

**EXCHANGE RATE VOLATILITY AND EXPORT GROWTH IN
ZAMBIA, THE CASE OF TOBACCO 1992-2014**

By

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**A dissertation submitted in partial fulfillment of the requirements for
the degree of Master of Arts in Economics.**

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DECLARATION

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The University of Zambia has approved this dissertation of **Ian Silumba, Mufana** as fulfilling the requirements for the award of the degree of Master of Arts in Economics.

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ABSTRACT

This study empirically investigates the effects of real exchange rate volatility on tobacco export growth in Zambia. The study employs annual time series data for the period 1992 to 2014 and uses the Exponential Generalised Autoregressive Conditional Heteroskedasticity (EGARCH) to measure exchange rate volatility; the Augmented Dicky Fuller (ADF) to test for order of integration among the variables and The ARDL Bounds F-testing procedure as proposed by Pesaran et al., (2001) to model the findings. The analysis assumes an export demand framework that includes; relative prices, which are a measure of competitiveness and foreign incomes to capture foreign demand factors. The empirical finding of the study reveals that real exchange rate volatility exerts positive but insignificant impact on tobacco export growth in both the short-run and the long-run. On the other hand, relative prices and foreign income have significant positive effects on tobacco exports growth in the short-run as well as the long run. Implying that a real depreciation in the kwacha and an increase in income of the trading partner are more stimulus to the growth of the tobacco export industry.

Keywords: Real exchange rate, volatility, ARDL-Bounds testing procedure, Tobacco Exports.

DEDICATION

To my late sister Precious, my mum and dad, the entire family and my friends.

ACKNOWLEDGEMENTS

I would like to thank the Lord my God for his provisions, his sustenance and his never ending presence. It's a great reminder of why he deserves to be praised and worshiped.

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LIST OF ACRONYMS

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
ARCH	Auto Regressive Conditional Heteroscedasticity
ARDL	Auto-Regressive Distributed Lag
BOZ	Bank of Zambia
CSO	Central Statistical Office
CTPD	Centre for Trade Policy and Development
EAZ	Economics Association of Zambia
ECM	Error Correction Model
EGARCH	Exponential Auto Regressive Conditional Heteroscedasticity
ERM	Exchange Rate Mechanism
EU	European Union
FAO	Food and Agriculture Organisation
FAOSTAT	Food and Agriculture Organisation Statistics
GARCH	Generalized Auto Regressive Conditional Heteroscedasticity
GDP	Gross Domestic Product
Ha	Hectares
IMF	International Monetary Fund
Kg	Kilogram
LM	Lagrange Multiplier
MC	Marginal Cost
MT	Metric Tonnes
NATCO	National Tobacco Company
NTEs	Non-Traditional Exports
OGL	Open General License
OLS	Ordinary Least Squares
RER	Real Exchange Rate
SAARC	Southern Asian Association for Regional Cooperation
TAZ	Tobacco Association of Zambia
TBZ	Tobacco Board of Zambia

TEX	Tobacco Exports
UECM	Unrestricted Error Correction Model
UK	United Kingdom
US	United States
USDA	United States Department of Agriculture
VAR	Vector Auto Regressive
VECM	Vector Error Correction Mechanism
VTAZ	Virginia Tobacco Association of Zambia
WDI	World Development Indicators
WHO	World Health Organisation
WLF	World Lung Foundation
ZDA	Zambia Development Agency
ZRA	Zambia Revenue Authority

CHAPTER ONE

INTRODUCTION

This Chapter presents an introduction to the study. The Chapter highlights historical developments made and challenges encountered in attempt to drive towards the diversification of the export industry in Zambia. Among other things, the chapter also highlights the potential of tobacco as a source of increased export earnings and the possible implication of exchange rate volatility on the growth of this industry. Furthermore, the chapter presents an explanation of the problem statement, Objectives and the significance of the study.

1.1 Background of the Study

The importance of exports to a country's economic growth cannot be overemphasized. Exports contribute greatly to the level of a country's national income. That is, the higher the level of exports relative to imports, the higher the level of national income. Not only that, 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 (Were, 2002). In fact, no country in the past 50 years has sustained high levels of growth and increased per capita incomes significantly without greatly expanding its exports (Pavcnik, 2002).

Nonetheless, expansion of exports requires a degree of diversification. This is the case in most developing countries that depend on primary commodity production. Dependence on a single product export leaves them vulnerable to commodity shocks, price fluctuations and declining terms of trade. Export diversification is defined as a widening of the range of products that a country can export (Dennis and Shepherd, 2007). Achieving export diversification has been a central objective of development policy for the last 50 years. Yet for most developing countries, the composition of production and exports is highly concentrated in natural resources. Zambia is one such country that has overly depended on copper export earnings to drive economic growth. Copper accounts for over 70 percent of total exports in Zambia (SNDP, 2014). This has been the case throughout the country's economic history. At the time of independence (in 1964) for

example, Copper exports contributed about 94% of total export earnings (ECA/UNCTC, 1984, 21).

Efforts were made however to diversify the economy by undertaking a vigorous promotion of the manufacturing sector in the post-independence era. The country pursued an import substitution (I.S) strategy aimed at creating a manufacturing base that would encourage production of goods locally and discourage imports (World Bank, 1984). The essence of the import substitution was to enhance the development of the local market to the level of self-sufficiency in the production of the goods suitable and at the dictate of the local market. But the rapid expansion of manufacturing industry did not contribute significantly to the spread of increased productivity in all sectors of the Zambian economy (Seidman, 1974). Hence the country remained dependent on the mining sector, in addition, the import substitution strategy also led to a highly protective exchange rate regime. The overvalued Kwacha during this period had negative repercussions on the agricultural sector as it reduced earnings realized by farmers from export of agricultural cash crops (World Bank, 1984).

However, during the 1990's International Monetary Fund (IMF) structural adjustment programmes, the government instituted more policy changes to diversify the economy away from the dependency on copper. This move was envisaged to boost overall growth by replacing commodities with positive price trends and adding value to additional processing or marketing and help minimise volatility in export earnings since traditional exports are predominantly vulnerable to exogenous shocks (Samen, 2010). These efforts entailed the revival of potential key sectors of the economy. Among these sectors, agriculture production and agro processing was identified to possess the greatest potential for export diversification. With only fourteen percent of cultivatable land and 19% of the water resources utilized in the 1990's, Zambia had considerable untapped potential for agriculture development (Sajeev, 2004: 20-25).

The liberalization of the economy in the 1990's helped the country to reverse some of the negative growth experienced in agriculture over the previous two decades when the agricultural sector was just seen as a way of satisfying the food needs of the ever-increasing urban population (Kapuya, 2011). Agricultural activities have since slightly diversified with the establishment of

private agricultural product processing facilities and private sector participation in out grower schemes and export promotion initiatives (Cuts International, 2011:220).

One agriculture activity that has benefited greatly under the private sector participation and out grower schemes is tobacco. In Zambia, tobacco is primarily grown for exports. It is one of the few crops that generates income from small plots of land, providing an income four times greater than any other crop, and utilizes family labour through contractual out grower arrangements with tobacco merchants, which accounts for more than 50 percent of production costs (CTPD, 2015). Tobacco production and export has a positive social impact, thus militating against rural exodus, which is one of the most dramatic problems in Zambia following trade liberalization.

Zambia has vast potential to increase tobacco production because of the suitable climatic conditions that include enough land, suitable soils, water and labour (ZDA, 2011). In particular, the Eastern, Central and Southern Provinces of Zambia provide the best land for growing the tobacco. Mwape (1995) argues that with 23 million hectares of class 1 and 2 arable land, adequate fuel supply and a potentially large labour force, Zambia could do much better than Malawi (16% the size of Zambia) or Zimbabwe (half the size of Zambia with semi-arid soils) which have enjoyed relatively greater success at the international tobacco market.

On a good note, the tobacco production and export industry has exhibited considerable growth rates despite the sectors' share of export earnings declining in certain periods due to macroeconomic factors. As expected of export commodities, the performance of tobacco exports has fluctuated amid swings in major trade determining factors. However, the actual magnitude and direction of the effects of such variables on the tobacco export industry during the liberal period is not quite clearly established. As a result, Zambia is still facing the same basic problem it has been facing over the years, "*the overwhelming difficulties in exploiting trade opportunities and diversifying into new high value industries*" (MCTI, 2005: 6).

The instability that the country experienced during the 1990's had a detrimental effect on non-traditional export promotion (Sekkat and Varoudakis, 1998). Following the move to flexible exchange rate management in 1992, the Kwacha experienced high levels of volatility that is believed to have created uncertainty towards non-traditional export promotion (Musonda, 2008).

Tobacco is one of the non-traditional export commodities in Zambia. This study therefore, attempts to empirically assess the magnitude and direction of the effect of real exchange rate volatility on the growth of a single non-traditional export commodity tobacco during the period of the flexible exchange rate 1992 to 2014. Unlike Chipili (2010) who focused the analysis on burley tobacco using values from 2000 to 2006, this study includes Virginia tobacco in the analysis and lengthens the study period to cover the period from 1992 when flexible exchange rates were implemented. The study also sets itself apart from earlier studies done on this subject by focusing on one export commodity instead of aggregated volumes. The study also employs the Exponential Generalised Autoregressive Conditional Heteroscedasticity Model (EGARCH) to generate the volatility series unlike the GARCH used by Musonda (2009) and most other studies. The EGARCH model does not have any restrictions on the parameters in the model. In addition, the EGARCH model always produces a positive conditional variance independently of the signs of the estimated parameters in the model and no restrictions are needed. This is preferable when the restrictions in the GARCH model sometimes create problems when estimated parameters violate the inequality constraints.

The term volatility in this context refers to the extent to which an economic variable, such as a price or an exchange rate, moves up and down sharply over time in relation to its mean (Harwood *et al.*, 1999). Volatility connotes two principal concepts: variability and uncertainty where volatility represents the directionless variability of an economic variable as represented by the dispersion of that variable within a given time horizon (Prakash, 2011). Variability represents the overall movement and uncertainty referred to as unpredictable movement. Sadoulet and de Janvry (1995) define an exchange rate as the price of a foreign currency unit in terms of the domestic currency units. Exchange rate Volatility therefore, refers to the extent to which a price of currency, moves up and down unpredictably over time in relation to its mean (Harwood *et al.*, 1999)

There are a wide variety of factors that influence the exchange rate such as interest rates, inflation, and the state of politics and the economy in each country (Pugel, 2007). However, Volatility is more associated with the kind of exchange rate system and policy a country has employed. There are fixed and floating exchange rate systems. Fixed exchange rates are meant to

be fixed for a specified period of time. On the other hand, floating exchange rates move up and down from year to year, week to week, and minute by minute (Clark *et al.*, 2004).

Under a fixed exchange rate regime, the rise and fall of the exchange rate are referred to as exchange rate devaluation and exchange rate revaluation (Sadoulet and de Janvry, 1995). A floating exchange rate may or may not be volatile depending on how much it changes over time. Since floating exchange rates are free to change, they are generally expected to be more volatile (Clark *et al.*, 2004). Conversely, given that fixed exchange rates are not supposed to change as per definition, they have no volatility. Nevertheless, fixed exchange rates are frequently devalued or revalued, implying that they can change over time and may also be volatile. Zambia uses a managed float, which is referred to as a flexible exchange rate system as is discussed later.

Exchange rate volatility is mainly a concern for firms that are linked to international markets and therefore exposed to currency risk like the local tobacco merchants (Raddatz, 2008). Exchange rate volatility creates gains or losses to farmers and exporters Pugel (2007). This unexpected losses cause exchange rate risk. This risk determines the flow of exports and imports thus impacting on production leading to adverse effects on economic growth (Cote, 1994). Most export contracts are designed for future delivery of goods and are denominated in terms of the currency of either the buyer or seller. Therefore, unless they cover themselves in the forward market, traders with commitments to pay or receive foreign currency in the future bear exchange rate risk (Sayinta, 2002).

Unfortunately, exchange rate risk hedging facilities in Zambia are virtually nonexistent. Even where hedging opportunities are readily available, these tend to be very costly especially for small exporting firms. Consequently, exporters bear all the risk of unexpected exchange rate movements (Musonda, 2008). In tobacco production, this risk is also transmitted to the small-scale tobacco farmers who are connected to the tobacco merchants in monopsony out-grower contractual arrangements. This impacts directly on tobacco production and growth of the industry. Excessive fluctuations in the exchange rate will risk crippling the engines of Zambia's highly successful agricultural export diversification (Ngoma, 2015).

1.2 Statement of the problem

The value of trade in Zambia has been rising throughout the era of the flexible exchange rate. Tobacco export value particularly has grown from less than \$5 million in 1995 to more than \$160 million in 2013 (CSO, 2015; ZRA, 2015) despite considerable fluctuations in real exchange rate. Real exchange rates are an important relative price determinant across local and world markets in that, a drop in the real exchange rate reduces export earnings while a rise in real exchange rates increases export earnings. Therefore, frequent unpredictable fluctuations in real exchange rates brings about uncertainty in export earnings which ultimately affects the flow and growth of exports. The direction and magnitude of that effect however is a subject of debate in the available theoretical and empirical work which continues to show mixed results. Subsequently, empirical work continues to be undertaken to verify the theoretical validity of existing evidence by assessing the size and direction of the impact of exchange rate volatility on exports in an attempt to establish robust and systematic evidence (Chipili 2010).

The prevailing argument in literature is that exchange rate volatility may either stimulate or depress exports (Clark, 1973; Baron, 1976; Hooper and Kohlhagen, 1978; Côté, 1994; McKenzie, 1999; Clark et al. 2004; and Ozturk, 2006) while in some instances empirical evidence has been inconclusive. However, the majority of the empirical findings seem to support the hypothesis that an increase in exchange rate volatility leads to a decrease in the performance of exports. Such evidence has been confirmed in Zambia where Moono (2010) finds a negative relationship between exchange rate volatility and Zambia's exports to South Africa. Musonda (2008) discovers that real exchange rate volatility depresses non-traditional exports. Similarly, Ngoma (2015) demonstrates that real exchange rate volatility has a negative long run effect on Zambia's Agriculture exports.

Nonetheless, the evidence provided by Moono (2010); Musonda (2008) and Ngoma (2015) are based on aggregated exports and not representative of the effects on individual export commodities. The concern is that, focusing the assessment on aggregated trade flows may cloud the effects of exchange rate volatility in individual products, or perhaps cancel out different effects across sectors which would otherwise provide information as to how individual export products are affected by exchange rate volatility (Bini-Smaghi, 1991). For this reason, Chipili

(2010) takes a step further to disaggregate the analysis using monthly data from 2000 to 2006 and establishes that actually burley tobacco exports responds positively to volatility in real exchange rates even if the non-traditional export sector responds negatively. This study therefore seeks to build on Chipili (2010)'s study and investigate the effects of real exchange rate volatility on the growth of the tobacco export industry in totality during the period of the flexible exchange rate regime in Zambia 1992 to 2014.

1.3 General objective

To undertake an empirical assessment of the magnitude and direction of the impact of exchange rate volatility on Tobacco export growth during the flexible exchange rate regime in Zambia (1992 to 2014).

1.3.1 Specific Objectives

- 1) To examine the influence of foreign demand factors as measured by foreign income on the demand for Zambian Tobacco
- 2) To examine the influence of relative prices on tobacco exports in Zambia
- 3) To establish the impact of real exchange rate volatility on tobacco exports in Zambia

1.3.2 Hypothesis

1. Foreign Income has a positive relationship with tobacco export volume in Zambia
2. There is a positive relationship between relative prices and tobacco export in Zambia
3. Real exchange rate volatility stimulates tobacco export volume in Zambia

1.4 Significance of the Study

The government has continued implementing policies that promote the growth of non-traditional export commodities in hope of diversifying the economy away from the dependency on copper export earnings. Tobacco is the most lucrative and most important non-traditional agriculture export commodity in Zambia. The tobacco industry employs more than 450,000 people and supports about 2.3 million dependents, which makes up about 20% of Zambia's population contributing over US\$130 million in export earnings and contributing to social-economic welfare in rural areas (CTPD, 2015).

The growth of this industry presents potential opportunities for export diversification, social-economic development and poverty alleviation. It is therefore important for us to understand the magnitude and direction of the effect of exchange rate volatility on the growth of this industry. Most international transactions done in this industry are denominated in foreign currency, unanticipated variation in the exchange rate can therefore affect predictability in earnings and conversely affect growth in tobacco exports.

This study takes a disaggregated approach which is more appealing because the impact of volatility in exchange rate may be more sensitive and have different impact across commodities as demonstrated by Chipili (2010). In addition, there may be different export demands and price elasticities across products and commodities that may not be fully captured under aggregated data and thus may not be fully represented in the results of the analysis of volatility on trade (Bini-Smaghi, 1991). The study also combines exports of the two main tobacco varieties burley and Virginia tobacco to give a robust representation of the tobacco industry in Zambia during the era of the flexible exchange rates. The results of the study are envisaged to bridge the knowledge gap in literature on exchange rate volatility and export growth in Zambia.

1.5 Scope of the Study

The study period is from 1992 to 2014. This period has been chosen because it coincides with the period of flexible exchange rate regime in Zambia. The period before 1992 was the era of different episodes of mostly fixed exchange rates and in few cases floating exchange rate regimes.

1.6 Organisation of the Study

The layout of the dissertation is as follows: chapter two gives an overview of tobacco export growth and exchange rate policy evolution in Zambia. Chapter three presents a review of the theoretical and empirical framework. Chapter four outlines the methodology of the study particularly presents the empirical model, describe the dataset and present the econometric estimation techniques used. Chapter five provides the results and analysis. Chapter six concludes the study findings and makes policy recommendations.

CHAPTER TWO

TOBACCO EXPORT GROWTH AND EXCHANGE RATE POLICY EVOLUTION

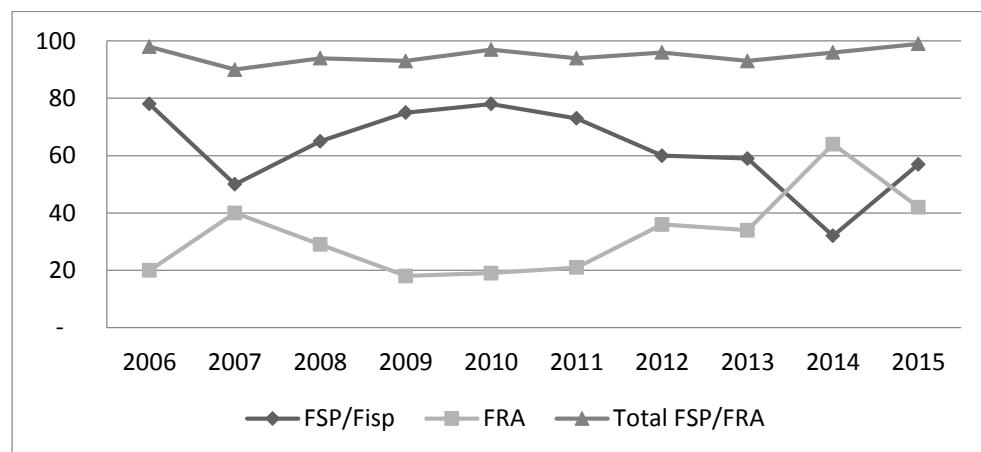
2.0 Introduction

This chapter presents a discussion of the tobacco production and export industry and exchange rate policy evolution in Zambia. It further highlights on real exchange rate volatility and the barriers to tobacco trade in Zambia.

2.1 Agricultural Crop production priority in Zambia

Traditional agricultural crops grown for home consumption include Sorghum, millet, cassava, groundnuts and mixed beans. On the other hand, wheat, sugarcane, coffee, tobacco, cotton and horticulture crops are grown for income generation. Maize is grown both for commercial purposes and as a traditional staple food crop. Consequently, much of the attention by government is devoted to maize production. This is observed by governments' deliberate programmes such as the Farmer Input Support Programme (FISP) and the Food reserve Agency (FRA) which has provided fertilizer and seed at heavily subsidized prices to farmers and market for maize produce respectively. Each year FISP has consumed the vast majority of the Government of Zambia's agricultural budget allocation (Burke et al., 2012). Figure 1, below for example, shows the trends in percentage of Poverty Reduction Program (PRP's) budget directed toward maize promotion though FISP and FRA.

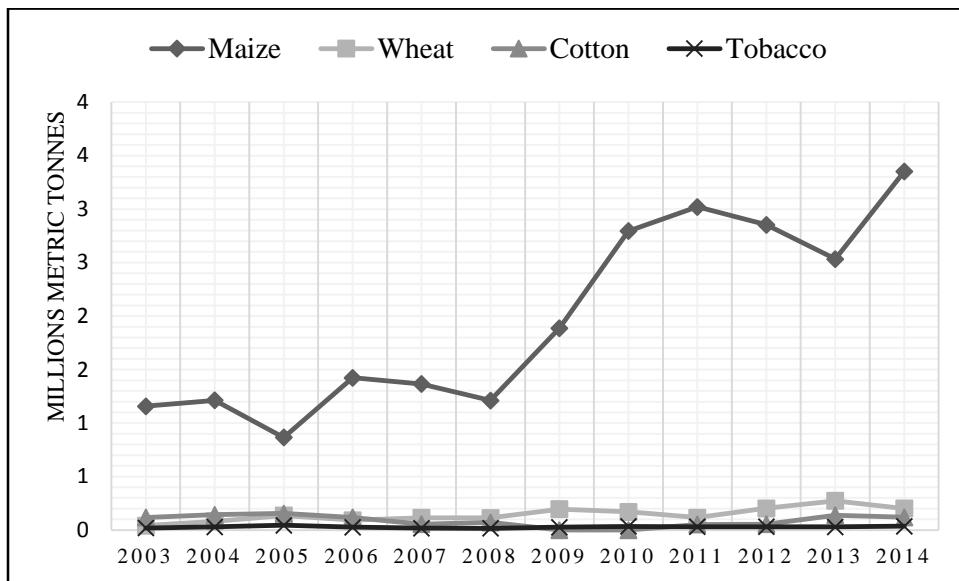
Figure 1: Percent of FISP/FRA to total Poverty Reduction Programs



Source: IAPRI 2014

The involvement of government through such programmes (FISP, FRA) has to a larger extent contributed to the observed preference in maize production especially among the small-scale farmers resulting in an overwhelming dominance of maize production (Wichern et al., 1999). The area cultivated with maize is more than 50 percent of that devoted to total crop output. Maize accounts for about 40 percent of agricultural GDP (CSO, 2015). This trend is depicted in figure 2 below for the period 2003 to 2014

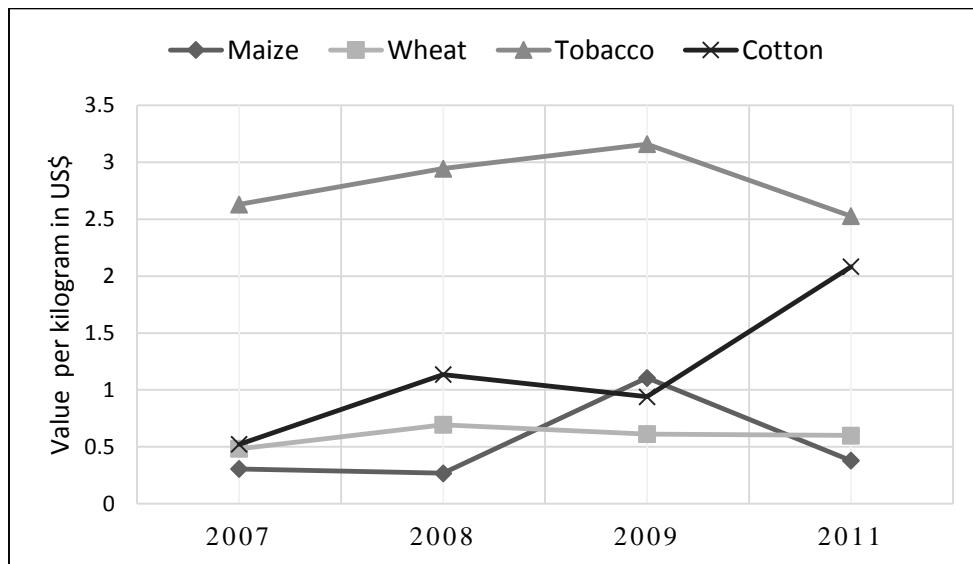
Figure 2: Dominance of Maize production in Agricultural Cash-crops (in 10,000 MT)



Source: CSO 2015

The observed dominance of maize production among other major commercial crops (Cotton and Tobacco) reveals the need to diversify the agriculture sector further if Zambia hopes to significantly expand exports. There is need to maximize the production of other crops with export potential. Tobacco for example is 7.5 times more profitable per hectare than maize production and 14 times more profitable than cotton (ZDA, 2011). Figure 3 below, shows the export value per kilogram of tobacco in comparison to other cash crops per kilogram exported from 2007 to 2011.

Figure 3: Export earnings per Kilogram of crop



Source: Authors own estimations

As can be observed in figure 3 above; a kilogram of tobacco generated 2.5US\$ on the foreign market. On the other hand, a kilogram of Maize fetched 0.3US\$ while a kilogram of Cotton and of Wheat generated and 0.5US\$ each respectively in 2007. This evidence clearly demonstrates the tobacco industry's potential to contribute significantly towards increased export earnings if fully maximized.

2.2 Overview of the Tobacco industry in Zambia

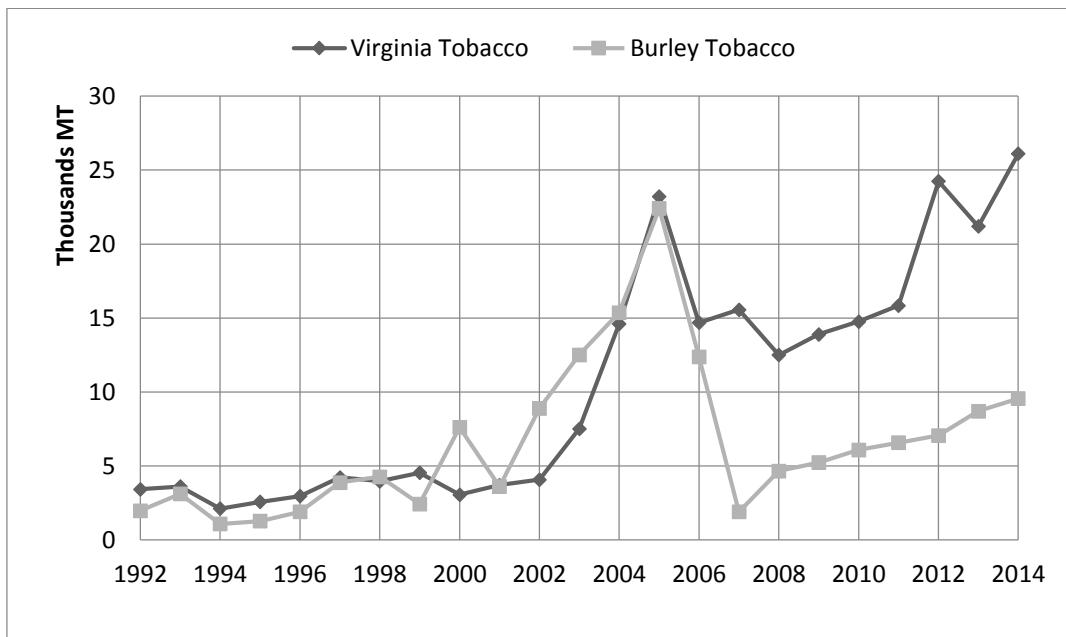
Zambia has a strong tradition in tobacco production and exports. Production of tobacco in Zambia started shortly after World War II but it was in the early 1950s when acceptable quality tobacco was produced in significant quantities. In 1955 the British government undertook to buy 2,000 tonnes of flue-cured Virginia tobacco to stimulate production. The industry expanded reaching a record high of almost 12,000 tonnes in 1964 (TBZ, 1971). In 1954, leaf tobacco was second in generating income for the Federation. Over 90 per cent of the tobacco was exported, approximately worth US \$70 million. This represented 3/4 of the total agricultural earnings of the Federation (Zambia, Malawi and Zimbabwe). The principal markets included the U.K. Australia, Union of South Africa and West Germany. In 1954, the Federation exports reached 70 per cent of the total world tobacco exports four times the average of the 1935-39 period (USDA, 1956).

After Zambia's independence in 1964, tobacco continued to be a mainstay of agricultural exports and rural employment until the mid-1980s. Tobacco exports then declined-falling to less than US\$5 million in 1995. Since the mid-1990s however, when considerable efforts were made to promote tobacco production, Zambia has seen a significant revival of the crop (World Bank, 2009). Tobacco production and exporting has grown rapidly in recent years, in fact, Zambia was ranked the 9th world largest tobacco exporter in 2007 (ZDA, 2011). Currently, the tobacco industry employs more than 450,000 people through rural out-grower schemes and supports about 2.3 million dependents relieving more than 20% of the Zambian people from poverty and contributing over US\$100 million in export value (CTPD, 2015).

2.2.1 Tobacco varieties

Traditionally, there are two main types of tobacco grown in the country. Namely, Virginia and burley tobacco. Virginia Tobacco is predominantly grown in the Central, Eastern and southern provinces of the country. There are at least 10,000 Virginia tobacco growers in Zambia. These comprise mainly of out-grower schemes, small, medium and large-scale commercial production, which account of 25% of total production. The crop sizes range up to 1,000 Ha, but the majority grow crops under 5 hectares or between 80 and 120 hectares. Burley tobacco on the other hand, is grown in the Central, Eastern, Lusaka, Western and Southern provinces of Zambia (ITC, 2012). It is the second largest smallholder crop in Zambia. Its production involves 20,000 households. The national average yields are 0.95 metric tons per hectare (CSO, 2016). Figure 4 below, shows the trends in tobacco production by variety during the study period.

Figure 4: Tobacco production (Thousands MT of unprocessed leaf), Zambia (1992-2014)



Source: CSO, 2014

As can be observed from the figure (4) above, production of both varieties of tobacco grew rapidly during the period 2000 to 2005 where each variety reached 24000 MT in 2005 from less than 5000MT in 1999. However, Zambia experienced unprecedented exchange rate appreciation during most of 2005 and the first half of 2006. During this period, the exchange rate for the Zambian kwacha (K) relative to the US dollar (US\$) appreciated from around K 5: US\$1 at the start of 2005 to K 2.8: US\$1 in April 2006 (World Bank, 2009). The appreciation of the kwacha reduced the competitiveness of the tobacco export industry. As a result, the estimated number of smallholders growing burley tobacco dropped from over 20,000 in 2005/06 to around 9,000 in 2006/07 and resulting in a drop in production from 24,000MT in 2005 to less than 5,000MT in 2007 (see figure 4). Thereafter, production of both varieties picked up and slowly started rising though production of burley tobacco has remained lower than that of Virginia tobacco as evident in figure (4) above.

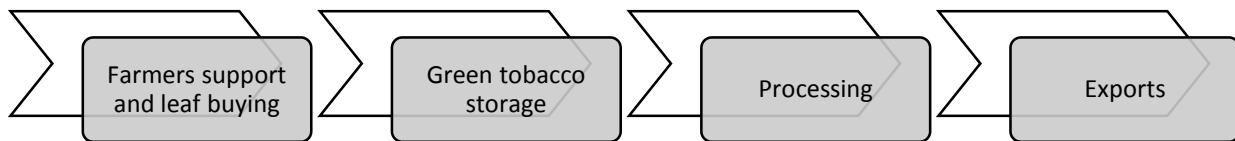
2.2.2 Tobacco value chain

Value chains consist of different producers and marketing companies that work within their respective businesses to pursue one or more shared end-markets. Small-scale farmers grow most of the tobacco in Zambia. These farmers are linked to agribusiness through contract farming in

which farmers form loose groups to receive services and inputs from tobacco merchants. Some firms (merchants) use company-employed extension agents to operate the schemes; other firms outsource this function to independent private operators. Prices in the tobacco industry are set by the companies, ‘based on the market. Negotiations on grades occur between the farmer and agent at the farm gate or on the auction/trading floor (World Bank, 2009). There is no auction floor in the country, but TAZ works as a trading floor. The Tobacco Association of Zambia, (TAZ) is a statutory authority that employs a small number of extension officers and operates auction and sales floors (ZDA, 2011).

There are five tobacco merchants operating in Zambia including Tombwe processing limited (TPL), the Zambia Leaf Tobacco (ZLT), Alliance One International (AOI), Associated Tobacco Company (ATC) and the Japanese Tobacco International (JTI) (NAR, 2013). These merchants are involved in sub-contracting small scale farmers in the production of tobacco under a monopsony market arrangement. They then buy the produce from them, process it and then export it to international cigarette manufacturers. Most of the tobacco processing is only done to the level of curing and is prepared for export (Mwape, 1995). The main stages of the tobacco value chain are illustrated in Figure 5 below.

Figure 5: Tobacco value chain activities



Source: Study primary industry information¹

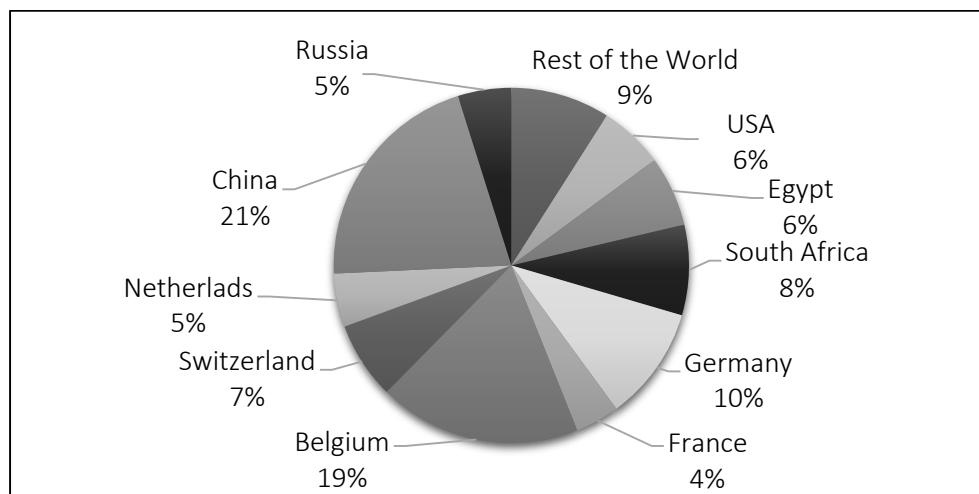
Tombwe Processing Limited (TPL) has been the only processing facility in Zambia offering processing services to various merchants (Ng’onga et al., 2013). The main processing methods employed include: Tipped & Threshed, Total Thresh, Hand Strip, Butted Straight Laid, Butted Loose Leaf and Tangled Loose Leaf. Before exporting the tobacco, most merchants strive to ensure that the tobacco exported from Zambia meets the stringent international processing standards set by cigarette manufacturers worldwide.

¹ Key industry informants

2.2.3 Tobacco export markets

Zambia produces some of the best grades of tobacco that are among the highest earning cash crops attracting demand from different cigarette makers across major markets in the world. These include; the Asian market, E.U, USA, COMESA and SADC. An analysis of the tobacco export statistics by country of destination during the period under review revealed that, China has been the major importers of Zambian tobacco accounting with a market share of 21% of the tobacco exported from Zambia between 2002 and 2014. The other major markets include Belgium (19%), Germany (10%) and Switzerland (7%). Furthermore, even within the eastern and southern African markets, South Africa and Egypt have been some of the consistent importers of Zambian tobacco, accounting for an approximated share of 8% and 6% respectively as indicated in figure 6 below:

Figure 6: Country Destination for Zambian Tobacco 2002-2014



Source: Authors own estimations²

² The market shares of each country are estimated using tobacco import and export data for the three countries; Zambia, Zimbabwe and Malawi. Every year merchants from Malawi and Zimbabwe import stipulated quantities of tobacco from Zambia, they process it and export it to different countries by stipulated quantities. The statistics of the quantities exported to each country are extracted from their published sources e.g Makoka (2014) and TIMB (2014). Therefore, we just calculate the proportion of total tobacco exports accrued to imports made from Zambia using $P_Z = MZ/TE * 100$, where P_Z = proportion of Zambian tobacco exports, MZ = tobacco imports from Zambia

and TE = total tobacco exported. The proportion is then applied cumulatively to the top importers to get the share that comes from Zambia. For example; China, Belgium and South Africa were the top 3 importers of Zimbabwean. So to get the market share of Zambian tobacco we apply the estimated proportion to the total quantities imported then we extract how much of it comes from Zambia. We do this to the remaining countries until we exhaust the quantity that was actually imported from Zambia. The extracted quantities per country are then compared with the total exported from Zambia in that year to estimate each country's market share of Zambian tobacco export.

In general, the major importers for Zambian tobacco include; The United States of America (USA 6%), China, Belgium, France, Germany, Netherlands, Russia, Switzerland, Egypt and South Africa. The tobacco however, goes through the Zimbabwean (21%) and Malawian (54%) auction floors before reaching the final destinations, only 25% of it is exported directly from Zambia.

2.3 Exchange rate policy evolution in Zambia

Zambia has since independence adopted different types of exchange rate regimes ranging from a fixed regime in 1964 to flexible exchange rate regime in 1992. According to Mungule (2004) the first episode was marked by two successive periods of fixed exchange rate parity firstly when the local currency was fixed to the British pound from 1964 to 1971. In 1968 however, the Kwacha replaced the pound as the local currency, from 1972 to 1976 the kwacha was then linked to the US\$ dollar resulting in devaluation. The move was envisaged to maintain international competitiveness.

The second episode was characterised by the pegging of the kwacha to the SDR. This lasted from 1976 to 1983, which saw the devaluation of the currency to about 50%. The third episodes run from 1983 to 1985 with a monthly crawl of one percent. As economic turmoil continued, the crawl rate was temporarily raised by 2.5 percent until the third quarter of 1985 (Aron and Elbadawi, 1992). Again this policy stance was meant to line up with the liberalization measures put in place. However, the government failed to diversify away the dependency on copper export earnings and coupled with its own crippling policies that included fixing agricultural producer prices, trade in agricultural products maintained its relative insignificance in Zambia's total export earnings (Saasa 1996: 4).

The approach in the fourth episode changed, the government introduced floating exchange regime through weekly auction floors in the fourth quarter of 1985. The exchange rate was determined by marginal market clearing bids in a weekly auction administered by the central bank. This was the first stride towards flexible exchange rates. In 1986, the auction system underwent a slight modification with the introduction of the Dutch auction system where successful bidders were permitted to exchange foreign currencies at their bid prices as opposed to the marginal rate. Unfortunately, a shortage of foreign currency prompted the authorities to

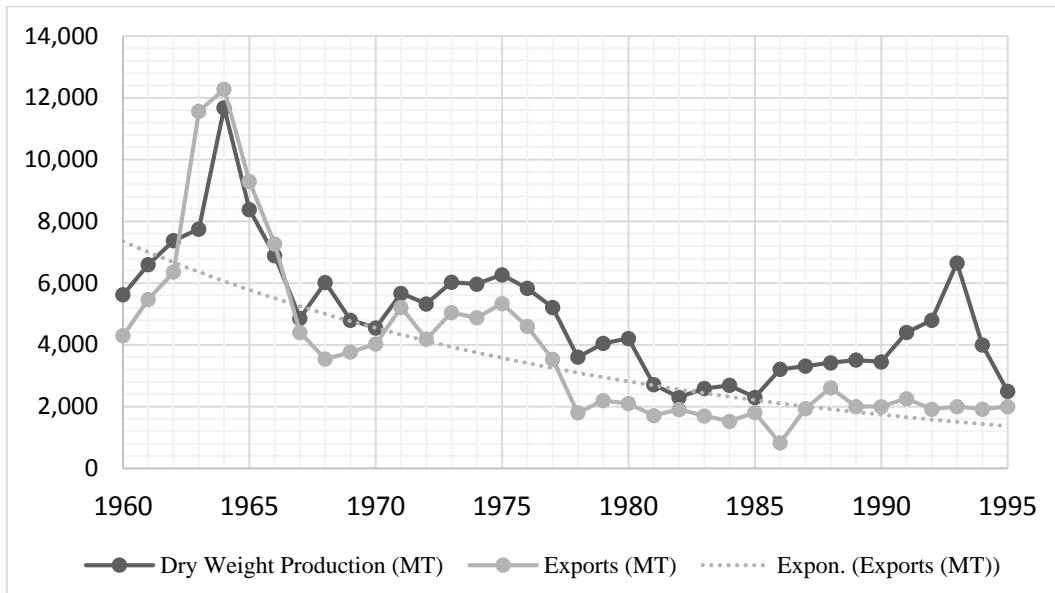
temporarily suspend the auction system and introduce the official parity rate, pegged to a basket of currencies in 1987 (Chipili, 2010). In March 1987, the weekly auction was reinstated for all other transactions, starting at K15/\$. This was a two-tier auction. In May 1987 the auction was suspended and the official and market rates were unified at K8/\$ for all transactions, due to a combination of both political and economic reasons (Mungule, 2004).

Bates and Collier (1995) argue that, the introduction of the auction system in 1985 played a crucial role in making a legal market for foreign exchange in that it was the first time in many years the country had an experience of a market determined exchange rate insofar as weekly price setting was concerned. The nominal and real exchange rates also depreciated providing some level of competitiveness in the export market (Bates and Collier, 1995).

Following the unification of the rates in 1987, the system reverted back and the kwacha was again fixed to the US\$ dollar in what is known as the fifth episode. During the process, the kwacha underwent a devaluation of almost K14 by 1989. This policy reversal led to rampant increases in prices that resulted in food riots on the copper-belt province (Chikwanda, 2007). The sixth episode is marked by a dual-exchange rate regime, which began in 1990 to 1991 with the establishment of a two-tier system. The dual exchange rate was unified in the first quarter of 1991, signifying the beginning of the current exchange rate regime. In October 1992 a system of bureaus of exchange was introduced to determine the market exchange rate (Mungule, 2004). In March 1993 most foreign exchange controls on current account transactions were removed and an inter-bank foreign exchange system was introduced as well as doing away with long-standing exchange controls in 1994 by abolishing the Exchange Control Act of 1965. Subsequently, the current and capital accounts were liberalized to attract foreign capital and investment inflows into the country (Musonda, 2008).

By and large, until the adoption of the flexible exchange rate, the entirety of the period before 1992 was marred by an interchange of different fixed exchange rate policies and auction systems that in themselves exhibited very little volatility. The tobacco export industry however failed to flourish notwithstanding the low volatility in the exchange rate. Figure 7 below shows the trend in tobacco volumes exported in the period 1960 to 1995.

Figure 7: Tobacco export performance during the exchange rate policy episodes (1964-1995)



Source: FAOSTAT

As can be clearly seen from the tobacco export trend in figure 7, the performance of the commodity on the export market kept dropping during the entire period of the fixed exchange rate policy shifts before the adoption of the flexible exchange rate. Beginning with the period when the local currency was fixed to the British pound sterling, tobacco export volumes dropped by more than half from 12000 MT in 1964 to about 5600 MT in 1971. The export volumes were maintained around the 5600-5800 MT mark when rates were fixed to the dollar but further declined in the successive exchange rate policy episodes reaching the lowest export volumes of 800 MT in 1986 at the hands of the Dutch auction system. The decline in the performance of the crop on the export market was partly to do with reduced revenues earned during periods of fixed parities with international currencies. Production too got affected by the loss in revenues and dipped alongside the dips in export. The devaluation of the kwacha by K14 in 1989 upon the reintroduction of the fixed parity to the dollar saw a rise in tobacco exports to 2000MT, these export volumes were sustained to the time of ushering in of the flexible exchange rate regime in 1992. Table 1 below presents a summary of the exchange rate policies evolution since independence.

Table 1: Summary Exchange Rate policy episodes

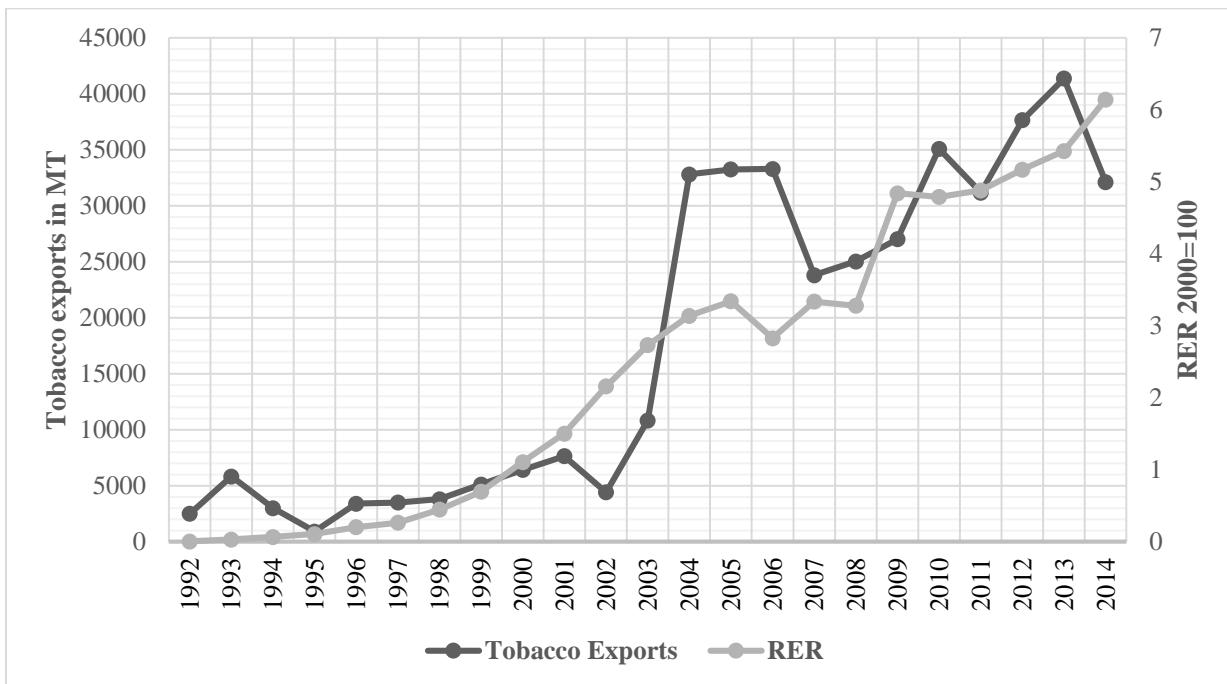
Period	Exchange rate policy description
1964–1971	Rates fixed to the British pound sterling
1972–1976	Rates fixed to the US dollar
1977–1982	Pegged to the SDR with occasional devaluations
1983–1984	Pegged to a basket of major trading partners' currencies
1985–1987	Foreign exchange Dutch auction system introduced
1988–1989	Fixed parity to the US dollar re-introduced with occasional devaluations
1990–1991	Dual exchange rate system (managed float)
1991–1992	Open general license (OGL) system, rate unified
1992–to date	Flexible exchange rate policy

Source: Bank of Zambia.

2.4 Real exchange rates and tobacco exports trends in Zambia

Zambia has enjoyed trade relationships with some of the largest markets with strong currencies in the world such as the USA and the E.U. International trade is characterized by interactions between local and foreign currencies. The level of exchange rate becomes key in influencing competitiveness of products exported from Zambia to any foreign market. Exchange rates can be considered either in nominal or real terms; the nominal exchange rate (NER) tells how much foreign currency can be exchanged for a unit of domestic currency while the real exchange rate (RER) is defined as the ratio of the price level abroad and the domestic price level. In essence, the real exchange rate tells how much the goods and services in the domestic country can be exchanged for the goods and services in a foreign country where the foreign price level is converted into domestic currency units via the current nominal exchange rate (Thomas, 2002). Therefore, real exchange rates are determined in consideration with both the foreign and domestic consumer price indices and domestic nominal exchange rates. Real exchange rates have a bearing on tobacco export growth via the relative price effect. The figure below (8), shows a plot of the trends in the real exchange rates and tobacco exports during the period under review (1992 to 2014).

Figure 8: Real exchange rate (RER) and tobacco exports (TEX)



Source: Authors own estimation³

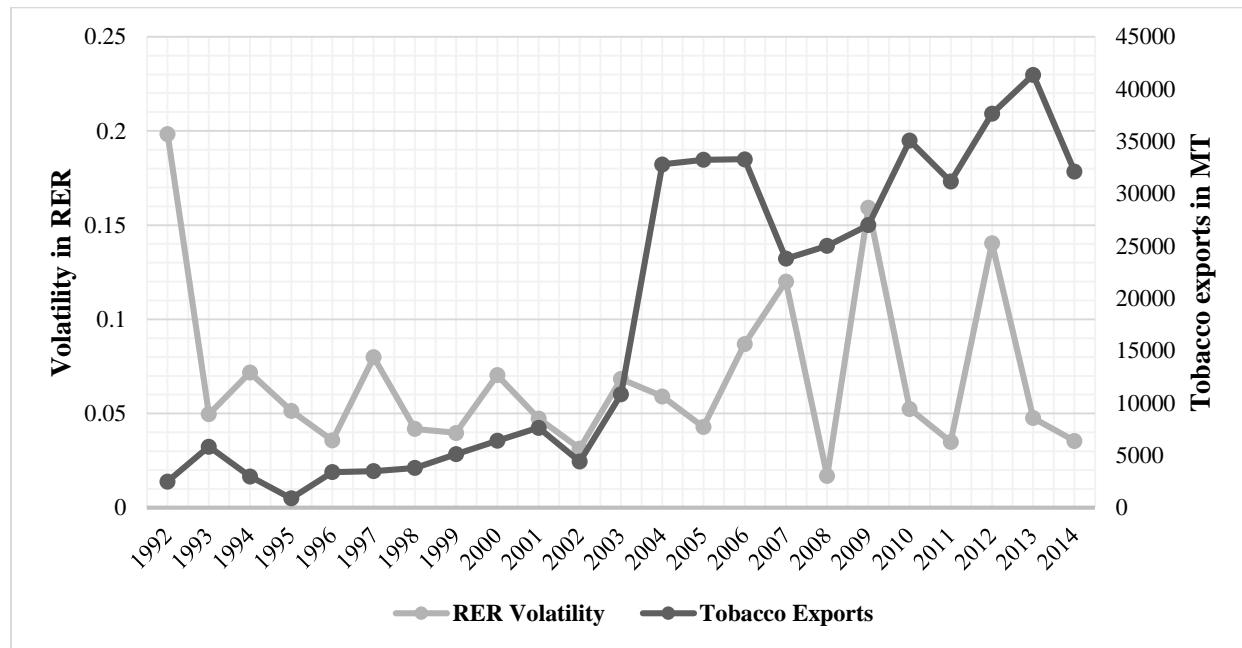
What is clearly evident in the period of analysis (1992 to 2014) in figure 8 above; is that, real exchange rates between Zambia and the major tobacco trading partners has been on a steady rise from 1992 and only experienced a deep during the period 2006 to 2008 and then continued rising. Conversely, tobacco exports experienced a revival under the new liberal policies from the decline suffered during the 1980's. The growth in tobacco exports was gradual with a few deeps perhaps an indication that the country's macroeconomic developments were beginning to take effect and stimulating growth of non-traditional export commodities like tobacco. We see that from 2000 to 2005 tobacco export volumes more than tripled from less than 10,000MT to over 30,000MT. From 2006 to 2008 tobacco export volumes fell below 25000 MT as a result of a fall in real exchange rates and rose again after the rise in real exchange rate in 2009. The tobacco export and the real exchange rate trend continued upwards with tobacco reaching a record highest of 41000 MT in 2013 before falling to 3300 MT in 2014.

It must be noted that exchange rates are a factor of interest rates, inflation, and the state of politics and the economy in both the domestic and foreign trading countries. Most of these

³ See Chapter four (Methodology) for the estimations of the RER series

macroeconomic variables are in themselves non-static and change upwards or downwards from time to time in response to market forces (Pugel, 2007). As a result, real exchange rates also tend to fluctuate as permitted by the exchange rate system employed in an economy. Since 1992, Zambia has been operating under a flexible exchange rate, which to a larger extent is market determined. Market determined exchange rates are prone to unpredictable fluctuations which are a source of risk for tobacco merchants. It is this risk that may discourage or encourage merchants in engaging in the export market because of the uncertainty surrounding the expected earnings. Figure 9 below shows a plot of the real exchange rate volatility along tobacco export volumes for the period 1992 to 2014.

Figure 9: Real exchange rate (RER) volatility and tobacco exports (TEX)



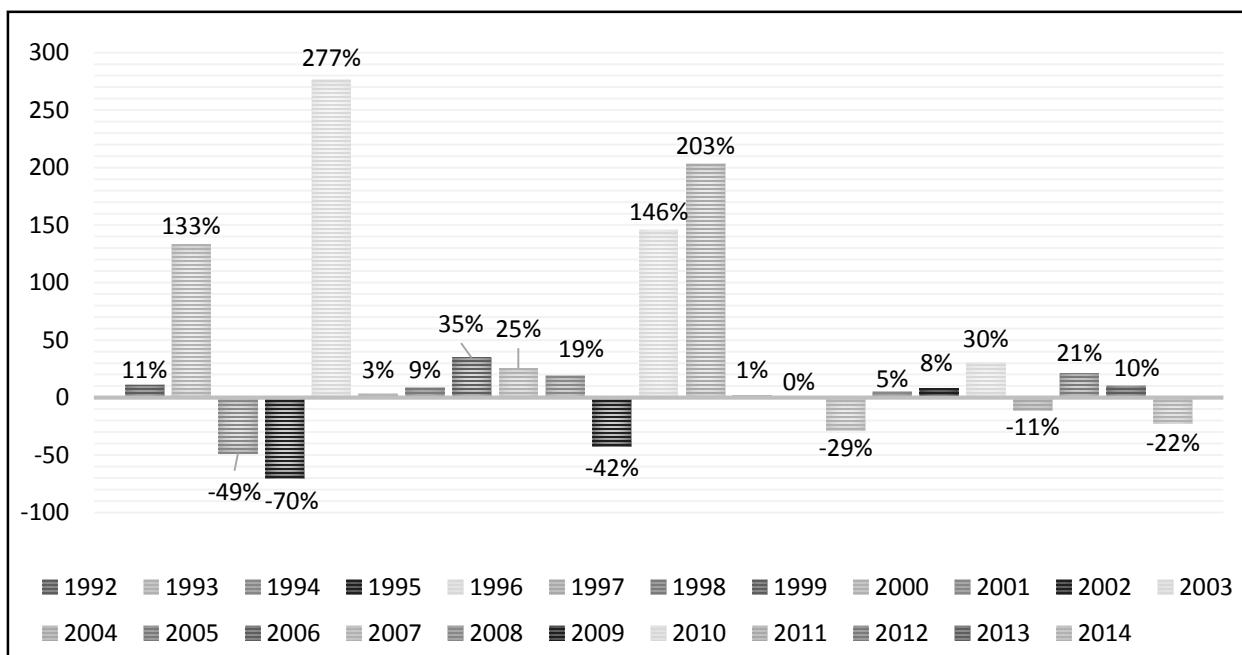
Source: Authors own estimation⁴

The real exchange rate volatility series were generated using the EGARCH and as can be observed from the graph in figure (9) above, huge fluctuations are observed in the real exchange rate during early 1990's and after 2005 to 2014. But remained minimal during the period 1995 to 2005. This implies therefore that, real exchange rates were more volatile in the period between 2005 and 2014. What is evident from the graph in figure 9 is that, tobacco export volumes

⁴ See chapter four (methodology) and five (results) for the EGARCH estimation process and results of the conditional variances used for measuring volatility

remained low in the periods (1992 to 2002) of minimal exchange rate volatilities and coincidentally fluctuated upwards in the periods (2003 to 2013) of increased real exchange rate volatilities. Indicating perhaps that merchants were able to cope with the uncertainty created by the volatility in exchange rates and used it to their advantage in the export market. As a result, it seems the increased volatility favoured the growth in tobacco exports during the period under review. Unfortunately, the growth rate in the tobacco exports has been inconsistent as shown in figure 10 below.

Figure 10: Tobacco export growth rates for the period 1991 to 2014



Source: Author's own calculations⁵

Judging from the evidence presented in figure 10 above, some of the highest growth rates attained were during the periods 1995 to 1996 and 2003 to 2004 when tobacco export volumes grew by almost 277%, 146% and 203% respectively. Unfortunately, the subsequent periods were followed by equally huge percentage declines and in certain periods some negative growth rates are observed in 1994 (-49%), 1995 (-70%), -42% in 2002, -29% in 2007, -11% in 2011 and -22% in 2014. The dips in export volumes were mostly dominated by market conditions and reduced competitiveness in periods of kwacha appreciation. For example, in 2005 to 2008 when the

⁵ Percentage differences in annual tobacco export volumes

kwacha appreciated significantly under the Mwanawasa led MMD government, the tobacco exports growth rates declined recording percentages of 0%, 1% and even -29%. Nonetheless, the industry has achieved average annual growth rates of 31% since 1991 which has seemingly not been significant enough to offset the industry's share of total exports earnings which remains less than 3% as shown in table 2 below.

Table 2: Tobacco exports value percentage share of total exports

Periods	Average Export value (US\$) Mil)	% product share of total exports
1992 to 1996	8.6	0.8
1997 to 2001	17.4	1.8
2002 to 2006	43.1	2.36
2006 to 2010	86.2	1.63
2010 to 2014	138.1	1.4

Source: Authors' own estimations

2.5 Barriers to Tobacco trade

World trade of tobacco has been impeded by both tariff and non-tariff barriers. Most of the tariff-based barriers are deliberate policies brought about in an effort to curb tobacco product consumption as discussed below.

2.5.1 Tobacco control innovations

As tobacco potentially plays a crucial role in the Zambian economy, a global reduction in demand for tobacco that might be brought about by successful efforts to control tobacco, could significantly impact farmers' incomes, the industry's growth and the economy as a whole. Governments and international organisations have in recent times implemented different mechanisms meant to restrict and minimise consumption of tobacco by-products because of the associated health hazards (WLF, 2015). Some of these interventions include; Restrictions on Cigarette advertising and promotion, Smoking restrictions in public places and private work sites and implementation of Cigarette taxes and other tobacco tariffs (Chaloupka et al., 2001).

In the Russian Federation for example, a sweeping anti-smoking bill in 2013, tax increases in 2014, and an economic downturn resulted in a 12% drop in cigarette consumption in what had been the world's second largest market (Ibid, 2015). Russia has also been one of Zambia's important markets accounting for about 5% of Zambia's tobacco exports between 2002 and 2014

(see Figure 6 above). Such developments may potentially threaten the growth of tobacco exports in Zambia. On the local scene however, the International Tobacco Control Policy (2014), reports that tobacco control regulations haven't yet taken root in Zambia. Even then, the regulations may not affect production as much because most of the tobacco produced in Zambia is primarily for the foreign market.

2.5.2 Non-tariff barriers

Non-tariff barriers that are used by foreign countries to limit imports may also affect trade in tobacco. These include; license requirements, restricted product lists, exchange control, mixing regulations (which govern the percentage domestic grown tobacco required in manufactured products), and quota restrictions. Cross-country price comparisons of tobacco of the same type indicate that prices have been altered significantly by trade restrictions and domestic tobacco policy in major producing and consuming counties (Grise, 1990).

Internally, the unstable and weak macroeconomic performance of the economy has presented one of the major constraints in the growth of the export industry. Luneta (2000) argues that, real exchange rate misalignment and volatility adversely affected the performance of Zambia's NTEs. Despite the implementation of trade reforms in 1991, the economic environment was not conducive to encourage private investment as it was characterized with high inflation and interest rates, averaging about 69% and 20% per annum respectively between 1990 and 1999 (BOZ, 2015). Furthermore, the exchange rate was overvalued. Since 2000, there has been some improvement in the economy. There has been a significant increase in both imports and exports following the removal of trade barriers. The performance of non-traditional exports (NTEs) has improved over the years (Musonda, 2008). A stable environment would hopefully attract investment in different sectors of the economy including the agricultural sector. However, the exchange rate continues to be volatile and affects export earnings for exporters (BOZ, 2011:5).

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This Chapter presents a review of literature. The chapter is sub divided into the theoretical literature and the empirical literature review. Firstly the chapter presents a review of theories relevant in explaining certain phenomenon associated with the study. Thereafter, a review of empirical literature follows. According to Kombo and Tromp (2006), reviewing related literature can portray what researchers have focused on and how the current study can benefit from that in terms of what to focus on. The reviewed literature can also help in forming a basis for analysing and interpreting the research data.

3.1. Theoretical framework

In general, there are two schools of thought in existence that attempt to explain the effect of exchange rate volatility on international trade: the traditional school inspired by Clark (1973), holds that higher volatility increases risk and therefore depresses trade flows, while the risk-portfolio school motivated by De Grauwe (1988) maintains that higher risk presents greater opportunity for profit and should increase trade. Both schools are examined in greater detail below.

3.1.2 Traditional School

The earliest studies on the issue of volatility focused on firm behavior. They presumed that increased exchange rate volatility would increase the uncertainty of profits on contracts denominated in a foreign currency and would therefore reduce international trade to levels lower than would otherwise exist if uncertainty were removed (Farrel, DeRosa, & McCown, 1983). This uncertainty of profits, or risk, would lead risk-averse and risk-neutral agents to redirect their activity from higher-risk foreign markets to the lower risk home market (Côté, 1994).

Clark (1973) laid the theoretical groundwork for the traditional school by examining bilateral trade and the behaviour of risk-averse firms. Let's assume the firms under examination are tobacco-exporting firms that produce tobacco through contractual out-grower schemes. Clark imposes numerous restrictions, which in our context include; firms that only produce tobacco for

export, limited hedging possibilities, contracts denominated in foreign currencies, no imported factor inputs and a perfectly competitive marketplace. Clark (1973) supposes that as the variance of exchange rate uncertainty increases, so does the uncertainty of profitability, where profits are expressed in the home currency. Utility is given as a quadratic function of profits:

$$u(\pi) = a\pi + b\pi^2 \dots \quad 3.1.2$$

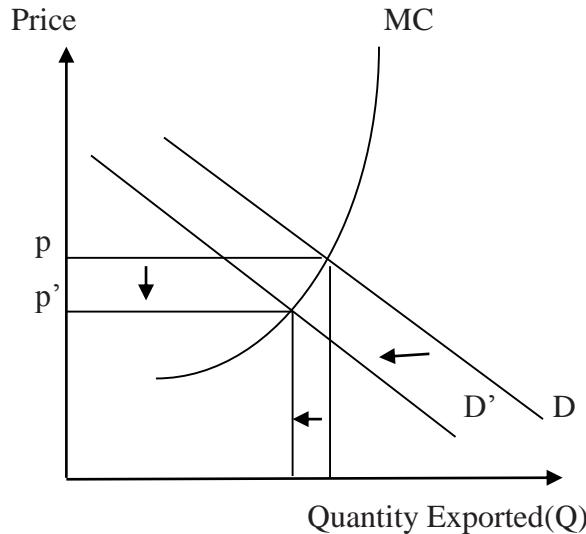
Where b , representing risk aversion, $b < 0$. As uncertainty increases, a risk averse firm will reduce the supply of tobacco to the level where marginal revenue actually exceeds marginal cost in order to compensate for the additional risk, thereby maximizing utility (Pickard, 2003).

Baron (1976), also looks at bilateral trade but focuses on how the choice of invoicing affects an export firm's production and pricing decisions when exchange rates are volatile and the marketplace is not perfectly competitive. According to Baron (1976), exporting firms face greater price risk when invoices are denominated in the foreign currency and face greater quantity demand risk when the home currency is used. In response, as exchange rate uncertainty increases, risk-averse, profit-maximizing firms will increase prices when the foreign currency is used to invoice goods (in this case tobacco). Baron (1976) argues that, the way in which a firm maximizes utility (minimizes risk) when the home currency is used for invoicing depends on the shape of the demand curve it faces: e.g., reducing prices when demand is linear, thereby increasing demand and decreasing profit variance (uncertainty).

Hooper and Kohlhagen (1978), describe a model, which empirically study the effect of volatility in exchange rate on international trade and found a negative relation. They derive demand and supply schedules for individual firms, where the explanatory variables include the currency denomination of contracts, the degree of firms' risk aversion and the percentage of risk hedged in the forward market. Pickard (2003) notes that perhaps the most significant contribution of this study is how it allows nominal exchange rate volatility to only impact the amount of risk that remains unhedged. Hooper and Kohlhagen (1978) includes a number of *a priori* assumptions, including the importer being a price-taker, the importer facing a known demand curve and exporters that sell all of their tobacco abroad in a monopolistic market framework. They find that increased exchange rate volatility leads to both downward-shifting supply and demand curves, where quantities and prices decline when importers face the exchange rate risk

(depending on demand elasticity and their degree of risk-aversion), and quantities decline and prices increase when exporters (suppliers) bear the risk (Pickard, 2003).

Figure 11: The Effects of Increased Exchange Rate Volatility on a Risk Averse Exporter



Source: Hooper and Kohlhagen

Figure (11) above, shows the effect of an increase in exchange rate volatility on a risk-averse Tobacco exporting firm. Price is assumed to be denominated in the domestic currency, MC represents the marginal cost and D represents the aggregate demand. All else equal, if an importer faces increased exchange rate volatility, the aggregate demand schedule for tobacco imports will shift to the left. This shift leads to a fall in price of tobacco and eventually the exporting firm exports less of the commodity. Using this side of the argument, we expect tobacco export volume to reduce significantly with increased volatility.

For risk-loving trading partner an increase in the exchange rate volatility shifts import demand to the right. The equilibrium level of trade is not affected, in the case of risk-neutral trading partners: No shift occurs. The attitude towards risk of the importers and exporters are crucial for the direction of the effect of exchange rate volatility on the equilibrium level of trade. However, Pickard (2003) argues that, the traditional school does not properly model how firms manage risk not only through the use of derivatives, but also as an opportunity to increase profitability. For this therefore, we turn to the risk-portfolio school.

3.1.3 Risk-Portfolio School

The risk-portfolio school of thought is a culmination of multiple theories, varying in complexity but with a common view that the traditional school of thought is unrealistic in explaining the effects of exchange rate volatility on trade flows. De Grauwe (1996) was the first one to launch an attack on the traditional school by arguing convincingly that due to the convexity of the profit function, exporters' return from favourable exchange rate movements and the accompanying increased output outstrip the decreased profits associated with adverse exchange rates and decreased output as a result, risk-neutral individuals will be attracted by these higher profit opportunities (De Grauwe, 1996)

Although the convexity of the profit function may imply a positive correlation between trade and exchange rate risk, the more prominent tenet of the risk-portfolio school examines exchange rate risk in light of modern portfolio diversification theory. As summarized by Farrell, et al., (1983) economic agents maximize profitability by diversifying the risk levels in their investment portfolios by simultaneously engaging in low-, medium- and high-risk activity with corresponding potential rates of return. Greater exchange rate volatility resulting in higher risk would then not discourage risk-neutral agents from engaging in trade, but would present an opportunity to diversify their risk portfolios and increase the likelihood of profitability (Pickard, 200: 4).

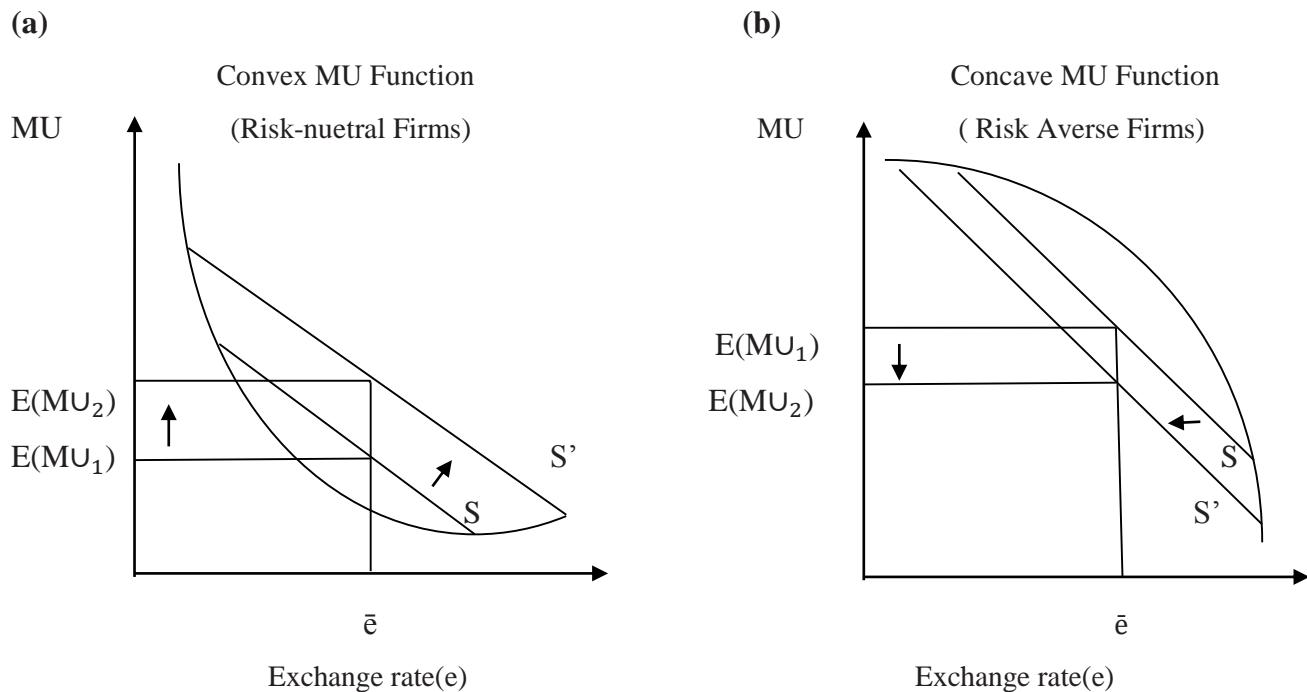
Côté (1994) likens this approach to derivative markets, where trade is viewed as an option that becomes more valuable as the exchange rate becomes more volatile. Franke (1991) discusses the trading strategy of a firm which is not risk averse and confirms the positive relation between volatility and international trade. The firm establishes its export's tactics by comparing the cost of entering (exit) in overseas market with the revenue (cost) generated by exports. The firm can take advantages from the increase in volatility, if value of cash asset is more than entering (exit) cost of firm in overseas market.

Broll and Eckwert's (1999) theoretical model demonstrates how higher exchange rate volatility increases the potential gains from trade. Their study uses an international firm that sells its product either entirely at home or abroad, and must also determine which market to choose with incomplete knowledge of exchange rate volatility. Their theoretical construct results in a

generally positive relationship between the variance of the foreign spot exchange rate and the volume of output and total export. As with Dellas and Zilberfarb (1993), the increase in the value of the firm's option to export depends on the convexity of the relationship between profits and the exchange rate, and ultimately upon the degree of the firm's risk aversion.

As can be seen from figure 12 below; graph (a) shows that the expected marginal utility of export revenues increases when there is an increase in the exchange rate volatility for the risk-neutral Tobacco exporters. However, this is not the case for risk averse tobacco exporters in graph (b). Their expected marginal utility of export revenues reduces with an increase in exchange rate volatility. Note that, the level of risk aversion influences the shape of the graph and hence predicts the possible behaviour of the firm as exchange risk increases.

Figure 12: Effect of volatility on marginal utility of profits



Source: De Grauwe

According to the illustrations of the figure (12) above, Risk-neutral tobacco-exporting firms will be more attracted to the increased risk that arises from exchange rate volatility. It gives them a chance to diversify risk and hence they respond by increasing exports to enhance their chances of increasing profitability and outstrip any reduction in revenues caused by adverse exchange

rates. On the other hand, the risk-averse tobacco-exporting firms are not as concerned with extreme outcomes and choose to export less (Altvater and Kottmann, 2012). In essence, De-Grauwe, (1988) contends that exporters can be in a better position if they export more in case of higher volatility in exchange rate because it increase the chances of marginal profits from exports. Hence using this argument, we would expect exchange rate volatility to have positive effects on tobacco export growth in Zambia.

3.2 Empirical framework

To further our understanding of the study in context, we endeavor to review empirical evidence that supports the theoretical arguments provided by both the traditional and Risk portfolio school of thought.

3.2.1 Negative effect of exchange rate volatility on exports

The typical argument that explains a negative relationship between exchange rate volatility and exports emanates from the notion that, higher exchange rate risk lowers the expected revenue from exports for risk averse firms and therefore reduces incentives to trade. This has been supported by early studies of Clark (1973), Baron (1976), Hooper and Kohlhagen (1978), etc. In the recent past however, more literature has come up in support of this view, we review such studies below:

Sukar and Hassan (2001), investigated the relationship between the U.S. trade volume and exchange rate volatility using cointegration and error-correction models. The study used quarterly aggregate data covering the period 1975 to 1993 and a GARCH model was used to measure the exchange rate volatility. The study finds evidence for a significantly negative relationship between U.S. export volume and exchange rate volatility. However, the short-run dynamics of the relationship shows that the effect of exchange rate volatility is insignificant.

Awokuse and Yuan (2006) claim that the use of aggregated data could reduce the probability of reaching an accurate result. In their study of 49 poultry importers from the US over the period of 1976–2000, they report that there is a positive relationship between the exchange rate volatility and the US poultry exports. Using data on certain agricultural commodity trade flows between the OECD countries for 1996–2002 periods, Karemera et al. (2011) find that while the exchange

rate volatility has a negative impact on the trade flows of most commodities, some specific ones are affected positively. Therefore, they suggested that the influence of the exchange rate uncertainty could be different across both sectors and commodities.

Using sectoral data on UK manufacturing exports and the VAR models, Gheong, Mehari and Williams (2005) analyze the relationship between exchange rate uncertainty, trade volumes, and price competitiveness. The authors came to the conclusion that unexpected fluctuation in exchange rates is usually accompanied by increasing export prices and decreasing trade volumes. Because export/import traders prefer to avoid the increased risk associated with additional exchange rate volatility, they try to avoid it by adjusting both prices and quantity. Consequently, the UK companies will become less competitive and the overall international trade will be suppressed. Therefore, the authors recommend that the UK should adopt the Euro, since it will lower exchange rate volatility and will have a positive impact on the country's export trade and the overall economic performance.

The negative effects are also observed in studies done on developing countries in the asian and middle east regions. These include studies of Bustaman and Jayanthakumaran (2006), who investigated the long run and short-run impacts of exchange rate volatility on Indonesia's exports over the period 1997-2005. They estimated cointegration relations using ARDL bounds testing procedure and used the errorcorrection model to obtain Estimates of the short-run dynamics. Their results showed significant positive and negative coefficients among the range of commodities. However, in the long-run, majority of commodities tended to support the traditional view that higher exchange rate volatility leads to higher cost and to less foreign trade. Bustaman and Jayanthakumaran (2006), concludes that, the net effect of exchange rate uncertainty on production and exports depends on the degree of relative risk aversion of the exporter of various commodities. This ultimately influences the reallocation of resources by participants.

Fang et al (2006) investigated the effect of exchange rate movement on exports of Eight Asian countries. The study revealed that real exchange rate depreciation has significant impact on exports for all countries except Singapore. Exchange rate risk proves negative for Indonesia, Japan, Singapore, Taiwan and no effect for Korea and Thailand. The study of Alam and Ahmad (2011) based on the ARDL analysis also showed that real exports are cointegrated with volatility

of Real exchange rate. The study results revealed volatility of Real exchange rate adversely affects the Pakistan's exports. Hooy and Choong (2010) examined the impact of currency volatility on export demand within the Southern Asian Association for Region Cooperation (SAARC) region, covering Bangladesh, India, Pakistan and Sri Lanka. The results showed that real exchange rate volatility had negative relationship with exports among the SAARC counterparts

Dolatti et al. (2012) investigated the effects of uncertainty and instability in real exchange rate on non-petroleum exports in Iran. The results indicated that uncertainty in real exchange rate had a negative effect on non-petroleum exports in long-term and short-term periods. Dhasmana (2012) on the other hand analysed the relationship between India's real exchange rate and its trade balance with her major trading partners using quarterly trade data for 15 countries. She found that real exchange rate volatility is negatively correlated with India's trade balance in the long run.

Similarly, other studies have found negative impacts of exchange rate volatility in latin american countries. Arize, Osang and Slottje (2004) investigated the impact of real exchange rate volatility on the export flows of eight Latin American countries between 1973 and 1997. The results show that increases in the volatility of the Real exchange rate exert a significant negative effect upon export demand in both the short-run and long-run. The long-run elasticities range from a low of 0.10 in the Dominican Republic to a high of 0.69 in Venezuela. This implies that exchange rate volatility exerts a significant adverse long-run effect on export volume.

In the African setting, Asogwa and Ngene (2010) found a negative and significant effect of exchange rate volatility on Nigerian trade flows for the period of 1980 to 2008. They concluded that, different policy changes in the economy have great influence on the fluctuations of exchange rate, which directly or indirectly affect trade flows negatively. In line with theoretical expectation, Foreign GDP exerts a significant positive effect on Nigeria's trade but curiously, domestic income exerts a significant negative effect on trade. The study also revealed that depreciation in the real exchange rate may lead to an increase in the volume of net exports.

Mwangi *et al.*, (2014), evaluated the magnitude and direction of the effects of exchange rate volatility on a single Agriculture export commodity, French beans in Kenya. They employed the

generalized autoregressive conditional heteroscedasticity model to measure exchange rate volatility using monthly data from January 1990 to December 2011. The analytical framework used encompassed estimation of an export demand model, cointegration and specification of an error correction model. The results revealed a negative and significant short and long run effect of exchange rate volatility on French beans exports. Specifically, the empirical results showed that a unit increase in exchange rate volatility in Kenya leads to more than proportionate decrease in French beans exports to the European Union. The paper recommended firms to hedge their currency exposures in the short run and implementation of economic policies aimed at stabilizing the exchange rate in the long run to improve the performance of French beans exports in Kenya.

In the Zambian case, Moono (2010), investigated the effects of exchange rate volatility on Zambia's bilateral trade with South Africa since the floating of the Kwacha in 1992. The author generated nominal exchange rate volatility series using a Generalised Autoregressive Conditional Heteroscedastic (GARCH) and concluded that Zambia's bilateral trade with South Africa is negatively affected by volatility through the depression of exports.

Luneta (2000) analyzed the impact of exchange misalignment and volatility on Zambian NTEs. The author used Secondary annual time series data from 1966 to 1991 in conducting estimations. Testing for cointegration was done using the Engle and Granger two step procedure, while short run dynamics are analysed using the ECM. A proxy was included to capture the effect of liberalization of economy in the 1990s on NTEs. It was found that the RER affected NTEs in Zambia both in the short run and the long run. In particular RER misalignment and instability was a significant factor discouraging the growth of NTEs in Zambia. Exporters in Zambia were found to be more risk averse with regard to losses arising from exchange rate changes, especially since hedging instruments were limited.

Musonda (2008) used data for the period 1965 to 1999 and estimated an error correlation model. The author employed a generalized autoregressive conditional heteroscedasticity (GARCH) to measure real exchange rate volatility. According to the author, the negative results suggest that supportive macroeconomic factors are important in enhancing non-traditional exports in the country. This requires packaging a set of incentives aimed at removing anti-export bias policies

so as to promote exports, particularly of non-traditional products, given their standing in the economic growth agenda for the country. (Musonda, 2008)

Ngoma (2015) on the other hand utilized annual time series data for the period 1991-2011 in Zambia. The author employed Johansen Cointegration and Error Correction Model techniques for estimating results. The auhor also made use of hhe Exponential Generalised Autoregressive Conditional Heteroskedasticity (EGARCH) to measure exchange rate volatility as opposed to the GARCH used by Musonda (2008). The results obtained from the econometric analysis revealed that exchange rate volatility has a negative long run effect on Zambia's agricultural exports. The author concludes that Zambia' institutional reforms must ensure a sufficient degree of macroeconomic stability so as to maintain a stable currency and minimize the degree of exchange rate volatility.

3.2.2 Positive effects of exchange rate volatility on exports

The other side of theory also argues that exchange rate volatility can have a positive impact on international trade flows if exporters can take advantage of increased volatility to enhance their chances of earning marginal profits. This theoretical argument is backed by early literature of the works of Franke (1991), Sercu and Vanhulle (1992), De Grauwe (1992), Kroner and Lastrapes (1993) Likewise; more empirical evidence in supporting of this theory has mushroomed in recent studies.

Arize (1998) studies the long-run relationship between imports and exchange-rate volatility in eight European countries within the period 1973 and 1995. Applying cointegration analyses, the major results show that exchange-rate volatility has a positive and significant effects on exports of Greece and Sweden,. These findings are reasonably robust in terms of measures of exchange-rate volatility, different estimation methods and membership in the European Exchange-rate Mechanism (ERM).

Using annual time series data for the period 1970 to 2011, Srinivasan & Kalaivani, (2013) conducted an empirical analysis of exchange rate volatility on real exports. The authors employed the ARDL bounds F-testing procedure proposed by Pesaran *et al.*, (2001) to estimate the findings. Their results confirm that real exports are cointegrated with exchange rate volatility, real exchange rates, gross domestic product and foreign economic activity. Their findings

indicate that the exchange rate volatility has significant negative impact on real exports both in the short-run and long run. This result implies that higher exchange rate fluctuation tends to reduce real exports in India. Besides, the real exchange rate has negative short-run and positive long-run effects on real exports. The empirical results also reveal that GDP has a positive and significant impact on India's real exports in the long run, but the impact turns out to be insignificant in the short-run.

Vargas (2010) used aggregated data for nominal exchange rates and trade between 1999 and 2008 to examine the effect of exchange rate volatility between the Euro and the Mexican peso on the exports from the first eleven Euro area countries (EA-11) to Mexico. The author's conclusion was that, the exchange rate volatility has a positive and highly significant effect in the exports of only one of the ten evaluated product groups

Hsu and Chiang (2011) assert that the non-existence of consensus about the impacts of the exchange rate volatility on international trade could be due to the non-linearity of the effects. By applying a threshold regression model based on the bilateral export data between the US and its top 13 trading partner for the period of 1973–2004, Hsu and Chiang (2011) find that the real exchange rate volatility has a positive impact on low-income trading partners of the US.

In regards to the effects of exchange rate volatility on agricultural produce in high and middle-income countries, Fogarasi (2011) studied the case of Hungarian agricultural exports between 1999 and 2008. The author based the study on a gravity model that controls for other factors likely to determine bilateral trade. The results show that nominal exchange rate volatility has had a significant positive effect on agricultural trade over this period.

Goudarzi et al (2012) investigated the effect of exchange rate volatility on Iranian agricultural exports. The authors used a GARCH model to measure exchange rate volatility and the ARDL bounds testing for modeling long run and short-run relationships between variables. Their results show that exchange rate volatility has had a positive effect on exports of agricultural products. In similar fashion, Hashemi and Akbaris (2009) made an attempt to analyze the impact of exchange rate volatility on Iran's agricultural exports using a VECM procedure. Their results indicated that exchange rate volatility did not have a significant impact on Iran's agricultural export flows in short run but it had a significant positive impact in long run.

On the African front, Sheshu and Youtang (2012) examined the causal relationship between exchange rate volatility, trade flows and economic growth of the sub-Saharan African countries with exclusive reference to Nigeria, which is considered as small open economy. The study is based on a time series data over the period of 1970-2009. Their results indicate significant positive effects of exchange rate volatility on trade flows and economic growth of Nigeria which they feel support the preference of flexible exchange rate regime over the fixed regime as it facilitates more trade flows in Nigeria.

For evidence in Zambia, Mushili (2001) investigated the impact of real exchange rate movements and macroeconomic stability on the growth of non-traditional exports in Zambia between 1970 and 1996. The results of the study revealed that there is a positive relationship between the performance of non-traditional exports and Real exchange rate (RER) movements and macroeconomic stability during that period. The sluggish performance of the NTES was explained by the real net appreciation in the RER over the study period. Chipili (2010) investigated the macroeconomic effects of exchange rate volatility. The author investigated the effects of real exchange rate volatility on total exports, total non-traditional exports and individual non-traditional exports. The study showed that even if total non-traditional exports were negatively affected by real exchange rate volatility most individual NTE's actually responded positively to volatility in exchange rates including burley tobacco.

3.2.3 Insignificant effects on exports

Nonetheless, some studies find insignificant effects of exchange rate volatilities on trade flows. Yanikkaya, *et al.*, (2013), investigated the effect of real exchange rate on the bilateral agricultural exports flows of Turkey to 46 countries. They used a panel data set for exports of the selected agricultural commodities to countries from 1971 to 2010 based on the gravity equation. Their empirical results show that exchange rate volatility does not exert any significant effect on Turkish agricultural commodity exports. However, they did establish that real exchange rates have a statistically significant effect on the agricultural commodity export flows. The authors argue that, regardless of the region chosen, raisins and tobacco exports are very much sensitive to the real exchange rates. It means that any depreciation in the Turkish Lira leads to higher exports for these commodities.

Similarly, Buguk et al. (2003) investigated the effects of the exchange rate and its volatility on the dried figs, grapes and tobacco exports of Turkey. The authors found a significant positive long-run relationship between these variables but were unable to find any significant short-run effects of the real exchange rate and its variability on the exports of commodities. Sabubi-Sabouni & Piri, (2008), also showed that the fluctuations of exchange rate affected Saffron export price more than other variables under the study. The authors used an Autoregressive Distributed lag model (ARDL) to investigate the short and long-run fluctuations of exchange rate on Saffron export price. They further established that the effect of exchange rate and quantity of export, on Saffron export price was positive in the long-run.

Todani and Munyama (2005) used the ARDL model to analyze the impact of exchange rate volatility on South African exports to the rest of the world. The study estimated an export demand equation and concluded that South African exports to the rest of the world are largely unaffected by exchange rate volatility. Khalilian and Farhadi (2002) studied factors affecting the supply of Iran's agricultural exports between 1962 and 1999. The authors show empirically that the country's output, the relative prices of exports and domestic consumption has a significant impact on the supply of agricultural exports. The effect of variable effective exchange rate on supply of agricultural exports was however, found to be insignificant.

3.2.4 Factors that affect demand for tobacco

Other factors influencing demand for tobacco include prices, habits, taxation, smoking restrictions, the most important of which is the retail price of tobacco products. The retail price, however, typically includes a very large excise tax which constitutes the largest part of the retail price. The share of tobacco leaf in the total cost of the final tobacco product is very small. Demand for tobacco products is rather inelastic. The price elasticity of demand for tobacco products varies considerably from -0.9 in most developing countries to -0.2 in developed countries. It has been found that as income per capita increases, the price elasticity of demand for tobacco products declines (Zhang, 2000).

The Food and agriculture organisation (2003) projections, the expansion of demand in the developing countries is expected to drive the tobacco economy of the world. Production of

tobacco leaf responds to demand trends and is increasing in countries where demand is increasing, production costs are low, and there are no production restrictions, as well as in countries with good transportation systems and access to the international market. Hence, some further shift of tobacco leaf production towards developing countries is expected (FAO, 2003).

In the Zambian setting, Mabeta et al (2015) investigated the growth of the tobacco industry using annual time series data stretching from 1980 to 2014 with a specific view to determine factors that affect the growth of the main non-traditional export commodity in Zambia; Tobacco. The study revealed that tobacco exports are significantly affected by Real exchange rate, real income of the trading partner and foreign direct investment in the short-run while only Real exchange rate and the real income of the trading partner affect the growth of tobacco exports in the long-run. The authors therefore recommended that Apart from creating an enabling environment through diverse export incentives that increase influx of foreign direct investment, there is also need to maintain a stable exchange rate by the government if export diversification is to be realized (Mabeta, Bett, Kiprop, & Gutema, 2015).

3.3 Summary

The chapter has presented a review of theoretical and empirical literature on the effects of exchange rate volatility on exports. According to the empirical evidence provided, exchange rate volatility has had positive, negative and or insignificant effects on exports. It has been observed that the majority of the studies reviewed seem to rally behind the traditional school's assertion that increased exchange rate volatility adversely affect export growth. However, gaps have been observed in existing literature. Most of the analysis done on the impact of exchange rate volatility on trade use aggregated data for different classes of products and industries.

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter presents the methodological approach adopted by this study. It includes the empirical model specification and justification, data sources, description and analysis of the variables, as well as the discussion of the techniques and procedures used in the estimation of the model.

4.1 Model Specification

We develop an export demand model based on Goldstein and Khan (1978) and applied by Chowdhury (1993) and Arize *et al.*, (2000). The model suggests a long-run relationship between exports, foreign economic activity, relative prices and exchange rate volatility. According to Chowdhury (1993) and Arize *et al.*, (2000), export demand model can be written as:

Substituting for the relevant proxy variables such as real exchange rates (RER) for price (P) and expressing the above function in linear reduced form the following equation is estimated:

$$\ln TE_{X_t} = \beta_{01} + \beta_{11} \ln WY_t + \beta_{21} \ln RER_t + \beta_{31} \ln V_t + \varepsilon_t \dots \dots \dots \quad (4.1.2)$$

Where:

ln stands for the natural logarithm of the relevant variable.

t is the time dimension.

TEX_t is Tobacco export volume to Metric tonnes

WY_t is foreign incomes proxied by GDP of the tobacco trading partners.

RER_t is the real exchange rate between Zambia and the tobacco trading partners to proxy for relative prices,

V_t is the exchange rate volatility estimated by the EGARCH method as discussed later;

β_0 is the intercept term and

ε_t is a white noise error term.

The sign on the β_{11} is expected to be positive, this is because an increase in proportion of GDP serviced by industry value addition for the tobacco importing countries is envisaged to increase foreign demand for the commodity. The real exchange rate depreciation may lead to an increase in exports due to the relative price effect. Hence, the expected sign on β_{21} , is positive. The sign on the coefficient of V_t , the exchange rate volatility, (β_{31}), can either be positive or negative, and this forms the main part of the analysis.

4.2 Data and Variables

Many studies done on this subject have used different kinds of data. It is widely believed that the type of data employed in a study may largely influence the findings of the analysis. One strong argument springs from the frequency (Monthly, quarterly and annually) of the data used. Most studies (Mwangi, 2014; Chipili, 2010; Moono, 2010) argue against the use of annual data because it tends to mask the effects of volatility on trade and instead use high frequency data to improve the sensitivity of the results. At the time of developing this study, the desired high frequency data especially for the variable of interest tobacco was only available for the period 2002 to 2014 and not for the chosen period 1992 to 2014. Therefore, to analyse the effects of exchange rate volatility on tobacco export growth during the period 1992 to 2014, only annual data could be employed. Moreover, other studies (Srinivasan & Kalaivani, 2013; Musonda, 2008; and Ngoma, 2015) successfully modeled their findings using annual time series data.

Therefore, this study employs annual time series data for the period 1992 to 2014. This period has been sampled because it coincides with the implementation of the floating exchange rate regime period in Zambia. The period before this was a mixture of periods of fixed and floating exchange rates where volatility in exchange rates was generally low. With these major differences in volatility structural breaks are bound to come up during the analysis, hence we only the period after 1992 to avoid these structural breaks in analysis.

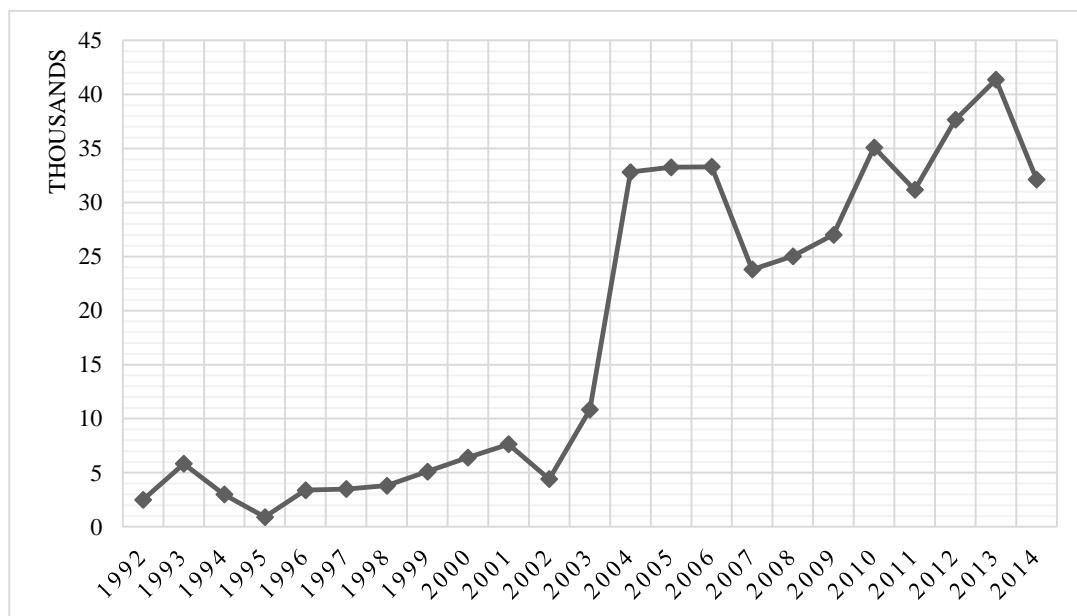
The variables and proxies used in this study have been selected in line with conventional literature. The data on GDP and consumer price indices for Zambia and all the tobacco trading partners was collected from World Development Indicators (WDI), meanwhile the data on

tobacco export series was gotten from, the Central Statistical Office (CSO). On the other hand, the exchange rate series were collected from Bank of Zambia (BOZ). Each variable used in this study is explained below as follows:

1) Tobacco Export

There has been a debate on whether the use of export volume or export value better measures export performance. Researchers such as Learner and Stern (1970) suggest that it is more appropriate to measure trade by volume than by value as it paints a more realistic picture of the movement of commodities across borders and removes price or valuation effects. The data on Tobacco is measured by the volumes of all classes (burley and Virginia tobacco) of unmanufactured raw tobacco exported out of Zambia in Metric tonnes annually from 1992 to 2014. A plot of the tobacco export volumes from 1992 to 2014 is presented below in figure 13.

Figure 13: Raw tobacco export series (1992 to 2014) in Metric tonnes



Source: CSO, 2014

2) Relative prices

A relative price is the price of a commodity such as a good or service in terms of another; that is, the ratio of two prices. A relative price may be expressed in terms of a ratio between any two

prices or the ratio between the price of one particular good and a weighted average of all other goods available in the market. Relative prices connects local and world markets for goods and services and are used in this case to denote the relative competitiveness of Zambia's tobacco on the international market. The assumption here is that, as competitiveness of the Zambian tobacco increases on the international market, tobacco exports also increases. Hence, relative prices play a key role in determining the flow of exports. In line with Chipili (2010), Srinivasan & Kalaivani (2013), and Ngoma (2015), we use real exchange rate (RER) to represent relative prices. RER is the the bilateral Real Exchange Rates (RER) between Zambia and each of its trading partners, in kwacha/US\$⁶.

The choice of the use of real exchange rates rather than nominal exchange rate is based on the arguement that real exchange rate better represents relative prices than nominal exchange rates. While nominal exchange rates only tells how much of foreign currency can be exchanged with one unit of domestic currency, the real exchange rate tells how much the goods and services in the domestic country can be exchanged for goods and services in the foreign country hence, a good proxy for relative prices. The foreign exchange rate used in this study is the Zambian Kwacha (ZMW) against the US\$. This exchange rate was chosen because the US\$ is the leading currency in the foreign exchange market trade and most of the official reserves and foreign currency transactions in Zambia are held in this currency. The real bilateral K/US\$ exchange (RER) rate series are estimated as follows:

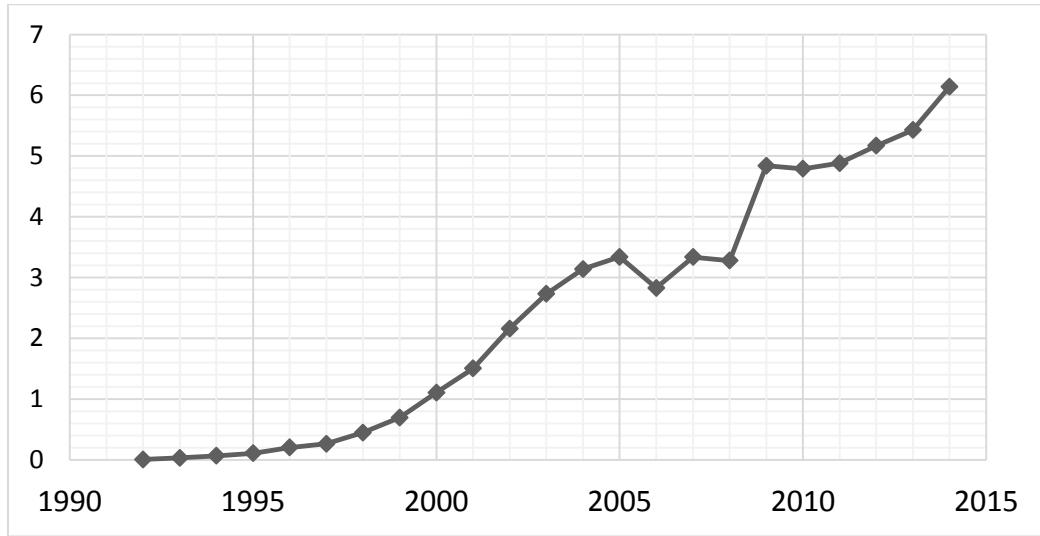
$$RER = \left(\frac{E_t P_t^*}{P_t} \right) \dots \dots \dots \quad (4.2.1a)$$

Where, E_t represents nominal kwacha/US\$ exchange rate, t is the time factor. P_t denotes consumer price Index for Zambia at time t and P_t^* is a consumer price index for the

⁶ <http://www.imf.org/external/pubs/ft/fandd/2007/09/basics.htm>

It should be noted however that the GDP's collected for all the foreign countries and Zambia are converted to US\$ and the E_t used is kwacha against US\$ because it's the currency unit for all transactions of tobacco leaving Zambia to whatever destination. The the CPI's on the other hand are set (with 2010 as the base year). A plot of the estimated Real exchange rates between Zambia and the trading partners is shown in figure 14 below:

Figure 14: Real exchange rate series from 1992 to 2014



Source: Authors own estimations

3) Foreign income of importing countries (WY)

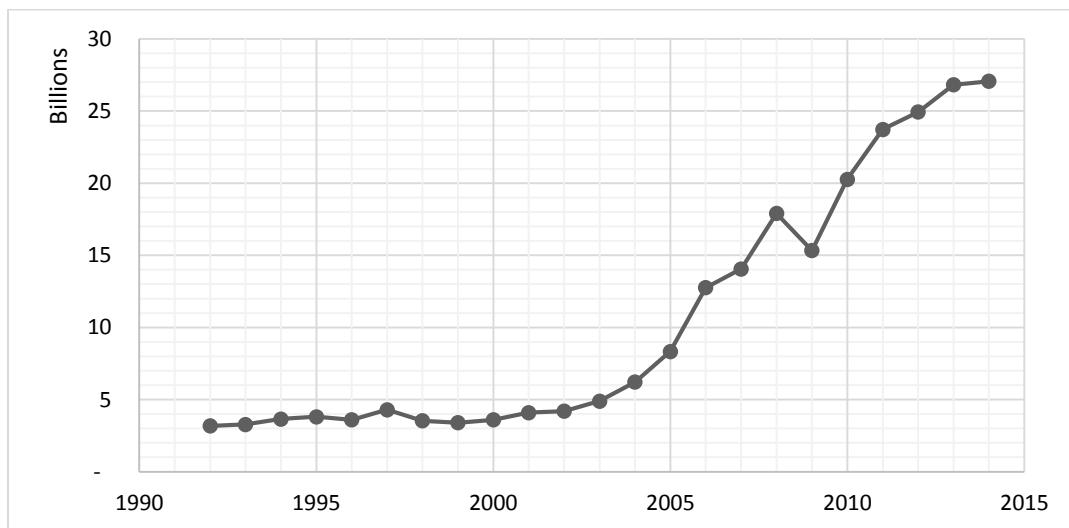
The level of a country's GDP indicates the level of income and aggregate demand for goods and services at home and abroad. In a bilateral trade setup, the amount of goods exported by the home country will to a larger extent be determined by the level of demand in the foreign country which is signaled by the foreign country's income level. This variable is very important in the analysis because it captures the foreign demand for the Zambian tobacco exports which is a key determinant for tobacco quantities exported. We expect that an increase in foreign income signals increased economic activity in the foreign country and increased demand for the Zambian tobacco and vice versa.

To arrive at an appropriate measure of a foreign economic activity variable that may directly influence the demand for Zambian raw tobacco. We consider the proportion of foreign GDP that is serviced by industry value addition. The underlying assumption is that; tobacco that leaves Zambia in its raw form is used by the subsequent importing country as a process input in the manufacturing of cigarettes and other tobacco related products. Hence we feel, revenues generated from such activities are best captured by the industry, value added (% of GDP). Therefore, for each country, the industry value added (% of GDP) is collected along with the GDP and using the formula (4.2.3) below, we estimate a proportion of the total income of Zambia's trading partners that is generated from industry value addition to proxy for foreign economic activity.

$$WY_t = \left(\frac{\sum_{i=1}^n (r_t^i \times GDP_t^i)}{n} \right) \dots \dots \dots \quad (4.2.3)$$

Where, t is a time factor, r is the industry value added percent % rate for country i at time t , GDP is the country's Gross Domestic Product. WY is the world income estimated as a proportion of GDP serviced by value addition at time t , i denotes the number of countries considered discretely and i runs from 1 to n where $n = 11$ (the total number of countries that import the 91% of Zambia's tobacco). Figure 15 below shows a plot of the estimated world income (WY).

Figure 15: World GDP (WY) variation over time (1992 to 2014)



Source: Authors estimations

4) Exchange Rate Volatility Modelling

There are several methods that can be used in modelling Volatility. The commonly used though, is the Moving Average Standard Deviation (MASD) first used by Kenen and Rodirik (1986). However, latest literature has challenged its appropriateness in measuring Volatility because of its implicit assumption that the exchange rates series are normally distributed (Boothe and Glassman, 1987) and it ignores the distinction between predictable and unpredictable elements of the exchange rate generation process (Musonda, 2008). Furthermore, it has been confirmed in recent literature that that exchange rates like other financial time series exhibit non-linear behaviour (Koutmos and Theodosiou, 1994; Brooks, 2001; and Bauwens and Sucarrat, 2006). The non-linear characteristic of volatility is the source of risk and uncertainty hence the need to employ appropriate non-linear models capable of capturing the uncertainty and risk created by volatility in exchange rate. Typically, conditional and unconditional models are employed to estimate volatility in variables.

Unconditional variance are observed ex-post variance while conditional variance is the variability of the unexpected part of the time series (De Grauwe and Rosiers, 1987). Unconditional variance is represented by the standard measure of variance (or standard deviation), a crude measure of total risk of financial assets. On the other hand, conditional variance captures the true measure of uncertainty. It reflects uncertainty about a variable given a model and information set (Chipili, 2010).

The most popular non-linear model employed by a good number of studies Musonda (2008); Moono (2010); Mwangi, Mbatia, and Nzuma, (2014), is the GARCH model. GARCH models are used to model and forecast conditional volatility by estimating the path of time-varying variance. GARCH models are also used to describe the autoregressive process of exchange rate volatility if interested in the stochastic process of short-term volatility (Hviding et al. 2004). As the objective of the study is to measure the impact of the risk and uncertainty created by the volatility on the performance of tobacco exports. An appropriate GARCH model that can capture the conditional characteristic volatility of the kwacha is necessary for this study.

The conventional GARCH model may not properly estimate the conditional variances reflective of the inherent volatility characteristic of the kwacha. Firstly, the estimated model may violate

the non-negativity conditions since the coefficients of the model probably are negative. The GARCH model also cannot account for leverage effects, along with and does not allow for any direct feedback between the conditional variance and the conditional mean (Chang Su, 2010). Chipili (2010) finds that kwacha exchange rates are characterised by different conditional volatility dynamics. It is therefore imperative to employ alternative GARCH models in examining conditional variance in exchange rate. The TGARCH and EGARCH are some of the alternative GARCH models. Furthermore, Chipili (2010) establishes that the TGARCH fails to show asymmetry in all exchange rates which was only obtained using the EGARCH model.

For the reasons highlighted, this study opted to use the EGARCH model proposed by Nelson (1991). The EGARCH model used in this study is given as:

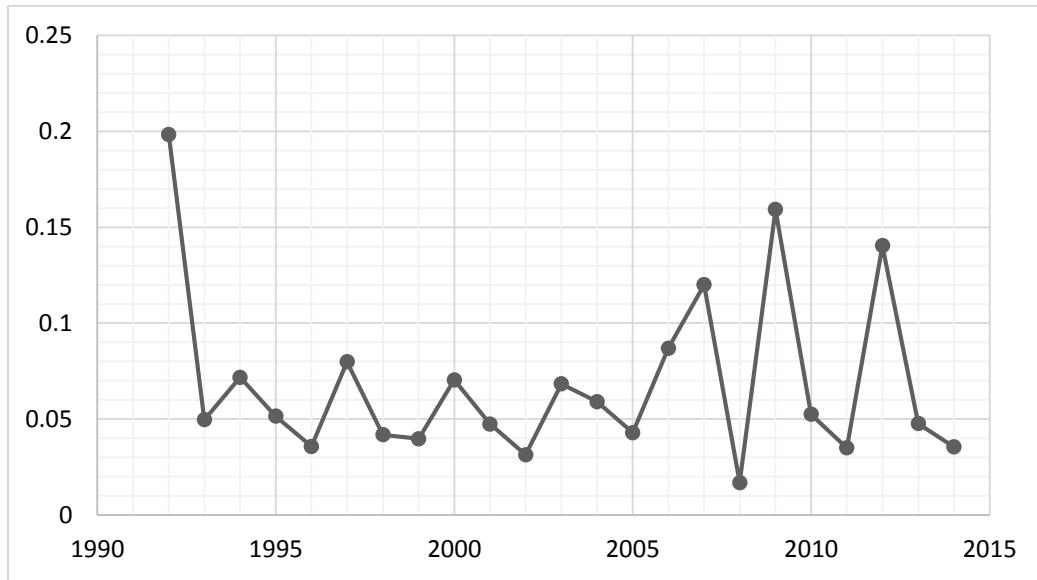
$$\ln \sigma_{j,t}^2 = \omega_t + \beta_j \ln(\sigma_{j,t-1}) + \gamma \frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left[\frac{|\varepsilon_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] \dots \dots \dots \quad (4.2.1)$$

Where $\sigma_{j,t}^2$ is known as the conditional variance since it is a one period ahead estimate for the variance calculated on any past information thought relevant. Since the equation defines a variance, $\omega, \alpha, \beta, \gamma$ are parameters to be estimated since the $\ln \sigma_{j,t}^2$ is modeled, then the significant advantage of EGARCH (1, 1) models is that, even if the parameters are negative, $\sigma_{j,t}^2$ will be positive. In addition, parameter restriction of non-negativity of coefficients like in the GARCH model is not required in the EGARCH specification since h_t is modelled in log-linear form. The α parameter represents a magnitude effect or the symmetric effect of the model, the “GARCH” effect. β Measures the persistence in conditional volatility irrespective of anything happening in the market. When β is relatively large, then volatility takes a long time to die out following a crisis in the market (Alexander, 2009). .

Further, asymmetric or leverage effects are captured via a statistically significant γ which can take on either a positive or negative sign, the parameter of importance so that the EGARCH model allows for testing of asymmetries. If $\gamma = 0$, then the model is symmetric. When $\gamma < 0$, then positive shocks (good news) generate less volatility than negative shocks (bad news). When $\gamma > 0$, it implies that positive innovations are more destabilizing than negative innovations. Predicted

values of $\ln \sigma_{j,t}^2$ are applied as an estimate of real exchange rate volatility (Takaendesa et al. 2005, p.10). The exchange rate volatility based on the above discussions is thus ambiguous, which implies that it can be both positively and negatively associated with trade volume. Below (Figure 16) is a plot of the exchange rate volatility based on the conditional variances estimated from the EGARCH process.

Figure 16: Real exchange rate volatility for period 1992 - 2014



Source: Conditional variances from the EGARCH estimation

4.3 Estimation Technique and Empirical Methodology

The study uses annual time series data from 1992 to 2014 for the four variables (Tobacco exports, RER, Volatility and World Income) included, meaning that each variable will have at most 23 data series which is quite a small sample. An appropriate model is hence required to model findings while addressing potential problems that could be brought about by the characteristic nature of the data employed. This study adopts the ARDL bounds F-testing procedure proposed by Pesaran et al. (2001) which is based on the estimation of an Unrestricted Error Correction Model (UECM) that enjoys several advantages over the conventional type of cointegration techniques. First, it can be applied to a small sample size study and therefore conducting bounds testing will be appropriate for the present study. Second, it estimates the

short- and long-run components of the model simultaneously, removing problems associated with omitted variables and autocorrelation.

Third, the standard Wald or F-statistics used in the bounds test has a non-standard distribution under the null hypothesis of no-cointegration relationship between the examined variables, irrespective of whether the underlying variables are I(0), I(1) or fractionally integrated. Fourth, this technique generally provides unbiased estimates of the long-run model and valid t-statistic even when some of the regressors are endogenous (Harris and Sollis, 2003). Inder (1993) and Pesaran and Pesaran (1997) have shown that the inclusion of the dynamics may correct the endogeneity bias. Fifth, once the orders of the lags in the ARDL model have been appropriately selected, we can estimate the cointegration relationship using a simple Ordinary Least Square (OLS) method (Srinivasan & Kalaivani, 2013).

In view of the above advantages, the following functional form defines ARDL-UECM used in the present study:

$$\Delta \ln TE_{t-1} = \beta_0 + \phi D_t + \sum_{i=1}^m \delta_1 \Delta \ln WY_{t-i} + \sum_{i=1}^n \delta_2 \Delta \ln RER_{t-i} + \sum_{i=1}^p \delta_3 \Delta \ln V_{t-i} + \sum_{i=1}^q \delta_4 \Delta \ln TE_{t-i} + \beta_1 \ln TE_{t-i} + \beta_2 \ln WY_{t-1} + \beta_3 \ln RER_{t-i} + \beta_4 \ln V_{t-i} + \varepsilon_t \dots (4.3)$$

The variables are as previously defined above; D_t is the deterministic term, t is the time dimension and Δ denotes a first difference operator. The expected signs on the coefficients as discussed above are that $\delta_1 > 0$, $\delta_2 > 0$, and $\delta_3 < 0$ or $\delta_3 > 0$.

4.3.1 Unit Root Test

Prior to the application of the ARDL approach, it is appropriate that all the series be tested for stationarity or the ‘same statistical property’ means the series have to be differenced or detrended by the same number of times to render them stationary. The traditional approach of first differencing disregards potentially important equilibrium relationships among the levels of the series to which the hypotheses of economic theory usually apply (Engle and Granger, 1987). John et al., (2005) emphasizes the use of the unit root test in checking for the order of integration adding that it is a crucial requirement for the existence of cointegration links. Moreover, results of the unit root tests are most cardinal in running the ARDL, which requires that dependent variable be non-stationary for the model to behave better. Furthermore, none of the variable

should be I(2) in normal conditions and none of the variable should be I(2) in structural break. The study employs the Augmented Dicker Fuller (ADF) test to check for the unit root in each variable and thereby determine the order of integration.

The unit root is estimated by the following ADF test equation.

Where y_t is the variable in question, T is the time trend, m is the lag length, and u_t is the error term assumed to be white noise, where $\Delta y_{t-1} = (y_{t-1} - y_{t-2})$. This equation is applied on all the variables including the dependent variable.

4.3.2 Cointegration Test

This test is conducted to find out if two or more variables share a stochastic trend or are cointegrated. Cointegration analysis is commonly used to test the existence of a long run stable relationship amongst variables. According to Engle and Granger (1987), cointegration implies that if variables are integrated of the same order, a linear combination of them will also either be integrated of the same order or lower order. The basic idea behind cointegration is that though macroeconomic variables may tend to move up and down over time, their linear combination may drift together (Dlamin, 2001). Therefore, though individually non-stationary, if they are integrated of the same order, a linear combination of these variables may be stationary. This stationarity attained in a linear combination of these is known as the cointegration equation (Funyika, 2015). This implies that the considered variables are cointegrated among them that is, these series cannot move too far away from each other or they cannot move independently of each other.

Cointegration test can be conducted using different methods; this study employs the Bound F-test procedure for cointegration relationship based on equation (4.3.1). According to Srinivasan & Kalaivani (2013), the first step in the ARDL bounds testing approach is to estimate Equation (4.3.1) and then check for existence of a long-run relationship among the variables by conducting a bounds F-test for the joint significance of the coefficients of the lagged level variables, under the null hypothesis:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$$

Against the alternative;

$$H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0.$$

Two sets of critical value bounds for the F-statistic are generated by Pesaran et al (2001). If the computed F-statistic falls below the lower bound critical value, the null hypothesis of no-cointegration cannot be rejected. Contrary, if the computed Fstatistic lies above the upper bound critical value; the null hypothesis is rejected, implying that there is a long-run cointegration relationship amongst the variables in the model. Nevertheless, if the calculated value falls within the bounds, inference is inconclusive (Srinivasan & Kalaivani, 2013).

4.3.3 Long-run Analysis

Since the ARDL model estimates both the long run and short-run dynamics simultaneously, once we establish cointegration we can isolate the conditional ARDL long run model (from Eq 4.3) for TEX_t using equation 4.3.3 below:

$$InTEX_t = \beta_0 + \sum_{i=1}^m \delta_1 \Delta InWY_{t-i} + \sum_{i=1}^n \delta_2 \Delta InRER_{t-i} + \sum_{i=1}^p \delta_3 \Delta InV_{t-i} + \sum_{i=1}^q \delta_4 \Delta InTEX_{t-i} + \varepsilon_t \dots \dots \quad (4.3.3)$$

Where, all variables are previously defined. This involves selecting the orders of the ARDL (p, q) model using Akaike Information Criterion (AIC).

4.3.4 Modelling Short-Run Relationship

In the final step we capture the error correction model associated with the long-run estimates in the ARDL-UECM Eq (4.3). The purpose of the Error Correction model (ECM) is to capture the short run dynamics of the variables in the cointegrated system. In other words, it illustrates the short run dynamics that restores the equilibrium relationships represented by the Cointegrating vectors in the event of asymmetric shocks (Gujarati, 2004). The error correction model for our study is defined by the following function:

$$\begin{aligned} \Delta InTEX_t = \beta_0 + \sum_{i=1}^m \delta_1 \Delta InWY_{t-i} + \sum_{i=1}^n \delta_2 \Delta InRER_{t-i} + \sum_{i=1}^p \delta_3 \Delta InV_{t-i} + \sum_{i=1}^q \delta_4 \Delta InTEX_{t-i} + \varphi ECM \\ + \varepsilon_t \dots \dots \quad (4.3.4) \end{aligned}$$

Where, $\delta_1, \delta_2, \delta_3, \delta_4$ and δ_5 are the short-run dynamic coefficients of the model's convergence to equilibrium and φ is the speed of adjustment parameter and ECM is the error correction term that is derived from the estimated equilibrium relationship of Eq (4.3).

CHAPTER FIVE

EMPIRICAL RESULTS AND DISCUSSION

5.0 Introduction

In this Chapter, we present the results from the econometric analysis conducted on the variables in the study. The chapter begins with the generation of the volatility series using the EGARCH (1, 1) after which other diagnostic tests follow, before performing the ARDL-UECM estimations and in conclusion some post estimation diagnostic and stability tests are conducted on the model.

5.1 Generating EGARCH Volatility Series

Before proceeding to generate the volatility series using the EGARCH (1, 1), we need to test for the presence of ARCH effects in the differences of Real exchange rate (RER) series. To do this we used the Lagrange Multiplier (LM) test. The results of the ARCH-LM test are presented in the table (3) below:

Table 3: LM test for autoregressive conditional heteroskedasticity (ARCH)

lags(p)	chi2	df	Prob > chi2
1	4.251	1	0.0392

H0: no ARCH effects vs. H1: ARCH (p) disturbance

Judging from the results of the LM test, the p-value of 0.0392 is below $p = 0.05$ indicating significance both at 5% and 10% level. We thus reject the null hypothesis of no ARCH effects. We can hence proceed and estimate the Exponential GARCH process and generate the volatility series. Table 4 below, shows the specified EGARCH model for Real Exchange Rates:

Table 4: EGARCH Equation for Real Exchange Rate Volatility

Variable	Coefficient	Standard Error	P> z
$\ln \sigma_{j,t}^2$			
Constant	0.275551	0.019946***	0.000
EGARCH equation for Real exchange rates			
Constant (ω_t)	0.011576	0.488769	0.981
γ	-2.40283	0.511964***	0.000
α	1.757438	0.670262***	0.009
β_j	0.846626	0.249255***	0.001

Note: *** indicates 1% level of significance

Our result for the conditional variance is:

$$\ln \sigma_{j,t}^2 = 0.012 + 0.85 \ln(\sigma_{j,t-1}) - 2.40 z_{t-1} + 1.756(|z_{t-1}| - \sqrt{2/\pi})$$

Where $z_t = \varepsilon_t / \sigma_t$ which is distributed as $N(0, 1)$

The negative γ ($\gamma < 0$) implies a weak leverage effect, which means that negative innovations (unanticipated price increases) are more destabilizing than positive innovations. Hence, positive shocks will generate less volatility in the Zambian market. The leverage effect is weak (-2.40) and substantially smaller than the symmetric effect (1.757). In fact, the relative scales of the two coefficients imply that the symmetric effect completely dominates the leverage effect. These findings are consistent with the findings of Ngoma (2015), Kwek (2006) and Stancik (2006) who found that the exchange rate volatility are sensitive to market events.

On overall, table 5. Below, presents the summary statistics of the variables used in the study:

Table 5: Summary Variable Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Log of Tobacco exports	23	9.29	1.14	6.80	10.63
Log of RER	23	-0.004	1.96	-5.46	1.81
Log of World GDP	23	22.75	0.82	21.88	24.02
Volatility	23	0.25	0.07	0.12	0.44

Source: Study data

5.2 Unit Root Testing

Prior to the application of the ARDL approach, it is appropriate that all the series be tested for stationarity or the ‘same statistical property’, this means the series have to be differenced or detrended by the same number of times to render them stationary. The traditional approach of first differencing disregards potentially important equilibrium relationships among the levels of the series to which the hypotheses of economic theory usually apply (Engle and Granger, 1987). The ARDL model requires that none of the variable are integrated of order I(2) in normal conditions (ADF test) and none of the variable are integrated of I(2) in structural break and the Dependent must be non-stationary in order for the model to behave better. The table (6) below shows the results of the Augmented Dicky-Fuller test results.

Table 6: ADF Unit Root Test Results

Variables	T-statistic in levels	T-Statistic in First difference	Decision
TEX	-1.044	-3.989***	I(1)
RER	0.644	-5.138***	I(1)
WY	1.225	-4.501***	I(1)
V	-7.752***	-	I(0)

Note: *** denotes significance at all levels (1%, 5% & 10%), optimum lag length is determined by the Akaike Information Criterion (AIC).

As evident in table 6 above, The results of the Augmented Dicky-Fuller test as indicate that all the variables except Volatility are non-stationary in levels I(0) but stationary at first differences I(1). Most importantly there is no variable which is integrated of order (2) [$>I(1)$] or more in our model and the dependent variable is non stationary in levels..

5.3 Lag length Selection

In time series analysis, values in the past affect today’s values for a given variable hence the need to specify lag length for different variables in the study. To do this, we employ the Akaike Information Criterion (AIC) and table (7) below shows the summary results of the lag determination test.

Table 7: Summary of Lag length Selection Criterion

Variables	Lag length	df	p	AIC
TEX	1	1	0.000	20.5074*
RER	1	1	0.000	1.19574*
WY	1	1	0.000	45.6064*
V	1	1	0.028	-2.82615*

Source: Stata output

*indicates lag order selected by the criterion

What is evident from the table above is that the selected lag length for all the tests in the variables is 1. This means at most, each variable will be lagged once during the estimations.

5.4 Bounds F-test for Cointegration

The Bounds test is used to test for existence of long run cointegration among the study variables. Table 8, below shows the results of the bounds F-test based on equation (4.3) above. The appropriate lag length was selected using the Akaike Information Criterion (AIC) for the conditional ARDL-UECM

Table 8: Results of Bounds Test Approach to Cointegration

Calculated Values		Critical Values	
Statistics		Lower Bound I(0)	Upper Bound I(1)
F-Statistic	7.276	2.72	5.61
T-Statistic	-4.527	-2.57	-4.37

Source: Stata Output

H0: no levels relationship

The Decision rule states that we reject the null hypothesis if computed F-statistic is greater than critical value for $I(I)$ regressors (Upper Bound). But if calculated F statistic is less than critical, we accept the null hypothesis, if otherwise, our test results are inconclusive. Therefore, from table 9 above, it is clearly evident that computed F-statistic ($7.276^{**} > 5.61$) is greater and above the upper bound hence we reject the null hypothesis of no cointegration indicating the existence of a stable long-run cointegration relationship among the variables. This implies that these series cannot move too far away from each other or they cannot move independently of each other (Srinivasan & Kalaivani, 2013). Besides, cointegration among the variables implies that, there is some adjustment process in the short run, preventing the errors in the long run relationship from becoming larger and larger.

5.5 Long run and Short run Estimates of ARDL process

Once the existence of cointegration relationship among the variables is confirmed, Equation (4.3.3) was estimated for the long-run coefficients of the selected ARDL (1, 1, 1, 1) model based on the Akaike Information Criterion (AIC) and the results of short-run dynamic coefficients associated with the long-run relationships were obtained from the ARDL-ECM equation (4.3.4). The results are presented in table 9⁷ below.

Table 9: ARDL-UECM Estimation Results

Dependent Variable $\Delta \ln \text{TEX}$				R-squared = 0.6915	
Timeframe	Regressors	Coefficients.	Std. Err.	t	P-value
Long-run	$\ln \text{RER}_{t-1}$	0.6124	0.1433	4.27***	0.001
	$\ln \text{WY}_{t-1}$	0.5694	0.1969	2.89**	0.012
	$\ln \text{V}_{t-1}$	0.4700	0.7336	0.64	0.532
Short-run	$\Delta \ln \text{RER}$	1.9382	0.4955	3.91***	0.002
	$\Delta \ln \text{WY}$	2.8499	0.9099	3.13***	0.007
	$\Delta \ln \text{V}$	0.3524	0.4017	0.88	0.395
	ECM_{t-1}	-0.9684	0.2139	-4.53***	0.000
Constant		-3.6552	5.1047	-0.72	0.486

Source: Stata output

Note: t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001

Estimated long-run tobacco export equation: $\ln \text{TEX}_t = 0.612 * \ln \text{RER}_t + 0.569 * \ln \text{WY}_t + 0.47 \ln \text{V}_t$

Short-run dynamics: $\Delta \ln \text{TEX} = 1.94 * \Delta \ln \text{RER} + 2.85 * \Delta \ln \text{WY} + 0.35 \Delta \ln \text{V} - 0.97 * \text{ECT}$

Table 9 above; shows the results of the ARDL-UECM estimation of both the long run and short-run relationships of the variables in the study. However, before discussing these findings, it is necessary that we check for cointegration among the variables as explained in the methodology. For this we conducted the bounds F-test presented below.

5.5 Long-run and Short-run Analysis

Once cointegration among the variables has been established, we proceed to the analysis of the findings by objectives.

⁷ The long run and short run estimates of the ARDL-UECM process were obtained using STATA version 12

Income

For the analysis of the effects of foreign income on exports, the findings of this study are consistent with findings of Srinivasan & Kalaivani (2013); Ngoma (2015); Mwangi, et al., (2014); Shane *et al.*, (2008) and Chipili (2010). Income exerts positive effects on tobacco exports both in the short-run and the long-run just as predicted in the hypothesis. The impact is statistically significant at 1% level in the short run with an elasticity of 2.8 and at 5% level of significance with an elasticity of 0.5 in the long run (See table 9). This result confirms the importance of foreign income in Zambia's tobacco export growth.

The possible explanation for this result is that, tobacco is usually exported in its raw form. Most of the processing done only involves stages of curing and preparing the tobacco for export, very little value is added to it. The importing countries then use this tobacco as a process input in the production of cigarettes and other tobacco products. Meaning that, the demand for the tobacco will to a larger extent depend on the economic conditions prevailing in the tobacco importing countries. As economic activity increases in the tobacco importing countries signified by increased income, industries will demand more process inputs like tobacco to produce more. This leads to increased demand for tobacco imports and a higher purchasing power for the locally produced tobacco. Hence, this will encourage more tobacco exports.

Relative prices

The results show that real exchange rates has a positive impact on tobacco exports in line with conventional theory and the study hypothesis. Moreover, similar results are found by Sabubi-Sabouni and Piri, (2008) Shane *et al.*, (2008) and Srinivasan & Kalaivani (2013). Yanikkaya, Kaya, & Kocturk, (2013) specifically found that any depreciation of the turkish Lira leads to higher exports of tobacco. Chipili (2010) and Mabeta *et al*, (2015) also found that a depreciation of the kwacha raises burley tobacco exports in Zambia. Table 9 above shows that the coefficients of the real exchange rates are statistically significant at 1% level for both the shorrun (with elasticity of 0.6) and the longrun (with elasticity of 1.9). The positive signs implies that the real depreciation of kwacha improves the flow of tobacco exports for both the short run and in the long run. We can therefore conclude that relative prices play a crucial role in influencing the growth of exports in that the real depreciation of the kwacha tends to be more effective in stimulating the growth of tobacco exports in Zambia.

Exchange rate volatility

The coefficients for exchange rate volatility indicate a positive impact on tobacco exports both in the short run and the long run implying that an increase in exchange rate volatility leads to a rise in tobacco export volume. The result confirms the findings of Chipili (2010), Buguk et al. (2003) and reinforces theoretical arguments of De Grauwe (1988) who argues that exporters may take exchange rate volatility as an opportunity for profit making rather than a trading risk. Hence dwelling on this result, tobacco exporting merchants respond by exporting more in periods of high volatility to improve their chances of increasing profitability and outdo any reduction in revenues caused by adverse exchange rates. This of course is made possible by the tobacco merchants' ability to diversify risk. The monopsony market arrangements surrounding the production of tobacco such as the out-grower scheme in Zambia provide for a perfect platform for risk sharing between the tobacco merchants (buyers) and the small scale farmers (sellers).

However, the increments in export volumes stimulated during periods of high volatility are not very significant as reflected by the insignificant coefficients of volatility both in the shorrun and the long run (see table 9 above). This finding conforms to the findings of Hosseini and Moghaddasi (2010) and Yanikkaya *et, al.*, (2013). The tobacco market in Zambia is underdeveloped and hugely monopolized by the foreign market. Very little is consumed in the local market because of the absence of local industries that can use the tobacco to manufacture cigarettes, Hookah, Kreteks and other tobacco products. Furthermore, limited storage facilities for tobacco has proven to be a major challenge for most tobacco merchants. As a result, few alternatives exist during periods of high volatility in form of more lucrative less risky local markets and storage facility for merchants to hold their tobacco and only export when the exchange risk is favourable for trade. In such a situation, almost all the tobacco produced in the country each season is offloaded on the international market even when there is exchange rate uncertainty.

Other than that, some tobacco merchants have long standing contractual obligations with parent firms and other companies operating in foreign countries to supply agreed upon quantities for raw tobacco every season. Therefore, these firms will continual exporting regardless of the volatility in exchange rate obtaining for as long as they are able to meet their running costs. Hence exchange rate volatility will exert insignificant effects on tobacco export growth.

Error correction model

In regards to the Error Correction Model, as shown in table 8 above, the estimated error correction term is negative and significant at one percent level. The regressor ECM_{t-1} corresponds to the one year lagged error correction term, which is indicative of the measure of the average speed at which export volume adjusts to a change in equilibrium conditions or the average time lag for adjustment of exports to changes in the explanatory variables. The significant error correction term implies that Zambia's tobacco exports demand model adjusts to changes in the specified independent variables. This further confirms the existence of a stable equilibrium long run relationship among the variables in the model (Banerjee *et al.*, 1993). The coefficient of the ECM is -0.968 confirms that 97% of the disequilibrium in Tobacco exports from the previous periods' shock will converge back to the long-run equilibrium in the current period. Table 10 below shows the post estimation results validating the findings of the study.

Table 10: Post estimations

Problems	Post estimation Tests	Probability
Higher order autocorrelation	Durbin-Watson (ARCH LM)	0.9359
Heteroscedasticity	Breusch-Pagan	0.5965
Omitted variables	Ramsey RESET	0.7174

The ARDL-Error Correction Model passed the relevant post-estimation tests, more precisely, the probability statistics (*p-values*) allowed for the acceptance of the null hypothesis against all potential problems in the model. The model results revealed no presence of autocorrelation and higher order autocorrelation. The Breusch-Pagan was used to prove that there was no Heterocedasticity and the model had no omitted variables as confirmed by the Ramsey reset test.

For the stability of the ARDL Model, we apply the CUSUM (Cumulative Sum of Recursive Residuals) and CUSUMSQ (Cumulative Sum of Squares of Recursive Residuals) plots (Brown *et al.* 1975), to examine the long-run coefficients together with the short-run dynamics. The CUSUM and CUSUMSQ plots for the estimated model are shown in Figure 14 and Figure 15 below, respectively. If the plots of the CUSUM and CUSUMSQ statistics stay within the critical bounds (Lower and Upper bounds), the null hypothesis, which states that all coefficients in the given regression are stable, cannot be rejected. An inspection of plots in Figure-14 and 15 shows

that CUSUM and CUSUMSQ statistics are well within the critical bounds implying that short run and long run coefficients in the ARDL-Error Correction Model are stable.

Figure 17: Cumulative Sum of Recursive Residuals

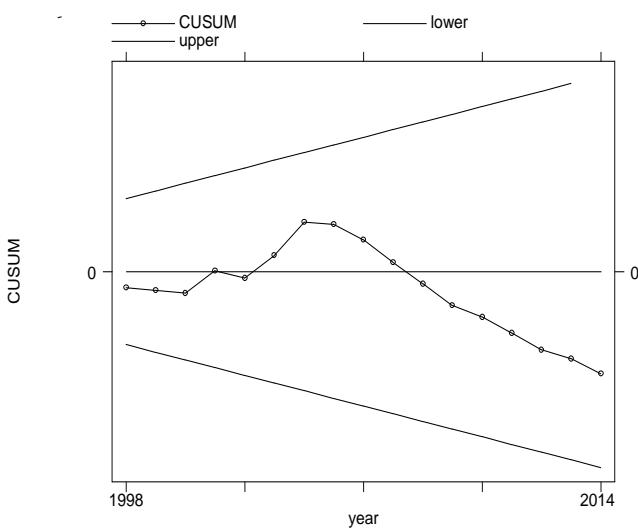
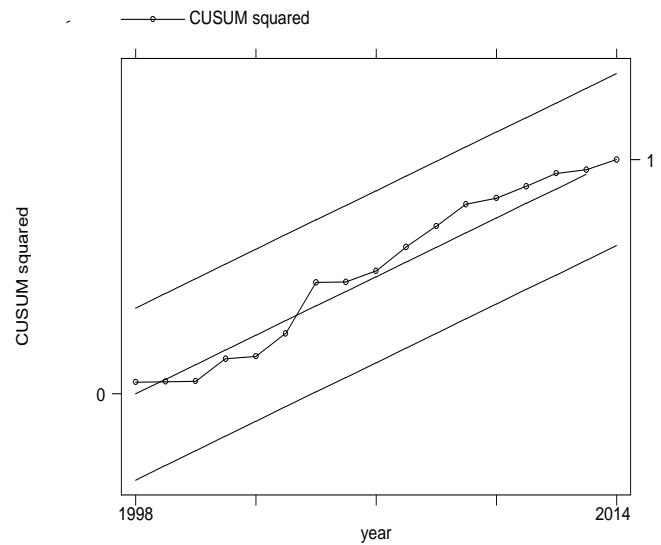


Figure 18: Cumulative Sum of Squares of Recursive Residuals



Source: Stata output

5.6 Summary

The study data was collected from CSO, BOZ and the WDI. All the variables included in the study except Volatility were integrated of order one I(1) as confirmed by the ADF test administered. The ARDL-bounds test confirmed long-run cointegration among the variables and the ARDL estimations revealed that the coefficients on volatility were positive but insignificant both in the shorrun and the longrun. Furthermore, the findings show that real exchange rate and foreign income exerts a positive and significant effect on tobacco export both in the short-run and the long-run. The speed of adjustment term revealed that 97% of the disequilibrium in tobacco exports from the previous years' shock converges back to the long-run equilibrium in the current year.

CHAPTER SIX

CONCLUSION AND POLICY RECOMMENDATIONS

6.1 Conclusions

This study investigated the impact of exchange rate volatility on Zambian raw tobacco exports using annual time series data for the period 1992 to 2014. The study is different from other studies done in Zambia such as Musonda (2008), Moono (2010) and Funyika (2015) whose analysis uses the GARCH (1, 1) to measure volatility in exchange rate. This study goes further to employ the EGARCH (1, 1) in generating volatility series and the ARDL bounds testing procedure proposed by Pesaran, Shin and Smith (2001) in estimating results.

The specific objective of the study was to evaluate the effect of the real exchange rate volatility on raw tobacco exports from Zambia to eleven (11) main tobacco-trading partners in the world. The Augmented Dicky Fuller (ADF) test used established that only volatility was integrated of order zero I(0) while the rest of the variables were integrated of order one I(1) in line with the conditions of the ARDL model which requires that no variable is of I(2) or more. Most importantly, the dependent variable was non-stationary as should be the case in the ARDL estimations. Furthermore, the optimum lag order was determined using the Akaike Information Criterion (AIC), it's worth noting that long-run cointegration among the study variables was confirmed using the bounds testing procedure.

The ARDL-UECM results show that real exchange rate volatility though positive exerts insignificant effects on tobacco exports both in the short-run and long run in respect to the positive significant effects observed by Chipili (2010). Indeed, from these results we are able to single out the effect of volatility on a single export commodity such as tobacco as opposed to taking the overall effect on aggregated sectoral exports. Exchange rate volatility for example, affects tobacco exports negatively when tobacco exports are aggregated together with other non-traditional and agricultural export commodities as revealed by Musonda (2008) and Ngoma (2015). Indicating perhaps that, when analysed as a group, individual effects may cancel each out and bring out an aggregated effect that is not in itself representative of the individual responsiveness to exchange rate volatility.

In this case we have found that actually, tobacco exports are not significantly affected by exchange rate volatility perhaps because of its unique industrial characteristics such as the monopoly structure of the tobacco market, which is dominated by the international buyers, as well as the monopsony nature of the tobacco local market which allows for the opportunity of sharing profit risk between the small scale farmers (sellers of the commodity) and the exporting firms (buyers of the commodity).

Besides, the real exchange rate has positive and significant impact on tobacco exports both in the short-run and the long-run, confirming that the depreciation of the Kwacha is more effective in stimulating the growth of the Zambian tobacco export industry as was hypothesized by the study. In other results, foreign GDP has positive and significant effect on Zambian tobacco exports both in the short-run and the long-run implying that an increase in foreign economic activity increases the purchasing power of the country's tobacco and hence encourages exports of more tobacco from Zambia.

The error correction term (ECT) was found to be -0.968 and was statistically significant confirming the existence of stable equilibrium long run relationship. The negative sign on this coefficient indicates that the direction of correction is towards the long-run equilibrium while the size indicates the speed of adjustment towards the long-run equilibrium. The economic importance of this finding is that the tobacco exports adjust to correct long run disequilibrium between itself and its determinants rapidly. This means that 97% of the disequilibrium in Tobacco exports from the previous years' shock will converge back to the long-run equilibrium in the current year.

6.2 Policy Recommendations

Based on the weak positive effects of real exchange rate volatility on tobacco exports, the study recommends the development of adequate modern storage facilities for storage of tobacco by the merchants. This will give them an option of gauging market conditions obtaining especially the level of exchange rate volatility for purposes of maximizing revenues and profits. With improved tobacco storage facilities, merchants will be able to take advantage of the market conditions to

significantly increase the volumes of tobacco exported when the level of volatility obtaining in the exchange rate is favourable to them and stockpile the commodity when it is not favourable to engage in the export market.

6.3 Limitations of the study and suggestions for further studies

The study had the following methodological limitations that future studies should address to improve on the results.

Study variables

The choice of variables in this study was guided by available theoretical and empirical literature. However, tobacco is not an ordinary commodity as it poses potential health hazards to consumers therefore, deliberate policies have been developed to curb the consumption of tobacco in many countries. These policies have the potential to significantly reduce the demand for tobacco in the tobacco importing nations. This study could not find an appropriate variable to capture the effects of policy restrictions on the demand for tobacco in the major tobacco trading partners for the period 1992 to 2014. It is therefore an area that future studies should pay keen interest to improve on the findings.

Annual data

As a result of unavailability of comprehensive monthly data for the main variable of interest tobacco in the period 1992 to 2014. The study opted to employ annual time series data in the investigation of the impact of exchange rate volatility on tobacco export growth. However, annual time series data presents known econometric limitations in that it tends to mask the effects of volatility. Future studies on this subject should therefore endeavor to collect monthly or at least quarterly data to improve on the results.

Analysis period

The study restricted the analysis period from 1992 to 2014 because it coincides with the period of flexible exchange rates which are known to exhibit relatively more volatility than the fixed exchange rates. However, there might be need to compare the performance of tobacco exports in periods of both low and high volatility. Therefore future studies may need to include the period

before 1992 and include appropriate econometric methods to detect the presence of structural breaks between different periods.

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APPENDIX

Appendix A- Lag order Selection Criterion for all study variables

Selection-order criteria								
Sample: 1995 - 2014				Number of obs = 20				
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-202.456				5.4e+07	20.6456	20.6845	20.8448
1	-199.843	5.2271*	1	0.022	4.7e+07*	20.4843*	20.5329*	20.7332*
2	-199.467	.7508	1	0.386	5.0e+07	20.5467	20.6051	20.8455
3	-198.867	1.2001	1	0.273	5.3e+07	20.5867	20.6548	20.9352

Endogenous: TEX

Exogenous: WGDP doGDP RER _cons

Selection-order criteria								
Sample: 1995 - 2014				Number of obs = 20				
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-31.8042				1.55679	3.28042	3.29014	3.33021
1	13.0673	89.743*	1	0.000	.019372*	-1.10673*	-1.0873*	-1.00716*
2	13.4427	.75067	1	0.386	.020654	-1.04427	-1.01511	-.894907
3	13.4601	.03488	1	0.852	.022859	-.946011	-.907136	-.746865

Endogenous: lnRER

Exogenous: _cons

Selection-order criteria								
Sample: 1995 - 2014				Number of obs = 20				
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-23.7373				.694845	2.47373	2.48345	2.52351
1	9.66911	66.813*	1	0.000	.027211*	-.766911*	-.747473*	-.667337*
2	9.709	.07978	1	0.778	.030002	-.6709	-.641743	-.52154
3	10.812	2.206	1	0.137	.029789	-.681199	-.642323	-.482052

Endogenous: lnWY

Exogenous: _cons

Appendix B: Generating Volatility series using EGARCH

LM test for autoregressive conditional heteroskedasticity (ARCH)

lags (p)	chi2	df	Prob > chi2
1	4.251	1	0.0392

H0: no ARCH effects vs. H1: ARCH(p) disturbance

ARCH family regression

Sample: 1993 - 2014 Number of obs = 22
 Distribution: Gaussian Wald chi2(.) = .
 Log likelihood = -6.382611 Prob > chi2 = .

DlnRER	OPG					
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
DlnRER						
_cons	.2755511	.0199462	13.81	0.000	.2364573	.314645
ARCH						
earch						
L2.	-2.40283	.5119641	-4.69	0.000	-3.406261	-1.399398
earch_a						
L2.	1.757438	.6702616	2.62	0.009	.4437494	3.071126
egarch						
L1.	-.2104703	.1505107	-1.40	0.162	-.5054659	.0845253
L2.	.8466258	.2492553	3.40	0.001	.3580943	1.335157
_cons	.0115758	.4887691	0.02	0.981	-.946394	.9695457

Appendix C: ADF-test for Unit Root in Variables

1). Tobacco export series

Augmented Dickey-Fuller test for unit root		Number of obs = 21		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-0.841	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.8066

2) Volatility series

Augmented Dickey-Fuller test for unit root		Number of obs = 21		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-6.405	-3.750	-3.000	-2.630

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

3) Real exchange rate series

Augmented Dickey-Fuller test for unit root		Number of obs = 21		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-4.218	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0006

5) World income series

Augmented Dickey-Fuller test for unit root		Number of obs = 21		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	0.187	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.9715

Appendix D: Dicky Fuller tests of Differenced variables

1) First difference Tobacco export series

Dickey-Fuller test for unit root		Number of obs = 21		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-5.267	-3.750	-3.000	-2.630

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

2) First difference World income series

Dickey-Fuller test for unit root		Number of obs = 21		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-4.004	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0014

Appendix E: Short-run and long-run ARDL-UECM estimation process

ARDL regression

Model: ec

Sample: 1993 - 2014

Number of obs = 22

Log likelihood = -5.5077833

R-squared = .69154386

Adj R-squared = .5373158

Root MSE = .38961657

	D.lnTEX	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
ADJ	lnTEX					
	L1.	-.9683575	.2138986	-4.53	0.000	-1.427124 -.5095906
LR	lnV					
	L1.	.4700001	.7336051	0.64	0.532	-1.103426 2.043426
	lnRER					
	L1.	.6124395	.1433124	4.27	0.001	.3050649 .9198141
	lnWY					
	L1.	.5693798	.1969035	2.89	0.012	.1470639 .9916958
SR	lnV					
	D1.	.3524172	.4017473	0.88	0.395	-.509245 1.214079
	lnRER					
	D1.	1.938224	.4955241	3.91	0.002	.8754307 3.001018
	lnWY					
	D1.	2.84991	.9099477	3.13	0.007	.8982657 4.801553
	_cons	-3.655262	5.10469	-0.72	0.486	-14.60373 7.293209

Appendix F: Bounds F-test

ARDL regression

Model: ec

Sample: 1993 - 2014
 Number of obs = 22
 Log likelihood = -5.5077833
 R-squared = .69154386
 Adj R-squared = .5373158
 Root MSE = .38961657

Pesaran/Shin/Smith (2001) Bounds Test

H0: no levels relationship F = 7.276
 t = -4.527

Critical Values (0.1-0.01), **F-statistic**, Case 3

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_3	2.72	3.77	3.23	4.35	3.69	4.89	4.29	5.61

accept if F < critical value for I(0) regressors
 reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), **t-statistic**, Case 3

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_3	-2.57	-3.46	-2.86	-3.78	-3.13	-4.05	-3.43	-4.37

accept if t > critical value for I(0) regressors
 reject if t < critical value for I(1) regressors

k: # of non-deterministic regressors in long-run relationship

Appendix G: Post-Estimations

Durbin-Watson d-statistic(8, 22) = 1.98632

LM test for autoregressive conditional heteroskedasticity (ARCH)

lags (p)	chi2	df	Prob > chi2
1	0.006	1	0.9359

H0: no ARCH effects vs. H1: ARCH(p) disturbance

Breusch-Godfrey LM test for autocorrelation

lags (p)	chi2	df	Prob > chi2
1	0.001	1	0.9695

H0: no serial correlation

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of D.lnTEX

chi2(1) = 0.28

Prob > chi2 = 0.5965

Ramsey RESET test using powers of the fitted values of D.lnTEX

Ho: model has no omitted variables

F(3, 11) = 0.46

Prob > F = 0.7174

Variable	VIF	1/VIF
lnRER		
L1.	8.94	0.111896
lnTEX		
L1.	8.30	0.120450
lnRER		
D1.	6.41	0.155965
lnV		
L1.	6.01	0.166314
lnWY		
L1.	5.85	0.171076
lnV		
D1.	4.97	0.201176
lnWY		
D1.	2.47	0.404830
Mean VIF	6.14	