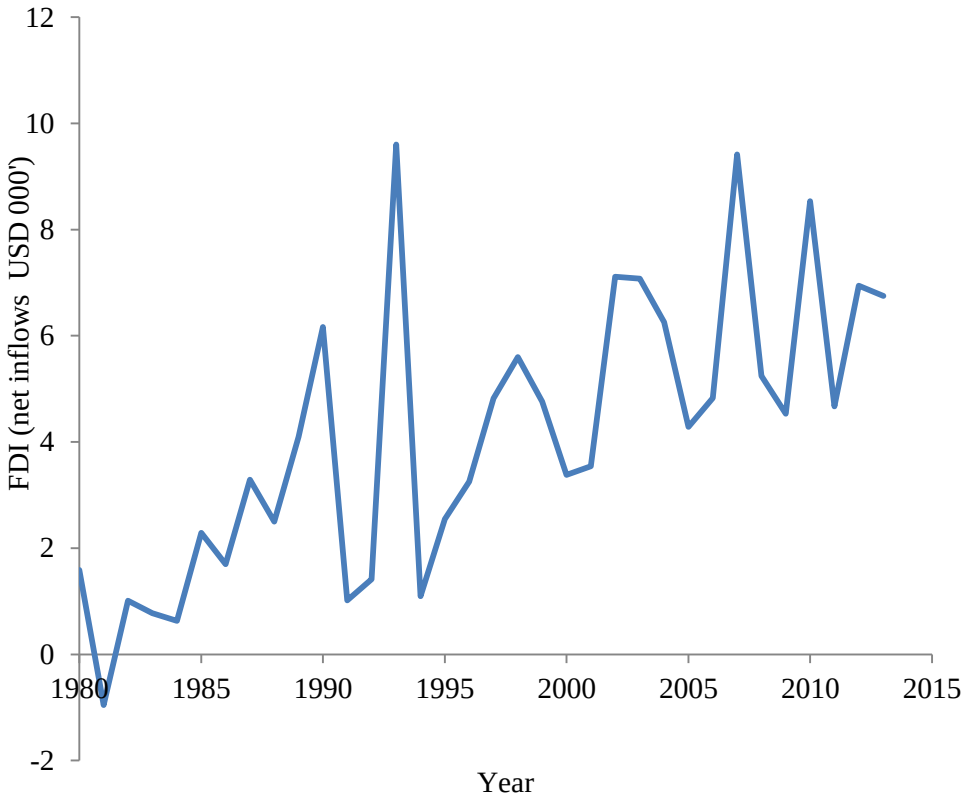

Figure 7: Trends in FDI in Zambia, 1980-2013.

Overall, the real effective exchange rate, world price of tobacco, world price of cotton and agricultural share of GDP have remained stable during the period 1980 to 2013. The real effective exchange rate on average has been below 100 implying that exports made by Zambia can be competitive on the international market. On the other hand, the agricultural share of GDP has remained about the same over the period 1980 to 2013 hence emphasizing the need to boost this sector if export diversification is to be realized. Figure 8 presents trends in the real effective exchange rate, world price of tobacco, world price of cotton and agricultural share of GDP over the period 1980 to 2013.

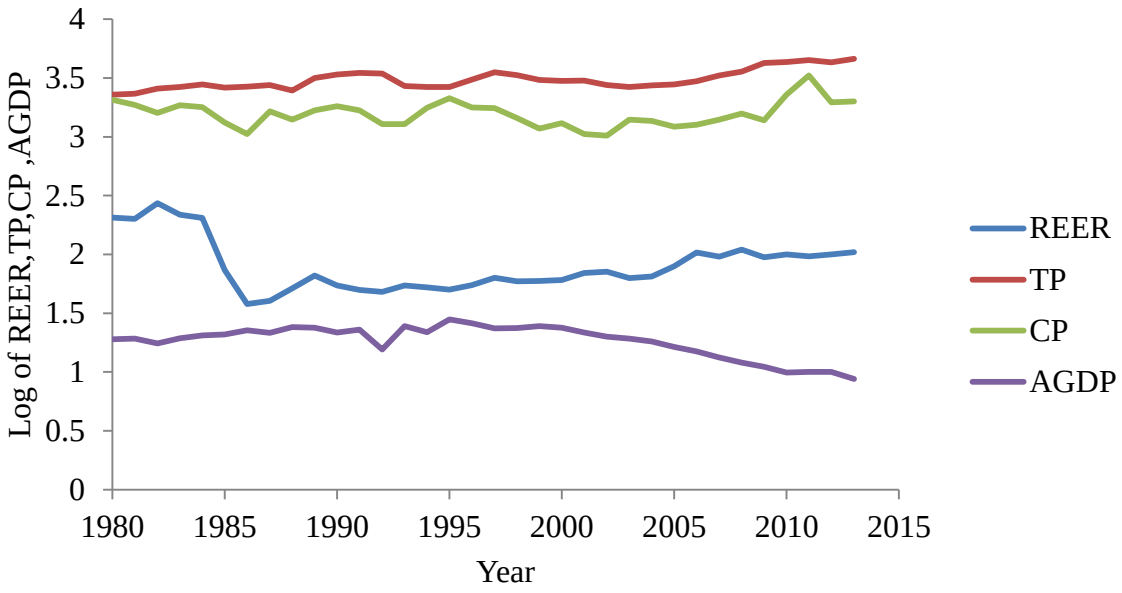

Figure 8: Trends in the real effective exchange rate, world price of tobacco, world price of cotton and agricultural share of GDP, 1980-2013.

4.3 Correlation Analysis

Correlation analysis was carried out to aid in identifying the degree and extent of collinearity between the regressors as well as determining the strength and direction of the relationship between the independent variables and the dependent variable. Tables 3 and 4 present a summary of the correlation coefficients among the variables that affect growth of tobacco and cotton exports respectively.

Table 3: Correlation Analysis of Tobacco Exports.

	TE	REER	RIR	FDI	TP	RIT
TE	1					
REER	0.0762	1				
RIR	0.5445***	0.2684	1			
FDI	0.6853***	-0.2241	0.3236*	1		
TP	0.5415***	-0.0664	0.0684	0.4656***	1	
RIT	0.9066***	-0.0909	0.4982***	0.6932***	0.7505***	1

***, **,* means significant at 1, 5 and 10 percent level of significance respectively

The correlation results indicate that there is a strong and positive relationship between tobacco exports and the real income of the importing country, international price of tobacco and foreign direct investment. On the other hand, there is a weak and positive relationship between tobacco exports and real effective exchange rate. As the Kwacha depreciates against the currencies of the major trading partners, the earnings derived from tobacco exports increase and the higher is the volume of exports hence the observed positive association between real effective exchange rate and tobacco exports. However, there is a positive relationship between tobacco exports and real interest rates. The observed positive relationship between interest rates and tobacco exports may be due to time lag effects such that even if interest rates increased, exporters would still borrow to finance their existing investment in tobacco in the short-run. Among the regressors, there is positive relationship between real incomes of importing countries and international price of tobacco, international price of tobacco and foreign direct investment, and real income of the importing country and foreign direct investment. Overall, the correlation analysis suggests low collinearity among the independent variables. However, it must be stated that a low correlation among the regressors does not guarantee absence of multicollinearity rather just gives a picture of nature of the relationship among the variables.

Table 4: Correlation Analysis of Cotton Exports

	CE	REER	RIR	FDI	CP	RIC
CE	1					
REER	0.1830	1				
RIR	0.4662***	0.2684	1			
FDI	0.5532***	-0.2241	0.3236*	1		
CP	0.0641	0.3435**	-0.0156	-0.0895	1	
RIC	0.8146***	-0.0789	0.5141***	0.6943***	0.0927	1

***, **,* means significant at 1, 5 and 10 percent level of significance respectively

Correlation analysis of factors that affect growth of cotton exports showed that there is a strong and positive relationship between cotton exports and the real income of the importing

country and foreign direct investment. On the contrary, tobacco exports exhibit a weak and positive relationship with international cotton price and real effective exchange rate. Astonishingly, interest rates are positively related to cotton exports. There is low correlation among the regressors although the coefficient of 0.6943 suggests a strong correlation between foreign direct investment and the real income of the importing country.

4.4 Trend Analysis of Tobacco and Cotton Exports

Growth of tobacco and cotton exports over the last thirty-four years was examined using trend analysis. Trend analysis provides an insight as to whether there has been an upward or downward trend in the growth of the exports. To this effect, graphical and regression analysis were used to provide information about the growth of the two export crops overtime. A semi-log regression was estimated in which the export volumes of each crop were regressed on time. Figure 9 gives a graphical analysis of the trend in tobacco exports.

4.4.1 Growth of Tobacco Exports

Figure 9: Growth of Tobacco Exports, 1980-2013.

As Figure 9 shows, tobacco exports have shown an upward trend although the growth was unsteady between 1980 and 1995 due to unfavorable policies such as taxation of the agricultural sector through overvalued exchange rates. According to Anderson and Kim (2008) poor performance of tradable agricultural commodities for developing countries including Zambia is due to distortionary effects of the policies pursued by African governments during the pre-liberalization period. Such distortionary policies explain poor trade performance not only among the developing countries but also with the developed countries. Anderson and Kim (2008) further note that adverse agricultural policies and economic mismanagement between 1960 and 1990 such as overvaluation of the Kwacha resulted in lower prices that farmers received than they would otherwise have received without government intervention. Zambia witnessed an upsurge in exports post liberalization due to increased participation of the private sector in the marketing of tobacco. Zambia's main export destination of tobacco exports is Zimbabwe, which are exported in raw form due to lack of processing facilities. Zimbabwe is also a regional force in as far as tobacco production is concerned. However, with change in land policies in 2001, a number of commercial farmers left Zimbabwe and settled in Zambia where they started investing in tobacco production on a large scale hence the upward trend in tobacco exports after 2001. Increased demand on the world market especially for raw materials by China may also have contributed to the increase in tobacco exports (Mudenda, 2006). Opening up of the external sector as well as removal of impediments to trade, however, may have caused the export volumes to increase between 1995 and 2013 although there was a sharp decline in tobacco exports between 2004 and 2008 due to appreciation of the Kwacha against major world currencies, especially the United States Dollar.

A regression analysis in which tobacco exports are regressed on time reaffirms what is obtaining in Figure 9 (see appendix C). The observed coefficient of time implies that tobacco exports increased at a yearly rate of 5.33 percent. Since the coefficient of the time variable is positive, it means that over the period 1980 to 2013, tobacco exports have exhibited a positive and upward trend. The observed P-value shows that the growth of the exports is significant at 1 and 5 percent respectively. However, the coefficient is interpreted as the instantaneous growth rate, that is, growth rate at a point in time, a year in this case since the study used annual data. Taking the anti-log of the estimated coefficient of time shows that the growth rate of tobacco exports over the period 1980 to 2013 is actually 5.47 percent. This means that the compound rate of growth of tobacco exports is 5.47 percent.

4.3.2 Growth of Cotton Exports

Figure 10: Growth of Cotton Exports, 1980-2013.

Figure 10 shows that during the period under consideration, the volume of cotton exports has increased albeit the growth has fluctuated over certain periods. A fall in the world cotton prices has contributed to the fluctuations in cotton exports. Exchange rate movements have also had an adverse effect on cotton exports. For instance, a strong appreciation of the Kwacha against the United States Dollar between 2005 and 2006 contributed to the decline in the volume of cotton exports (Kalinda, 2014). Furthermore, between 1996 and 1999, most farmers defaulted on their loans from the ginning companies culminating in the ginning companies paying the farmers lower prices than the pre-agreed ones (Kabaghe, 2013). Low producer prices offered to farmers therefore acted as disincentives in far as cotton production was concerned subsequently impacting negatively the volume of exports. The increase in the volume of cotton exports after 1998 can be attributed to improved repayment rates by farmers contracted to ginning companies that subsequently increased their scale of production (Tschirley, 2007).

Overall, a regression of the volume of cotton exports on time (refer to appendix D) showed that the instantaneous or yearly growth of cotton exports is 4.09 percent and is

significant at 1 and 5 percent. The estimated coefficient can also be interpreted as the partial elasticity of exports with respect to time. On the other, the compound rate of growth or the growth of cotton exports over the period 1980 to 2013 is 4.18 percent. Since the coefficient of time is positive, it therefore implies that the growth of cotton exports have exhibited an upward trend.

4.5 Factors that affect Growth of Cotton and Tobacco Exports

The first step in examining factors that affect growth of cotton and tobacco exports is examining the stationarity of variables of interest to avoid spurious regression results since most time series data exhibit non-stationarity. The next step involves examining the existence of co-integration among the variables. The existence of co-integration entails that both the short and long-run dynamics can be examined using different estimation techniques.

4.5.1 Unit Root Tests

The Augmented Dickey Fuller test was used to test for the stationarity of the variables in levels and first difference. The Augmented Dickey Fuller (ADF) is a powerful tool for testing for stationarity of variables as it accounts for serial correlation through inclusion of lags of the variables. The null hypothesis is that the variable under consideration has a unit root or is not stationary while the alternative hypothesis is that the variable of interest is stationary. The null hypothesis is rejected if the absolute value of the computed ADF test exceeds the absolute critical value at 1 and 5 percent. Since the ADF requires identification of the lag structure of a particular variable, the Likelihood Ratio (LR), the Akaike Information Criterion(AIC), the Hannan Quinn Information Criterion (HQIC) and the Swartz Bayesian Information Criterion (SBIC) were used to determine the optimal number of lags for each variable prior to testing for stationarity. Table 5 presents the results of the unit root tests.

Table 5: Unit Root Tests.

Variable	Level		First Differences		Order of Integration
	Constant	Constant and trend	Constant	Constant and trend	
REER	-3.655(2)**	-3.644(2)**	-3.657(1)**	-4.256 (1)**	0
RIR	-1.632(1)	-2.150(1)	-5.301(0)***	-5.221 (0)***	1
FDI	-1.931(4)	2.331(4)	-4.548(4)***	-4.954(4)***	1
RIT	1.848(3)	-0.302(3)	-4.275(1)***	-5.318(1)***	1
RIC	1.093(3)	-1.071(3)	-3.511(1)**	-4.318(1)**	1
TP	-1.404(1)	-2.331(1)	-3.613(1)**	-3.609(1)**	1
CP	-2.837(1)*	-2.810(1)	-3.450(2)**	-3.727(2)**	0
TE	-0.577(1)	-3.196(1)	-4.439(2)***	-4.410(2)***	1
CE	-1.574(1)	-2.837(1)	-4.309(4)***	-4.254(4)**	1
AGDP	0.430 (2)	-1.122 (2)	-2.410 (2)	-3.449(2)*	1

Note (*) (**) (***) means stationary at 10, 5 and 1 percent respectively. Lag length is in parentheses.

Results in table 5 show that all the variables are integrated of the same order except for real effective exchange rate and international cotton price that are stationary in levels. The appropriate and congenial method for testing for co-integration is the Auto Regressive Distributed Lagged (ARDL) bounds test as proposed by Pesaran *et al*. (2001). The main advantage of this approach is that it provides estimates of co-integration irrespective of whether the variables are integrated of the same order or not. The other advantage is that both short and long-run dynamics are estimated simultaneously. The null hypothesis is that there is no co-integration while the alternative hypothesis is that there is co-integration among the variables. The ARDL approach to co-integration provides two bounds: the lower and upper bounds. The null hypothesis of no co-integration is rejected if the computed F value exceeds the F critical

for the upper bound. On the other hand, the null hypothesis is not rejected if the computed F value is less than the F value of the lower bound. However, if the computed F value lies between the lower and upper bounds, the bounds test procedure for co-integration is inconclusive. In this case, other tests of co-integration such as trace statistics, maximum eigen value test or Engle and Granger residual tests can be used to assess the existence of co-integration among the variables.

4.5.2 Co-integration among variables that affect Growth of tobacco exports

The results of the bounds approach for co-integration among factors that affect growth of tobacco exports are presented hereunder. The results of the ARDL approach to co-integration are reported in appendix E. The computed F static is greater than the F-critical at 10, 5, 2.5 and 1 percent respectively. Therefore, the null hypothesis is rejected hence; there exists a long-run relationship among the variables. A test of the residuals shows that they are stationary implying the existence of co-integration among the variables (see appendix E). Since there is co-integration among the variables, the short-run and long-run dynamics of the factors that affect growth of tobacco exports are examined in section 4.4.2.1.

4.5.3 Short-run and long-run dynamics of factors that affect growth of tobacco exports

The ARDL (1, 0, 3, 0, 3, 0) was used to estimate factors that affect growth of tobacco exports. The lag structure of the ARDL model was determined by the Schwartz Bayesian Information criterion. The model included the trend variable. Factors that affect growth of tobacco exports and the corresponding co-integration equation are shown in Table 6 and 7 while details of the estimated models are presented in appendix F.

Table 6: Long-run dynamics of factors that affect growth of tobacco exports

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	-0.0044	0.0033	-1.3497	0.1948
REER	1.7850	0.3382	5.2776***	0.0001
TP(-1)	0.6601	0.8996	0.7337	0.4731
FDI	0.1768	0.0916	1.9302*	0.0704
RIT	-16.1426	5.0572	-3.1920***	0.0053
@TREND	0.3275	0.0963	3.4000***	0.0034

Note: *,**,*** means significant at 10, 5 and 1 percent respectively.

Table 7: Short-run dynamics of factors that affect growth of tobacco exports.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RIR)	-0.0012	0.0024	-0.4999	0.6235
D(REER)	0.9189	0.2517	3.6510***	0.0020
D(REER(-1))	-0.4391	0.2328	-1.8860*	0.0765
D(REER(-2))	-1.3889	0.2508	-5.5370***	0.0000
D(TP(-1))	0.8683	0.6259	1.3874	0.1832
D(FDI)	0.0478	0.0127	3.7603***	0.0016
D(FDI(-1))	-0.0516	0.0140	-3.6942***	0.0018
D(FDI(-2))	-0.0352	0.0106	-3.3324***	0.0039
D(RIT)	-9.7343	4.1615	-2.3391**	0.0318
C	157.0160	23.2269	6.7601***	0.0000
CointEq(-1)	-0.8523	0.1263	-6.7481***	0.0000
R-squared				0.9692
Prob(F-statistic)				0.0000
Breusch-Godfrey LM Test (Prob>. Chi-Square)				0.4499
Breusch-Pagan-Godfrey(Prob>. Chi-Square)				0.5327
Ramsey RESET Test(Prob F)				0.7406
Jarque-Bera(Prob)				0.4855

Note: *,**,*** means significant at 10, 5 and 1 percent respectively.

All the variables have the correct expected signs. The partial elasticity of tobacco exports with respect to real interest rates is -0.0012. This means that a 1 percent increase in the real interest rate will result in a 0.12 percent decrease in the volume of exports in the short-run. On the other hand, a 1 percent increase in the real interest rate in the long-run reduces the volume of exports by 0.44 percent. However, the probability values of the estimated coefficients of real interest rates show that they are insignificant in both the short-run and long-run. This means that the real cost of borrowing is not an important determinant of tobacco exports growth in both the short-run and long-run. This result is consistent with that found by Byanyima (2011) who found that interest rates do not influence exports in the short-run. Abolagba (2010) also found that interest rates did not affect the quantity of rubber exports in the long-run in Nigeria.

The coefficient of real effective exchange rate is significant in both the short-run and long-run. A 1 percent increase in the real effective exchange rate (depreciation of the Zambian Kwacha against its trading partner) results in an increase in the volume of exports by 0.92 percent and 1.79 percent in the short and long-run respectively. This result is consistent with that found by Abbott (2004) who found a positive and significant relationship between the real effective exchange rate and agricultural exports of the United States of America. Kingu (2014) also found a positive and significant relationship between real effective exchange rate and cotton lint exports in Tanzania. Ragoobur (2011) on the other hand found an insignificant relationship between exports and the real effective exchange rate in Mauritius. Byanyima (2011) and Agasha (2009), on the other hand, found a negative and significant relationship between exports and the real effective exchange rate in Uganda. A depreciation of the Zambian Kwacha makes tobacco exports cheaper and competitive on the international market. The converse is also true. An appreciation of the Zambian Kwacha against its trading partners makes the tobacco exports expensive and less competitive on the world market thereby decreasing the volume of tobacco exports. The results also show that depreciation of the Kwacha against major trading currencies in the previous period reduces tobacco exports by 0.44 percent while the depreciation in the previous two periods decreases tobacco exports by 1.39 percent.

The international price in the previous year was found to have a positive but insignificant effect on the volume of tobacco that is exported. The coefficient of international tobacco price means a 1 percent increase in the world price of tobacco will lead to an increase in tobacco exports by 0.87 percent in the short-run and 0.66 percent in the long-run. This means that that the price offered on the world market does not affect the volume of tobacco exports.

This result is similar to that of Mold (2010) who found that the international price was positive (0.09) but not significant in influencing the quantity of exports. However, Morrissey (2006) and Mwansakilwa (2013) found a positive and significant relationship between exports and the world price.

Foreign direct investment was found to have a significant impact on tobacco export volumes. The partial elasticity of tobacco exports with respect to foreign direct investment was found to be 4.78. This means a 1 percent increase in the amount of foreign direct investment increases tobacco exports by 4.78 percent in the short-run. In the long-run, a 1 percent increase in the amount of foreign direct investment increases the quantity of tobacco exports by 17.68 percent and is significant at 10 percent level of significance. This finding is consistent with that of Paulino and Thirwall (2004) who found out that foreign direct investment significantly affects exports in developing countries while Boansi (2013) also found a positive and significant relationship between coffee exports and foreign direct investment in Ethiopia. However, this result contradicts that of Majeed and Ahmad (2006), Nadeem *et al*. (2012) and Agasha (2009) who found a positive but insignificant relationship between the volume of exports and foreign direct investment in Pakistan and Ethiopia respectively. On the other hand, a 1 percent increase in the amount of foreign direct investment in the previous year decreases tobacco exports by 5.16 percent while an increase in the previous 2 years of foreign direct investment reduces the volume of tobacco exports by 3.52 percent. The contradictory results imply that the impact of foreign direct investment on the volume of exports may differ depending on its motive whether the aim is to satisfy local demand or primarily for export purposes.

The real income or GDP of the importing country was found to have a significant but negative impact on the volume of exports both in the short-run and long-run. A 1 percent increase in the income of the trading partner decreases the volume of exports by 9.73 percent and 16.14 percent in the short-run and long-run respectively. This result is consistent with that found by Ragoobur (2011) who found a negative impact of the income of the trading partner on the growth of exports in Mauritius although the impact was positive in the short-run. Idisardi (2010) also found that the real income of the trading partner had a negative impact on South Africa's agricultural exports namely; sunflower seeds, wheat and cereal pellets. However, this finding contradicts that found by Mwansakilwa (2013) who found that the real income of Germany, United Kingdom and Netherlands had a positive and significant impact on the volume of flowers that are exported by Zambia. Shane (2008) also found a positive and significant impact of the real income of importing country on the quantity of agricultural

exports of the United States of America. The negative impact of the real incomes of the major trading partners of Zambia on exports may be due to slower adjustment to import tobacco exports when their incomes reduce such that a reduction in their incomes may still increase their imports. On the other hand, an increase in the trading partners' incomes in the long-run may divert their resources towards domestic production of tobacco thereby reducing the amount of tobacco imports from Zambia.

The error correction term is negative and significant thereby affirming the existence of co-integration among the variables. The coefficient of the error correction term implies that 85 percent of the disequilibrium is corrected within a year, as the frequency of the data is annual. Since the error correction term is significant and large, the speed of adjustment towards the long-run equilibrium is therefore high. The reported R squared implies that the variables in the estimated model explain 97 percent of the variation in tobacco exports.

4.5.4 Post-estimation diagnostic tests for factors affecting growth of tobacco exports

The results of the autocorrelation results are presented in Table 7. The test for autocorrelation is necessary since the estimated parameters may be inefficient and the standard errors wrongly estimated and biased downwards (Dougherty, 2001). The Breusch-Godfrey serial correlation LM test was used to test the null hypothesis of no autocorrelation against the alternative hypothesis of autocorrelation. The computed probability value statistic was found to be 0.4499 implying that the null hypothesis is not rejected; hence, the estimated model is free from autocorrelation.

The results of the Breusch-Pagan –Godfrey test for heteroskedasticity are presented in Table 7. Like estimation in the presence of autocorrelation, the estimated parameters in the presence of heteroskedasticity will be inefficient and have high standard errors thereby rendering the F and *t* statistics invalid. The null hypothesis is that the disturbance term is homoskedastic while the alternative hypothesis is that the error term is heteroskedastic. Under the Breusch-Pagan –Godfrey test, the probability value was found to be 0.5327 implying that the null hypothesis is not rejected; hence the disturbance term is homoskedastic.

The Jarque-Bera test was used to check if the residuals are normally distributed. The null hypothesis of the residuals being normally distributed is tested against the alternative hypothesis of the residuals not being normally distributed. The results are presented in Table 7. The probability value of the computed Jarque-Bera test statistic was found to be 0.4855 implying null hypothesis is not rejected; hence the residuals are normally distributed.

The Ramsey-Reset test was used to test if the estimated model is correctly specified in terms of omission of relevant variables, inclusion of irrelevant variables as well as the functional form. The null hypothesis is that the model is stable while the alternative hypothesis is that the model is unstable. Results of the Ramsey- Reset test are presented in Table 7. The Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) were also used to confirm the stability of the coefficients with the null hypothesis that the coefficients are stable against the alternative hypothesis that the coefficients are not stable. The plots show that the coefficients are stable as the recursive residuals lie within the 5 percent level of significance; hence the null hypothesis is not rejected. Therefore, the estimated coefficients are stable and consistent (refer to appendix G).

4.5.5 Co-integration among variables that affect growth of Cotton exports

Results of the ARDL bounds test are shown in appendix H. The null hypothesis is that there is a long-run equilibrium relationship among the variables while the alternative hypothesis is that there is no co-integration among the variables. The computed F-statistic is significant at 5 percent level of significance implying that the null hypothesis is rejected; hence there is existence of a long-run equilibrium relationship among the variables. A unit root test on the residuals also confirms the existence of co-integration among the variables (see appendix H).

4.5.6 Short-run and long-run dynamics of factors that affect growth of cotton exports

The existence of co-integration among the variables suggests that the short-run and long-run dynamics of factors that affect growth of cotton exports can be examined. The lag selection of the estimated short and long-run ARDL (2, 1, 0, 0, 1, 0) was determined by the Schwarz Bayesian Information Criterion. The long-run and short-run determinants are presented in Tables 8 and 9 respectively while the details of the estimated models are given in appendix I.

Table 8: Long-run dynamics of factors that affect growth of cotton exports.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	-0.0061	0.0035	-1.7654*	0.0920

REER	2.1622	0.4730	4.5716***	0.0002
FDI	0.0224	0.0264	0.8487	0.4056
CP(-1)	0.4221	0.5724	0.7375	0.4690
RIC	-13.8983	4.0062	-3.4692***	0.0023
@TREND	0.4581	0.1201	3.8151***	0.0010

Note: *,**,*** means significant at 10, 5 and 1 percent respectively.

Table 9: Short-run dynamics of factors that affect growth of cotton exports.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CE(-1))	-0.3280	0.1101	-2.9792***	0.0072
D(RIR)	-0.0150	0.0035	-4.2462***	0.0004
D(REER)	1.3612	0.2800	4.8623***	0.0001
D(FDI)	0.0180	0.0107	1.6800	0.1078
D(CP(-1))	1.3025	0.3420	3.8087***	0.0010
D(RIC)	-8.6719	3.6545	-2.3729**	0.0273
C	134.3074	22.0297	6.0966***	0.0000
CointEq(-1)	-0.8820	0.1451	-6.0795***	0.0000
R-squared		0.9059		
Prob(F-statistic)		0.0000		
Breusch-Godfrey LM Test (Prob>. Chi-Square)		0.0590		
Breusch-Pagan-Godfrey(Prob>. Chi-Square)		0.2047		
Ramsey RESET Test(Prob F)		0.8185		
Jarque-Bera(Prob)		0.7641		

Note: *, **, *** means significant at 10, 5 and 1 percent respectively.

The results of the short and long-run determinants are consistent with economic theory and have the correct signs. The previous year's exports have a negative and significant impact on the current level of exports. The coefficient of the lagged exports imply a 1 percent increase in the volume of export results in the previous period leads to a reduction in the current volume of cotton exports by 0.33 percent. This may be due to previous performance on the international market. If a nation exported more in the previous year and suffered losses, then it will cut down on the volume of exports in the current period.

The coefficient of real interest rate is significant both in the short-run and in the long-run. The partial elasticities of cotton exports with respect to real interest rates are -0.02 and -0.01 in the short-run and long-run respectively. This means a 1 percent increase in the real interest rate will result in a decline in the volume of cotton exports by 2 percent in the short-run and by 1 percent in the long-run. This shows that the real cost of borrowing has had a negative impact on the growth of cotton exports. This finding contradicts that of Abolagba (2010) who found that interest rates had no effect in the case of cocoa exports in Nigeria although they did affect the volume of rubber exports. On the other hand, Byanyima (2011) found that interest rates had no effect on coffee exports in the short-run while they had a negative and significant impact in the long-run in the case of coffee exports in Uganda.

Cotton exports are highly elastic to movements or changes in the real effective exchange rates. An increase in the Kwacha price of the currencies of the trading partners or a depreciation increases cotton exports by 1.36 percent in the short-run and by 2.16 percent in the long-run. This finding is consistent with that of Anagaw (2012) who found that the real effective exchange rate had a positive and significant impact on exports in Ethiopia. On the contrary, Menji (2010) found that real effective exchange rates had an insignificant impact on both manufacturing and merchandise exports in the case of Ethiopia. Agasha (2009) also found a negative and significant relationship between real effective exchange rate and coffee exports in Uganda.

Foreign direct investment has a positive but insignificant impact on cotton exports both in the short-run and in long-run. A 1 percent increase in the amount of foreign direct investment increases cotton exports by 1.80 and 2.24 percent in the short-run and long-run respectively although both coefficients are insignificant. This result is consistent with that of Sharma (2003), Agasha (2009) and Menji (2010) who found a positive but insignificant impact of foreign direct investment on exports. However, the result differs from that of Morrisey (2006) who found that foreign direct investment had a significant impact on exports on a study to explain the trade

performance of 48 African nations. Boansi (2013) also found that foreign direct investment had a positive impact on coffee exports in Ethiopia.

The price of cotton in the previous year on the international market has a positive and significant impact on cotton exports in the short-run although it is insignificant in the long-run. An increase in the international price of cotton by 1 percent culminates into a 1.30 percent increase in cotton exports in the short-run and by 0.42 percent in the long-run albeit it is insignificant. Similarly, Mesieke (2008) and Babatunde (2009) did not find a significant relationship between world prices and exports. However, Agasha (2009), Mwansakilwa (2013) and Boansi (2013) found out that the world price had a significant impact on the volume of exports in Uganda, Zambia and Ethiopia, respectively.

The real income of the trading partner was found to have a negative impact on the volume of exports both in the short-run and long-run although the impact was larger in the long-run. The reason for the reported negative coefficient is that as the economies of the trading partner grow they may channel their resources towards the production of the same commodity that they import hence reducing their imports of cotton. The export elasticities with respect to the income of the trading partner are -8.67 percent in the short-run and -13.90 in the long-run. This means that an increase in the income of the trading partner by 1 percent results in the decline of exports by 8.67 percent in the short-run and by 13.90 percent in the long-run. This result is consistent with that found by Ragoobur (2011) who found out that foreign income had a negative impact on exports in Mauritius. On the other hand, Anagaw (2009) found a positive but insignificant impact of an increase in the trading partner's real gross domestic product on Ethiopian exports.

The error correction term is negative and significant thereby confirming the existence of a cointegrating relationship among the variables. The coefficient of the error term is high reflecting a faster adjustment towards the long-run equilibrium in case of disequilibrium. It shows that 88 percent of the disequilibrium is corrected within one year. The reported R squared implies that the variables in the estimated model explain 91 percent of the variation in tobacco exports.

4.5.7 Post-estimation diagnostic tests for factors affecting growth of cotton exports

Results of the Breusch – Godfrey serial correlation test are presented in Table 9.The null hypothesis of no serial correlation is tested against the alternative hypothesis of the existence of serial correlation. Two lags were used to test for the presence of autocorrelation in the Breusch –Godfrey serial correlation test. The null hypothesis is rejected if the probability

value of the calculated chi-square statistic is less than 0.05. The probability value of the computed chi-square statistic is not significant at 5 percent level of significance. Therefore, the null hypothesis is not rejected implying that the residuals are not serially correlated.

The Breusch –Pagan –Godfrey Heteroskedasticity test was used to test the residuals in terms of whether they are homoskedastic or not, the null hypothesis being a homoskedastic disturbance term against the alternative hypothesis of heteroskedastic disturbance term. Rejection of the null hypothesis depends on the significance of the computed chi-square statistic at 5 percent level of significance. The results of the Breusch –Pagan –Godfrey Heteroskedasticity test are presented in Table 9. The probability value of the computed chi-square statistic is greater than 5 percent level of significance. Therefore, the null hypothesis is not rejected implying that the residuals are homoskedastic.

Normality of the residuals was tested by the Jarque- Bera normality test. The null hypothesis is that the residuals are normally distributed while the alternative hypothesis is that residuals are not normally distributed. The results of the Jarque- Bera normality test are presented in table 9. The probability value of the Jarque-Bera test is not significant at 1 percent level of significance. Therefore, the null hypothesis is not rejected; hence the residuals are normally distributed.

The Ramsey–reset test was used to test if the estimated ARDL (2, 1, 0, 0, 1, 0) is stable and correctly specified, the null hypothesis being the model is correctly specified against the alternative hypothesis that the model is mis-specified. The results of the Ramsey-reset test are presented in table 9. The probability value of the F-statistic is insignificant. Therefore, the null hypothesis is not rejected implying that the model is correctly specified. A plot of the Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) show that the coefficients are stable as the recursive residuals lie within the 5 percent level of significance; hence we fail to reject the null hypothesis that the coefficients are stable and consistent (refer to appendix J).

4.6 Causality tests

The granger causality test was used to determine if there is causality from tobacco exports to real agricultural gross domestic product or from real agricultural gross domestic product to tobacco exports. This was to achieve objective (iv). A Vector Auto Regressive (VAR) model was used in the granger causality test with a total number of four lags selected using the Akaike Information Criterion and the Hannan Quinn Information Criterion. The pairwise results of the granger causality test are presented in Table 10.

Table 10: Causality test for tobacco exports.

Null Hypothesis:	Obs	F-Statistic	Prob.
AGDP does not Granger Cause TE	30	1.34130	0.2877
TE does not Granger Cause AGDP		5.52708	0.0034

The first hypothesis is that the share of agricultural gross domestic product does not granger cause tobacco exports while the alternative hypothesis is that the share of agricultural gross domestic product granger causes tobacco exports. The null hypothesis is not rejected at 5 percent level of significance; hence the share of agricultural gross domestic product does not granger cause tobacco exports. The second hypothesis is that tobacco exports do not granger cause the share of agricultural gross domestic product while the alternative hypothesis is that tobacco exports granger cause the share of agricultural gross domestic product. The null hypothesis is rejected at 5 percent level of significance implying that tobacco exports granger cause the share of agricultural gross domestic product.

For cotton exports, a VAR model was also used to test for causality with two lags selected using the Akaike Information Criterion and the Hannan Quinn Information Criterion. The first null hypothesis is that the share of agricultural gross domestic product does not granger cause cotton exports is tested against the alternative hypothesis that the share of agricultural gross domestic product granger causes cotton exports. The second null hypothesis is that cotton exports do not granger cause the share of agricultural gross domestic product is tested against the alternative hypothesis that cotton exports granger cause the agricultural share of gross domestic product. The pairwise results of the granger causality tests are presented in Table 11.

Table 11: Granger causality test for cotton exports.

Null Hypothesis:	Obs	F-Statistic	Prob.
AGDP does not Granger Cause CE	32	0.29446	0.7473
CE does not Granger Cause AGDP		3.38932	0.0486

The null hypothesis that the share of agricultural gross domestic product does not granger cause cotton exports is not rejected at 5 percent level of significance implying that the share of agricultural gross domestic product does not granger cause cotton exports. On the other hand, the null hypothesis that cotton exports do not granger cause the share of agricultural gross domestic product is rejected at 5 percent level of significance, hence cotton exports granger cause the share of agricultural gross domestic product.

As evident from the foregoing, agricultural exports, both cotton and tobacco granger cause the share of agricultural gross domestic product and therefore emphasizes the need to grow the two sectors if export diversification and indeed economic growth is to be realized. These results are consistent with those found by Bulagi (2011) who found that avocado, apple, mango and orange exports granger caused the agricultural share of gross domestic product of South Africa. Memon (2008) also found that there was strong causality between agricultural exports and the gross domestic product in Pakistan.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

This study sought to find out factors that affect growth of tobacco exports over the last 34 years in Zambia. In order to examine the developmental trajectory of cotton and tobacco exports, trend analysis was employed in which exports of either crop were regressed on time.

Graphical analysis was also used to analyze the trends in the growth of cotton and tobacco exports. To achieve the objectives of the determinants of the growth of cotton and tobacco exports, the ARDL models were employed. The ARDL (1, 0, 3, 0, 3, 0) was used to estimate determinants of the growth of tobacco exports. On the other hand, an ARDL (2, 1, 0, 0, 1, 0) was used to estimate the determinant factors influencing growth of cotton exports. The lag structure of the respective ARDL models was determined by the Schwartz Bayesian Information Criterion. The bounds test was used to examine the existence of co-integration prior to estimation of the respective ARDL models. Finally, the study used the granger causality test to examine if there is causality between cotton or tobacco exports and agricultural share of GDP.

5.2 Conclusion

A trend analysis found out that both exports have grown during the period under consideration. There has been an upward and positive trend in the growth of cotton and tobacco exports. Tobacco exports have grown by 5.47 percent while cotton exports have grown by 4.18 percent for the period under review. The bounds test found that there is co-integration among factors that affect tobacco exports as well as cotton exports. The study found that the factors that affect growth of exports are crop specific although there are common factors that are significant for both crops such as real effective exchange rate and the income of the trading partner. The real effective exchange rate, foreign direct investment and real income of the trading partner were found to have a significant impact on the volume of tobacco exports in both the short-run and long-run. Generally, tobacco exports are more elastic to movements in real effective exchange rate, foreign direct investment and real income in the long-run than in the short-run. In case of cotton, the exports in the previous period, real interest rate, real effective exchange rate, international price of cotton and real income of the trading partner were found to have a significant impact on the volume of cotton exports in the short-run. However, only real interest rate, real effective exchange rate and the real income of the trading partner were found to have a significant impact on the volume of cotton exports in the long-run.

Granger causality tests revealed that agricultural exports, both cotton and tobacco granger cause the share of agricultural gross domestic product. On the other hand, the share of agricultural gross domestic product does not granger cause cotton or tobacco exports.

5.3 Policy Recommendations

Analysis of objectives (ii) revealed that tobacco and cotton exports are significantly affected by the income of the trading partner and the real effective exchange rate. Therefore, policies should be tailored in such a way that they address the impediments on the demand and supply sides of both tobacco and cotton exports. To cushion the impact of changes in the income of the trading partner, government should exploit available markets by increased participation actively in regional integration.

With regards to exchange rate movements, there is need to use policy instruments such as capping of interest rates to take care of interest rate differentials that may affect international capital flows. This may reduce volatility of the exchange rate and stabilize foreign exchange earnings derived from the export of cotton and tobacco.

Cotton exports are specifically affected by interest rates while tobacco exports are affected by foreign direct investment. Currently, interest rates in Zambia are one of the highest in the Southern African region. Government therefore needs to establish an agricultural development fund to provide credit at favorable and preferential rates.

In case of tobacco exports, there is need to attract foreign direct investment by scaling up incentives in form of tax holidays. Influx of foreign direct investment will also have added benefits such as increased access to foreign markets, improved bargaining of better international prices, better production techniques and employment creation for the local population. Foreign direct investment also brings infrastructural development in form of construction of roads and railways, especially in rural areas thereby reducing transaction costs such as transportation.

For objective (iii), tobacco and cotton exports were found to granger cause agricultural share of GDP. This means growth of the two sectors has to take place first before growth of agricultural share of GDP and not the converse. The policy implication is that the two sectors should be prioritized in terms of increased budget allocation and this will in turn raise agricultural GDP and drive the economy towards export diversification.

5.4 Areas of further research

While the study endeavoured to find out factors that affect growth of tobacco and cotton exports, there is need for a detailed study to investigate factors that may affect the production of the two export commodities through elaborate interviews with the various stakeholders such as the exporters themselves and the farmers. Results would be better, more informative and relevant if panel data were employed to examine the determinants of exports growth at country

or region level rather than total exports of either crop as a whole. By doing so, there will be increased awareness on elasticity of exports with respect to a particular country or region thereby aiding policy makers to identify countries or regions with which Zambia should specialize in trading with. Furthermore, studies should go beyond just factors that affect the volume of exports but also examine competitiveness of the exports on the international market.

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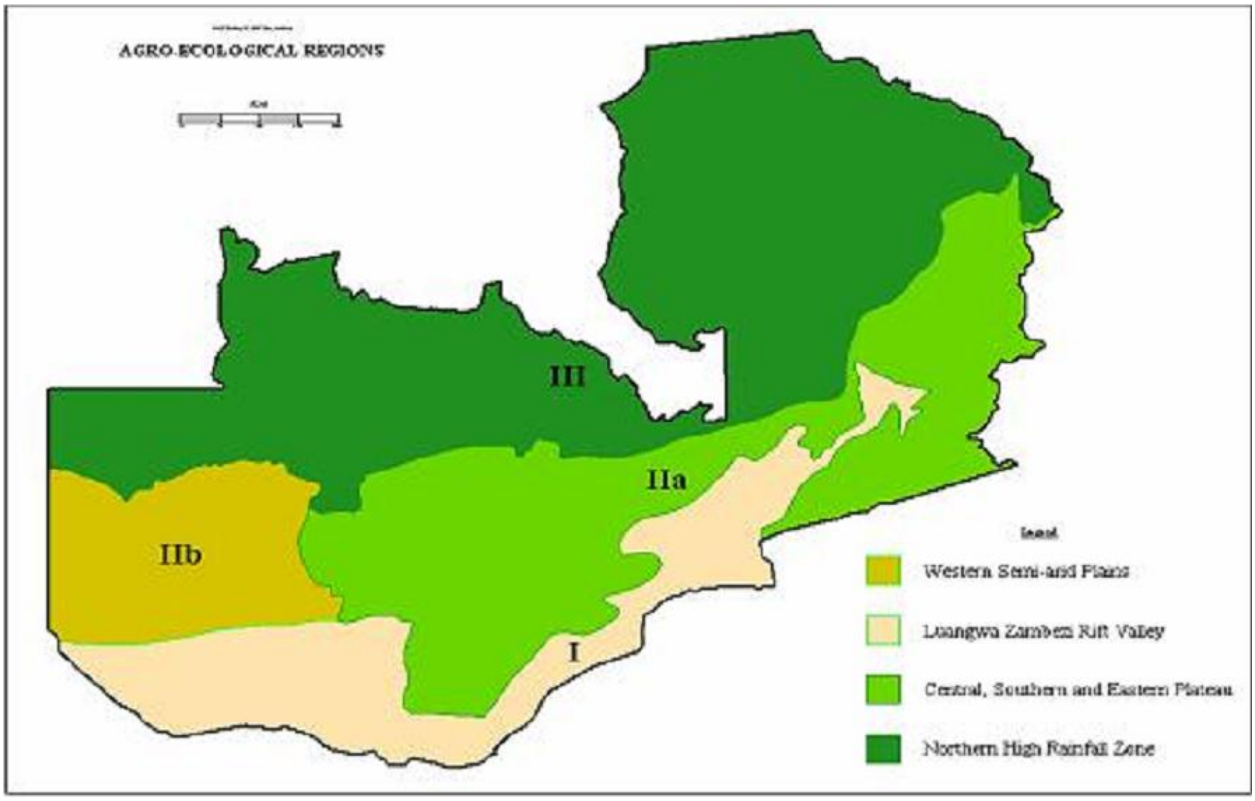
APPENDICES

Appendix A: Map for Agro-ecological zones of Zambia



Appendix B: Definition of Agroecological zones of Zambia

Agro-Ecoligcal Zone	Average Rainfall (mm/year)	Elevation (meters above sea level)	Growing Season (days)	Soil productivity	Temperature range (^{o}C)
I	<800	300 - 1,200	80 - 129	Highly erodible	10.3 – 36.5
IIa	800-1000	900 - 1,300	100 – 140	More fertile	6.3 – 33.6
IIb	800-100	900-1,200	100-140	Infertile coarse sands	17– 18
III	>1000	1,100 - 1,700 (<1,000 in Luapula)	120 – 150	Highly leached and acidic	5.7 – 32.1

Appendix C: Regression analysis of tobacco exports

Source	SS	df	MS	Number of obs =		34
				F(1, 32) =		141.71
Model	9.285447	1	9.285447	Prob> F =		0
Residual	2.096729	32	0.065523	R-squared =		0.8158
				Adj R-squared =		0.81
Total	11.38218	33	0.344914	Root MSE =		0.25597
te	Coef.	Std. Err.	t	P>t	[95% Conf.	
year	0.053267	0.004475	11.9	0.0000	0.044153	0.062382
_cons	-102.588	8.933691	-11.48	0.0000	-120.786	-84.3909

Appendix D: Regression analysis of cotton exports

Source	SS	df	MS	Number of obs	=	34
				F(1, 32)	=	63.81
Model	5.480162	1	5.480162	Prob> F	=	0
Residual	2.748163	32	0.08588	R-squared	=	0.666
				Adj R-squared	=	0.6556
Total	8.228325	33	0.249343	Root MSE	=	0.29305
ce	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
year	0.040922	0.005123	7.99	0	0.030487	0.051357
_cons	-80.0127	10.22777	-7.82	0	-100.846	-59.1794

Appendix E: Co-integration test of tobacco exports

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	6.569264	5

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.49	3.38
5%	2.81	3.76
2.5%	3.11	4.13
1%	3.5	4.63

Null Hypothesis: Residuals have a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.407949	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Appendix F: Tobacco exports model selection

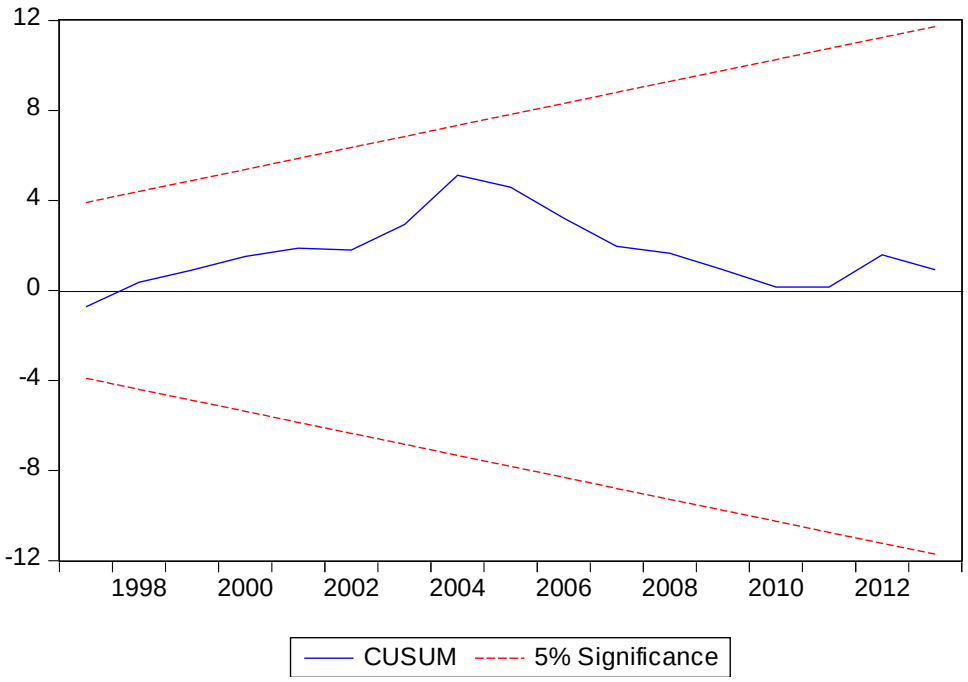
Dependent Variable: TE
Method: ARDL
Date: 06/27/15 Time: 23:53
Sample (adjusted): 1983 2013
Included observations: 31 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Schwarz criterion (SIC)
Dynamic regressors (3 lags, automatic): RIR REER TP(-1) FDI RIT
Fixed regressors: C @TREND
Number of models evalulated: 1024
Selected Model: ARDL(1, 0, 3, 0, 3, 0)
Note: final equation sample is larger than selection sample

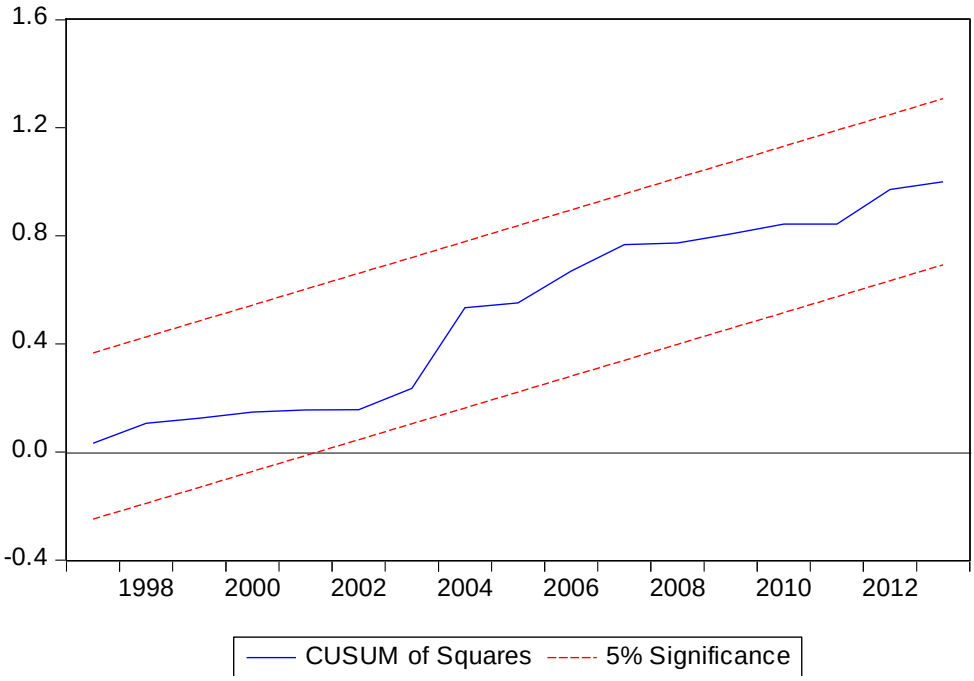
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
TE(-1)	0.174117	0.160415	1.085415	0.2929
RIR	-0.003674	0.002926	-1.255663	0.2262
REER	1.001632	0.352257	2.843470	0.0112
REER(-1)	0.080900	0.431198	0.187617	0.8534
REER(-2)	-0.958161	0.406782	-2.355464	0.0308
REER(-3)	1.349798	0.278737	4.842552	0.0002
TP(-1)	0.545162	0.687159	0.793357	0.4385
FDI	0.047192	0.019186	2.459731	0.0249
FDI(-1)	0.046720	0.023421	1.994814	0.0624
FDI(-2)	0.014572	0.023111	0.630502	0.5368
FDI(-3)	0.037496	0.018734	2.001438	0.0616
RIT	-13.33192	3.657142	-3.645448	0.0020
C	151.9561	41.45038	3.665975	0.0019
@TREND	0.270447	0.076486	3.535890	0.0025

R-squared	0.969220	Mean dependent var	3.811822
Adjusted R-squared	0.945682	S.D. dependent var	0.587975
S.E. of regression	0.137034	Akaike info criterion	-0.834720
Sum squared resid	0.319232	Schwarz criterion	-0.187113
Log likelihood	26.93816	Hannan-Quinn criter.	-0.623616
F-statistic	41.17743	Durbin-Watson stat	2.301738
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix G: Stability tests for factors affecting growth of tobacco exports





Appendix H: Co-integration test for factors that affect growth of cotton exports

ARDL Bounds Test
Date: 06/28/15 Time: 23:40
Sample: 1982 2013
Included observations: 32
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	3.943658	5

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.49	3.38
5%	2.81	3.76
2.5%	3.11	4.13
1%	3.5	4.63

Null Hypothesis: Residuals have a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.402957	0.0000
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Appendix I: Factors that affect growth of cotton exports and model selection

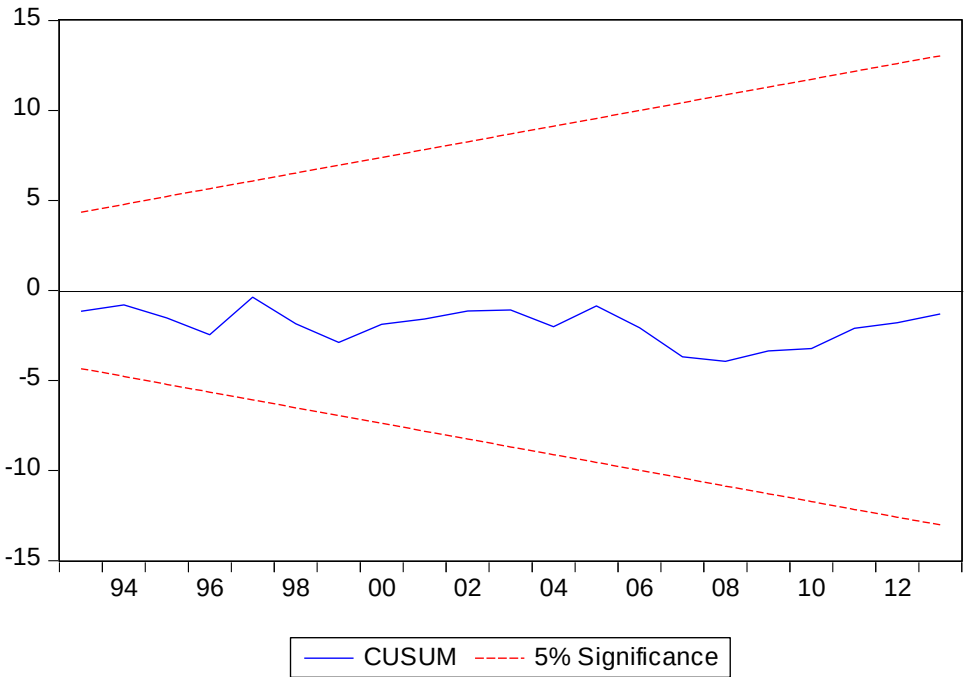
Dependent Variable: CE
Method: ARDL
Date: 06/29/15 Time: 02:47
Sample (adjusted): 1982 2013
Included observations: 32 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): RIR REER FDI CP(-1) RIC
Fixed regressors: C @TREND
Number of models evalulated: 64
Selected Model: ARDL(2, 1, 0, 0, 1, 0)

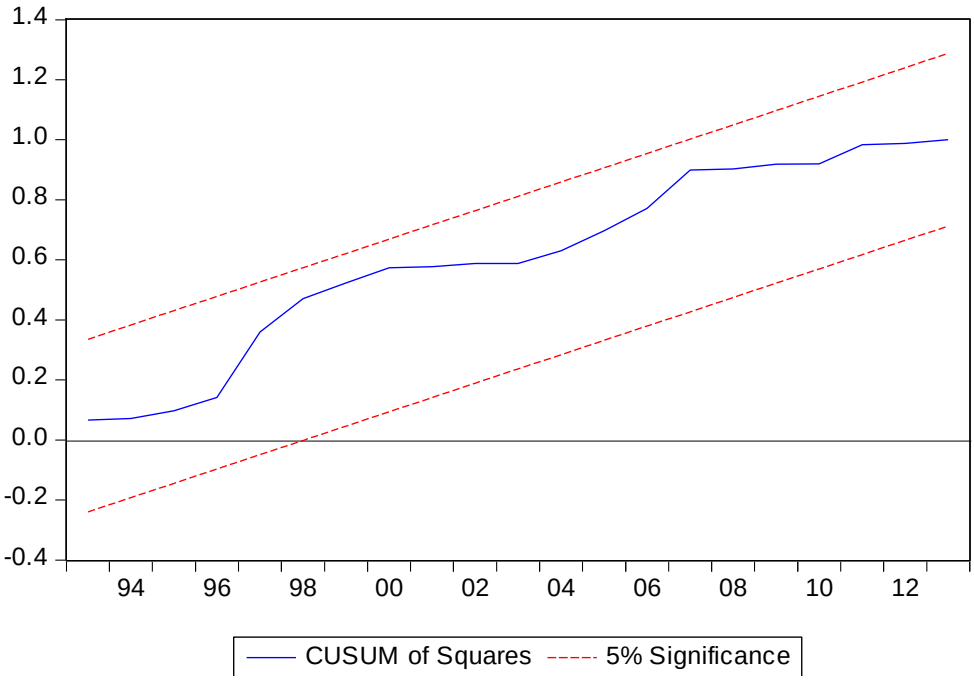
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
CE(-1)	-0.077713	0.158957	-0.488894	0.6300
CE(-2)	0.344100	0.160400	2.145259	0.0438
RIR	-0.014618	0.004215	-3.467893	0.0023
RIR(-1)	0.010121	0.003925	2.578410	0.0175
REER	1.586192	0.273391	5.801908	0.0000
FDI	0.016424	0.018768	0.875095	0.3914
CP(-1)	1.274285	0.491493	2.592685	0.0170
CP(-2)	-0.964598	0.410769	-2.348275	0.0287
RIC	-10.19599	2.168344	-4.702199	0.0001
C	111.4724	23.62200	4.719007	0.0001
@TREND	0.336038	0.066407	5.060272	0.0001

R-squared	0.905924	Mean dependent var	1.726137
Adjusted R-squared	0.861126	S.D. dependent var	0.488884
S.E. of regression	0.182186	Akaike info criterion	-0.301286
Sum squared resid	0.697030	Schwarz criterion	0.202561
Log likelihood	15.82058	Hannan-Quinn criter.	-0.134275
F-statistic	20.22245	Durbin-Watson stat	2.608894
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix J: Stability tests of factors that affect growth of cotton exports





Appendix K: Data used in the study

YEAR	REER	RIR	FDI	RIT	RIC	TP	CP	TE	CE	AGDP
1980	2.312226	-2.02475	1.588351	11.64182	11.32868	3.357146	3.314255	3.415641	1.20412	1.277505
1981	2.302706	2.184969	-0.95805	11.64766	11.34461	3.365804	3.272087	3.230449	0.954243	1.285581
1982	2.435381	3.16699	1.007461	11.65019	11.35523	3.408911	3.203377	3.033021	1.498839	1.244019
1983	2.337459	-4.74532	0.773852	11.66031	11.37134	3.424316	3.268084	3.196176	1.50515	1.287557
1984	2.309564	-3.20251	0.632465	11.67925	11.40567	3.445031	3.251602	3.183555	1.612784	1.312663
1985	1.867289	-15.9666	2.286395	11.69449	11.43373	3.416943	3.120009	3.257439	1.447158	1.320611
1986	1.579467	-29.9983	1.700299	11.7077	11.45315	3.424748	3.023777	2.915927	0.69897	1.353811
1987	1.604996	-25.1937	3.288819	11.72058	11.47961	3.438629	3.217071	3.286232	0.69897	1.332711
1988	1.710991	-11.9713	2.502093	11.74179	11.51025	3.392328	3.145942	3.416807	0.954243	1.382936
1989	1.819975	-34.5468	4.097957	11.75812	11.52665	3.500726	3.223814	3.01536	1.255273	1.375596
1990	1.734666	-34.539	6.164126	11.77791	11.53969	3.53048	3.259867	3.306854	1.612784	1.337186
1991	1.6991	-48.0936	1.015757	11.801	11.55743	3.544077	3.224639	3.102091	1.69897	1.359243
1992	1.680796	-41.7902	1.413845	11.8176	11.58754	3.5365	3.106633	3.39794	1.50515	1.19244
1993	1.736542	-12.456	9.604376	11.82682	11.62109	3.430614	3.1073	3.765743	1.39794	1.389478
1994	1.718847	-5.63447	1.09385	11.84745	11.65681	3.421877	3.246197	3.477121	1.39794	1.337658
1995	1.70061	11.42491	2.54795	11.86444	11.68744	3.422169	3.327951	2.955688	1.39794	1.447407
1996	1.738991	23.67049	3.255291	11.87873	11.71724	3.485064	3.24879	3.531479	1.176091	1.415171
1997	1.802299	16.97663	4.819568	11.89536	11.74642	3.547965	3.242438	3.61078	2	1.372225
1998	1.772088	12.73931	5.596791	11.91062	11.77149	3.523242	3.159783	3.736443	1.30103	1.37482
1999	1.772913	19.1588	4.758709	11.92633	11.79607	3.483042	3.068585	3.708571	1.653213	1.391644
2000	1.783289	4.664768	3.379962	11.94635	11.82586	3.473664	3.114661	3.826046	1.812913	1.375754
2001	1.84141	16.67746	3.541387	11.96278	11.85285	3.477788	3.024516	3.913637	1.875061	1.335026
2002	1.852117	21.61562	7.114941	11.97648	11.88193	3.438458	3.00827	4.044523	2.060698	1.300295
2003	1.797975	19.52534	7.078932	11.99029	11.91392	3.422606	3.145852	4.204364	2.176091	1.282937
2004	1.812338	9.196934	6.253547	12.01019	11.94906	3.437785	3.135362	4.686385	2.352183	1.260296
2005	1.899462	9.909364	4.284035	12.03187	11.98859	3.44555	3.085279	4.668149	2.511883	1.21425
2006	2.016089	7.517675	4.827091	12.06349	12.0333	3.472639	3.102624	4.547766	2.30103	1.174978
2007	1.980553	5.239336	9.418165	12.09752	12.08295	3.520491	3.144623	4.368776	2.09691	1.123197
2008	2.041823	7.61291	5.240453	12.1192	12.1173	3.554942	3.196979	4.386936	2.09691	1.078996
2009	1.975505	15.63422	4.532788	12.12672	12.1471	3.626874	3.140515	4.428246	2	1.043434
2010	2	6.112657	8.533265	12.15753	12.18511	3.636812	3.358578	4.535149	2.113943	0.994608
2011	1.983157	6.500196	4.670929	12.18542	12.21918	3.651767	3.522249	4.494323	2.39794	1.001479
2012	2.000391	7.560147	6.94279	12.2043	12.24736	3.633706	3.29383	4.578731	2.39794	1.001897
2013	2.018197	3.667867	6.751832	12.22327	12.27608	3.661701	3.299441	4.619246	2.230449	0.940175