AN ECONOMIC ANALYSIS OF CIGARETTE DEMAND IN ZIMBABWE.

BY

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CERTIFICATION OF DISSERTATION

This document has been read and recommended to be submitted to the Faculty of Natural resource management under the department of Agricultural Economics and Development in partial fulfilment of Bachelor of Science Honours degree in Agricultural Economics and Development by Tendai M Kurehwatira titled:

AN ECONOMIC ANAYSIS OF CIGARETTE DEMAND IN ZIMBABWE 1980-2015.

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DEDICATION

This dissertation is dedicated to my parents, the late Mr. and Mrs. Kurehwatira.

ABSTRACT

Empirical literature exists that cigarette consumption is a major epidemic internationally and locally. The study was mainly conducted to analyse cigarettes consumption in Zimbabwe from 1980 to 2015 by looking into the consumers' response if there is a change in price, income, excise tax or an addition of more tobacco control events. The study sought to solve for the increase in the demand for cigarettes, where consumers continue to consume knowing the negative impacts it has on their lives. The study was conducted using secondary data, where the data for cigarette consumption per capita, real price of cigarettes, real GDP per capita, excise tax and tobacco control events was collected from annual reports and national survey's done by Zimstat, World Health Organisation (WHO), World Bank, Global Youth Tobacco Survey (GYTS) and Global Adult Tobacco Survey (GATS). A descriptive research was conducted using a linear convectional demand model which was developed to analyse the relationship between the dependant variable cigarette consumption per capita and the independent variables which are the real price of cigarettes, real GDP per capita, excise tax and tobacco control events. The empirical literature shows that price elasticity was negative and income elasticity was positively related to cigarette demanded. Price and income elasticities were found to be -0.39 and 0.39 respectively, proving that both price and income have an influence on cigarette consumption. In conclusion, all variables had an impact on cigarette consumption but need to be implemented correctly to ensure a reduction in cigarette demanded by consumers in Zimbabwe.

Keywords: cigarette demand, time series, price elasticity and income elasticity

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey Fuller
BAT	British American Tobacco
FAO	Food and Agriculture Organisation
GATS	Global Adult Tobacco Survey
GDP	Gross Domestic Product
OLS	Ordinary Least Squares
RESET	Regression Specification Error Test
USDHHS	United States Department of Health and Human Services
WHO	World Health Organisation
ZIMSTAT	Zimbabwe Statistics

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Historically the tobacco crop in Zimbabwe is recognized as the most important crop in the nation, where Zimbabwe is known to be one of the major exporters of tobacco in the world. Tobacco industries are mostly known to be one of the most successful and substantial businesses in the world. Tobacco products can be chewed, snuffed and smoked, were products that are associated with tobacco are known to be associated with deaths and diseases, compared to any other product (US Department of Health and Human Services, 2006).

The main tobacco products are mainly cigarettes and cigars that are mostly consumed in the world. Cigarette smoking and manufacturing at a large scale began only in the 19th century. According to the Food and Agriculture Organisation, (2003) before the 1980s cigarette production in developed countries was very high as compared to the developing countries, but after the mid-1980s cigarette production in developing countries later surpassed the production of cigarettes in the developing countries. After the year 2000 cigarette smoking had spread worldwide and a total of 1.2 billion people smoked on a global scale. According to the World Health Organisation, (2008) the smoking of tobacco in the 21st century would make smoking the main cause of death in developing countries, where by 2030 a total of 8 million people will die every year globally due to smoking. This would have resulted from an increase in both adult population and cigarette consumption.

The WHO, (2008) recorded that cigarette consumption on a global scale had dropped in the 1970s, where the causes of the reduction in the demand for cigarettes was attributed by health information which was published in the 1970s. The health information included reports about the addictive nature of the nicotine that is found in cigarettes. Nicotine is a naturally occurring liquid alkaloid, where this organic compound has potent effects on the human body and is addictive. The nicotine found in cigarettes is known to be one of the main causes of lung diseases like chronic obstructive pulmonary, lung cancer and cardiovascular death (Chaloupka & Warner, 1999).

Looking at the cigarette industry given all these drawbacks available from the smoking restrictions, public bans, advertisement bans and even excise tax on that product, consumers

still continue to consume the product. According to Chaloupka and Warner, (2000) indicated also that with all the information available on not to consume cigarettes but the product is still consumed, hence proving there is a need to understand the demand for the product. Consumers that smoke cigarettes do it for many reasons that include to alleviates discomfort, stress relief, provides pleasure, acquiring status, wealth status, proof to be matured, weight loss and enjoying the taste.

Consumers demand more of the cigarette because of the good provided by the product. In some cases it is for weight loss or controls their weight. Chiolero, Faeh, Paccaud and Cornuz, (2008) conducted a medical research that supported the medical aspect of smoking a cigarette, which is said to boost the metabolic rate by increasing the energy available in the body by approximately 3% within just 30 minutes. Studies by Chiolero *et al.,* (2008) and Mineur *et al.,* (2011) pointed out that the nicotine found in cigarettes can also supress one's appetite hence also promoting weight loss or controlling one's weight. Kessler, (1995) indicated that the majority of smokers became addicted when they were still teenagers because teenagers tend to underestimate the short and long term effects of smoking and the health consequences associated with tobacco use.

The main reasons why the youth smoke is to look mature, to experiment and to be like their friends. This brings out another feature that smoking also provide a social reward, by making the consumer feel like they are part of a group which can provides a sense of comfort and acceptance at any age (Cunningham, 2011). According to Gajalakshmi *et al.,* (2000); Efroymson *et al.,* (2001) found that the increase in the number of youths, which were partaking in tobacco smoking in developing countries was mostly because the product has been recognized by society as sign of wealth. In some developing countries like Malaysia youth smoking is a problem, where it is mainly influenced by the youths' socio-economic backgrounds (Zulkifli, 1997). Bringing out the aspect that another factor that encourages smoking is of the consumers background from the family, community and society at large, through the acceptance of smoking in the area as a socially acceptable behaviour.

According to Jacobs, (1997) another aspect is that of risk taking behaviour, where in different countries it is against the law to smoke if one is under the age 18. Smoking is also seen as an unacceptable behaviour in the eyes of the parents, relatives and community.

Through criticism smoking hence becomes very attractive and teenagers will smoke just to break the rules or by doing an illegal act.

Adults also smoke when they have a lot of stress and pressures because of personal and economic problems. According to Jacobs, (1997) the personal and economic problems may include unemployment, being homeless, dealing with addictions (alcohol or drugs) and bad marriages or relationships. The main reason here is to feel relaxed or by giving the consumer energy to get through their rough patch. We have individuals that smoke because they love smoking where smoking makes them feel good about themselves and gives them a sense of pleasure.

The consumer demand estimations for cigarette consumption have been a research interest for understanding the demand for the product have been driven by two considerations. Firstly is that the consumption of cigarettes is mainly associated with negative social, health and economic consequences, which affect both smokers and non-smokers (Sayginsoy *et al.,* 2002;Huang *et al.,* 2004; Falk *et al.,* 2006; WHO, 2008; Hidayat and Thabrany, 2010, 2011; Nguyen *et al.,* 2012; and Kidane *et al.,* 2015).

Secondly but lastly, it is concerned with the reluctance of the governments in implementing policies that will aid in curbing cigarette consumption. There is vast literature that tax increases, which raises the price of the tobacco product, is the most powerful tool used to reduce cigarettes consumption, where many governments have been hesitant to adopt cigarette tax as means to reduce alcohol and tobacco consumption (Chaloupka *et al.,*2002; Sayginsoy *et al.,*2002). The governments fear that a tax increase and other proven cost effective tobacco control measures will harm their economies in terms of revenue, job and income losses. Zimbabwe is one of the countries that have the lowest excise tax on cigarettes in Africa at 40%, where it is below the recommended WHO excise tax rate of 75-80%. According to a study done by Chaloupka and Warner, (2000) the demand for cigarettes, while inelastic, is nonetheless affected by its price and the young and poor are the ones who are most sensitive to price increases. Prabhat, (1998) found out that a 10% increase in the price of cigarettes will lead to a reduction in cigarette demanded, in the short term by 4% in developed countries and 8% in developing countries.

Therefore given such circumstance where tobacco use continues to be a problem there is need for an analysis of the cigarette demanded by the consumers, in order to understand how they

will respond to an increase in tobacco prices and toughened tobacco control events, should be analysed in a low income country.

1.2 Problem Statement

The consumption of cigarettes is increasing in developing countries, given the same rules, information and regulations as all the other products. Many countries have taken measures to reduce cigarette use as a way of reducing tobacco related social costs. While other countries heavily depend on both tobacco growing and manufacturing of the leaf for employment and income. According to Wilkins *et al.,* (2003) states that the increase in the smoking epidemic and the negative consequences that are involved with cigarettes, there still is a strong demand for the product which is harmful and fatal to smokers and non-smokers. But the consumers tend to prove that tobacco use is a problem under the circumstances of failure to reduce consumption given all information related to the fatal effects of tobacco use. To conclude the possible effects of cigarette demanded by consumers has an effect on the economy of the country. Hence an analysis on cigarette consumption looking into the response by the consumers on an increase in price of the product and an addition of more tobacco controls should be assessed.

1.3 Objectives

The main objective of the study is to analyse cigarette demand in Zimbabwe. The specific objectives are as follows;

  i.   To evaluate the major factors that influence cigarette consumption.
 ii.   To estimate the price and income elasticities of cigarette demand.
iii.   To analyse the impact of excise tax on cigarette demand in Zimbabwe.

1.4 Research Questions

  i.   What are the major factors that influence cigarette consumption?
 ii.   What are the price and income elasticities of cigarette demand?
iii.   What is the impact of excise tax on cigarette demand in Zimbabwe?

1.5 Justification

Wilkins *et al*., (2003), states that the main reason for analysing the demand of cigarettes is to understand ways in which demand can be determined, where by understanding this aspect the demand of a product can be easily reduced. According to the WHO, (2008) smoking is

recognized as one of the most preventable causes of premature death in developed countries where the smoking epidemic in developing countries is now becoming even more popular and accepted in society. Studies available used aggregate data over a certain time frame using different econometric techniques, where they were mainly performed in high income countries, the studies include Saffer and Chaloupka, (2000), Escario and Molina, (2001), Nelson, (2003), and Gallus *et al.,* (2006).

As a country Zimbabwe should understand what influences the demand for cigarette consumption in order to bring important policy recommendations. According to Chapman and Richardson (1990) developing countries mostly concentrate on malnutrition and infectious diseases, and have a low priority when it comes to smoking. Zimbabwe does not have comprehensive programmes that are put in place to control tobacco consumption. In 2002 the Government passed a statutory Tobacco Control Bill and no assessments have been done to see if the tobacco control policies have an impact on cigarette consumption. Hence proving that a study should be done to analyse this aspect in developing countries and provide a solution on how to reduce this epidemic. The study is to aid the low income countries like Zimbabwe, to analyse the consumer behaviour and find a way to reduce cigarette consumption as a way to also reduce the present and future toll in cigarette-related illnesses and death.

1.6 Organisation of Study

The remainder of the study will be organised as follows: where the second chapter will be looking at theoretical and empirical aspects that are related to the study. The third chapter will describe the methodology that will be used in estimating the demand model for tobacco demanded. The fourth chapter will present and interpret the results that have been obtained from the estimations found in the previous chapter. Finally, chapter five will give a summary, conclusion and some policy recommendations relative this study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature of the underlying study. This chapter will be divided into two segments which are the theoretical and empirical literature review. The theoretical literature review will be dealing with what theories about the area under study and empirical literature review will be looking at what researches have done about that particular study. This chapter will be include the succeeding topic that is the definition of key terms, theoretical framework, empirical literature review and a summary of the insights of literature found in the study.

2.2 Definition of Key Terms

Economic analysis

Economic analysis is a study that involves the analyses of the economic factors in a specific area. Martins, (2007) defined economic analysis in both economic and financial terms where he argued that the introduction of the levels of income falls in this category of analysis. This type of analysis uses a systematic approach that determines the optimum use of scarce resources, where it involves a comparison of at least two or more alternatives in achieving a specific objective under the given assumptions and constraints.

Demand

Demand is defined as the want and/or desire to possess a good or service, with the necessary goods, services, or financial instruments necessary to make a legal transaction for those goods and services (Moffat, 2016). According to the Institute of Charted Accountants India, (2006), demand defined as the quantity of a good or service that consumers need or want, where they are also willing and able to purchase at different prices and during different times.

2.3 Theoretical Review

2.3.1 Theory of Demand

This study seeks to examine cigarette consumption demanded in Zimbabwe and the effects in the change of price, income and other factors. The theory of demand is the economic theory that will be used to show the rate of cigarettes consumed that will be influenced by factors

such as price of cigarettes, income, excise tax and tobacco control events. The law of demand states that if the price of cigarettes increases then the demand of the product should decrease and vice versa provided other things being held constant, such as income, price of related products, tastes and preferences, advertisements and population. The economics of smoking was reviewed by Chaloupka and Warner, (2000); Chaloupka *et al.,* (2000) and Chaloupka *et al.,* (2002), they agreed that it mainly focuses on the demand for the cigarette product and the tobacco control policies, where it mainly looks at the influence of a new upcoming pricing policy or any other approach to the economic model for cigarettes demanded.

The theory of demand has three main elements which include alternatives, constraints and criterion for choosing (Arizonedu, 2016). The alternatives look at the consumer's consumption bundles by considering the amounts of various goods and/or commodities required by the consumer. Secondly the constraint element in the demand theory will be looking at constraints that are present and will be affecting the consumer's choice. Lastly the criterion element in the demand theory assumes the consumer has a utility function and helps aid the consumer in which bundles they prefer most than others.

The demand function is denoted as per law of demand, it is also a function of price and other factors held constant.

$$D_x = F(P_x) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \text{ (1)}$$

Where D_x is the demand for the commodity X, which is also the dependant variable in the function and P_x will be the price of the X which is the independent variable. The demand function can also be expressed in a linear or straight line function, which can be expressed in the form of the following equation;

$$D_x = \beta_0 + \beta_1 P_x \ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots\ldots\ldots\ldots \text{ (2)}$$

In the equation β_0 and β_1 are both constants where β_0 is the intercept in equation and β_1 quantifies the relationship between the demand and the price of the commodity.

In economics the law of demand is the fundamental concept, which states that there is a negative relationship between the price of the product and the quantity demanded. Under the theory of demand there are specific demand specifications that are allocated to a study

depending on its time frame which are associated with specific demand models. There are three main demand models that include convectional, myopic addiction and rational addiction models (Wilkins *et al.,* (2003). The convectional demand model is manly described as a function of income, price of the product and any other relevant variables. The consumption of a tobacco product is known to promote an addictive nature on the consumer; hence the use of the following addiction models myopic and rational addiction models. Looking at these models the convectional model looks at consumption that is given at any point of time and how it influences consumption, independent of the past choices. Then the myopic addiction model looks at the past consumption and how it influences the consumption, while rational addiction looks to the past and future consumption and how it affects consumption (Nguyen; Pekurinen and Rosenqvist, 2012).

Economists have treated the demand for tobacco products much like any other good and therefore used the conventional demand theory (Chaloupka and Warner, 1999; Collis *et al.,* 2010). The conventional demand model is a static model which is used to determine the quantity demanded in a certain period with respect to the independent variables in that particular period (Wilkins *et al.,* 2003). In this framework it is assumed that consumers demand cigarettes so as to maximize their utility subject to a set of constraints such as the price of cigarettes, personal income, and other factors.

The convectional demand model looks at how the quantity of cigarette demand will respond due to any change in monetary prices, income and other factors that describe consumer tastes. The assumption for the cigarette demand is a function of cigarette price and income. The convectional model is specified as follows:

$$Q_{it} = f_i(P_{it}, Y_t Z_t)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{.. (3)}$$

Where *i* stands for the tobacco product (cigarettes) and *t* stands for the time period. The cigarette consumption per capita *i* and its real price are denoted as $\boldsymbol{Q_{it}}$ and $\boldsymbol{P_{it}}$ respectively where $\boldsymbol{Y_t}$ represents the income (real GDP per capita). Now the vector $\boldsymbol{Z_t}$ will be accounting for assumed factors that will influence consumption of the tobacco product *i*, that is tobacco control events and policies, bans and restrictions on smoking advertisement, smoking in

public, public campaigns, an increase of warning labels on cigarette boxes and treatments to help dependant smokers quit.

The convectional demand framework therefore considers consumption decisions at a given point and times to be independent of previous choices (Hidayat and Thabrany, 2011). According to Nichols (2013), the conventional models treat addiction as a preference with the standard conventional assumption that preferences are intertemporal independent. Although, the conventional demand framework is simple and convenient, it is underspecified and its estimated coefficients are biased and inefficient if effects of previous or future consumption on current consumption are significant (Nichols, 2013). Nonetheless, the fact that the cigarettes are highly addictive in nature, there is no doubt that cigarette consumption at any time depends on the previous and future choices, (Andrienko and Nemtsov, (2006); Hidayat and Thabrany, (2011).

2.3.2 An Overview of Tobacco Demand In Zimbabwe (1980-2015)

Zimbabwe is in the sixth position in the world for top tobacco producer, producing over 198,000 tonnes out of 16.2 million tons produced in the world (Chikwati, 2015). According to Woelk, Mtisi and Vaughan, (2001) tobacco is known as the major foreign currency earner where it accounts for at most a third of the export earnings in Zimbabwe. The tobacco leaf is considered as one of the major contributors to the country's gross domestic product (GDP). Zimbabwe being one of the major producers and exporter of tobacco in the world, will have certain consequences on global programmes that are put in place toward tobacco control policies, an example is that of the framework convection that was launched by WHO on issues on tobacco control in countries.

In Zimbabwe there are mainly two cigarette manufacturers, Savanna Private Limited and British American Tobacco Private Limited. The production and manufacturing of the tobacco product has led to an increase in generating foreign currency; hence the Zimbabwean government has remained supportive to the cigarette manufacturing industries. However, Zimbabwe being solely dependent on the tobacco leaf and manufactured product, the country has been recognized by cigarette manufactures as an ideal country for manufacturing cigarettes, (Maravanyika, 1998). According to Chapman and Richardson, (1990) developing countries are mostly concerned with health problems like malnutrition and infectious

diseases; hence they have low concerns on tobacco control issues that are occurring in their boarders.

Demand for the tobacco products has increased, hence making tobacco products one of the products that are consumed globally. In contrast to developed countries, consumption in developing countries has increased rapidly as compared to the developed countries during 1970-2000 where FAO, (2003) recorded that over the thirty year period, cigarette consumption in developing countries increased by 70%. According to the World Health Organization, (2008) in the period 1970-1992 smoking prevalence had increased but during these two decades smoking had reduced in the developed countries, but not in the developing countries like Zimbabwe.

The World Health Organisation, (2008) performed a survey in Zimbabwe which showed that tobacco control programmes hardly existed in the country. The advertisement of tobacco products like cigarettes on mass media, have no restrictive regulations at all. Hence in the absence of any active tobacco control legislation, economic factors like the price of cigarettes and personal income are the ones that may have an influence on cigarette consumption in Zimbabwe. According to Mtomba, (2014) the British American Tobacco company (BAT) faced a decline in cigarettes sales in 2013, the company concluded that it was due to economic stagnation and the lack of disposable income.

Since 1980, cigarette consumption per capita in Zimbabwe has shown a decline. Figure 1 captures the trend of cigarette consumption per capita that is annual number of cigarette sticks consumed per person between 1980 and 2015 in Zimbabwe. Cigarette consumption increased from 1980-1982, 1986-1988 and 2008-2012, especially in the dollarization era the economy was becoming economically stable hence improvement in personal disposable income which promoted an increase in consumption. Zimbabwe experienced severe droughts in 1991/1992 and this had a negative effect on personal disposable income because individuals had to ensure that provisions of basic needs were first achieved. In the years 2012-2015 the cigarettes incurred an increase in excise tax from the government and during that period there was presence of economic stagnation and lack of disposable income in the country. Hence given all information on the drawbacks brought up through smoking, there is still a strong demand for the product in Zimbabwe.
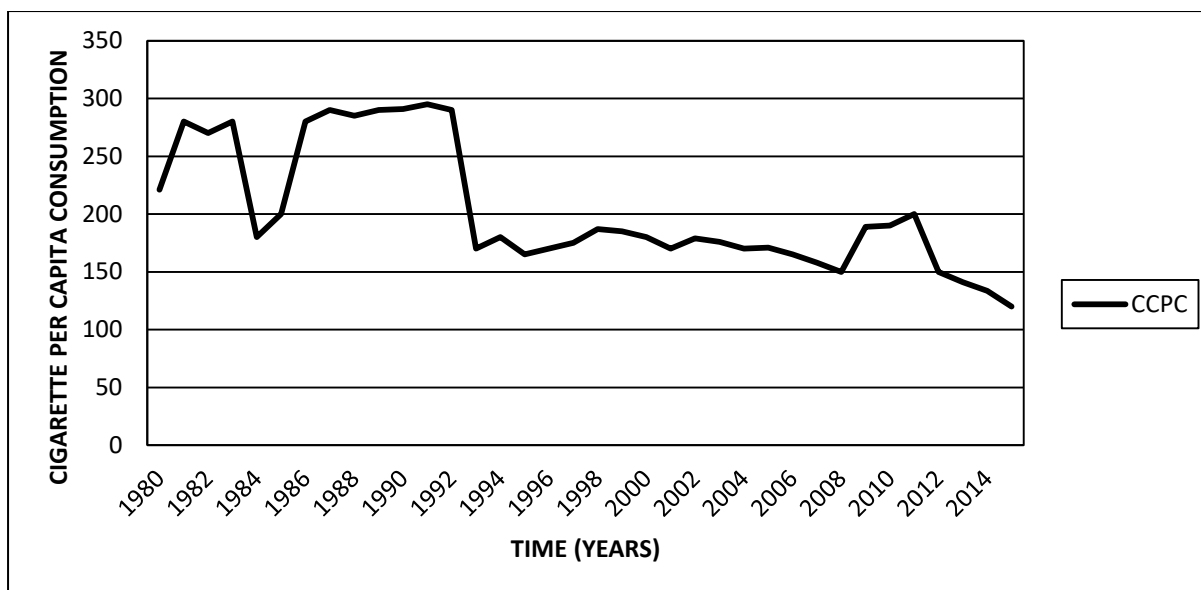
Figure 1: Cigarette Consumption per capita in Zimbabwe (1980-2015)

Source: *Zimbabwe Statistics* (*ZIMSTAT*)

2.3.3 Effects of Cigarette Consumption

Cigarettes have an effect on the human body, the product its self has negative impacts on the consumers' life in both the short and long run and impose a net social cost to society. According to the USDHHS, (2006) the consumption of cigarettes has effects on both smokers and non-smokers. Looking at the smokers the UNDHHS identified that it has an effect on the human respiratory health where smoking causes cancers like lung, throat, mouth, nasal cavity, oesophagus, stomach, pancreas, kidney, bladder and cervix. Smoking will also promote chronic obstructive pulmonary disease, tuberculosis and heart disease which results in death. The consumption of cigarettes does not only lead to death but also has long term effects that will affect the consumer in their future years, where in teens there is infertility, diabetics and in children slow lung growth. With non-smokers, smoking increases their risk in being diagnosed with lung cancer and heart disease by an average of 20-30%, (United States Department of Health and Human Services, 2006).

A study was also conducted by Wanjeck (2011) showing that being given the negative consequence of the consumption of the cigarette product, there are positive impacts that come from consuming cigarettes. Smoking also has a positive impact to the human system, where by it reduces the risk of having a knee replacement surgery, obesity, death after having a heart attack, parkinson disease and helps the heart drug clopidogrel work better.

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Smoking also inflicts certain costs on non-smokers. Costs imposed on non-smokers include physical and financial costs. According to Wanjeck, (2011) non-smokers incur direct costs through passive smoking, where it has an impact on the non-smoker's health and has greater risk on property damage by fires. The financial costs are incurred by individuals who are not exposed to smoke, which include public or private health care costs that are tobacco related. Smoking also inflicts caring externalities that include emotional suffering experienced by non-smokers caused by the illness inflicted or death of the smoker.

2.4 Empirical Literature Review

Smoking being recognized as a world epidemic various studies have been conducted in line to analyse the demand for the product. Sebaggala and Musinguzi, (2014) conducted a research on the economic analysis on the determinants of tobacco consumption in Uganda. The study used an aggregated panel data taken from the countries National Panel Survey from 2006 to 2013. The study tested rational and myopic addiction behaviour of cigarette demanded, whereby it also examined the socio-economic factors in cigarette and alcoholic consumption in Uganda. The results concluded that past and future consumption of tobacco products, price of goods, disposable income, education and other household consumption factors have significant impact on tobacco consumption. Their study concluded with a positive price elasticity that implied that increasing tax on the tobacco product will only raise tax revenue and not reduce the consumption of the product. The limitation in the study is that they failed to include convectional demand model which could have directed the study into altering smoking being considered by the consumer as a preference.

Al-Sadat, (2005) did a research on the demand analysis of tobacco consumption in Malaysia. The researcher conducted a time series analysis on the price of cigarette, income per capita, excise tax, population (male to female population ratio) from 1990 to 2004. The study was aimed to estimate the impact of price and income on cigarette demanded. The objectives of the study were to estimate the price and income elasticity of cigarette demand, where the results obtained were negative price elasticities and positive income elasticities. The results obtained concluded that if the price of cigarettes rises, a decrease in the consumption of cigarettes will occur and an increase in income per capita will lead to an increase in the consumption of cigarettes. Hence efforts at decreasing the cigarette consumption would be influenced by an increase in cigarette tax, on the other hand promoting an increase in tax revenue for the government. The limitation of this study is of the time frame, where fourteen

years for time series analysis was below the minimum requirement. According to Nguyen *et al.,* (2012) when analysisng demand for tobacco in time series a minimum of 25 years is needed for the data set, so as to make sure that the number of observations and parameters are both relative to each other so as achieve efficient estimations of the model.

Another study conducted was by Sweis, (2014), where the study focussed on the economics of tobacco use in Jordan. The researcher conducted a cross-sectional household survey by collecting data from the Jordanian households in order to determine the demographics of the smoking population. The targeted group were both male and females that were above the age of fifteen years. The study used the Global Adult Tobacco Survey (GATS), which is a tool that was developed to aid in monitoring global tobacco measures and use. The survey was aiming to produce national level estimates of indicators of interest by age group, gender, education, religion and work status. The results were that elasticity of smoking in Jordan was estimated to be -0.6. The study indicated that an increase in tax by a percentage led to a decrease in cigarette consumption by 6%. The limitation of this study is that the study used cross sectional data where this type of study fails to accommodate the time aspect, which is a very important aspect to be taken note of when analysing cigarette consumption.

Mukong, (2016) conducted a research which focused on the empirical analysis of peer networks and tobacco consumption in South Africa. The study mainly considered the effects of smoking participation and intensity. The study identified that the peer networks have a major influence and encourage smoking behaviour among the youths, where the level of influence was still being debated by the researcher. The results showed peer networks had a positive and significant influence on smoking intensity and participation. Mukong, (2016) however failed to consider the influential impact that comes from excise tax and tobacco control policies introduced by the government and are more likely to have an impact with consumption in relation with peer networking.

Martinez *et al.,* (2013) conducted a research on the empirical analysis of the cigarette demanded in Argentina, where the study aimed to estimate the short and long term effects on the cigarette demanded based on two variables the price of the cigarette and the income received per person. The research was conducted a monthly time series analysis from 1994 up to the year 2010. Results achieved in the study concluded that the demand for cigarettes in the country was mainly affected by changes in the income and price of the product. The

limitation in this study was the use of few variables which included cigarette consumption, retail price of cigarettes and real income, hence leaving out the aspect of how the government can influence cigarette demand through tobacco control events.

Nguyen; Rosenqvist and Pekurin, (2012) conducted a research that looked at measuring tobacco demand in Europe among eleven countries. Their study looked to analyse the price elasticities and key variables that influence tobacco demanded in Europe. An annual time series was used where the data sets ranged between 30 to 60 years until 2009. Nguyen *et al.,* (2012) put into account the three demand models of demand which include convectional, myopic and rational demand models. The models were used to estimate the Engel Granger and Instrumental variables (2SLS). The study had some countries that failed to pass the autocorrelation tests. The results obtained claimed that price and tobacco control policies alone, are the most effective in terms of influencing tobacco consumption. Hence the study failed to introduce the impact of personal savings (disposable income), where this study will try to fill in this aspect and introduce income in the convectional demand model used in this study.

Elster, (1979); Winston, (1980) and Schelling, (1984) looked at cigarette smoking and the addictive behaviours associated with smoking and concluded them to be unreasonable and unsuitable for convectional economic analysis. The authors believed that demand for any addictive products such as cigarettes does not follow the essential laws of economics and the theory of demand. A study conducted by Ippolito, *et al.,* (1979) and Fujii, (1980), revealed that they believed that cigarettes should be referred to as a normal good where cigarette demand will increase if there is an increase in personal savings. Now, with the considerable collection of empirical research the demand for tobacco products is clearly sensitive to a change in the price of the product and other variables, where this applies to traditional demand models.

2.5 Insights from Literature
Studies included in the empirical review show that most of the studies are mostly cross sectional rather than time series, and models mostly used were the rational addiction model or the myopic addiction model. An example is that of Sebaggala and Musinguzi, (2014) who focused on using addiction models that include rational and myopic addiction. The common finding in literature is that price of cigarettes and disposable income variable, both have a

level of influence on the consumption of the tobacco product. This study seeks to examine the effect of price, real GDP per capita (income) on cigarette consumption in Zimbabwe. The study will attempt to adopt the convectional demand model where the model, consists of price, income and excise tax variables to capture the specific objectives of the study.

This study will include five variables which are cigarette consumption, price of cigarettes, real GDP per capita (income), excise tax and tobacco control policies. The data concerning the variables will be collected from secondary data in annual form. A time series analysis will be conducted from 1980 to 2015 so as to ensure that the numbers of observations are to be in a reasonable relation to the number of parameters to be estimated.

CHAPTER THREE: METHODOLOGY AND RESEARCH

3.1 Introduction

The main focus in this chapter is mainly to examine the methods that are to be used in the collection and analysis of data. This study will give detail on how cigarette data, income, tax and tobacco control policy variables were attained and how they will be analysed. The chapter will show how applicable the theory of demand is to this study and conclusion will be illustrated for the reader giving them a brief understanding of the tools and techniques that will be used in this study.

3.2 Research Design

A research design is defined as a strategic map that will aid the researcher in the collection of data and interpreting the data as well, where the researcher will be enabled to identify the problem of the study (Burkingham and Saunders, (2004) The study will use a descriptive research which is based on the uses, description, classification, measurement and comparison to describe, where it mainly concerns with the questions to ask. The study used descriptive research because it enables the researcher to condense the large volumes of data into summary measures suitable for the study. The descriptive method will be used to analyse the effects of price, income and other factors of cigarette demand in Zimbabwe.

The study required the use of secondary data. The secondary data was from reports, that had any information on cigarette consumption per capita, cigarette prices, excise tax on cigarettes and tobacco control policies. The data was collected from Zimbabwe Statistics, World Health Organisation (WHO), World Bank, Global Youth Tobacco Survey (GYTS) and Global Adult Tobacco Survey (GATS).

3.3 Conceptual Framework

The determinate factors that influence cigarette consumption include economic, internal of psychological, social, cultural and personal factors. However this study will be looking at the economic factors that influence the cigarette consumption in Zimbabwe.

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│                        ┌──────────────────────────┐                   │
│                        │ ECONOMIC FACTORS         │                   │
│                        │ PRICE                    │                   │
│                        │ REAL GDG PER CAPITA      │                   │
│                        │ EXCISE TAX               │                   │
│                        │ TOBACCO CONTROL POLICIES │                   │
│                        └──────────────────────────┘                   │
│                                                                       │
│  ┌──────────────────┐                      ┌──────────────────────┐  │
│  │ SOCIAL FACTORS   │                      │ PERSONAL FACTORS     │  │
│  │ FAMILY           │                      │ AGE                  │  │
│  │ SCHOOL           │        ╭─────────╮   │ OCCUPATION           │  │
│  │ PEERS            │        │CIGARETTE│   │ INCOME               │  │
│  └──────────────────┘        │CONSUMP- │   │ LIFESTYLE            │  │
│                              │ TION    │   └──────────────────────┘  │
│  ┌──────────────────┐        ╰─────────╯                             │
│  │ CULTURAL FACTORS │                      ┌──────────────────────┐  │
│  │ CULTURE          │                      │ PSYCHOLOGICAL FACTORS│  │
│  │ TRADITION        │                      │ MOTIVATION           │  │
│  │ RELIGION         │                      │ PERCEPTION           │  │
│  │ BELIEFS          │                      └──────────────────────┘  │
│  └──────────────────┘                                                 │
└─────────────────────────────────────────────────────────────────────┘
```
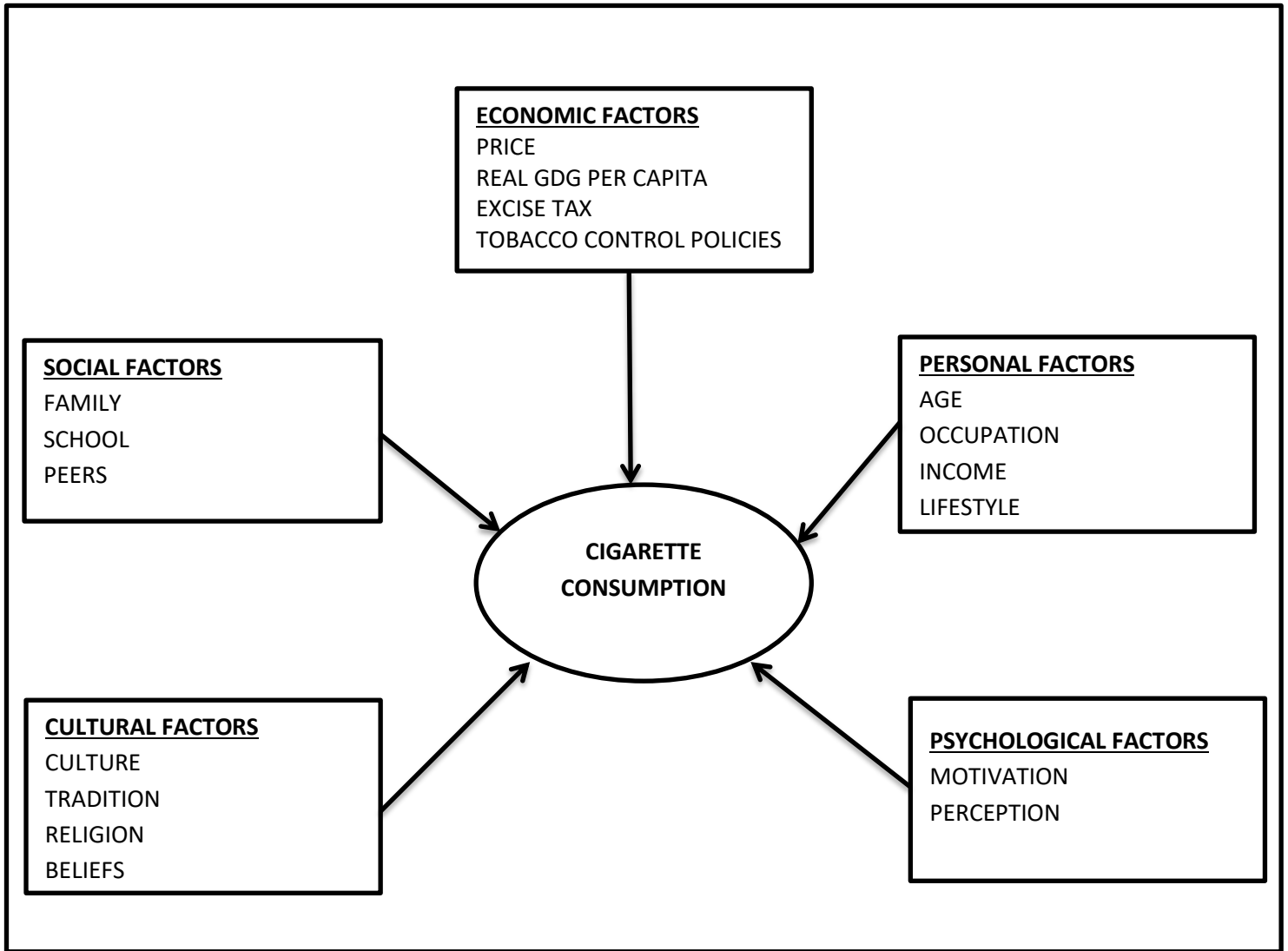
Figure 2: Conceptual Framework

Source: Own

3.4 Study Area

Zimbabwe is a wholly landlocked country that is situated in Southern Africa. The nation has a land area of 390,580 square kilometers. The nation is situated between the Tropic of Cancer and Tropic of Capricorn. The latitude and longitudes for the state are 18.8641° S and 30.3339° E. There are also five agro-ecological regions mainly known as the natural regions which are characterised on the basis of the rainfall regime, vegetation, and soil quality. The climatic conditions are fairly tropical, although sometimes moderated by altitude. Population in Zimbabwe as of 1 January 2016 it is estimated as 15,764,255 people and the population of 15 years and over, are 9,162,185 people, 58%.

3.5 Analytical Framework

3.5.1 Association among Objectives, Research Problems and Technique

Table 1: Specific objectives

OBJECTIVE	RESEARCH QUESTIONS	DATA REQUIRED	METHOD OF ANALYSIS
To evaluate the major factors that influence cigarette consumption.	What are the major factors that influence cigarette consumption?	Secondary data	Descriptive statistics
To estimate the price and income elasticities of cigarette demand.	What are the price and income elasticities of cigarette demand?	Secondary data	Convectional Demand Model
To analyse the impact of excise tax on cigarette demand in Zimbabwe.	What is the impact of excise tax on cigarette demand in Zimbabwe?	Secondary data	Convectional Demand Model

Microsoft Excel will be used to code and process the data, while E-views will be used to analyse the data and to estimate the coefficients to the model. The model will used both descriptive statistics and ordinary least squares to model the data.

3.5.2 Descriptive Statistics

This study will use means of central tendency in order to compare the data sets between each other by using the descriptive statistic. This will also be used to summarize, interpret the properties of the data set and describe the basic features of the data set (Trochim, 2006).

3.5.3 Correlation Study

According to the Free Dictionary, (2016) a correlation analysis will be used to evaluate the relationship and strength between cigarette consumption and pricing variables.

3.6 Model Specification

The model to be used in this study is the convectional demand model, where the model was adopted from the research done by Al-Sadat, (2005) where the model will be used to analyse cigarette consumption in Zimbabwe. The empirical research used a convectional demand model. A convectional model is known to be a static model of demand, where the quantity demanded in that particular given period will be determined by the exogenous variables within that given time frame. The variables that will be used in this study include aggregate cigarette consumption per capita, price of cigarettes, disposable income or GDP per capita, population aged 15 and over and indicator of tobacco control event.

$$Q_t = \beta_0 + \beta_1 P_t + \beta_2 Y_t + \beta_3 Et_t + \beta_4 Tc_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ (4)}$$

Where;

Q_t –aggregate per capita consumption of cigarettes per adult in year *t*

β_0 –intercept

P_t –real price per cigarette in year *t*

Y_t –real GDP per capita in year *t*

Et_t –Excise tax in year *t*

Tc_t –indicator of a tobacco control event in year *t*

ε_t –error term

3.7 Definition and Justification of Variables

3.7.1 Cigarette Consumption per Capita (Q_t)

The tobacco products used in the study, are cigarettes which are the major tobacco product that is consumed in Zimbabwe. According to Wilkins *et al.,* (2003), cigarette consumption per capita ought to be used to control the influence of an increase in population growth on the aggregate sale of cigarettes. Hence cigarettes consumption per capita will be used so as to factor in the influence of population growth on aggregate cigarette sales. The cigarette consumption per capita will be used to also assume that, it will be reflecting the behaviour of a consumer in Zimbabwe.

3.7.2 Real Price per Cigarette (P_t)

This will be the average price for the tobacco product as sold by the manufacturing companies. Sebaggala and Musinguzi, (2014) stated that in order for the study to estimate consistent elasticities and also guarantee the identification of the actual responses to the demand model, the researches needed to generate the real prices of the tobacco products. For the data to capture both pre and post dollarization, the cigarette prices are in the United States of America Currency.

3.7.3 Real GDP per Capita (Y_t)

A study conducted by Al-Sadat, (2005) identified that the use of the cigarette demand model in the study, will control for the impact of income on the cigarette consumption, by measuring their personal savings (disposable income) by the real GDP per capita. The real GDP per capita will be representing income as recorded by the ZimStat and Reserve Bank of Zimbabwe. Consumption of cigarettes is also determined by the availability of income affordability of the specific tobacco product.

3.7.4 Excise Tax (ET_t)

Excise tax is the tax paid when purchasing the tobacco product. According to Al-Sadat, (2005) the use of the excise tax, aided their study to determine cigarettes consumption per year. The data was collected by Zimbabwe Statistics.

3.7.5 Tobacco Control Event (TC_t)

According to Al-Sadat, (2005) tobacco control measures that include policies are also included as important determinants to aggregate cigaretet consumption. The study will be considering all tobacco control and events that have been enforced and occurred during 1980-2015. Hence the study will create a dummy indicator, where it will be used to capture the impact of the tobacco control events, which include an anti-tobacco campaign, tobacco control policies and public discussions.

3.8 Diagnostic Tests

These are tests that asses the data sets available in order to ensure the relevance of the data being used to estimate the model. Before taking the model into any form of consideration, diagnostic tests have to be done to see whether the model will fit the study. The tests in this

study include price endogeneity, coefficient, autocorrelation, heteroscedasticity, residual normality, stability and multicollinearity tests.

3.8.1 Autocorrelation

According to Gujarati, (2004) if a study indicates that there is presence of autocorrelation will render the F and t-test invalid. The estimated parameters from the OLS technique are likely to be inefficient in the presence of autocorrelation. The study will test for autocorrelation using the Breusch-Godfrey Serial LM test statistic.

3.8.2 Heteroscedasticity

Gujarati, (2004) defines heteroscedasticity as a scenario where the error variances of the model are non-constant across observations or in some other cases error term of the model is time variant. The study will use the White General test for testing for heteroscedasticity.

3.8.3 Residual Normality

The parameters of the model are expected to generate residuals where the descriptive statistics are normally distributed. If the residuals are not normally distributed this may distort hypothesis testing. The Jarque Bera test is mainly used to estimate the normality of residuals found in the study. Gujarati, (2004) indicates that the Jarque Bera statistic requires the statistical measures of skewness and kurtosis which will be used verify the existence of the assumption.

3.8.4 Stationarity

Wooldrigde, (2012) defned a stationery time series as a procedure conducted when probability distributions are said to be constant. The use of time series analysis on data will increase the risk of obtaining bias regression results caused by non-stationary data hence there is need to check for stationarity and correct it prior to regressing. The study will apply the Augmented Dickey Fuller test for unit root testing.

3.8.5 Multicollinearity

Andale, (2015) defines multicollinearity generally occurs when there are high correlations between two or more predictor variables, where in other words, one indicator variable can be

utilized to anticipate the other. It is a measure of linearity between the explanatory variables in the model. This will arise when there are two or more variables are highly correlated with each other and testing the degree of the relationship between the explanatory variables. If the coefficient is greater than 0.8 then there is reason for concern, if it's less, its advised to do nothing.

3.8.7 Parameter Stability

The parameters of the model need to be stable so as to produce feasible decisions in predictions and forecasting. The CUSUM test will be used in diagnosing the estimated model. Given that the parameters of the model are to be stable, this can only occur if and only if the CUSUM line remains within the 95% confidence interval and/or 5% critical bounds over the entire study period.

3.9 Elasticities of Demand

The study is using convectional demand model where when calculating price and income elasticity it should follow the linear functional form. The study will be calculating short-run elasticity of both price and income. According to Al-Sadat, (2005) to calculate short-run elasticities the researcher should use the coefficients obtained from the model and the means of the variables, where the variables include consumption, cigarette prices and income.

Short run price elasticity will be calculated as;

$$e_{pt} = \beta_i * P_t/Q_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where;

e_{pt} – Price elasticity of demand at time t

β_i – Estimation coefficient on relevant independent variable (for price)

P_t – Price in period t

Q_t – Quantity demanded in period t

Short run income elasticity will be calculated as;

$$e_{yt} = \beta_i * Y_t/Q_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where;

e_{yt} – Income elasticity of demand at time t

β_i – Estimation coefficient on relevant independent variable (for income)

Y_t – Income in period t

Q_t – Quantity demanded in period t

3.10 Conclusion

The chapter represented the research methodology, design, data collection and data analysis techniques that were used in the study. The convectional demand model that was highlighted in this chapter is assumed to have captured all the desired variables that influence cigarette consumption. The methodology of the study is assumed to be reliable and efficient to gather the necessary information on cigarette demanded.

CHAPTER FOUR: RESULTS PRESENTATON AND ANALYSIS

4.1 Introduction

This chapter will provide results, findings and analysis for the study. The economic softwares used in the analysis of the model were Eviews7 and STATA12. The regression is of time series nature from 1980 to 2015.

4.2 Presentation of Results and Discussion

4.2.1 Descriptive Statistics

This section presents the descriptive statistics, which will examine central tendency and measures of dispersion for each variable in the model. The presentation of the descriptive statistic is important because it will assist in detecting the anomalies in the data. Table 2 gives a summary of the statistics.

Table 2: Measures of Central Tendency

	Cigarette Consumption per capita	**Excise Tax**	**Retail Price for a pack of 20**	**Real GDP Per Capita**
Mean	203.5147	47.25714	0.606944	684.2472
Median	180.0000	48.00000	0.565000	675.0850
Maximum	295.0000	70.00000	1.500000	1084.210
Minimum	120.0000	26.00000	0.320000	327.2000
Std. Dev.	54.59946	9.837930	0.231255	193.2099
Skewness	0.636391	0.267079	2.047966	0.200615
Kurtosis	1.933854	2.877511	8.109150	2.217897
Jarque-Bera	4.134964	0.437979	64.32012	1.159004
Probability	0.126504	0.803330	0.000000	0.560177
Sum	7326.530	1654.000	21.85000	24632.90
Sum Sq. Dev.	104338.5	3290.686	1.871764	1306552.
Observations	36	36	36	36

Results shown in Table 2 indicates that the real GDP per capita is the variable with the highest dispersion from the mean, which is followed by real GDP per capita, cigarette consumption per capita, excise tax, tobacco control events and retail price of cigarettes as indicated by their standard deviations 193.2099, 54.59946, 9.837930, and 0.231255 respectively. The mean indicates that the Zimbabweans annual average cigarette consumption per capita 203.5147. All the variables are positive hence are positive skewed towards the right implying that high values were observed at the end of the period under consideration. Kurtosis and Jarque-Bera statistics are used to test normality, where they should be near 3 and 2 respectively to accept the null hypothesis. According to Green, (2003) despite the failure of the variables to satisfy the assumption of normality the variables can still be included in the model.

4.2.2 Generating Dummy Variable

Table 3: Summary of Generated variable (Tobacco Control Events)

Tobacco Control Event	Frequency	Percent
Absence of an event	32	88.89
Presence of an event	4	11.11
Total	**36**	**100.00**

Source: *STATA* 12

Table 3 shows the number of tobacco control events that occurred in Zimbabwe. These include the tobacco control events that occurred in the country which are four events within the time frame of 1980-2015. The data shows that 88.89% are tobacco control events that did not occur, showing the lack of tobacco control events in Zimbabwe.

4.2.3 t-Test: Mean Comparison

Table 4: t-test mean comparison: Tobacco Control Events

GROUP	OBS	MEAN	STD ERR	STD DEV
Absence of an event	32	211.0313	9.318998	52.71621
Presence of an event	4	143.3825	12.64284	25.28567
Combined	36	203.5147	9.09991	54.59946
Diff		67.64875	26.99066	

t statistic = 2.5064, d.f = 34, $Pr(|T| > |t|) = 0.0086$

Table 4 shows the mean comparison between cigarette consumption and the tobacco control events. The distribution of the data is of a one tailed test and positively skewed obtaining the probability value of 0.0086 which is less than 10% hence the results show that there is a statistical difference between cigarettes consumed by an occurrence of tobacco control events and non-occurrence of an event. The test concludes that cigarette consumption attained in the country if there was a number of tobacco control events will be different as compared if no events occurred in the country.

4.2.4 One way ANOVA Test

According to Laerd, (2013) identified the one way ANOVA, also referred to as the analysis of variances in a study. It is a test that is used to see if there are any statistical significant differences between the dependent and independent variables, if the p-value is less than 5% (0.05). The test looks at rejecting or accepting the null hypothesis which will be saying the means for the variables are the same and the alternative hypothesis will conclude that the means show a difference.

Table 5: One way ANOVA: Cigarette Consumption per capita and Price of cigarettes

Analysis of Variance					
Source	**SS**	**Df**	**MS**	**F**	**Prob>F**
Between groups	78308.3766	24	3262.84903	1.38	0.2956
Within groups	26030.1667	11	2366.37879		
Total	104338.543	35	2981.10124		

Source: $STATA$ 12

The p-value obtained from Table 5 is 0.2956 which is greater than 0.05 hence stating that the study should accept the null hypothesis and conclude the means in the study are the same.

Table 6: One way ANOVA: Cigarette consumption per capita and Excise Tax

Analysis of Variance

Source	SS	Df	MS	F	Prob>F
Between groups	52337.4193	21	2492.25806	0.67	0.8015
Within groups	52001.124	14	3714.366		
Total	104338.543	35	2981.10124		

Source: *STATA*12

The p-value obtained from Table 6 is 0.8015 which is greater than 0.05 hence stating that the null hypothesis should be accepted and conclude the means in the study are the same.

Table 7: One way ANOVA: Cigarette consumption per capita and Tobacco control events

Analysis of Variance					
Source	**SS**	**Df**	**MS**	**F**	**Prob>F**
Between groups	16271.4788	1	16271.4788	6.28	0.0171
Within groups	88067.0644	34	2590.20778		
Total	104338.543	35	2981.10124		

Source: *STATA*12

The p-value obtained from Table 7 is 0.0171 which is greater than 0.05 hence stating that the null hypothesis should be rejected and conclude there is statistically significant difference in cigarette consumption per capita and tobacco control events.

4.2.5 Time Series analysis

i. Cigarette Consumption per capita
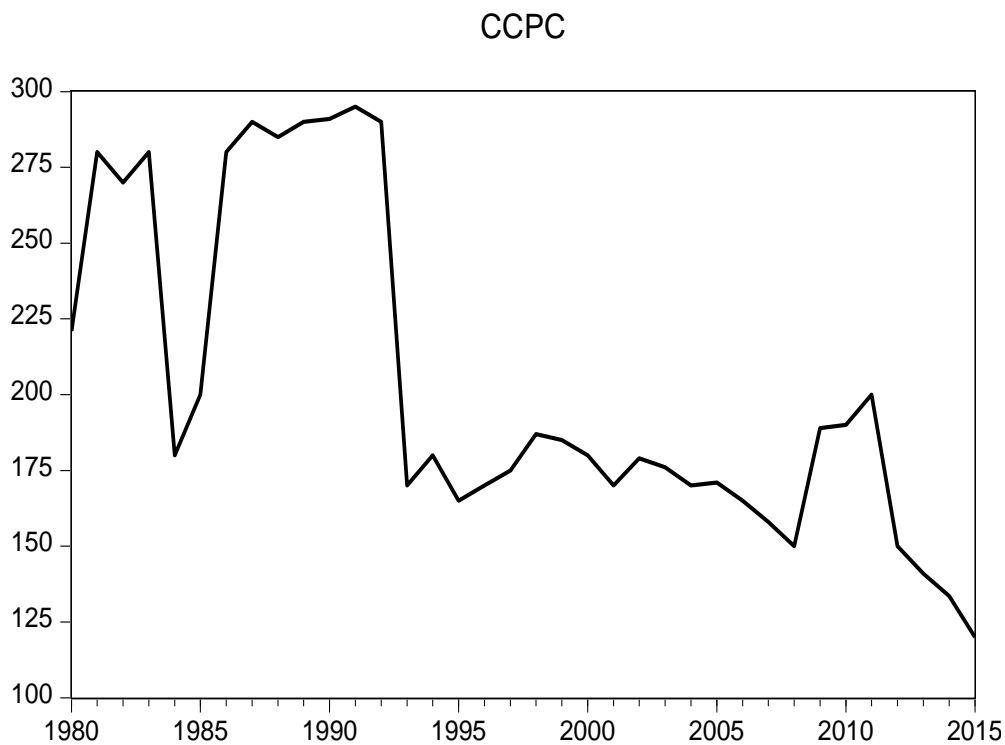
Figure 3: Cigarette consumption per capita

Source: *Zimbabwe Statistics*

Cigarette consumption per capita is mainly looking at the total annual cigarette consumption that is the number of consumed cigarette sticks divided by the total adult population aged 15 and over. Figure 3 shows the major declines in cigarette consumption that occurred in 1982, 1984, 1992 and 2005-2008. During 1982 and 1992 the consumption had declined due to presence of drought in the country, where consumers had diverted the need of purchasing more cigarettes to the purchasing of more food stuffs for themselves and/or family. In 2004 up to 2008 the economy was unstable, where the economy was declining; the Zimbabwean dollar was depreciating and presence of hyperinflation in the country. A decline in the economy affected agricultural output which also affected the manufacturing industries in terms of reduction in output produced and the closing down of companies. The closing down of companies led to an increase in the number of individuals employed in the county, hence leading to a decrease in disposable income available which led to a decrease in consumption.

In 2009-2011 came the introduction of the multicurrency system in the country, where an increase in consumption was recorded. From 2011-2015 figure 3 shows a decline in consumption which was influenced by an increase in excise tax which lead to an increase in

price, where according to Prabhat, (1998) the poor are the ones who are the most sensitive to a change in price.

ii. Price of cigarettes (US$)

P
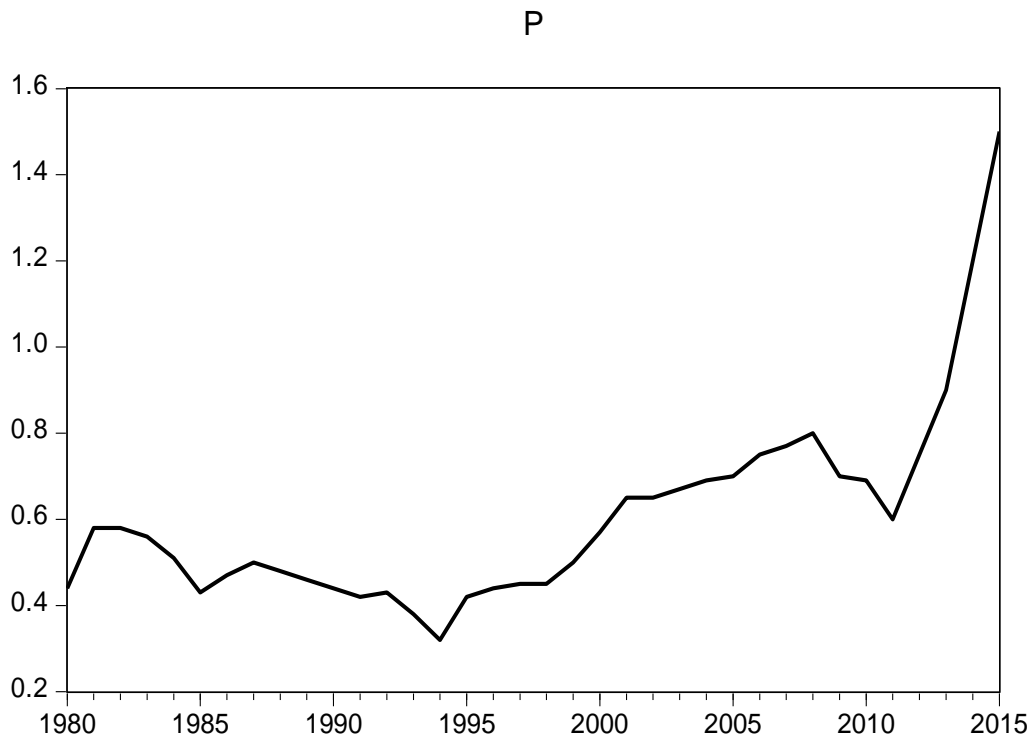
Figure 4: Real Price of Cigarettes in Zimbabwe (20 pack)

Source: *Zimbabwe Statistics*

Figure 4 shows an increase in price from 1998 to 2008 and 2011-2015. In the early 1980s to early 1990s and from 1995-1998 prices of cigarettes remained constant relative to the pricing policy that was present (Maravanyika, 1998). The pricing of cigarettes from 1998 up to 2015 were mostly subjected to an increase in excise tax, where cigarette companies passed the their burden on to the consumers.

iii.   Real GDP per capita

RGPC
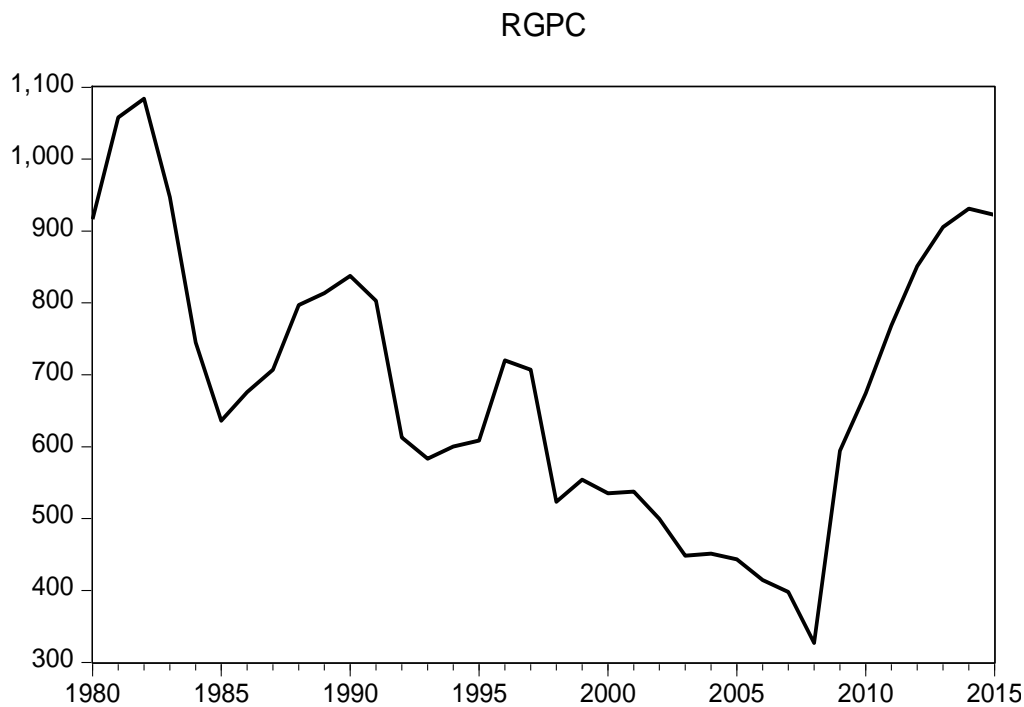
Figure 5: Real GDP per capita in Zimbabwe ($US)

Source: *World Bank*

Figure 5 shows that from 1982 up until 2008 the country recorded a decrease in real GDP per capita obtained in the country, where this was mostly influenced by the drought occurrences in the country, decline in agricultural output, underperformance in industries and hyperinflation. The real GDP increased in 2009-2015, due to the introduction of the multicurrency system in the county, which aided the economy to recover from hyperinflation that was experienced in 2008.

iv.   Excise Tax

In figure 6 excise tax was at its highest in 1984 at 70%, but began to decline and reached its lowest in 1992 at 26%. The decrease in tax was to aid the introduction of cigarette companies in the country. From 1995 to 2008 and 2012-2015 the cigarette tax increased rapidly which was mostly influenced by tax polies introduced by the Government and initiatives introduced by the World Health Organization, so as to reduce the smoking epidemic.

ET
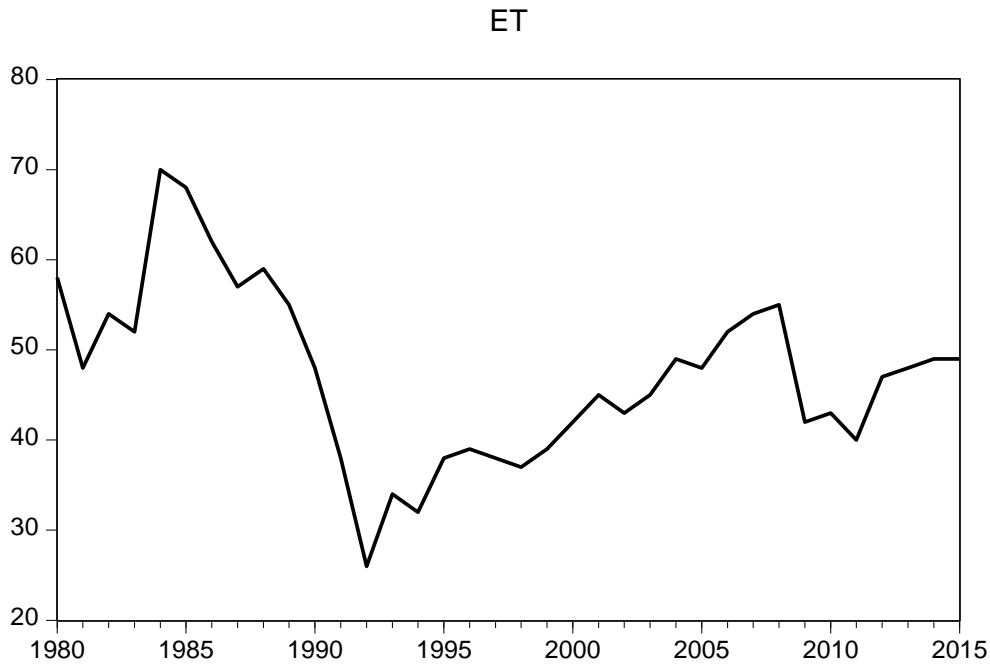
Figure 6: Excise Tax in Zimbabwe (%)

Source: *Zimbabwe Statistics*

v.   Tobacco Control Events

TCE
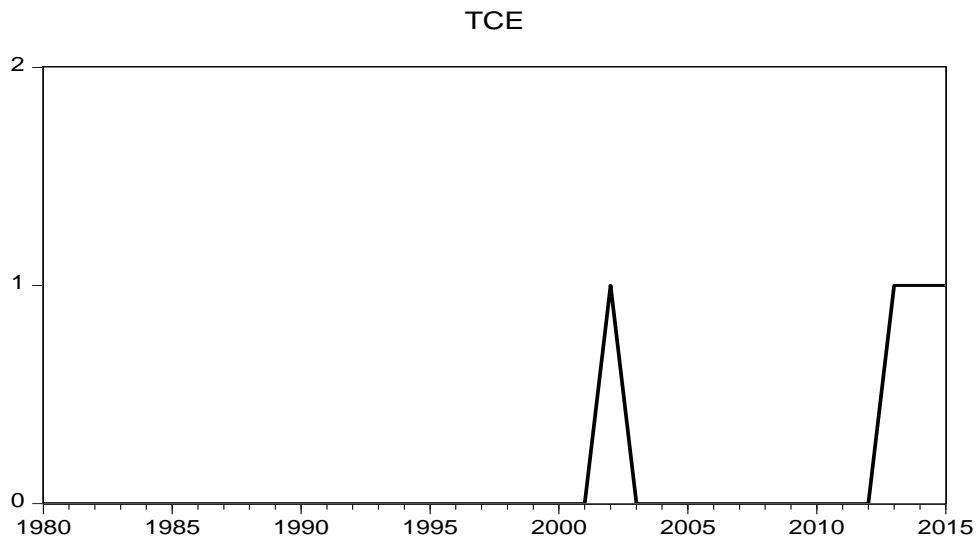
Figure 7: Tobacco Control Events in Zimbabwe

In figure 7 the graph shows the major events that occurred in Zimbabwe, so as to reduce cigarette consumption in the country. The data was recorded as a dummy variable where 0 represented the absence of an event and the number 1 represented the presence of an event.

In 2002, the government introduced a statutory instrument which looked at cigarette consumption under the Public Health Act. On the 31st of May, 2013 the country joined the world by honoring World No Tobacco Day and on the 4th of March, 2015 there was framework convection on tobacco control that was funded by the World Health Organisation.

4.3 Diagnostic Tests

4.3.1 Tests for Stationarity

Table 8 shows the results obtained using the Augmented Dickey Fuller (ADF) unit root test. The null hypothesis of the ADF test is that the variable selected will have a unit and will be rejected if the p-value is less than 10%. If the p-value is not less than 10% the data will need to be differenced so as to make the variable stationary.

Table 8: ADF Stationarity Tests

Variable	ADF statistic	$P-value$	Order of Integration
Cigarette Consumption	-6.357316	0.000***	I(1)
Price	-8.061475	0.0019***	I(2)
Real GDP per capita	-4.384582	0.0014***	I(1)
Excise Tax	-6.128575	0.000***	I(1)
Tobacco Control Events	-8.120308	0.000***	I(1)

$Note$: $***\, denote\, p < 0.01$

Table 8 shows that all the variables included in the study are not stationary at levels. For the variables cigarettes consumption per capita, real GDP per capita, excise tax and tobacco control events results rejected the null hypothesis, and the variables were then differenced at first differences and showed that the variables are integrated of order one. For the price variable the null hypothesis was also rejected but after the second differencing the variable was then concluded to be integrated at order 2. Wilkins *et al.,* (2003) concluded that if the variables of the study are integrated at different orders there is no need to perform a cointegration test.

4.3.2 Normality of Residuals

| Series: Residuals |
| Sample 1980 2015 |
| Observations 36 |

Mean	-6.70e-15
Median	1.244813
Maximum	90.16702
Minimum	-77.95614
Std. Dev.	30.49052
Skewness	0.044515
Kurtosis	4.590781
Jarque-Bera	3.701994
Probability	0.157080
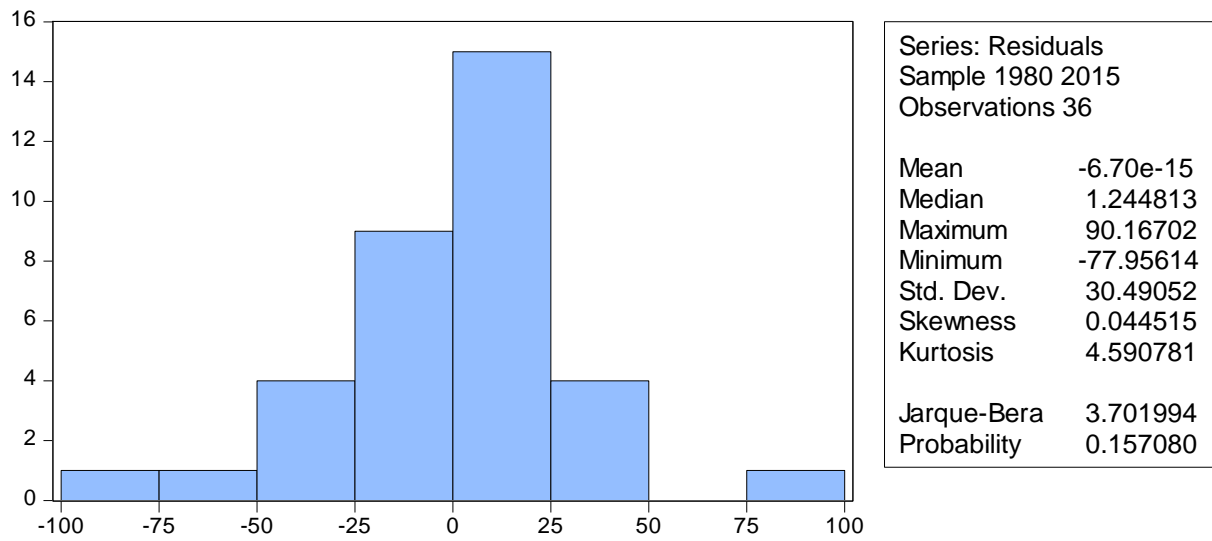
Figure 8: Normality Test

The p-value obtained in the test is 0.157080 which is greater than 10% hence the null hypothesis cannot be rejected. Figure 8 shows that the convectional model used in the study has residuals that are normally distributed.

4.3.3 Parameter Stability
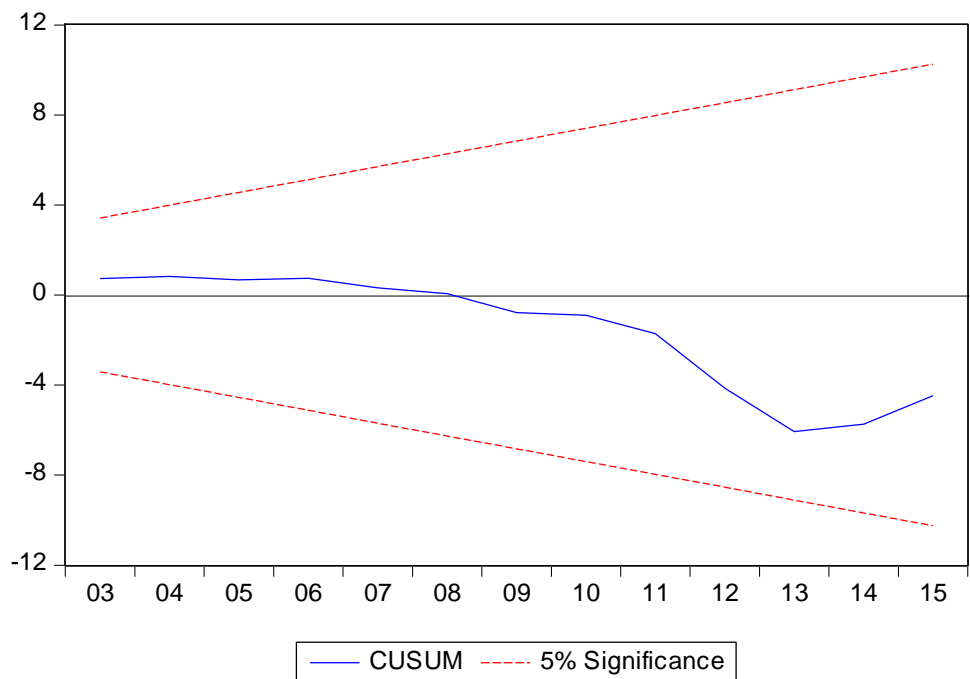
Figure 9: CUSUM Test

Figure 9 shows that the parameters of the model are relatively stable. This is shown by the CUSUM line; where in figure 9 it lies within and doesn't exceed the 5% critical bounds during the whole period of study.

4.3.4 Heteroscedasticity

Heteroscedasticity will be tested using White General Test. The expected p-value should be greater than 10% (Chi^2 > 0.10). If the p-value is greater than 10% we do not reject the null hypothesis. Table 9 represents the results obtained from the test.

Table 9: Heteroscedasticity Test: White General Test

Heteroscedasticity Test: White			
F-statistic	0.859017	Prob. F(13,21)	0.6020
Obs*R-squared	12.15066	Prob. Chi-Square(13)	0.5153
Scaled explained SS	16.02747	Prob. Chi-Square(13)	0.2476

The probability value obtained in the test is 0.6020, which is greater than Chi^2>0.10, hence we conclude there is presence of homoscedasticity and the variances from the model are said to be constant across observations.

4.3.5 Multicollinearity Test

Table 10: Correlation Matrix

	Cigarette consumption per capita	Price	Real GDP Per Capita	Excise Tax	Tobacco Control Events
Cigarette consumption per capita	1.000000				
Price	-0.536690	1.000000			
Real GDP Per Capita	0.399185	0.138257	1.000000		
Excise Tax	0.456630	0.098289	0.227609	1.000000	
Tobacco Control Events	-0.392917	0.705634	0.260429	-0.000265	1.000000

Table 10 shows all the absolute partial correlation coefficients are less than 0.8 hence shows that there is no problem of multicollinearity and also signifies an absence of multicollinearity amongst the variables. From the decision criteria we do not reject the null hypothesis and conclude variables are not correlated.

4.3.6 Autocorrelation

Table 11 presents the results obtained from Breusch Godfrey Serial LM test. The null hypothesis is accepted if the probability value is greater than 0.1 which means that there is no presence of autocorrelation. The alternative hypothesis is accepted when the p-value is less than 0.1, which means that the model shows presence of autocorrelation.

Table 11: Breusch Godfrey Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	8.160819	Prob. F(2,28)	0.1565
Obs*R-squared	12.88890	Prob. Chi-Square(2)	0.1195

Table 11 shows that the probability value 0.1565 is greater than 0.1 hence this shows that the model estimated in the study is free from autocorrelation.

4.3.7 Ramsey RESET Test

Table 12: Ramsey RESET Test

	Value	Df	Probability
t-statistic	1.194430	29	0.2420
F-statistic	1.426663	(1, 29)	0.2420

The Ramsey reset test is used a test that used to specify the model of the study. The results obtained for both the F and t probabilities are greater than 0.05, therefore, we conclude that we do not reject the null hypothesis. If null hypothesis is not rejected this means that there are no omitted variables and the model is correctly specified and ready for reliable interpretation of results.

4.4 OLS Regression Results

The empirical results of the model for tobacco demanded are presented in the Table 13 and the objectives of the study will be solved by the regression results obtained.

Table 13: OLS Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDP	-131.8167	91.11278	-1.446743	0.1587
DRGPC	0.151178	0.032847	4.602443	0.0001***
DTCE	-57.91972	24.24566	-2.388869	0.0236**
DET	-3.893594	0.997806	-3.902157	0.0005***
C	111.1307	22.34381	4.973668	0.0000

R-squared	0.648246	Mean dependent var	205.4568
Adjusted R-squared	0.599728	S.D. dependent var	54.19657
S.E. of regression	34.28856	Akaike info criterion	10.04255
Sum squared resid	34095.45	Schwarz criterion	10.26702
Log likelihood	-165.7234	Hannan-Quinn criter.	10.11910
F-statistic	13.36101	Durbin-Watson stat	1.922869
Prob(F-statistic)	0.000003		

$Note$: $*,**,***$ $denote$ $p < 0.1, p < 0.05$ & $p < 0.01$

4.4.1 Interpretation of Results

The r-squared also known as the coefficient of determination is reasonably high and it shows that the estimated model explains about 64% variation in cigarette consumption while the remaining 36% is captured in the disturbance term. According to the results in Table 13, the variables that significantly affect cigarette consumption are real GDP per capita, excise tax and tobacco control events.

Chapman and Richardson, (1990); Al-Sadat, (2005) and Martinez *et al.,* (2013) discovered in their studies a strong positive impact on income received. The results show that income is statistically significant where the coefficient for income is 0.151178 and also found to be significant at all levels of significance. In other words an increase in one's income will lead to the increase of purchasing more cigarettes which may also be influenced by the cigarettes addictive nature. In conclusion the results conclude that a percent increase in real GDP per capita will lead to an increase in the consumption of cigarettes by 15.1178%. The positive sign also on this coefficient is consistent with the results attained by
Al-Sadat, (2005).

Tax has a negative coefficient of -3.893594 and is statistically significant at all levels of significance. The variable is significant as shown by the p-value 0.0005. The negative sign will influence the sale and purchasing of cigarettes. Sebaggala and Musinguzi, (2014) concluded that an increase in tax will only lead to an increase in tax revenue rather than the reduction in cigarette consumption which conflicts with the finding by Al-Sadat, (2005) and Sweis, (2014). A survey conducted by WHO, (2008) supports the fact that, an increase in the excise tax on cigarettes will lead to a decline in the cigarette demanded.

The tobacco control variable in the study produced a negative coeffecient of -57.91972 and the results showed that the variable is significant at levels of 5% and 10%., with a probability value of 0.0236. According to Al-Sadat, (2005) the results obtained from their study, tobacco control measures are not to be significant, due to limited law enforcement, legislation, tobacco control policies or social acceptance of smoking in the Malaysia. The resuts in table 13 show that a percentage increase in the tobacco control events will lead to a reduction in consumption by 5791.972%.

Wilkins *et al.,* (2003) stated that economic theory states that demand and a change in price moves in opposite directions, where for an example if prices increases demand is expected to fall. Elster, (1979); Winston, (1980) and Schelling, (1984) stated that looking at the cigarettes and the addictive behaviour associated with the product, the demand for cigarettes does not follow the essential laws of economics and the theory of demand. The coefficient for price has the expected negative sign, with a coefficient value of -131.8167. The price variable is statistically insignificant with a probability value of 0.1587. These results are also consistent with studies done by Al-Sadat, (2005) and Martinez *et al.,* (2013) who also found a negative relationship between price of cigarettes and cigarette consumption per capita, hence the study is expecting a negative price elasticity. The above results prove that the cigarettes being an addictive product have no influence on the change in price of the commodity.

4.5 Conclusion

The chapter presented results that were obtained using Eviews7 and STATA12, statistical software. The study shows that there is a positive relationship between cigarette demanded and real GDP per capita. It was also found that there was a negative relationship between the

dependent variable cigarette consumption per capita and the independent variables excise tax and tobacco control events.

CHAPTER FIVE: CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

This chapter will give a summary of the conclusions and findings of the study. The impact of real price, real GDP per capita and excise tax on cigarette consumption was carried out using the time series analysis in Zimbabwe 1980-2015. The time series analysis was used to test the variables using Ordinary Least Squares (OLS), where it was applied using Eviews7. The chapter will be concluded policy recommendations and lastly suggesting areas for further study.

5.2 Conclusion

5.2.1 To Evaluate the Major Factors that Influence Cigarette Consumption

The study imposed the impacts of the independent variables on cigarette consumption in Zimbabwe where a change in price and income requires a long run change with a long run effect represented by coefficients in levels. The ordinary least squares results showed that excise tax, tobacco control events and income were statistically significant. However the price of cigarettes was found to be statistically insignificant, because of its addictive nature. In conclusion the factors that are considered in study be it price of cigarettes, real GDP per capita, excise tax and tobacco control event all are able to influence cigarette consumption.

Therefore the increase in real GDP per capita will lead to an increase in the consumption of cigarettes in Zimbabwe and vice versa. An increase in excise tax and the enforcement of tobacco control events showed that the cigarette demand will decrease.

5.2.2 To Estimate the Price and Income Elasticities on Cigarette Demand

The price elasticity for cigarette demand was calculated to be -0.39, where it ranges from -0.35 to -0.67. The results state that a 10% increase in price will result in a 3.9 % reduction in the consumption of cigarettes in Zimbabwe. Income is positively related to cigarette consumption: where income elasticity was calculated to be 0.50, where it ranges from 0.41 to 0.55. The results indicate that a 10% increase in income (real GDP per capita); will lead to an increase in cigarette consumption by 5%.

5.2.3 To Analyse the Impact of Excise Tax on Cigarette Demand In Zimbabwe

The excise tax variable has a negative relationship with cigarette consumption. An increase in cigarette excise tax would lead to an increase in the price of cigarettes which will leads to the decrease in cigarette demand. The reduced consumption can be translated to also a reduction in tobacco-related illnesses and deaths per annum. During that same period the Government will be collecting more tax revenue as compared to the revenue collected the year before. In conclusion the Model managed to pass the following diagnostic tests Unit root, ramsey RESET, heteroscedasticity, multicollinearity and autocorrelation hence showing the model is stable and reliable.

5.3 Policy Recommendations

The findings of the study research will provide policy solutions that will help in aiding to the reduction in cigarette consumption in Zimbabwe. The world is turning into a smoking epidemic and with the aid of these recommendations may change both, on a global and national scale.

5.3.1 To the Government

Government should increase tax on the tobacco product where it will provide a win-win scenario on both counts that is reduction in consumption and a gain in revenue received by the government through the tax provision. Not only just reduction in consumption but this will improve public health of the country. Another policy is the enforcement of smoking restrictions not only public areas but also schools so as to hinder the youth from partaking in the act of tobacco use. Given the young age of smoking initiation for cigarettes and the higher price sensitivity for young than for old, the Government should enforce laws of prohibiting selling and buying tobacco products by minors. Provision of educational sections in the school curriculum is important to educate them on the short and long term effects of smoking.

Introduction of effective warning labels to be added to all tobacco products. The Government can introduce a system that sends texts messages to every individual using a cellular network just stating the effects of smoking and encouraging the receiver to stop smoking. The Government should also provide cessation programs, medication to smokers to help them quit, and providing medical education informing smokers that quitting is cheaper than treating an illness that is caused by smoking.

The Government should reinforce laws that prohibit smoking in public places like schools, buses, clinics and work office so as to reduce smoking and reduce exposure to second hand smoking. Another law to be enforced is the reduction of all smoking advertisements on all mass media that include newspaper, radio, television and magazines in Zimbabwe.

Government should also aid local communities in raising the social awareness of tobacco harm and risks in their communities through informing people of the drawbacks that comes with smoking cigarettes. By providing information through the use of brochures and fliers, that will show the effects of smoking on both, the smoker and non-smoker. This encourages the society not to accept smoking in their community.

5.4 Areas of Further Study

This study involved the economic analysis of tobacco demand using time series analysis 1980-2015. Therefore a further study is needed by looking at the economic analysis of tobacco demand in Zimbabwe using panel data and using the addiction demand models that include rational and/or myopic addiction models.

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APPENDICES

Appendix 1: Generating Dummy Variable

. tabulate tc,generate (dummy)

TCE	Freq.	Percent	Cum.
0	32	88.89	88.89
1	4	11.11	100.00
Total	36	100.00	

Appendix 2: t-Test Mean Comparison

. ttest ccpc, by(dummy2)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	32	211.0313	9.318998	52.71621	192.025	230.0375
1	4	143.3825	12.64284	25.28567	103.1474	183.6176
combined	36	203.5147	9.09991	54.59946	185.0409	221.9885
diff		67.64875	26.99066		12.79712	122.5004

diff = mean(0) - mean(1)   t =   2.5064
Ho: diff = 0   degrees of freedom =   34

Ha: diff < 0   Ha: diff != 0   Ha: diff > 0
Pr(T < t) = 0.9914   Pr(|T| > |t|) = 0.0171   Pr(T > t) = 0.0086

.

Appendix 3: One way ANOVA

. oneway ccpc p

```
                           Analysis of Variance
        Source            SS        df      MS         F     Prob > F
    ─────────────────────────────────────────────────────────────────

    Between groups    78308.3766    24   3262.84903    1.38    0.2956
     Within groups    26030.1667    11   2366.37879

    ─────────────────────────────────────────────────────────────────

        Total        104338.543    35   2981.10124
```

. oneway ccpc et

```
                           Analysis of Variance
        Source            SS        df      MS         F     Prob > F
    ─────────────────────────────────────────────────────────────────

    Between groups    52337.4193    21   2492.25806    0.67    0.8015
     Within groups     52001.124    14    3714.366

    ─────────────────────────────────────────────────────────────────

        Total        104338.543    35   2981.10124
```

Bartlett's test for equal variances: chi2(9) = 12.8780 Prob>chi2 = 0.168

```
. oneway ccpc tce


                  Analysis of Variance
    Source          SS        df      MS          F      Prob > F
──────────────────────────────────────────────────────────────────
Between groups   16271.4788     1   16271.4788    6.28    0.0171
 Within groups   88067.0644    34   2590.20778
──────────────────────────────────────────────────────────────────
    Total        104338.543    35   2981.10124


Bartlett's test for equal variances:  chi2(1) =   1.8130  Prob>chi2 = 0.178
```

Appendix 4: ADF Stationarity Test

Null Hypothesis: D(CCPC) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.357316	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

Null Hypothesis: D(P,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.061475	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

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

Null Hypothesis: D(RGPC) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.384582	0.0014
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

Null Hypothesis: D(ET) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.128575	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

Null Hypothesis: D(TCE) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

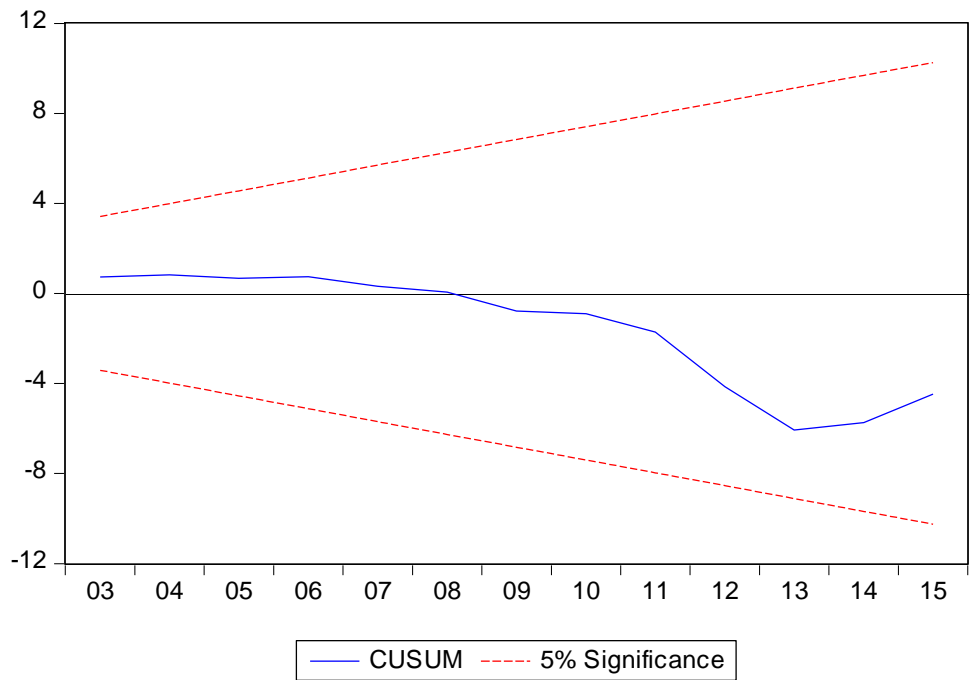|		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.120308	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

Appendix 5: Normality test

Series: Residuals
Sample 1980 2015
Observations 36

Mean	-6.70e-15
Median	1.244813
Maximum	90.16702
Minimum	-77.95614
Std. Dev.	30.49052
Skewness	0.044515
Kurtosis	4.590781
Jarque-Bera	3.701994
Probability	0.157080
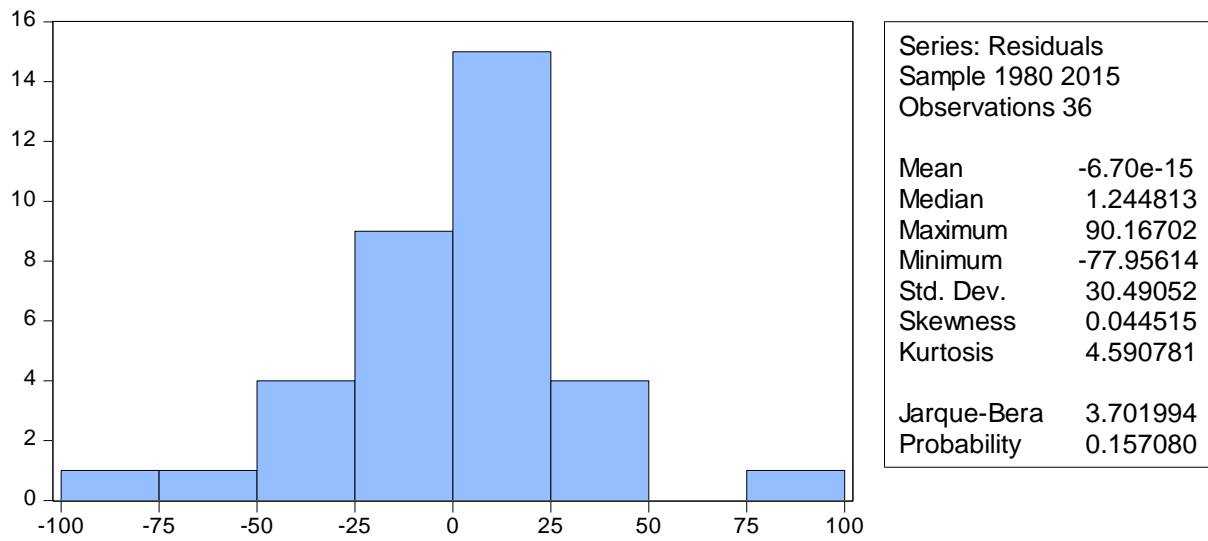
Appendix 6: CUSUM Test

—— CUSUM ----- 5% Significance

Appendix 7: Heteroscedasticity

Heteroscedasticity Test: White

F-statistic	0.859017	Prob. F(13,21)	0.6020
Obs*R-squared	12.15066	Prob. Chi-Square(13)	0.5153
Scaled explained SS	16.02747	Prob. Chi-Square(13)	0.2476

Appendix 8: Multicollinearity

	CCPC	P	RGPC	ET	TCE
CCPC	1.000000	-0.536690	0.399185	0.456630	-0.392917
P	-0.536690	1.000000	0.138257	0.098289	0.705634
RGPC	0.399185	0.138257	1.000000	0.227609	0.260429
ET	0.456630	0.098289	0.227609	1.000000	-0.000265
TCE	-0.392917	0.705634	0.260429	-0.000265	1.000000

Appendix 9: Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	8.160819	Prob. F(2,28)	0.1565
Obs*R-squared	12.88890	Prob. Chi-Square(2)	0.1195

Appendix 10: Ramsey RESET Test

Ramsey RESET Test

Equation: UNTITLED

Specification: CCPC ET P RGPC TCE C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.194430	29	0.2420
F-statistic	1.426663	(1, 29)	0.2420
Likelihood ratio	1.680821	1	0.1948