Analyzing the impact of changes in tobacco trade barriers and cigarette taxes on developing countries.
- A Global Simulation Model Approach

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Abstract/ Summary

While tobacco production and exports prove to be one of the major activities by most developing countries, making tobacco a strategic crop in enhancing their economies, there has been mounting pressure worldwide through international bodies such as the World Health Organization and World Bank to reduce consumption of this crop as it is considered to have drastic health implications. Increased, integrated and harmonized action to reduce the tobacco burden is therefore key priority to improving public health and alleviating poverty. As a way to reduce tobacco imports, internal trade and consumption, a number of countries worldwide especially developed, enacted trade taxes through which tobacco is covered by high import and retailing taxes. This thesis therefore explored the impact of tobacco trade taxation, on developing countries as one of the key evidence-based tobacco control and demand reduction measures. The thesis makes use of current tobacco trade policies and stipulated tobacco import and retailing taxes; through the Global simulation Model developed by Francois & Hall (2003) to analyze the impact of such taxes on developing economies' tobacco sectors. The simulated GSIM scenarios indicate that tobacco trade restriction changes in China have a greater impact on developing countries tobacco sectors than in other markets, with world prices in developing countries going up an average 3.8% while output goes up 1.3%, when import tariff in China is scratched off. The extended GSIM results show a negative impact of tax on developing countries while contributing positively to reducing tobacco demand and consumption. A 10% point increase in cigarette tax will reduce global tobacco output by average 0.39%. Sensitivity analysis of Armington elasticities shows short run elastic industry supply by developing countries and results are not affected by changes in elasticity values.

Abbreviations

ASH	-	Action on Smoking and Health
ATPSM	-	Agricultural Trade Policy Simulation Model
BRICS	-	Brazil Russia India China and South Africa
CGE	-	Computable General Equilibrium model
CES	-	Constant Elasticity of Substitution
CIF	-	Cost-Insurance and Freight
Em	-	Elasticity of composite demand
Es	-	Elasticity of substition
EU	-	European Union
Ex	-	Elastictity of industry supply
FAO	-	Food and Agricultural Organization of the United Nations
FAOSTAT	-	Food and Agriculture Organization Statistics
FCTC	-	Framework Convention on Tobacco Control
FOB	-	Full on Board
GSIM	-	Global Simulation Model
GTAP	-	Global Trade Analysis Project
MacMap	-	Market Access Map
MPOWER	-	Monitor use, Protect from, Offer help, Warn, Enforce and Raise taxes.
ROW	-	Rest of the World
RYO	-	Roll your own tobacco
UNACTAD	-	United Nations Conference on Trade and Development
UNCOMTRADE		United Nations Commodity Trade
UNIDO	-	United Nations Industrial Development Organization
USA	-	United States of America
USD	-	United States Dollars
USDA	-	United States Department of Agriculture
WHO	-	World Health Organization
WITS	-	World Integrated Trade Solution

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1 Introduction

1.1 Problem background

Tobacco is an important crop known to be grown in more than 100 countries in the world about 80% of which are developing countries. Available data (FAOSTAT, 2016), shows that tobacco production and trade has experienced a steady growth for the past decade with the greatest percentage of the growth coming from developing and emerging countries. The world tobacco industry produced approximately 7.6 million metric tons in 2011 with China being the leading producer contributing about 42% of the total output. Other major producers within the same year were Brazil and India producing 951,000 tons and 830,000 tons respectively, (worldlistmania, 2011). Statistics and data on tobacco and tobacco related products show that the industry is quite significant in enhancing economies of both developing and emerging countries.

While tobacco production, processing and trade seems to be quite enormous and significant in a number of economies, there has been a lot of effort by international bodies such as the World Health Organization and World Bank to significantly reduce tobacco consumption (which would indirectly reduce production and supply), through various trade restriction measures as its consumption is said to pose serious health and social problems worldwide. As a result, to address the aforesaid global burden of tobacco, the World Health Assembly in 2003 unanimously adopted the WHO FCTC, the main objective for which was and still is to protect the present and future general populace from all the devastating consequences of tobacco production and trade. Moreover, in order to tackle the supposed tobacco epidemic, a wide range of measures coupled with individual countries tobacco trade policy to restrict international tobacco trade were proposed.

On the other hand, the global tobacco industry argue based on the economic consequesnces of banning or stricter controls in tobacco in order to support tobacco production and trade to persuade world bodies, for example the World Bank, Governments, the public and media that tobacco production, trade and consumption has a lot of economic benefits such as vast employment creation, revenue generation and poverty alleviation through incomes from tobacco sales. It is often claimed that if control measures are further tightened and increased then farmers and governments' revenue will fall and jobs will be lost since a lot of labour is employed in the tobacco industry. The existence of free trade in tobacco is also envisaged to enhance uninterrupted trade flows, creating competition among

producers who would thrive to offer the best quality and offering variety for consumers, thereby benefiting consumers and producers alike. While governments worldwide generally recognize the negative health, environmental and social consequences of tobacco production and consumption, many developing countries especially those that produce and trade tobacco in large quantities and whose economies depend heavily on it, have either partially or not at all made efforts to implement measures set out worldwide to reduce tobacco consumption in fear of the supposed various negative economic consequences that come with these measures. As a result, international health bodies such as the World Health Organization made efforts to make sure that policies aimed at reducing the trade and consumption of tobacco were taken seriously and implemented by all countries at local, regional and international level. The Framework Convention on Tobacco Control, dubbed as the world's first tobacco control initiative was tabled, putting together a lot of countries who were concerned about reducing the negative health effects of tobacco consumption. This FCTC which was put into effect in 2005 became legally-binding to signatory countries, and outlined a number of measures that member countries were and are obliged to integrate and enforce together with their tobacco production and trade policy in order to reduce the consumption of tobacco and tobacco related products. According to a report by the World Health Organization (2015, p. 1), inorder to assist countries to fulfill their FCTC obligations, it introduced a package of evidence-based tobacco control demand reduction measures that have been proven to reduce tobacco use by a number of researchers. These measures include tobacco trade restrictions in the form of high tariffs and high cigarette retailing taxes. The two were proved to make tobacco and its related products unfordable to consumers thereby reducing demand and consumption.

While the overall goal of increasing tobacco price through high import tariffs and retailing taxes is to reduce its demand, according to the (The World Bank, 2003) report, tobacco farmers' livelihoods thus far and for some years to come seems to be reasonably secure irrespective of the aforesaid coordinated global efforts to reduce tobacco use. Based on results by a global tobacco market projection commissioned by the Food and Agricultural Organization (FAO), global demand for tobacco leaf is likely to increase over the coming decade, chief among the reasons behind the projected increase in demand for tobacco leaf are population and income increases that are likely to either maintain or expand global demand for cigarettes. World trade of tobacco and tobacco products has for long been restricted and regulated by both tariff and non-tariff measures. Many countries mostly developed, have high import tariffs as well as retail taxes on imported raw tobacco and tobacco products. Non-tariff barriers that for long have been used to limit imports include quota restrictions, license

requirements, restricted product lists, exchange control and mixing regulations (which govern the percentage domestic grown tobacco required in manufactured products). Of late, certain export promotions through bilateral trading agreements, trade on concession terms, export subsidies and other government interventions in domestic production also had a part to play in distorting the pattern of trade in tobacco. (Grise, 1990). Currently, most Governments no longer offer support in the form of production and export subsidies to tobacco producing farmers like what used to happen in the United States of America some few years ago.

The objective of this study is therefore to assess the overall effects of tobacco trade barriers in the form of tariffs and cigarette retailing taxes by emerging and developed economies on developing countries' tobacco sector as major tobacco producers and exporters. The impact will be assessed by a well calibrated Global Simulation (GSIM) model such as the one developed by (Francois & Hall, 2003) using individual countries current tobacco trade policies and stipulated tobacco import tariffs and retailing taxes. By using the GSIM approach, the study examines exporter and importer effects related to tariff revenues, exporter (producer) surplus and importer (consumer) surplus. Domestic tobacco production effects such as output and price effects are also examined through this model. Furthermore, the model is not a multi-market model and therefore does not cover the effects of tobacco trade barriers and tax policy on unmanufactured tobacco and cigarette markets jointly. I initially analyze the raw tobacco market separately and then further extend the results to the cigarette markets cognisant of the strong forward linkage between raw tobacco and cigarette manufacturing and using the known fact that factors that affect demand for unmanufactured tobacco also affect demand for cigarettes.

The hypothesis for the research objective is that developing economies are incurring unsurmountable losses in value and welfare terms due to the enacted tobacco trade tariffs and cigarette taxes by both developed and emerging economies which reduce demand for and consumption hence imports of tobacco and tobacco related products due to the forward linkage between raw tobacco and its related products. High import tariffs increase the costs of manufacturing cigarettes, ceteris paribus, and cigarette manufacturers would compensate this high costs through high cigarette prices.

1.2 Problem

Quite a significant number of studies have been done on tobacco markets and trade. Literature on tobacco control suggests that cigarette taxes, high tobacco import tariffs and a number of non- tariff measures are known to reduce demand for tobacco through various channels such as increases in price and improved knowledge. Available evidence from nations that witnessed a decline in demand for tobacco shows that the combined effect of non-tariff measures such as timeous increases in tobacco and cigerete prices through taxes, banning cigarette advertisements and promotions, (ASH, 2007, p. 7) and (Gregmar, et al., 2014, pp. 17-23); public places smoking restrictions as well as extended consumer information on the negative health effects of tobacco use would be a noteable reduction in tobacco consumption and demand. Many studies which confirm the positive impact of prices on tobacco demand were done in different regions and at country level using various approaches and methods. Guindon et al (2003), (Sesma-Velásquez, et al., November 12, 2002), (Moertiningsih Adioetomo, et al., 2005), (Nyo Nyo, et al., 2003) and (Lance, et al., 2004) all did assessed and confirmed the positive impact of price on tobacco demand and cessation in various countries.

However, a small number, if there are any of the studies done on tobacco have centred on the country and regional level implications of the tobacco trade policy reforms on economies that rely most on tobacco production and trade. The major focus of a number of studies is on reducing demand hence consumption of tobacco without also looking at the economic and other implications of the reduction in demand and consumption on economies dependant on tobacco. It should be noted that tobacco and tobacco products, are produced, traded and consumed legally, as all other products, and their production and trade is subject to the same rules and regulations as all other products. Thus, although many countries effected tobacco trade control policies to reduce tobacco imports and internal trade which is perceived to reduce tobacco use, economies of other countries have to depend heavily on tobacco growing and tobacco-related manufacturing for employment and income. (FAO, 2003). Hence there is need to look at what implications does the effort to reduce tobacco consumption through various tobacco trade restriction policies, specifically trade tariffs and cigarette taxes, have on economies that depend on tobacco exports. Knowing the impact would help governments and international public health organizations to explore alternative crops and other agricultural ventures which are equally profitable but with little or no health, environmental and social concerns and craft adjustment strategies for countries, especially developing countries that are heavily dependent on tobacco.

1.3 Aim and delimitations

The aim of this study is to assess welfare, importer and exporter effects related to the tobacco trade barriers and cigarette tax policy by developed and emerging countries, explore the overall effects of the change in trade quantities and prices of tobacco on developing countries. The model used in this thesis takes upto 25 countries hence an anlysis involving 25 countries was done.

1.4 Objectives

The specific objective of the research is:

1) To determine the welfare, price and quantity effects of developed & emerging countries changes in tobacco trade barriers in the form of tariffs on developing countries.

While the other objectives are:

2) To determine the effect of increases in cigarette taxes on developing countries tobacco sector.

3) To analyze the sensitivity of simulated results to different Armington elasticity levels.

1.5 Research Questions

This study will be guided by the following research questions:

(1) What effect does escalating tobacco import tariff by emerging and developed economies has on developing countries?

(2) What are the likely implications of reducing the import tariff for China as a major market for tobacco and tobacco related products.

(3) Does increasing cigarette tax in developed and emerging countries have a negative effect on developing countries tobacco sector?

(4) Does increasing cigarette tax in developed and emerging countries help reduce tobacco consumption?

(5) How sensitive are the simulated results to varying Armington elasticity levels.

1.6 Outline

This thesis is organised as follows: the second chapter gives major highlights on the global tobacco and cigarette industry as well as controls. It further narrows down to tobacco production and trade in developing countries. In Chapter 3 is a background of the tobacco industry and various tobacco control policies through a review of literature and studies on tobacco and tobacco products by different researchers. The review of literature provides a deep insight into the work already done by some researchers and the milestones reached in so far as tobacco control is concerned. The theoretical framework and model used in the study are detailed in chapter 4, while chapter 5 and 6 give the results and conslusions in that order.

2 The tobacco industry: A general overview

Chapter 2 provides an overview of the global tobacco industry in terms of production, consumption, trade and control. Within the same chapter, I narrow down to tobacco trade patterns and the position of developing countries in the global tobacco industry giving full details of the important statistics and figures that pertains to tobacco and cigarettes.

2.1 Global tobacco production

During the past decade, the world has experienced a shift in tobacco leaf production from high-income countries to developing countries, particularly those in Africa. Most Governments in developing countries promote tobacco farming as it generates revenue for the Government and income for farmers who grow it thereby acting as a way to alleviate poverty both in rural and urban areas. The world prices of tobacco are still attractive and makes tobacco production in these countries more viable than any other cash crop especially when labour costs are low, hence the supposed economic benefits of tobacco farming have been used by the tobacco industry in these countries to block tobacco control policies but it has been without much success as tobacco is currently one of the products that is highly controlled and taxed at both local, regional and international level. The tobacco industry is active in promoting the alleged positive aspects of tobacco farming and in "protecting" farmers from what they portray as unfair tobacco control regulations that reduce demand. (Hu & Anita, 2015, p. 1). According to a working paper by (Gijsbert van Liemt, 2002), tobacco products are being chewed, snuffed, and (mostly) smoked[1] all around the world. People have been consuming tobacco and tobacco products for centuries and are still consuming them.

Current Literature and data shows that world production of tobacco leaf has continued to grow since 2003, up 25% from 6.03 million tons in 2003 to 7.5 million tons in 2012. African countries produced 650,000 tons which constitute about 8.7% of the world production of tobacco leaf in 2012, compared to 440,000 tons (7.3%) in 2003. Total area harvested for tobacco in African countries increased by 66% and output increased by 48%. In this same period, area harvested for tobacco in the United States decreased by 18% while production decreased by 5%.

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[1] Cigarettes are the most popular type of tobacco and could be filtered or not but, mostly commercially sold are filtered. Other tobacco products include *Bidis, Cheroots, cigars, pipe smoking* and *Kreteks* (cheroots containing tobacco, cloves and cocoa). (Corrao et al., 2000; WHO, 1997).

For Europe, the decrease was 40.4% in the area harvested and 43% in production. The source drift from high income to low income countries is therefore evident, (Hu & Lee, 2015, pp. 1-2). Production policies supporting tobacco in developed countries are under constant pressure due to the perceived health effects of consuming tobacco products and tobacco profitability at farm level has been declining and is expected to decline further. Conversely, tobacco production returns and tobacco profitability in most developing countries are much higher than for any other cash crop due to favourable production conditions and world prices, thus there are good prospects for increasing production especially of those types of tobacco, for example flue-cured or Virginia which have an expanding world market. Due to this, most of the developing countries are expected to further increase their share in world tobacco production, assuming that the world prices remain stable and attractive. Moreover, for the past decade, the profitability of tobacco leaf is attributed to relatively cheaper labour and seemingly high world prices which explains why most developing countries are emerging as the world's popular producers and exporters of tobacco leaf. [2]

It is quite apt that tobacco is an essential ingredient for cigarettes, cigars, roll your own tobacco (RYO), pipe tobacco, snuff and chewing tobacco, though in most cases it is used for cigarettes. A Food and Agricultural Organization report in the early 1990s estimated that at least 80% of tobacco leaf was used for cigarettes, (FAO, 1990 in (Gijsbert van Liemt, 2002)). Until recently, the proportion of tobacco in cigarettes has been high as demand for cigarettes is seen to outgrow that for other tobacco products which explains why demand for tobacco is largely determined by demand for cigarettes. The aforesaid relationship motivates the need to analyse policies that are aimed at reducing demand for unmanufactured tobacco and the implications of these policies on agents who trade in unmanufactured tobacco. The volume of tobacco sold in the world can be expected to closely follow increases (or decreases) in the demand for cigarettes[3] as factors that determine demand for tobacco also follow factors that determine demand for cigarettes.

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[2] The fact is solely by the author's own synthesis of past and current data and statistics on tobacco leaf production.

[3] That is not to say that demand for tobacco increases at the same pace as that for cigarettes. Historically, the amount of tobacco used per cigarette has decreased as a result of the increased use of filter tips; of the smaller diameter of cigarettes; and of reduced waste due to more efficient packing technologies. (FAO, 1990).

Those who follow and study trends in tobacco production, marketing, trade and consumption strongly believe that in the past, cigarette production was mostly located in developed countries, but since the mid-1980s, everything ubraptly changed and cigarette manufacturing has been steadily increasing in developing countries as those multinational companies that manufacture cigarettes that used to be based in developed countries are now following down to developing countries due to the fact that cigarette manufacturing in developed countries currently has a lot of restrictions and requirements which is a different case in developing countries, making cigarettes somehow relatively affordable and readily available in developing countries than in developed countries.

Blecher & Van Walbeek (2008, p. i), asserted to the aforesaid trend when they said, "Over the past decade a clear dichotomy has developed between developed and developing countries. Cigarettes are becoming less affordable in developed countries and much more affordable in developing countries." Much of this change is mostly attributed to developments in China as it has emerged as the biggest producer and consumer of tobacco and tobacco products. Also, major multinationals with foreign direct investment have increased cigarette production in developing countries, where most of the growth takes place. Trends among tobacco types show that the Virginia type has stronger growth, reflecting consumption choices for certain cigarette types. A third point is that, in almost all tobacco types, a shift of production is observed from developed to developing countries, thus increasing developing country share in world tobacco leaf production. (FAO, 2003).

Despite the fact that per capita consumption of tobacco remains much higher in the developed world than in developing countries, (Guindon & Boisclair, 2003, p. 10) the trends indicate that the situation in the latter is much worse today than it was 20 or 30 years ago, while the former experienced a continued decline since the 1975 peak. It thus seems fallacious to pretend that tobacco use is a "developed world problem", all the more so because the population of developing countries as a whole is increasing at a much faster pace. Available data (table 2) in a discussion paper by (Guindon & Boisclair, 2003, p. 11) shows that total cigarette consumption has been increasing rapidly in this group (developing economies) as well as in the countries in transition (emerging economies) over the past few years up to the 2003, while it has been massively decreasing in the group of developed countries over the past 20 years. Current data also shows that economies in transition such as that of China and Russia, have higher cigarette consumption rates as they are currently the world's leaders in cigarette consumption.

2.2 Tobacco consumption and trade

Most of the tobacco produced worldwide is not consumed as a final consumer product but rather used to produce a lot of tobacco products such as cigarettes, cigar, chewing tobacco and snuff. While we have a list of products for which raw tobacco is used as a major input, most of the raw tobacco produced is used mainly for cigarettes production. (USDA, 1996), suggests that cigarette production utilized almost 90% of the total tobacco consumed in the USA within the same year. Current statistics on tobacco production and exports by developing countries shows evidence that most of these countries produce a lot of tobacco and export almost all of it as raw tobacco, for example Malawi is an important producer of tobacco, and it exports 98% of its crop as raw or unmanufactured tobacco, leaving only a mere 2% for own consumption, though it supplements this small quantity by importing a significant amount of manufactured tobacco in the form of cigarettes.

On the other hand, countries like Singapore and the Netherlands grow and produce no tobacco domestically yet they rank amongst the world's top exporters of cigarettes and cigars. This shows the co-existence of a number of configurations within the global tobacco industry. The United States is a leading importer and exporter of unmanufactured tobacco, imports far less quantities of cigarettes but leads in the export of cigarettes. China, is currently ranked the world's largest producer as well as importer of raw tobacco, and the world's largest consumer and producer of cigarettes whose participation in world trade of tobacco and cigarettes is very significant and modest. Worldwide, the production of tobacco and the consumption of tobacco products increased steadily[4] until the early 1990s. Between the early 1970s and the early 1990s tobacco production increased by around 50% in volume terms.

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[4] it should be kept in mind however that slow overall growth does not necessarily mean that demand growth for all countries or all categories of tobacco and cigarettes was slow.

FAOSTAT (2014) data on tobacco production indicates that world tobacco production started to increase steadily from the year 2000 and continued to rise until present time with total world production standing at 6,737,541 million metric tons in 2000 and 7,435,068 million metric tons in 2013. **Figure 2.2.1** shows leading World producers of unmanufactured tobacco in value and quantity.

Rank	Area	Value (USD $1000)	Production (MT)
1	China, mainland	5,096,844	3,200,000
2	India	1,393,668	875,000
3	Brazil	1,291,014	810,550
4	USA	550,836	345,837
5	Indonesia	361,079	226,700
6	Malawi	241,303	151,500
7	Argentina	235,729	148,000
8	Republic of Tanzania	191,131	120,000
9	Zimbabwe	183,167	115,000
10	Pakistan	156,090	98,000

Figure 2.2.1 Top ten producers of raw tobacco in the world in metric tons (MT) (2014)

Source: http://www.mapsofworld.com: November 22, 2014

The Asian and the Russian crises dampened demand as did the drastic price increases in the US following the Master Settlement Agreement. On balance, according to the USDA, world tobacco consumption (at 6.5 million metric tons) and world cigarette production (at 5.5 million pieces) were no higher in 1999 than they were in 1991. (Gijsbert van Liemt, 2002, pp. 5-6). Gijsbert van Liemt (2002), continued to give an overview of world tobacco consumption patterns by pointing out that by year 2002, at around 60% of the total, Asia was the main tobacco producing region with China alone accounting for about 36%. The shares of India, South America (mainly Brazil), and particularly Africa (Zimbabwe, Tanzania, Mozambique and Malawi) have not stopped increasing, and this trend continues to date. The share of Europe (including Eastern Europe) declined, with Italy being Europe's leading producer of tobacco and its production has been declining and that of the US remained more or less the same. By 1997, the developing countries accounted for 80% of world production, compared to 53% 30 years earlier. Again, between the period 2000 to 2014, in as far as cigarettes markets is concerned China was also by far the largest market, followed by Russia, the United States, Indonesia, Japan, India, Turkey, South Korea, the Philippines and Germany.

Nonetheless, a greater percentage of world tobacco production (mainly high quality tobaccos) is traded internationally. There are several reasons for this. Firstly, some large tobacco growing countries like Malawi, Zimbabwe, and Tanzania manufacture very few tobacco products (cigarettes) of their own. Secondly, as has been pointed out before, some important cigarette and cigar producing countries do not grow any tobacco domestically therefore have to rely strongly on imported raw tobacco for its cigarette industry. The Netherlands and Singapore (two of the world's top cigarette and cigar exporters) are a case in point. Other countries for example Japan, Germany and Russia do not produce enough tobacco to satisfy their domestic demand. The third reason is that most cigarettes sold today are blended cigarettes which is a mixture of different tobaccos produced in different parts of the world under different production conditions. A few of the leading cigarette producing countries grow all the different types of tobaccos needed for blending, hence explaining the reason why tobacco is mainly traded on the international market.

In so far as tobacco use is concerned, a report by the Action on Smoking and Health (2007, pp. 2-3) shows that the World Health Organization estimated there were around 1.3 billion smokers in the world, of which almost 77% were men smoking a combined total of about 15 billion cigarettes every day. This was found to represent about one third of the global population aged 15 and over and the vast majority of these people, lived in developing countries. Meaning that there is high consumption of tobacco products in the form of cigarettes in developing countries through imports, while at the same time leading also in terms of unmanufactured tobacco production. With respect to cigarettes, the Chineese tobacco company known as China National Tobacco currently dorminats the market in terms of cigarette production and sales, contributing about over 33% to the global cigarette market. Moreover, current statistics on unmanufactured tobacco shows that China produces more than the next nine world's top tobacco producing countries put together. Thus affirming China's number one position in terms of tobacco production and consumption.

The fact that there has been noticeable significant increases in tobacco consumption in both developing and emerging economies and likewise a decrease in tobacco consumption in developed countries where people are stopping smoking explains the reason why cigarette manufacturing has been tremendously expanding in the former countries (ASH, 2007), with cigarette manufacturing opertaions showing a larger growth in much of countries in the Middle East, Africa, Arab countries, upper middle income but developing countries in Easten Europe and Latin America. **Figure 2.2.2** below shows historical cigarette export quantities by region for the period 1998 to 2013.
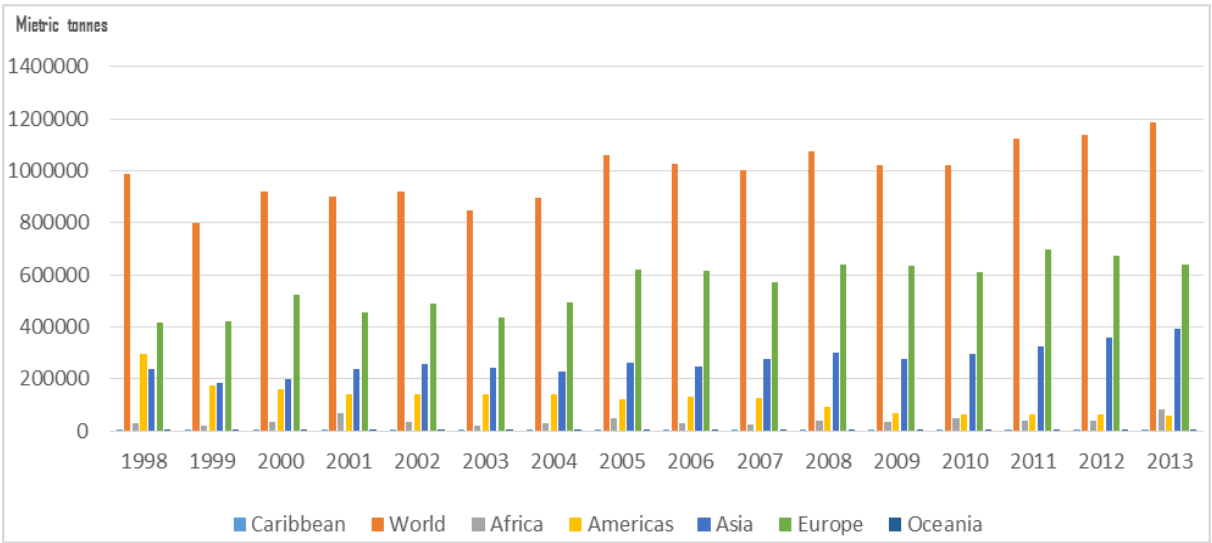
Figure 2.2.2 – Cigarette export quantities by region (1998-2013) in metric tonnes (MT)
Source: Own, using data from FAOSTAT (http://faostat3.fao.org/home/E)

As can be seen from the figure above, Europe leads in cigarette exports followed by the Asian region, the Americas and Africa. The Oceania and Caribbean region exported very few quantities of cigarettes. The European Union region's leading role in cigarettes exports is attributed mainly to its leading role as a market for raw tobacco as well. During the same period, African and Asian countries increased total cigarette exports from 0.28 million tons in 1998 to 0.83 million tons in 2013 and 2.4 million tons in 1998 to 3.9 million tons by 2013 respectively. While recorded major importing regions worldwide are China, Japan and the Far East, the Eropean Union is also highly rated as both an exporter and importer of cigarettes. (FAO, 2003). **Figure 2.2.3** shows cigarette import trends and shares for the period 1990 - 2013.
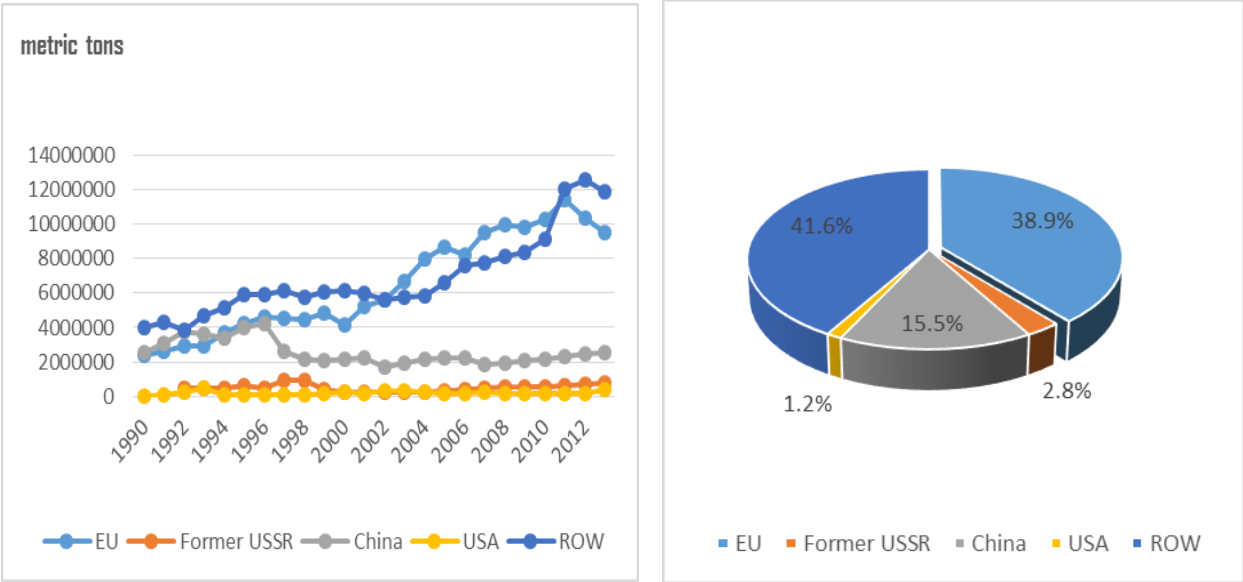
Figure 2.2.3 cigarette imports (1990-2013) in metric tonnes (MT)
Source: Own, using data from FAOSTAT (http://faostat3.fao.org/home/E)

The FAO (2003) report highlighted the major reasons why tobacco and tobacco products are traded at the world market, and Jacobs et al (2000, pp. 323-325), weighed in saying that the way in which the tobacco industry is structured world-wide has led to five basic categorization of countries for trade in tobacco and tobacco products. Based on this, there are countries that produce a lot of tobacco but do not consume much of tobacco products and these fall under full exporters, examples include Zimbabwe and Malawi. The second category consists of countries such as the United States, Brazil, Mexico and India, which produce more tobacco products than are consumed domestically and these are known as net exporters. Self-contained countries produce and consume almost the same amount of tobacco (tobacco

products) though they do export some, this pertains to countries such as China, South Africa, Egypt and many others. There are some countries that produce very little amounts of tobacco hence they import from other countries much of the tobacco (tobacco products) that they consume making them net importers, for example Russia and Spain. Lastly, there are some countries that import all tobacco and tobacco products that are domestically consumed implying therefore that these countries do not produce any tobacco but import tobacco leaf which is used to make cigarettes in those countries for example Singapore and a few countries like Japan do go to these extremes for tobacco by importing most if not all of the tobacco that it uses to manufacture cigarettes. These are known as full importers. Thus much of the tobacco supplied on the international tobacco markets comes from full exporting and net exporting countries, the categories under which most of the developing countries fall. **Figure 2.2.4** below highlights leading importers and exporters of tobacco leaf in the year 2013.

Leading importers		Leading exporters	
Unmanufactured tobacco in metric tons, 2013, by dry weight			
Russian Fed	241 615.50	Brazil	609 926.84
USA	199 861.53	India	253 934.23
Germany	161 460.64	China	199 455.63
China	147 813.37	USA	173 470.61
Netherlands	132 075.75	Zimbabwe	147 873.44
Indonesia	121 218.23	Malawi	135 675.97
France	113 861.93	Belgium	80 482.59
Belgium	112 520.00	Argentina	70 053.15
Poland	88 067.78	Tanzania	69 448.87
World	3 078 220.99	World	2 642 916.72

Figure 2.2.4 leading importers and exporters of tobacco leaf, in metric tonnes (2013)

Source: Own, using data form WITS (http://wits.worldbank.org/WITS/WITS/Results)

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* Imports are not equal to exports possibly due to informal market trading and smuggling.

2.3 The global cigarette market

Tobacco is the major input for cigarette manufacturing. Current data and statistics show that 90% of the tobacco[5] produced and traded world-wide is used for cigarette manufacturing. The (Euromonitor International, 2015, p. online) an online tobacco production and trade database suggetsts that in 2014, cigarette retail values were pegged at USD$744 billion the cigarette industry having sold well over 5.66 trillion cigarettes worldwide. It also revealed that over a fourteen year period, that is, from the year 2000 to 2014, global cigarette volume sales increased by 8% while retail values increased by 121%. Industry analysts predict that over the next five years the global cigarette industry will continue to grow, with volumes predicted to increase by 0.9% and values by 29%. Between 2005 and 2014, cigarette sales in the Asian Pacific and in the Middle East and Africa region have increased while all other regions have experienced declining sales. The world's five largest cigarette consuming nations, accounted for 63% of the volume of all cigarettes sold word-wide in 2014. These countries are China, Russia, U.S.A, Japan and Indonesia. Six of the ten largest cigarette markets in 2014 were emerging markets, three of which are Asian Pacific countries. (Euromonitor International, 2015). **Figure 2.3.1** below shows information on global cigarette markets in historic retail volume for the period 2000 to 2014.

Country	Retail Volume, 2014 (Million sticks)
China	2,542,891.9
Russia	316,512.1
USA	270,199.1
Indonesia	238,867.2
Japan	187,456.1
India	95,930.2
Turkey	94,684.3
South Korea	89,517.1
Philippines	82,666.3
Germany	80,355.0

Source: Euromonitor International, 2014 (online)
Figure 2.3.1 – cigarettes retail volume by country (2000-2014), in million sticks

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[5] owner data and statistics gathered from literature and statistics review.

As it pertains to cigarette consumption, China emerges as the world's number one consumer of tobacco and tobacco products hence it is the world leader in both production of unmanufactured tobacco and consumption of cigarettes.[6] The Euromonitor International (2015), estimated that the retail value of China's cigarette market in 2014 was US$226 billion. By comparison, the retail value of the next largest cigarette market, that is, Russia was pegged at US$28 billion within the same year. Evidence on tobacco markets shows that volume growth in China has driven global market growth. Between 2012 and 2014, the global cigarette market decreased by 2.2%, but the global market declined even more (6.3%) when excluding China's volume gains. The Indonesia cigarette market is somehow perculiar as sales are dominated by kreteks (cigarettes made with a blend of tobacco, and cloves). Smokeless tobacco dorminates India's tobacco market, though they also consume smoking cigarettes as there was a growth of 8% in the cigarette market between the periods 2013 to 2014.

In India, manufactured cigarettes are only 5% of the market, and 20% of tobacco users smoke bidis (hand-rolled cigarettes). While cigarettes are not the most popular tobacco product in India, cigarette sales data shows that nearly 96 billion cigarettes were sold in 2014 alone, making the country an important strategic market for cigarettes. Moreover, much of the world's number one smokers, above 80%, live in low and middle income countries, making these countries a target market for multinational cooperations who are giants in the tobacco manufacturing industry, (Euromonitor International, 2015, p. online). Studying tobacco consumption patterns and trends shows a wide variation between countries and regions and also within countries, caused mainly by differences in population and income and also the available tobacco control policies. Thereby explaining why some regions and countries lead in tobacco consumption while others still consume less. This variation also weighs much on the reason why a combination of different tobacco control measures should be implemented in different countries if a reduction in the consumption of tobacco and its related products is to be experienced.

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[6] based on data from unmanufactured and manufactured tobacco.

Whilst China still remains the largest tobacco producing and consuming nation in the world in terms of volume and value, India also produces and consumes a lot of tobacco whilst Russia at the same time still maintains its position as one of the leading consumers of manufactured tobacco in the form of cigarettes after having experienced a significant growth in cigarettes consumption between the periods 2002 to 2004, even though it produces very little quantities of tobacco leaf which is by far not sufficient enough to cater for its domestic consumption. This therefore means high imports of cigarettes and tobacco leaf in Russia. (FAOSTAT, 2016). **Figure 2.3.2** below shows domestic consumption of manufactured cigarettes in 2004 for Top 6 countries and the rest of world in terms of percentage overall in the world.[7] In terms of billion pieces consumed by each country, Russia 3.73, Japan 2.78, Indonesia 1 .71, Germany 1.27, USA 4.02, China 17.7 and Rest of the world 22.7
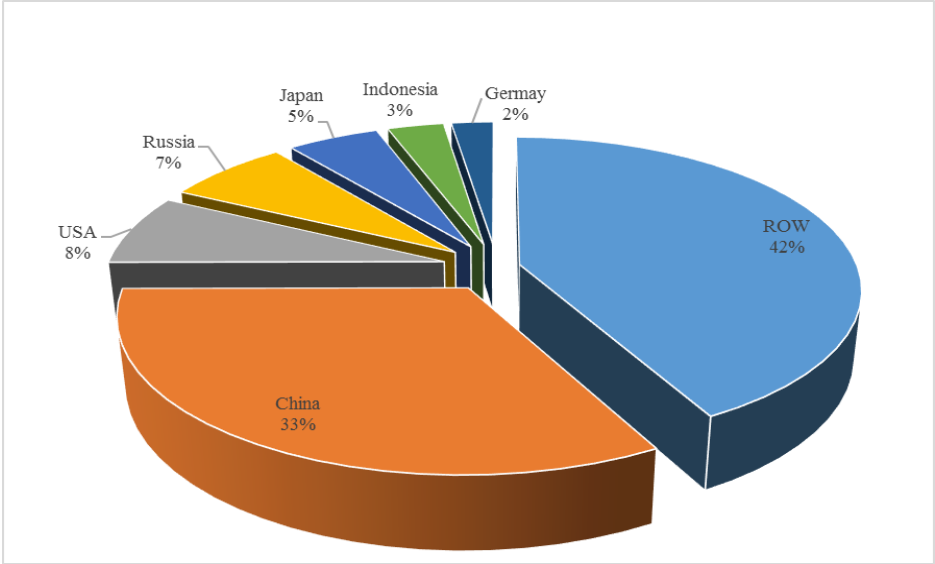
Figure 2.3.2. – Domestic cigarette consumption, 2004 in million sticks

Adapted from (ASH, 2007, p. 4), writer converted million sticks into percentages.

As pointed out earlier, it should be noted that rest of the world includes all other countries that produce, process, consume and export tobacco and tobacco products. As can be seen from the figure above, China consumes quantities which are close to quantity consumed by the rest of the world, Germany, Indonesia, Japan, Russia and United States of America excluded.

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[7] Adapted from (ASH, 2007, p. 4), writer modified billion pieces to percentages.

2.4 Tobacco in developing countries and tobacco control

Tobacco is grown and produced in various countries worldwide. While other countries, mostly those which are developing, produce high quality tobacco due to favorable environmental conditions, some countries cannot produce tobacco but they need to consume it hence tobacco is therefore traded on the international market just like any other product. In fact, in 2012 five countries in Africa were rated among the top 20 producers of tobacco leaf in the world. These include; Malawi, Tanzania, Zimbabwe, Zambia and Mozambique, ranked 6th, 8th, 9th, 16th and 17th in that order. (Hu & Lee, 2015). Data and statistics on world tobacco production indicates that most of the countries that lead in tobacco production in Africa, the middle East and Asia are among the poorest countries and given the favourable and a bit stable world prices, they view tobacco production as a panacea to their poverty. The Government and tobacco industry in these countries encourage farmers to do tobacco production with a justification of it having a number of economic benefits such as employment creation, revenue generation as well as boosting farmers' income therefore relieving household poverty especially in rural areas where most of tobacco farming activities are based. Growing tobacco in developing countries to a greater extent also takes advantage of the vast fertile and non-fertile land resources for which without tobacco farming, would otherwise be staying unused. Most importantly, most tobacco producing developing countries strongly believe that tobacco farming promotes local economic development by generating the much needed export earnings.

Five African countries ranked in the top 20 of tobacco leaf growers produced over 530,000 tons in 2011. (FAOSTAT, 2014) in (Hu & Lee, 2015, pp. 2-4), these same five countries had produced 372,000 tons in 2000 showing a growth in tobacco leaf production of 158,000 tons within a decade. In African countries alone, total exports of tobacco leaf increased by about 47%, which is an increase in value of about 73%, within the same period that production grew by 138,000 tons, Tobacco leaf exports in the aforesaid five countries play a very significant role in their export trade and economic development as tobacco leaf emerged as one of the key export commodities and in 2011, tobacco leaf was the top agricultural export for, Mozambique, Zimbabwe and Malawi. It turns out that, tobacco was ranked as the 2nd agricultural export in Tanzania and 3rd in Zambia, also in the same year.

Malawi is among developing countries whose economies are largely dependent on tobacco production and exports with the tobacco sector contributing well above 60% of the country's total annual earnings, and the tobacco sector having accounted for close to 13% of the economy in terms of Gross Domestic Product in 2011. In Zimbabwe and Mozambique, tobacco leaf accounted for 22.6% and 7.8% of total exports[8] respectively in 2011. Total export value of tobacco leaf from the five previously mentioned African countries grew by US$698 from around US$960 million in 2000 to about US$1.658 billion in 2011, representing a growth of more than 70% in a period of ten years. The whole African continent recorded a 74% growth in export earnings from tobacco leaf between the year 2000 and 2011, with export values increasing from US$1.03 billion to US$1.79 billion. (Hu & Lee, 2015, p. 2). Moreover, within the developing countries category, the Far East also emerged as a major exporter of tobacco leaf. In terms of cigarettes, the United States, Netherlands, the United Kingdom and Germany are major exporters while Singapore also trails behind these countries as a major cigarette exporter in the Far East, (FAO, 2003), although figures from the FAOSTAT database shows that it is not a producer of tobacco leaf itself.

While a lot of researches have been done that assessed the impacts of various policy changes, including tax, on the consumption of tobacco, these were done either at country level or at both country and the distributional effects at international level. On the contrary, a great number, if not all of these studies did not outline the negative effects of the reduction in tobacco demand in terms of the welfare of countries that depend much on tobacco production. There seem to be limited information or studies that verify the combined consumption decline impact of tobacco tax on a group of tobacco trading countries. This research therefore tries to cover that gap by simulating changes in both tobacco tariff rates and cigarette retailing taxes and explore the implications of these changes on developing countries whose economies depend on tobacco production and trade. While various tobacco trade barriers have been there for a while, history of international tobacco control dates back in 2003 when the FCTC was adopted by the World Health Organization and became the first international public health initiative that came into existence as a result of the recognition of the public health problems that tobacco trade and consumption has. The global effort to reduce the identified negative effects of tobacco consumption, which was projected to result in the death of over one billion people by 2030, over 70 % of which will be in low and middle income countries,

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[8] Note that the value of tobacco leaf exports includes the value added for the handling of exports, such as grading, packaging, and transporting.

(Fong, et al., 2006, pp. iii3-iii7), culminated in the creation and adoption of the FCTC. The FCTC sets out minimum standards and tobacco control policies that member countries are oblidged to implement at country and international level so as to reduce the demand and use of tobacco and tobacco related. In many cases, signatory countries are even encouraged to put into place policies that are even stricter than those spelt out by the FCTC. Some of the policies and strategies encouraged are but not limited to, high taxes on cigarettes, non- zero import tariffs on tobacco leaf and cigarettes, banning cigarettes advertising and promotion and smoking restrictions in public places, (ASH, 2007).

An Action on Smoking and Health (2015) fact sheet states that significant improvements in tobacco control in relatively all countries has been recorded in recent years to date, highlighting that a lot of countries are becoming very much concerned and understanding more about the long term effects of increased tobacco use, thus the need to reduce tobacco use through the various policies and strategies spelt out in the WHO FCTC. The WHO FCTC puts much emphasis on what it refers to as the key evidence based strategies to reduce the tobacco burden known as the MPOWER. Much of the reduction in tobacco and tobacco related products use is derived through, monitoring and reviewing the implemented tobacco control policies, protecting the general populace from tobacco by those who smoke through public places smoking restrictions, helping to quit those who would want to, warning people about the health hazards of tobacco use through warning labels on cigarette packs and billboards, making sure bans on tobacco advertising and sponsorship are enforced and lastly making sure that cigarette taxes are periodically and timeously reviewd upwards to make cigarettes somehow unaffordable to smokers as it was proven that high cigarette prices reduce tobacco demand. As highlighted before, one of the key policy provisions of the FCTC include raising tobacco taxes to make tobacco and tobacco related products highly unaffordable to a greater percentage of the general populace which would discourage smoking (consumption) and hence reduce demand. In its 2015 report, the WHO indicated that the recorded number of countries implementing more than one of the measures aimed at reducing tobacco use increased worldwide from 92 to 103 which is quite a significant improvement and much of this increase is through low and medium income countries. Fong *et al* (2006), further asserted that the FCTC is the first international public health iniative which oblidges ratifying countries to have strong and comprehensive tobacco control policies that include raising import and retailing taxes for tobacco.

The FCTC has for long provided a global motorification to the tobacco control initiative as countries all over the world having considered incorporating FCTC policies and recommendations into their own tobacco production, retailing and trade policies which are currently into full force. Amongst the 25 countries in this study, all are participants of the WHO FCTC and have ratified the FCTC except for Malawi, Indonesia and The Republic of Tanzania which are not participants, while the other countries which fall under the rest of the world are also participants. The United State of America and Argentina are participants but having not ratified by 2015. (WHO Website, 2015). It should also be noted that these countries which are said not to be part of the WHO FCTC and have not yet ratified it, have their own tobacco control policies which are implemented at country level. Part of the FCTC encourages price and tax measures as effective means to reduce the demand for tobacco. These include tax increases that result in an increase of the sales price of tobacco products (including import tariffs); and prohibiting or restricting sales of tax and duty free[9] tobacco products. (WHO FCTC, 2015). To add on, in an effort to control tobacco trade globally, the World Health Organization further engaged a number of countries worldwide to provide technical assistance on tobacco taxation.

The objectives of the engagements were to raise taxes on tobacco and tobacco products so as to increase their price, to increase the efficiency and effectiveness of tax systems so as to improve the sustainability of tax revenue by timeously reviewing the tax policy and ensure that the governments collect expected tax revenues without any leakages. Out of the 25 countries included in this study, 15 were engaged as individual countries under the aforesaid collaboration and these countries include China, India, Indonesia, Tanzania, Pakistan, Poland, Korea Republic, Romania, Philippines, Greece, Russia, Zambia, South Africa and Malaysia. Other countries in the study which were also engaged will fall under Rest of the World.

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[9] therefore there are no tax free and duty free tobacco and tobacco products in all WHO FCTC participating countries, and based on article 6, the prices for tobacco and tobacco products are very high due to high taxes.

3 Literature Review

According to Mackay & Ericksen (2002, p. 12), tobacco is grown in over 125 countries, on over 4 million hectares of land 33% of which is in China alone. The global tobacco crop is worth approximately US$20 billion, a small fraction of the total amount generated from the sale of manufactured tobacco products. Due to the increases in population and income, the demand for tobacco worldwide has been modestly increasing, (The World Bank, 2003). The fact that demand for tobacco has been increasing is a major cause for concern given the background that tobacco production and consumption has serious and high social costs, and which is the reason why tobacco control has been implemented worldwide.

Literature on tobacco trade and control at international level stipulates standard measures and agreements put in place to control the global demand and consumption of tobacco and its related products due to perceived health effects that tobacco consumption has. For example, The World Bank (1999) notes that by 2030, tobacco will account for approximately 10 million deaths per year. This will make it the single biggest cause of death worldwide. Solutions to this epidemic have generally focused on reducing the demand for tobacco products. It has been shown that the most effective way to reduce demand is through price increases on cigarettes. This is achieved by increasing the tax rate on cigarettes, which has the further advantage of generating additional revenue for governments, (The World Bank, 1999). A lot of researches[10] have been done which looked at implications of changes in various forms of policies to reduce tobacco consumption. These researches used different methodologies and models as well as different policies to see how tobacco consumers will respond to changes in certain policies which are aimed at reducing tobacco consumption, supply as well as trade.

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[10] most of the studies used country level data and the impacts of taxation at country level using different methods and approaches. The major focus of these studies was to assess the impact of cigarette taxes on the demand for cigarettes.

Again, a handful of studies have already examined the relationship between cigarettes and tobacco products demand and their sales price in some developing and emerging countries, with results showing a negative and significant relationship between cigarettes demand and prices through tax. Beghin & Chang (1992), through a multi-market model, analyzed the impact of a reduction in assistance to US tobacco producers by changing tobacco trade barriers through alternatively relaxing production quotas and lowering tariffs on imported tobacco. The aim was to look at how would the removal of trade distorting measures such as quotas and tariffs will affect international tobacco trade volumes, welfare and prices. They concluded that high production quotas would have an effect of reducing local tobacco prices while increasing domestic demand and reduce tobacco imports. Moreover they found that lowering tariffs for tobacco increases derived demand for tobacco imports and consequently consumers substitute away domestically produced tobacco resulting in a fall in its price. In their working paper titled "The Trade and Health Effects of Tobacco Regulations," (Galianato, et al., 2014), developed a gravity equation incorporating various domestic and foreign tobacco regulations into a country's tobacco import demand to estimate the bilateral trade effects of marketing, counter advertising age and smoking tobacco location regulations as part of the six evidence-based tobacco control demand reduction measures that are proven to reduce tobacco use, the MPOWER. They found various effects on of the components of the MPOWER on tobacco demand.

It is quite apt to bear in mind that all tobacco control and regulations are aimed at reducing tobacco supply and demand locally and at international tobacco markets. Hence all trade distorting policies and restrictions may have the effect of either increasing supply and demand of tobacco at world markets or reduce both. Limited follow-up information is however available to policy makers on the welfare and revenues consequences of changes in tobacco control policies. The availability of this information will help in knowing the magnitude of harm that these policies have and therefore would help governments and policy makers of countries that rely much on tobacco to explore alternative crops and enterprise that are equally profitable while at the same time with little or no negative public health implications. Hu *et al*, (2008), estimated the impact of tobacco taxation in China. They found that given the current minimum amount of specific excise tax on cigarettes, the tax reform most likely to be effective for tobacco control in China is to increase the specific excise tax. They also postulated that, to determine the impact of taxation on smoking prevalence and the effect on government revenue, population health, and the tobacco economy, the price of cigarette consumption (price elasticity) is the key parameter. This study used price elasticities

of demand of -0.15 and -0.50 to simulate the impact of tax increases on government revenue, population health, and the economy with an increase in the specific excise tax of RMB 1 per pack up to an additional RMB 4 per pack. On tobacco taxation, (Liemt, 2002), argued that, raising the tax on tobacco products is a component of virtually every government's tobacco policy. On the surface, it is an attractive component because it raises the price of tobacco products (and thus discourages demand) and it raises government revenue (thereby cushioning the treasurery). While the tax policy seems plausible at first glance, it could be more complicated to administer. First, a flat tax per packet would act as a regressive tax as it weighs more heavily on people with a low income. In his analysis of the impact of taxation on tobacco consumption, Warner (1990, pp. 529-31), argued that due to the big differences in income levels between developed and developing countries, the tax policy would suggest that developing countries are more price elastic than developed countries hence the need to have a tax regime that take into account the differences that exists among countries in terms of their income levels. Early time studies to empirically estimate the impact of taxes on tobacco and tobacco related products and their elasticities in developing countries were done by the likes Chapman & Richardson (1990), using cigarette and non-cigarette tobacco consumption data in Papua New Guinea between the period 1973 and 1986. They found that cigarettes and non-cigarette tobaccos are price elastic with elasticities for both being positive, that is, an increase in the price of cigarette and non-cigarette tobacco is associated with a relatively biger decreases in quantities consumed of both. Their estimates clearly shows that taxation plays a big role in reducing tobacco consumption in developing countries as consumers in these countries positively respond to a slight increase in tobacco price by reducing consumption.

Other tobacco taxation studies done in low and medium income countries include those done by Maravanyika & Van De Marwe *et al* (1998) in South Africa and Hsieh & Hu (1997) in Taiwan which all showed a positive response of tobacco consumers to an increases in the price of tobacco. Moreover, a whole bunch of studies done in OECD and other developed countries also confirm that an increase in the price of cigarettes and non-cigarette tobacco products would reduce consumption even though the response in these countries is far much less that the response by developing countries. (Chaloupka, et al., 2000). This further confirms the role that the level of income plays, in so far as to tobacco consumption and prices is concerned. In the long run, high income countries' response to price changes will become insignificant as consumers would adjust to these price changes. The same slightly compares to low income countries.

A study on tobacco consumption done by (Guindon, *et al.*, 2003) in (Ross & Chaloupka, 2006) on the Asian countries Nepal, Sri Lanka, Bangladesh, and Thailand using pooled macro-level data on cigarette prices and quantities consumed on a 30 year period, showed that a slight increase in cigarette prices would reduce cigarette consumption in these countries by almost the same magnitude that the price would have increased with.The above studies by Guindon *et al*, (2003) showed that the short term effects of an increase in the price of cigarettes is less than the long term effects of an increase in price of cigarettes, with the long term impact being twice more than the short term.[11] In their paper on Global tobacco value chain in low-income countries, Goger *et al* (2014) pointed out that during the period 1993 to 2002 when the European Union scratched import tariffs for raw tobacco imports into the EU from developing and least developed countries, the causal effect of removing the tariffs on these countries still remained ambiguous and somehow thoroughly unexplainable as there was no comprehensive quantitative analysis in welfare terms, highlighting that this does not suggest that trade policy is irrelevant but rather that understanding the impact of trade policy requires some more robust approaches than just the simple correlation between tariffs and imports.

Chaloupka et al (2012) concluded that significant increases in tobacco taxes are a highly effective tobacco control strategy and lead to significant improvements in public health. The positive health impact is even greater when some of the revenues generated by tobacco tax increases are used to support tobacco control, health promotion and/or other health-related activities and programs. In general, oppositional arguments that higher taxes will have harmful economic effects are false or overstated. Serletis & Fertzer (2008), estimated the impact of US tobacco quota buyout in both the US and foreign tobacco markets. They assumed high tobacco supply elasticity from all sources and found out that market prices for US produced tobacco would fall by 20 to 23%, which will reduce supply, while market price for foreign produced tobacco fall by less than one percent. But however, shipments of both US produced burley and flue-cured tobacco increase to both markets; while shipments of foreign produced tobacco falls to both markets as well, hence reducing the overall supply for tobacco on both foreign and US markets. The same concepts of product heterogeneity and differentiation still hold in their model, the same as the Armington model.

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[11] Guindon G.E, Perucic A.M, Bosclair D. Higher tobacco prices and taxes south East Asia. HNP Discussion paper, Economics of tobacco control paper No.11. Washington DC: World Bank, 2003

4. Methodology

4.1 Theoratical framework

Early neoclassical trade models used in commodity trade analysis have always assumed product homogeneity irrespective of where they are produced, (Saito, 2004, p. 3) that is, their origin. One good example of such is the composite commodity theorem by Leontief (1936), which asserts that a group of commodities can be treated as a single if the observed trend in price movement seems parallel. However, as pointed out by Armington (1969), prices of goods produced in different countries do not typically move together, as consumers are assumed to have the ability to differentiate commodities based on where they originate from and since then, models that treat goods produced in different countries and regions differently and that assume a constant elasticity of substitution (CES) among the goods have been widely used to explain trade and reforms in various policies worldwide. As pointed out by Saito (2004), the Armington specification has played a crucial role in deriving some of the important findings in the recent empirical commodity trade literature, thus making it more relevant in analyzing international and regional tobacco markets. The Armington model is a linear specification of the demand for imports and models demand for differentiated import goods in terms of their point of origin. The assumption here, which is a bit plausible is that goods imported from different countries create or give different consumer utilities hence a finite elasticity of substitution between them.

Armington elasticities as estimated by Gallaway *et al* (2003, p. 49–68.), (Shiells, et al., 1986, p. 497–519) and many others played an important role in the welfare analysis of, and trade patterns predicted by the famous CGE models in commodity trade, such as the GTAP. The GTAP and other CGE models however have been found to require a lot of factors and data. On the contrary, the partial equilibrium trade models, which reduce many factors and require less data as compared to CGE models have been employed in a few studies in the past (Rakhal & Surry, 2006, pp. 39-78) for commodity trade analysis. The partial equilibrium trade model with Armington elasticities known as the Global Simulation Model (GSIM) for the analysis of global, regional or unilateral trade policy changes (Francois & Hall, 2003) is the same model applied in this study. The model assumes imperfect competition in the tobacco sector and allows for product differentiation, that is, consumers are able to differentiate tobacco products according to their point of origin and imports and domestically produced tobacco products are imperfect substitutes to each other with the imperfect substitution measured by a constant elasticity of substitution. Given this, as a result of high

tariffs levied on imported goods, they become expensive in the importing country while locally produced products become relatively cheaper while the price of aggregate tobacco in the importing country will depend on which price effect offsets the other. Therefore, the demand for a product in the Armington model is defined in two stages. Firstly, a representative consumer choses a certain level of consumption for a composite good, given a general price for the good, for example aggregate consumption of tobacco as a product given its price. Secondly, the consumer would then consume either more or less of a certain variety within the chosen composite good in the first stage depending on relative prices, [12] for example more tobacco from Zimbabwe and less from Malaysia or vice versa and otherwise. Own and cross price elasticities as well as substitution elasticity, are therefore key elements of the model, (Francois & Hall, 2003). An elasticity of substitution defines the point to which changes in relevant prices would lead to the change in the source of the imports.

Given trade restrictions in tobacco in form of high tariffs, the results of GSIM allows for the assessment of importer and exporter effects related to tariff or tax revenues, producer surplus, consumer surplus and changes in overall domestic prices of the commodity under study. Economic theory predicts that generally barriers to trade, for example, high tariffs in the trade of any commodity or service will reduce total external supply of that commodity while raising quantity supplied domestically consequently lowering prices in the exporting country. High import tariffs for tobacco will result in high prices for tobacco and tobacco products in the importing country as high input prices would entail high output price leading to a significant decline in cigarettes consumption and tobacco use. Due to higher prices domestic producers will respond by increasing their supplies hence domestic producers will benefit while local consumers and foreign suppliers and producers will usually be worse off due to this kind of policy. The model is extended to the cigarette market by looking at the effect of cigarette retailing taxes on tobacco demand through the conversion of cigarette retailing taxes to tobacco import tariff equivalence. The tariff equivalence is generated by use of tobacco supply chain marketing margin coefficients for the various countries in the model.[13]

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[12] The extent of the between variety allocation response to changes in relative price is measured by the Armington substitution elasticity

[13] For more information on the conversion of cigarette tax into tobacco import tariff equivalence see appendix 4 Table 5.2.7. See Appendix for (WHO, 2015) report on tobacco use for various cigarette tax levels in various countries. Also see (Peterson, 2004) for tobacco and beverages marketing margins used in this study.

4.2 The model

Based on Francois & Hall (2003), the basis for this model is the import demand which can be expressed as a function of industry prices of imports from various sources and total spending on the category as:

(1) $\mathbf{M}_{(t,v),r} = \mathbf{f}(\mathbf{P}_{(t,v),r}, \mathbf{P}_{(t,r),s\neq r}, \mathbf{Y}_{(t,v)})$

Where $\mathbf{M}_{(t,v),r}$ is the import demand of tobacco for country v from exporting country r; $\mathbf{P}_{(t,v),r}$, $\mathbf{P}_{(t,r),s\neq r}$ are internal prices of t (tobacco) from countries r and s (other varieties) within country v respectively; $\mathbf{Y}_{(t,v)}$ is total spending on imports of tobacco in country v. Here the concept of weak Seperability is implicit in this model. Based on Armington (1969) specifications, the basket of goods identified by country is weakly separable, meaning to say that the marginal rate of substitution between two goods from the same basket or the same country is separable from the rest, [14] hence goods in one group are compliments. One good example is that the marginal rate of substitution between two goods (tobacco) in this case, from the basket of domestic goods (for example from Zimbabwe) does not depend on foreign goods (tobacco) from other countries. Assuming that no country is no longer supporting tobacco production through subsidies, price supports and geographic and quantitative restrictions like what used to happen in the USA (Serletis & Fertzer, 2008, p. 2), but that the export of tobacco products is levied with tariffs, in the importing country, then export supply to the world market from country r is defined as a function of world prices ($\mathbf{P}_{t,r}*$), and import tariff of imports of **tobacco** in country v, ($\mathbf{T}_{t,r}$):

(2) $\mathbf{X}_{t,r} = \mathbf{f}(\mathbf{P}_{t,r}*, \mathbf{T}_{t,r})$

Export supply is therefore a function of world prices and the tax (tariff) on the product, $\mathbf{P}_{t,r}{}^{*}$ has a positive effect on $\mathbf{X}_{(t,r)}$ while $\mathbf{T}_{t,r}$ has a negative effect on $\mathbf{X}_{t,r}$. This therefore means that the higher is $\mathbf{T}_{t,r}$, the less is $\mathbf{X}_{t,r}$ and vice versa. As highlighted in the Global Simulation Model literature, the starting point is to have the product import demand functions which are basically of two types, that is, Hicksian demand equations and Marshallian demand equations.[15]

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[14] for more information and definitions of weak Seperability, see (Pollak & Wales, 1992)

[15] the difference between these two types of the equations is on how they are derived. Hicksian demand functions are derived through minimizing expenditure subject to a fixed utility level, while Marshallian demand functions are based on maximizing utility subject to a fixed expenditure budget which is the constraint.

By doing a first order differentiation and applying the Slutsky decomposition in equation (1), also applying the zero homogeneity condition, and knowing that aggregate import demand and industry supply equations for tobacco differ in both income and substitution effect, Francois & Hall, in (Francois & Reinert, 1997), the following equations which define cross price elasticity and own price elasticity respectively, are derived:

Cross price elasticity

(3) $\mathbf{N}_{(t,r),(r,s)} = \mathbf{\Theta}_{(t,v),s} (\mathbf{E}_m + \mathbf{E}_s)$

Own price elasticity

(4) $\mathbf{N}_{(t,v),(r,r)} = \mathbf{\Theta}_{(t,v),r} \mathbf{E}_m - \sum_{s \neq r} \mathbf{\Theta}_{(t,v),s} \mathbf{E}_s = \mathbf{\Theta}_{(t,v),r} \mathbf{E}_m - (1 - \mathbf{\Theta}_{(t,v),r})\mathbf{E}_s$

Where $\mathbf{\Theta}_{(t,v),s}$ is country *v*'s expenditure share of tobacco coming from country **s** and $\mathbf{\Theta}_{(t,v),r}$ is country *v*'s expenditure share of tobacco coming from country **r** (both at internal prices); $\mathbf{E}_s$ and $\mathbf{E}_m$ are substitution and aggregate import demand elasticities for country *v*.

National Demand and Supply Equations

Having previously defined own-price and cross-price elasticities, (Francois & Hall, 2003), the next step is to define demand for national tobacco product varieties as well as national tobacco supply functions which would enable us to have a full market clearing condition specification. Also, having previously defined $\mathbf{P}_{t,r}*$ as the export or world price of tobacco received by exporter *r* on world markets, and $\mathbf{P}_{(t,v),r}$ as the domestic price for tobacco in country *v*, the world price and domestic price can now be linked as:

(5) $\mathbf{P}_{(t,v),r} = (1 + t_{(t,v),r})\mathbf{P}_{t,r}* = \mathbf{T}_{(t,v),r} \mathbf{P}_{t,r}*$

Where $\mathbf{T} = \mathbf{1} + \mathbf{t}$ is the power of the tariff (the proportional price markup on tobacco as a result of levying the tariff *t*). Hence the domestic price is a function of the world price and the tariff. I will next define export supply of tobacco to world markets as being a function of the world price $P_{t,r}*$ [16] as follows:

(6) $\mathbf{X}_{(t,r)} = \mathbf{f}(\mathbf{P}_{t,r}*)$

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[16] If there are any subsidies offered in one of the producing countries, then they are factored in at this stage but in this particular instance we assume no assistance to tobacco farmers in form of subsidies, price supports and quota restrictions. Rather I introduce import taxes.

Differentiating equations (1), (5) and (6), the differentiation effects will be as follows:

(7) $\dot{P}_{(t,v),r} = \dot{P}_{t,r}* + \dot{T}_{(t,v),r}$

(8) $\dot{X}_{t,r} = E_{X(t,r)}\dot{P}_{t,r}*$ [17]

(9) $\dot{M}_{(t,r),r} = N_{(t,v),(r,r)}\dot{P}_{(t,v),r} + \sum_{s\neq r} N_{(t,v),(r,s)}\dot{P}_{(t,v),s}$

While the main focus is production of tobacco for exports, it is quite useful at this juncture to emphasize that production of tobacco also takes place for domestic consumption as noted in literature that most developing countries are world leaders in tobacco consumption, though through both imports and local production (own trade). Home market demand can be indexed through and supplied as is other demand for production, hence giving us the urge to implore, (Francois & Hall, 2003, p. 6) domestic industry effects by modeling home market trade in addition to foreign trade, using a non-nested import and domestic demand structure. Where E_x is the industry t (tobacco)'s global equilibrium export supply[18] elasticity, with the total change in imports demand equal to the change in export supplies being a valid condition for each export variety. (Thanh, 2013). From equation (9), we get equation (10) of the model by substituting equations (7), (3) and (4) into equation (9), and summing over all import markets as follows:

$$(10)\ \dot{M}_{t,r} = \sum_{v} \dot{M}_{(t,v),r} = \sum_{v} N_{(t,v),(r,r)}\dot{P}_{(t,v),r} + \sum_{v}\sum_{s\neq r} N_{(t,v),(r,s)}\dot{P}_{(t,v),s}$$

$$= \sum_{v} N_{(t,v),(r,r)}[P_r* + \dot{T}_{(t,v),r}] + \sum_{v}\sum_{s\neq r} N_{(t,v),(r,s)}[\dot{P}_s* + \dot{T}_{(t,v),s}]$$

From equation (10) we can work out and manipulate it to yield our global market clearing condition for each export variety by equating equation (10) to equation (8).

$$(11)\ \dot{M}_{t,r} = \dot{X}_{t,r} \approx$$

$$E_{X(t,r)}\dot{P}_{t,r}* = \sum_{v} N_{(t,v),(r,r)}\dot{P}_{(t,v),r} + \sum_{v}\sum_{s\neq r} N_{(t,v),(r,s)}\dot{P}_{(t,v),s}$$

$$= \sum_{v} N_{(t,v),(r,r)}[P_r* + \dot{T}_{(t,v),r}] + \sum_{v}\sum_{s\neq r} N_{(t,v),(r,s)}[\dot{P}_s* + \dot{T}_{(t,v),s}]$$

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[17] $\dot{X}$ denotes Δx, hence the (.) on each letter is a proportional change and Δ represents change.

[18] $E_x = \dfrac{\%\ \text{change in export supply}}{\%\ \text{change in world price } P_{(t,r)}*} = \dfrac{\Delta X_{(t,r)}}{\Delta P_{(t,r)}} \cdot \dfrac{P_{(t,r)}}{X_{(t,r)}}$

$E_m = \dfrac{\%\ \text{change in aggregate imports}}{\%\ \text{change in composite price } P_{(t,v)}} = \dfrac{\Delta M_{(t,v)}}{\Delta P_{(t,v)}} \cdot \dfrac{P_{(t,v)}}{M_{(t,v)}}$

$\dot{\mathbf{P}}_{t,r}*$ above, is the price for tobacco from country *r* in country *v*. Thus equation (11) becomes the core equation of the model from which we get new aggregate demand, new industry supply and the price changes in relative terms. These would provide a measure of the effect of the change in the trade policies.

4.3 Data and data sources used

Tobacco trade flows in Cost-Insurance-Freight [19] values, import tariffs for tobacco, the value of within country shipments which is known as "domestic trade" on the diagonal of the tobacco trade matrix, cigarette taxes, tobacco marketing margins as well as elasticities of supply, composite demand and substitution, all for the 25 countries are the data required for the model adopted in this thesis. All the trade data is in base year 2011 except for cigarette taxes which were in base year 2014. Import tariffs and other relevant policy instruments were obtained from MacMap, UNCOMTRADE/ World Integrated Trade Solution (WITS), FOASTAT, World Trade Organization (WTO), Centre for Disease Control and Prevention, UNACTAD – trade analysis information system database, United nations Industrial Development Organization (UNIDO), database for the International Trade Data, Centre for International Trade. The Agricultural distortions database developed at the World Bank and supervised by Professor Kym Anderson in Australia (University of Adelaide) was also extensively consulted.

4.3.1 Countries in the Model

The approach adopted in this study involves analyzing the impact of changes in tobacco trade barriers and cigarette taxes by factoring into the model 25 countries which are major tobacco producers, exporters as well as importers of raw and manufactured tobacco, (MACKAY & ERIKSEN, 2002), from the BRICS, Africa, Europe as well as rest of the world. The other countries participating in the production and trade of tobacco as well as tobacco products which did not fit into the model as individual countries were grouped together as rest of the world (ROW) [20] so as to include in the model, all countries that produce and trade in tobacco as the model only accommodates upto 25 countries only. EU member countries are taken as a single country called "EU" based on the fact that they use a common external trade policy. Selected countries are China mainland, India, Brazil, United States of America, Indonesia, Malawi, Argentina, Thailand, Tanzania, Zimbabwe, Pakistan, European Union, South Korea, Turkey, Bangladesh, Mozambique, Japan, Sri Lanka, Philippines, Russia, Zambia, South Africa, Malaysia, Vietnam and Rest of the World.

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[19] Cost Insurance & Freight (CIF) values are trade values that include transaction costs (inclusive of all services performed and insurance) for the goods to be at the border or port of entry of destination country.

[20] Rest of the world include all other countries which are involved in the trade (imports and exports) of tobacco and tobacco products. it should be noted that some countries which are in the model, for example Russia, do not produce significant amounts of unmanufactured tobacco as compared to other countries., but they are world leaders in importing and exporting tobacco and tobacco products. Hence viewed as an attractive market for tobacco.

4.3.2 Developing country status

Sulivan & Sheffrin (2003), defined a developing country as one with a less development industrial base and low Human Development Index (HDI) relative to other countries. It can also be referred to as a less developed or underdeveloped country. According to the World Bank country group database, the following countries are classified as developing countries though in different income groups, that is, some are low income, low middle income, and upper middle income: **Asia:** Malaysia, Thailand, Philippines, Indonesia, Vietnam, Pakistan, Sri Lanka and Bangladesh. **Sub-Saharan Africa:** Zimbabwe, Zambia**,** Tanzania**,** Mozambique and Malawi. **Europe**: Turkey. **Latin America**: Argentina. **Emerging economies:** Brazil, India, Russia, China and South Africa. Therefore the total number of developing countries in the model is fifteen and based on trade values in the trade matrix, major world markets for tobacco with tobacco imports valued at 500 million USD$ and above include China, Brazil, the EU, Russia, Indonesia, India and the US. Changes in tobacco trade barriers after which the impact on developing countries will be analyzed therefore focuses on the above listed developed and emerging countries.

4.3.3 Bilateral trade data and important definitions

Bilateral trade data for all countries for the base year 2011 were available from the UNCOMTRADE/WITS database, except for Mozambique which were available in the base year 2012. This difference in base years does not affect the simulation results. Trade data extracted from UNCOMTRADE/WITS include net exports and imports in both quantity and value terms, for each country in the model. The United Nations Harmonized System (HS) code 240120 was used to define raw/ unmanufactured tobacco which refers to tobacco partly or wholly stemmed or stripped and net aggregate values were extracted from this database as reported. Export values for all the countries to the ROW were computed as the sum of exports to all the countries that are in the Rest of the world category and the same applies for imports. Production quantities by each country were obtained from FAOSTAT. Domestic shipments on the diagonal of the 25X25 GSIM matrix were computed from production and export quantities, specifically domestic shipments referred to as 'own trade' equals production quantities less export quantities. The values were also obtained through figures from UNCOMTRADE and FAOSTAT stated as Free-on Board (FOB). Own trade for countries like Zimbabwe and Russia were found to be negative which could possibly be due to smuggling and these could not be used in the model as negative values.

To solve this problem, an assumption was made that the per capita consumption of tobacco for countries in the same region is the same, hence average per capita consumption for Malawi, Zambia and Mozambique was used as a proxy to compute own trade for Zimbabwe and that for the EU was used to compute own trade for Russia. Net Quantities which were small and had the effect of inflating unit export prices were dropped to zero for some countries and in cases were large and significant import quantities had unrealistic unit export price, the price was adjusted through what I refer to as the price calibration ratio (PCR) calculated as :**PCR = FOB price/ CIF price**. This gives information on the share of export costs per each unit price received by every exporting country and thus enabling us to know the share of domestic price in the CIF price. This ratio uses the available FOB and CIF prices for one country to calculate the fob price for a country in the same region whose FOB price is not available. This was done using the FOB/CIF price weighting using the assumption that countries in the same region would incur the same cost-freight and insurance costs as the data shows an almost identical export market destination. Countries for which this assumption was employed include Zimbabwe, Mozambique, Indonesia, EU, Russia, Turkey, Japan, Malaysia, Philippines, Sri Lanka and South Korea.

The Price Calibration Ratio of one country in a region will give us an almost close to the true costs of shipping tobacco outside the country (for countries within the same region). Based on this, the ratio was used to calculate fob prices for countries which had higher FOB prices as compared to CIF prices as it is expected that CIF price should always be higher than FOB price because CIF includes the cost of shipping and other related costs until the good is at the border of the importing country. This was carefully done without losing much detail, hence avoiding biased results due to unrealistic data while at the same time keeping the data in check. This data adjustment therefore resulted in import quantities and values reported in UNCOMTRADE not to 100% tally with quantities and values used herein. However the difference is small and insignificant to affect the empirics. Another noticeable feature of the data from the two databases used to extract export and import quantities, that is, UNCOMTRADE and FAOSTAT is that the former reports in terms of net quantities while the later reports in gross quantity hence the difference in the figures in the two databases[21].

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[21] Both domestic consumption and production quantities from FAOSTAT had to be converted to net weight. The conversion formulas and calculations for this are shown in appendix 2, Table 5.1.9

4.3.4 Bilateral trade Tariffs and tax

Tariffs were obtained from the MacMap database and reported in ad valorem equivalence based on the World Tariff Profile system. Ad valorem Equivalent (AVE) tariff is a tariff calculated in the form of a certain percentage of the goods incoming from an exporting country. (MacMap). MFN and preferential tariffs reported in ad valorem equivalence were used. Amongst all the countries in the model, Japan had zero tariffs for tobacco from all countries. Import tariff for the country 'Rest of the World' was assumed to be zero. For countries which did not have tariff figures for the base year 2011 for example tobacco from Tanzania to Bangladesh, Zimbabwe, Malaysia and many others, tariffs for the latest reported year were adopted. For the EU, the tobacco import tariff rate for France was used, again based on the common tariff assumption. An extension of the GSIM model was also done by looking at the cigarette market in tobacco equivalence. This was done so as to cover both raw tobacco and cigarette markets. Since the model used is not a multi-market model, to cater for the cigarette market, retail taxes on the most sold brand of a pack of cigarette in all the countries in the base year 2014 were used after being converted into tobacco equivalence import tariff assuming fixed proportion of inputs in cigarette manufacturing. The conversion was done using marketing margin coefficients in the tobacco supply chain. The taxes were obtained in the (WHO, 2015, pp. 131-168) report on tobacco epidemic while tobacco marketing margin coefficients used are from (Peterson, 2004).

4.3.5 Elasticities

Elasticities include export supply elasticity denoted by E_x, [22] composite demand elasticity (E_m) and elasticity of substitution for tobacco and all the figures except for elasticities of substitution were obtained from the Agricultural Trade Policy Simulation Model database and other studies. These are crucial for the analysis of any trade policy reforms hence key to this study as well. Since the adopted expenditure approach in this study assumes a CES objective function, then the estimated elasticity is the elasticity of substitution between imports of tobacco and domestically produced tobacco, also known as the Armington elasticity (Kee, et al., 2005). A default elasticity of substitution value of 5 was adopted following literature from (Francois & Hall, 2003), (Fujita, et al., 2000) and (Donnelly, et al., 2004).

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[22] Export supply elasticity defined as the degree of responsiveness of the supply of exports of tobacco to changes in its price.

5 Scenario simulations and Results

In this chapter I present the simulated scenarios as well as the subsequent results from them. An extensive discussion of the results follows noting key effects of each scenario simulation, mainly focusing on overall price changes, changes in producer and consumer surplus, changes in revenue, changes in output and changes in trade values at world prices. Basically, five scenarios are considered and the results presented and analyzed.

5.1 Scenarios

(1) Scenario one: Considers a 10% point decrease in import tariff for all countries by China as the world's biggest tobacco market. Since China has a 10% tariff on all tobacco, a 10% point decrease in tariff means completely scratching out the import tariff such that it goes to zero for tobacco imports from all countries.

(2) Scenario two: Import tariffs for tobacco are assumed to increase by 10% point in the European Union for all its trading partners except for preferential tariffs for developing countries which will remain unchanged.

(3) Scenario three: Import tariffs for tobacco in Brazil are assumed to have be scratched off, meaning no tariff for tobacco imports into Brazil. All tariffs goes down to zero.

(4) Scenario four: Assumes a condition where all developed and emerging economies remove all import tariffs for tobacco imports while developing countries still have tariffs for all tobacco imports.

(5) Scenario five: Assumes a 10% point increase in cigarette retailing taxes by china, note that cigarette retailing tax works through tobacco import tariff equivalence.

5.1.1 Scenario 1 - when China scratches off tariff for tobacco imports from all countries.

As a result of China completely removing its tariff, all countries experience an increase in output within the range of 0.1% to 1.3% except for China itself, with the greatest increase of 1.3% being in Malaysia followed by Zimbabwe which would increase output by 1%. As would be expected China's output reduces by 0.5%. The effect in China could be as result of consumers having a wider range of product characteristics from which to select thereby making Chinese producers face stiff competition resulting in them reducing their output as the market will be dominated by foreign products. Malaysia and Zimbabwe experience relatively bigger changes to the positive side as compared to other countries in the model as China is the biggest market for these two countries. In terms of trade at world prices, Zimbabwe would increase its exports to China by $56.3 million and Brazil again increases exports to China by $121.7 million. Argentina's exports increases by $30.1 million, Malawi by $6.4 million and Malaysia $1.2 million to the same export market. Own trade at world prices by China goes down by $238.5 million thereby offsetting the combined increase in imports value by all countries.

Domestic consumption or own trade at world prices for Zimbabwe will go down by 7.9% while also significantly reducing export supply to countries like Mozambique, South Africa, United States, Indonesia, India, the European Union, Russia, Turkey, Malaysia, Philippines, Vietnam, Korea, Pakistan and the Rest of the world. In a nut shell, when China scratches its import tariff on tobacco for all countries, Zimbabwe will significantly increase export supply to China at the expense of other export partners for which she reduces export supply by a range of 12% to 21%. Malawi will reduce exports to Europe and other Asian countries by 1% to 5% while also increasing exports to Zimbabwe, South Africa, Brazil, Argentina and USA by a range of 0.9% to 5% at the same time that this policy reform is implemented. Chinese exports to other countries will significantly increase as producers respond to low internal prices and resort to the export market. The export increases for China in value terms varies between 9% and 22%. Overall, after this policy reform, Zimbabwe responds more positively in terms of export supplies to the Chinese market while at the same time more negatively in terms of exports to other trading partners indicating that China will become a key strategic tobacco market for Zimbabwe. As mentioned before, the Chinese market will also be key to countries like Malaysia, Turkey, the European Union, Indonesia, Argentina, Brazil and Malawi as this is shown by increases in exports to this market than any other market. In terms

of welfare, China and Indonesia will experience producer surplus loss of 140.1 and 0.2 respectively while the rest of the countries will have an increase in producer surplus due to the expanded Chinese market. As a result of competition in the Chinese market due to the influx of tobacco imports from all over the world, prices for tobacco will decrease resulting in reduced producer surplus as producers would have reduced their output and increased consumer surplus as consumers would buy more for less due to reduced internal prices. The reverse is also true in terms of consumer surplus for the rest of the countries. Consumers will lose due to increased consumer price as producers would now concentrate on supplying the Chinese market from which it receives relatively higher prices than the local market, hence creating less supply locally, raising demand and consequently the internal price. **Table 5.1.1** summarizes effects of complete tariff removal by China.

	Producer surplus	Consumer surplus	Tariff revenue	Change in Output	Change in Overall Consumer Prices	Producer Price for Home Good	Market Price for Home Good
MLW	6.554	-1.091	0.015	0.003	0.012	0.013	0.013
TNZ	3.389	-1.128	0.000	0.002	0.009	0.009	0.009
ZWE	22.713	-2.144	0.417	0.010	0.026	0.039	0.039
ZAM	1.565	-0.266	0.000	0.003	0.010	0.010	0.010
MOZ	2.649	-0.730	0.000	0.003	0.015	0.010	0.010
SA	4.774	-10.260	3.194	0.007	0.034	0.026	0.026
BRZ	76.458	-31.256	0.018	0.004	0.015	0.015	0.015
ARG	16.183	-6.879	0.049	0.006	0.025	0.025	0.025
US	8.084	-14.789	3.447	0.002	0.014	0.009	0.009
BAG	1.442	-0.953	-0.016	0.002	0.010	0.010	0.010
INDO	-0.305	2.865	0.188	0.000	-0.004	-0.001	-0.001
IND	15.071	-9.652	-0.201	0.002	0.007	0.007	0.007
THA	1.069	-2.834	0.524	0.002	0.007	0.007	0.007
EU	11.835	-55.767	1.695	0.002	0.012	0.009	0.009
RUS	0.132	-9.859	0.102	0.002	0.011	0.007	0.007
TUR	0.652	-3.800	0.197	0.002	0.011	0.007	0.007
CHN	-141.475	195.702	-86.292	-0.005	-0.027	-0.021	-0.021
JPN	0.794	-3.161	0.000	0.002	0.010	0.009	0.009
MLS	0.553	-4.728	-0.322	0.013	0.008	0.051	0.051
PHL	1.479	-2.220	-0.017	0.002	0.011	0.009	0.009
SLA	0.001	-0.002	0.001	0.001	0.006	0.002	0.002
VIT	0.314	-1.816	0.085	0.001	0.007	0.006	0.006
KOR	0.933	-2.940	-0.008	0.002	0.010	0.009	0.009
PAK	0.936	-0.864	-0.002	0.001	0.004	0.004	0.004
ROW	18.545	-33.673	0.000	0.002	0.009	0.008	0.008

Table 5.1.1 - Complete tariff removal by China, welfare and price effects

Source. Made from GSIM

Major highlights in terms of welfare are a positive net welfare effect in all Sub-Saharan African countries except for South Africa. In Asia, countries like Malaysia, Vietnam, the Philippines and Thailand will have a negative net welfare effect while Indonesia and Bangladesh will benefit positively in terms of net welfare. The same applies to Argentina. Net welfare is measured by adding producer surplus, consumer surplus and tariff revenue after the change in policy. Sub Saharan African countries will have an average consumer price increase of 1.5% with Zimbabwe having the highest consumer price increase of 2.5%. This would mean high consumer prices for local tobacco as a result of producers supplying more to the export market hence increasing demand and raising prices for both consumers and producers. Composite prices internal is also noticed to increase in all countries in the model, developed and developing alike except for China and Indonesia for which both consumer and producer prices have decreased. Tariff revenue for China goes down due to tariff cut while tariff revenue for USA, Malawi, Zimbabwe, South Africa, Argentina, Indonesia, Thailand, the EU and others will go up but not with a significant margin except for the US. Consumer, producer and market price for local tobacco will increase for all the countries in the model except for China and Indonesia as highlighted before due to less supply in the local market which rises demand and prices.

5.1.2 Scenario 2 – Assuming a 10% point tariff escalation in the EU for all countries except for developing countries with preferential tariff.

It is evident that the tariff policy has recently been used by countries in duality, that is, both as a trade control tool for tobacco and as a local industry protection strategy. The increase in tariff in the EU is envisaged based on the fact that the EU is leading in terms of tobacco trade control and consumption measures as the block is advancing public health objectives. The increase in tariff by the EU by 10% point while preferential tariff will remain unchanged would cause an increase in tobacco output in the region by 0.4% and all other countries in the model by varying percentages except for the US and Brazil, which would experience a reduction in tobacco output by 0.2% and 0.1% respectively since it is only the US, Brazil, South Korea and Japan for which the tariff would have increased, all the other countries have preferential tariff in the EU. This is so because as the EU increases tobacco tariff, the price of domestically produced tobacco in the EU would increase causing an increase in the aggregate price of tobacco in the region while reducing world prices as well as consumer and producer prices for tobacco in the exporting countries for which a tariff has been hiked in this case, US, Brazil, South Korea and Japan. For Japan and South Korea, there is an increase in prices as

this tariff hike does not affect these countries directly since there are no tobacco exports from these countries to the EU. When the world price and the local price of the exporting countries which experienced a tariff hike goes down, producers would respond by reducing their production capacity which would reduce local supply and demand leading to negative changes in both supply and demand on the local market. **Table 5.1.2** below shows core model solutions in terms of changes in demand, supply and producer price**.**

MARKET CLEARING CONDITIONS Relative price changes				
	bench-mark prices	new prices	change in supply	change in demand
MLW	0.0000	0.0131	0.0033	0.0033
TNZ	0.0000	0.0152	0.0038	0.0038
ZWE	0.0000	0.0069	0.0017	0.0017
ZAM	0.0000	0.0119	0.0030	0.0030
MOZ	0.0000	0.0148	0.0037	0.0037
SA	0.0000	0.0051	0.0013	0.0013
BRZ	0.0000	-0.0053	-0.0013	-0.0013
ARG	0.0000	0.0061	0.0015	0.0015
US	0.0000	-0.0089	-0.0022	-0.0022
BAG	0.0000	0.0094	0.0024	0.0024
INDO	0.0000	0.0010	0.0002	0.0002
IND	0.0000	0.0075	0.0019	0.0019
THA	0.0000	0.0068	0.0017	0.0017
EU	0.0000	0.0164	0.0041	0.0041
RUS	0.0000	0.0039	0.0010	0.0010
TUR	0.0000	0.0046	0.0012	0.0012
CHN	0.0000	0.0023	0.0006	0.0006
JPN	0.0000	0.0005	0.0001	0.0001
MLS	0.0000	0.0023	0.0006	0.0006
PHL	0.0000	0.0067	0.0017	0.0017
SLA	0.0000	0.0007	0.0002	0.0002
VIT	0.0000	0.0034	0.0009	0.0009
KOR	0.0000	0.0027	0.0007	0.0007
PAK	0.0000	0.0036	0.0009	0.0009
ROW	0.0000	0.0051	0.0013	0.0013

Table 5.1.2: tariff escalation by the EU, prices and demand changes

Source: extracted from GSIM

All countries in the sub-Saharan African region will increase their trade with the EU. Notable increases in trade values at world prices include a high of 11.7% by South Africa, 10.7% by Zimbabwe, 8.3% by Zambia, 7.7% by Malawi, 6.8% and 6.6% for Mozambique and Tanzania respectively. In the Asian and Western Pacific region, all countries will also increase tobacco

trade in value terms at world prices with the EU block by varying percentages ranging from 9.5% to 12.5%. Value of tobacco exports for Indonesia, Malaysia, Sri Lanka and South Korea to the EU will remain unchanged indicating these countries' supply inelasticity to the EU market which would have experienced a slight and somehow insignificant price increase. Due to the tariff increase, the US will reduce its value of tobacco exports to the EU by 6.9% while Brazil will reduce by 8.8%. Overall, due to this policy, there is net welfare loss as negative net welfare effect outweighs positive net welfare effect by about five times.[23] Positive overall consumer price changes are experienced by all countries except the US and Brazil whose tariff have been escalated.

Producers in developing countries who have a preferential tariff in the EU will benefit through the increase in the world price which would stimulate more production in these countries thereby increasing incomes for producers. The reverse is true on consumer surplus except for Sri Lanka whose consumer surplus would remain unchanged. The increase in export supply to the EU by most developing countries will be at the expense of most renowned markets such as Russia, China, Turkey, Japan, Malaysia and Brazil as export supply to these countries would shrink thereby reducing the quantity of imports.

5.1.3 Scenario 3 - Import tariffs for tobacco in Brazil are assumed to have been scratched off, meaning no tariff for tobacco imports into Brazil. All tariffs goes down to zero.

The removal of all tariffs on tobacco imports in Brazil has no much significant effect on trade flow between countries, with output in all the countries in the model, Brazil included, remaining unchanged, producer price of tobacco slightly changing to the negative in most developing countries by a range of between 0.01% to 0.07%, while changing to the positive side in some by between 0.01% to 0.13%. In Pakistan, Zimbabwe and Turkey, overall consumer prices of tobacco remain unchanged. Under a normal situation we would expect that when one country removes tariff for all countries on a certain product, then exports from other countries into this country would significantly increase and when the country which had removed its tariff is a big country, then this tariff removal would be expected to have an impact on the world market for the good under consideration.

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[23] Calculated from the GSIM values of positive net welfare and negative net welfare getting total positive net welfare of 28,23 and total negative net welfare of -147,15.

Figure 5.1.1 details welfare effects of removing tariff on all tobacco imports to Brazil.
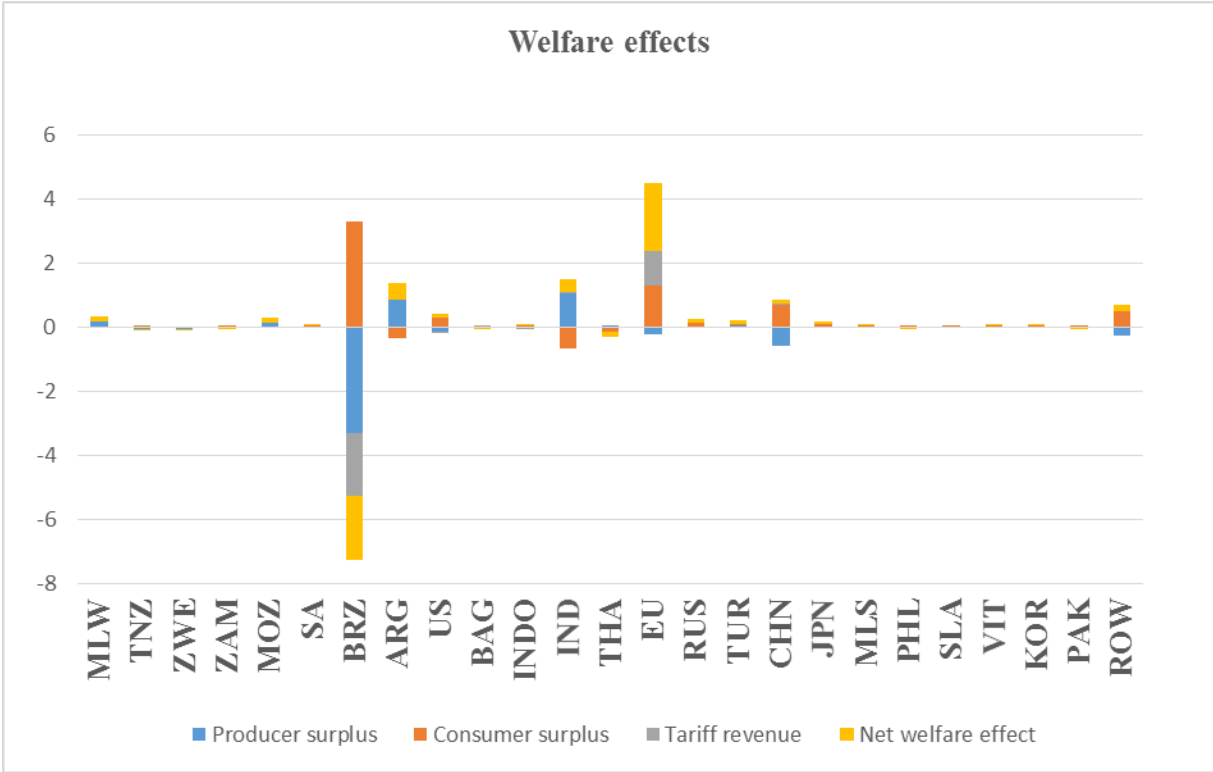
Figure 5.1.3, welfare effects of removing tariff in Brazil

Source: own using information extracted from GSIM results.

As a result of tobacco tariff being removed on all tobacco imports in Brazil, major noticeable changes include Malawi increasing the value of its tobacco exports to Brazil by 60.5%, Mozambique by 60.4%, Argentina increasing exports to the same export market by 49% and India and Turkey also increasing exports by 60.5% and 60.4% respectively. The noticeable changes shows that Brazil is not a major importer of tobacco from other countries hence has a great capacity to satisfy its local market (own trade) by itself with less imports required. The removal of tariff by Brazil has a slight effect on exports to the EU and the US by most of the countries with exports to the EU going doing down by between 0.1% to 0.8% and the same range in the US. **Table 5.1.3** gives a summary of effects of removing import tariff in Brazil.

	welfare				Other			
	Producer surplus	Consumer surplus	Tariff revenue	Net welfare effect	Change in Overall Consumer Prices (%)	Change in Output (%)	Producer Price for Home Good (%)	Market Price for Home Good (%)
	A	B	C	D= A+B+C				
MLW	0,1647	-0,0051	0,0026	0,1622	0,0001	0,0001	0,0003	0,0003
TNZ	-0,0632	0,0210	0,0000	-0,0422	-0,0002	0,0000	-0,0002	-0,0002
ZWE	-0,0545	-0,0029	-0,0032	-0,0606	0,0000	0,0000	-0,0001	-0,0001
ZAM	-0,0138	0,0023	0,0000	-0,0114	-0,0001	0,0000	-0,0001	-0,0001
MOZ	0,1497	-0,0227	0,0000	0,1271	0,0005	0,0001	0,0006	0,0006
SA	-0,0181	0,0367	0,0035	0,0220	-0,0001	0,0000	-0,0001	-0,0001
BRZ	-3,3179	3,2948	-1,9643	-1,9874	-0,0016	-0,0002	-0,0007	-0,0007
ARG	0,8562	-0,3615	0,0031	0,4978	0,0013	0,0003	0,0013	0,0013
US	-0,1651	0,3005	-0,0235	0,1119	-0,0003	0,0000	-0,0002	-0,0002
BAG	-0,0283	0,0220	0,0025	-0,0038	-0,0002	0,0000	-0,0002	-0,0002
INDO	-0,0359	0,0572	0,0000	0,0213	-0,0001	0,0000	-0,0001	-0,0001
IND	1,0683	-0,6641	0,0041	0,4083	0,0005	0,0001	0,0005	0,0005
THA	0,0117	-0,1443	-0,0117	-0,1443	0,0004	0,0000	0,0001	0,0001
EU	-0,2307	1,2761	1,0787	2,1241	-0,0003	0,0000	-0,0002	-0,0002
RUS	-0,0019	0,1136	0,0039	0,1156	-0,0001	0,0000	-0,0001	-0,0001
TUR	0,0711	0,0136	0,0205	0,1052	0,0000	0,0002	0,0007	0,0007
CHN	-0,5985	0,7038	0,0192	0,1245	-0,0001	0,0000	-0,0001	-0,0001
JPN	-0,0231	0,0918	0,0000	0,0687	-0,0003	-0,0001	-0,0003	-0,0003
MLS	-0,0009	0,0568	-0,0076	0,0483	-0,0001	0,0000	-0,0001	-0,0001
PHL	-0,0189	0,0177	-0,0009	-0,0020	-0,0001	0,0000	-0,0001	-0,0001
SLA	0,0000	0,0000	0,0000	0,0000	-0,0001	0,0000	-0,0001	-0,0001
VIT	-0,0076	0,0427	-0,0020	0,0331	-0,0002	0,0000	-0,0001	-0,0001
KOR	-0,0139	0,0443	0,0078	0,0381	-0,0002	0,0000	-0,0001	-0,0001
PAK	-0,0103	0,0089	-0,0001	-0,0015	0,0000	0,0000	0,0000	0,0000
ROW	-0,2770	0,4824	0,0000	0,2055	-0,0001	0,0000	-0,0001	-0,0001

Table 5.1.3 – Tariff removal by Brazil, welfare, output and price effects

Source: extracted form GSIM

5.1.4 Scenario 4: simultaneous removal of tobacco import tariff by all developed and emerging economies.

When both developed and emerging economies simultaneously remove tariffs for tobacco imports from all countries while at the same time import tariffs in developing countries are maintained for all countries, a shift in export supplies is experienced with a lot of developing countries drastically reducing their export supply to other developing countries while immensely increasing export supply to developed and emerging countries for which imports do not have a tariff. The import tariffs that are imposed in the developing countries will not affect world prices for tobacco since they are taken as small countries but the tariff removal by developed and emerging countries will have an effect on the world market prices for tobacco. Since all developed and emerging countries are taken as big countries in partial equilibrium trade models, when these countries remove a tariff, the world price of tobacco will go down and all developing (small countries) will take the world price as given which means that there will be a reduction in export price in developing countries thereby reducing quantities of tobacco traded at the world market.

As a result of this policy reform, the EU would reduce quantities of tobacco consumed internally, that is, its own trade while increasing exports to a lot of developing countries. The influx of imports in a number of these developed and emerging countries would result in reduced prices for tobacco as there will be competition between local producers and foreign tobacco (imports). Local producers would respond by reducing local their output and local supply. Developing countries such as Bangladesh, Philippines, Thailand, Vietnam, Pakistan and all those in the Sub-Saharan African region will reduce their export supply to the EU by varying percentages ranging from 62% to 130%. In all countries, positive increase in export values to Brazil, Argentina, India, China, Russia and Japan is recorded except for exports to Russia from Brazil and Indonesia, Brazil to China, and Brazil to Japan which would reduce. Results from GSIM shows that this policy reform will reduce imports in the EU while increasing imports in other markets such as China, Russia, South Africa, Japan and India. Domestic consumption will reduce in all the countries except for Brazil and Bangladesh which would increase by $43.6 million and $0.2 million respectively. Brazil will experience a world price increase of 6.39% and local consumer price increase of 6.16% while all other countries in the model will experience local consumer and world price decrease of varying magnitudes with a range of 2.7% to 17.6% producer price and 3.7% to 45% consumer price. The decrease in producer and consumer price in most of the countries (except Brazil and Indonesia) will result in producers receiving less hence they lose while consumers would

benefit through the reduced price which would result in them affording more for less thereby enhancing consumer surplus while reducing producer surplus. This would mean that removing import tariffs for tobacco in all developed and emerging economies while maintaining tariffs in developing countries would result in the undesired effect of increasing consumption of tobacco worldwide.

5.1.5 *Scenario 5*: China increases cigarette tax by 10 % point

This is an extension of GSIM modelling of raw tobacco market. I assume a 10% point increase in cigarette retailing tax by China which in this model works through tobacco import tariff equivalence. Taking China as a big country, the increase in the tax of cigarettes In China would make cigarettes very expensive hence imports from all other countries would receive a high price in China, making cigarettes and tobacco unaffordable by Chinese consumers as it would have increased its share of the Chinese consumers budget, not taking into account the effect of habits and addiction. Consumers in China would therefore respond by reducing tobacco consumption, thereby reducing demand for tobacco leading to producers adjusting prices downwards and also reducing their output. The overall internal consumer price of tobacco in China will go up by 4.79%, while the producer price of domestically produced tobacco will go down by 2.94%. Output in China will go down by 0.7%. This is most expected as the tax for cigarettes escalates in China since it is a big market for tobacco and tobacco products. The effect on other countries, of an increase in tobacco retailing price in China is a decrease in world prices that other countries, including all developing countries, get in other exports markets.

This would result in reduced output by all countries with a magnitude varying between 0.1% and 0.3%. As there will be a decrease in world price across all countries, exporters will therefore be willing to offer less of their product at a lower price resulting in decreases in domestic consumer price of tobacco in these countries, to the benefit of local consumers who would find tobacco cheap. This would reduce producer surplus and increase consumer surplus, though consumers benefit less than producers lose leading to negative net welfare as the negative producer surplus effect would offset the small positive consumer welfare in all the countries except in a small number of countries such as the EU, Russia, Indonesia, Malaysia and others.

The cigarette tax has an overall effect of reducing exports by all countries except for China which increase exports to other countries as producers in China would opt for export markets since the producer price would have gone down locally. **Table 5.1.4** below shows a summary of effects of a 10% point increase in cigarette tax in China.

	welfare				other			
	Producer surplus	Consumer surplus	Tariff revenue	Net welfare effect	Change in Overall Consumer	Change in Output	Producer Price for Home	Market Price for Home Good
	A	B	C	D= A+B+C				
MLW	-5.14	1.00	-0.14	-4.28	-1.0%	-0.3%	-1.0%	-1.0%
TNZ	-3.39	1.43	-0.17	-2.12	-0.9%	-0.2%	-0.9%	-0.9%
ZWE	-10.24	1.64	-0.38	-8.98	-1.4%	-0.4%	-1.8%	-1.8%
ZAM	-1.39	0.28	-0.04	-1.15	-0.9%	-0.2%	-0.9%	-0.9%
MOZ	-2.35	0.62	-0.06	-1.79	-1.1%	-0.2%	-0.9%	-0.9%
SA	-1.77	4.73	-0.80	2.16	-1.1%	-0.2%	-1.0%	-1.0%
BRZ	-55.10	32.72	-5.53	-27.92	-1.1%	-0.3%	-1.1%	-1.1%
ARG	-8.74	5.36	-0.89	-0.42	-1.4%	-0.3%	-1.4%	-1.4%
US	-8.16	13.29	-4.95	0.18	-1.1%	-0.2%	-0.9%	-0.9%
BAG	-1.20	1.22	-0.21	-0.20	-0.9%	-0.2%	-0.8%	-0.8%
INDO	-6.03	17.02	-2.42	8.57	-1.8%	-0.4%	-1.4%	-1.4%
IND	-15.32	13.93	-2.10	-3.50	-0.7%	-0.2%	-0.7%	-0.7%
THA	-1.17	4.40	-1.16	2.07	-0.8%	-0.2%	-0.8%	-0.8%
EU	-11.72	70.50	-20.08	38.70	-1.1%	-0.2%	-0.9%	-0.9%
RUS	-0.15	12.94	-1.86	10.93	-1.1%	-0.2%	-0.8%	-0.8%
TUR	-1.06	5.95	-1.44	3.46	-1.1%	-0.3%	-1.1%	-1.1%
CHN	-200.41	-444.70	566.39	-78.73	4.8%	-0.7%	-2.9%	-2.9%
JPN	-0.90	5.09	-0.76	3.43	-1.2%	-0.2%	-1.0%	-1.0%
MLS	-0.24	8.00	-2.76	5.01	-1.2%	-0.6%	-2.2%	-2.2%
PHL	-1.45	2.76	-0.47	1.48	-0.9%	-0.2%	-0.9%	-0.9%
SLA	-0.01	0.00	0.00	0.00	-0.7%	-0.3%	-1.2%	-1.2%
VIT	-0.56	3.82	-0.57	2.69	-1.2%	-0.3%	-1.0%	-1.0%
KOR	-0.94	4.02	-0.56	2.53	-1.0%	-0.2%	-0.9%	-0.9%

Table 5.1.5 China Increases cigarette tax, summary of effects.

Source: Extracted from GSIM

5.2 Sensitivity analysis

So as to ascertain the correctness and precision with which the welfare effects of the tobacco trade tariffs and tax changes were estimated by GSIM, I proceeded to conduct sensitivity analysis of some of the scenarios considered using different levels of elasticities. To do this, elasticities above and below the baseline were used to see how the new results would be different from the baseline results with specific interest on the changes in world prices, welfare and trade values at world prices. Much emphasis was on the notable changes in developing countries aggregated by region. Sensitivity analysis in studies that are anchored on elasticities is done to check the robustness of the results and make sure that the results are not sensitive to the choice of elasticity values, (Leudjou, 2012). All the sensitivity analysis were done using scenario one by changing all the elasticities, that is, elasticity of substitution, elasticity of export supply and elasticity of import demand.

5.2.1 Changes in Elasticity of supply (Ex)

The changes considered on the elasticity of industry supply include increasing the baseline elasticities by magnitudes of 2, 4 and 8. As highlighted before, scenario one was used to conduct the sensitivity analysis using the background that changes in the tariff for China have had a significant impact in terms of trade quantities, output, welfare and world prices for different countries. Scenario one involves China scratching away its import tariff for all countries making zero tariff imports for tobacco. As this happens, the results show that export prices for all the countries in the model goes up except for Indonesia and China itself. Again, increasing the export supply elasticity values by double lead to positive export prices for all countries while Indonesia and China prices still remain negative though these prices are less than the baseline price with a baseline elasticity (Ex). Increasing the elasticity values by 4 (4Ex) and 8 (8Ex) further reduces world prices which reduces the value of exports for most of the countries except for countries like Malawi, Brazil, Argentina, and Malaysia whose export values slightly increases with an increase in the supply elasticity. A reduction in the price and export values as supply elasticity increases shows that a big number of the countries are not price elastic. On the contrary, all countries increase output with an increase of supply elasticity which again points back to the issue of being unresponsive to prices. Both producer and consumer surplus reduces as industry supply elasticity increases and this is evident in all countries. Overall, the changes in both export supply, prices and surpluses are not that much significant.

5.2.2 Changes in Elasticity of substitution (Es)

Elasticity of substitution was reduced by half (0.5Es) and increased by double (2Es). Results show that if the substitution elasticity is reduced by half, imports will reduce by almost half while when it is increased by double, imports will increase by almost twice as well which indicates the underlying principle of Armington elasticity which is defined by constant elasticity of substitution. Export prices are seen to reduce when elasticity is halved and increase when elasticity is doubled. When double (2Es), consumers in sub Saharan African countries face a more decrease in welfare -6.34 when doubling substitution elasticity, while halving implies a less deterioration in welfare -4.09, from a baseline of -5,29 . The same applies to developing countries in the Asian and East Mediterranean region. In these countries, consumers lose more when the substitution elasticity is doubled than when it is halved, deviating from a baseline of -14.43 to -19,08 when substitution elasticity is doubled and -10,10 when it is halved, thereby having a difference of 4,65 and 4,33 respectively. In the European Union, Halving substitution elasticity makes consumers loose more than doubling. The above figures show that consumers in the Asian and East Mediterranean region lose more than those in sub Saharan Africa region.

5.2.3 Changes in import demand elasticity (Em)

This is one of the key parameters in this analysis, giving information on the overall aggregate imports to changes in composite prices. The import demand elasticity shows that prices will go up when the import elasticity goes down by half from the baseline elasticity and prices go down with doubling and quadrupling the import elasticity. Consumers loose less when the import demand elasticity is doubled and quadrupled while loose more when the elasticity is halved. This is because of the prices going up with halving elasticity and going down the other way round.

5.3 Ethical considerations

High taxes on tobacco act as an extra cost of consuming tobacco, habits and addiction aside, an increase in cigarette taxes would reduce cigarette consumption thereby contributing to the desired goal of reducing the tobacco burden. However, with increased incomes and population growth, even with high taxes, tobacco consumption will remain high. The effect of the high tax would be offset by the growth in population and incomes hence making the tax just a source of Government revenue without achieving the intended goals of reducing the negative externalities of tobacco. With the issue of addiction and habits, some consumers could adjust to increases in cigarette prices caused by high taxes or increase smoking intensity by extracting more nicotine per cigarette, hence questions would be raised whether taxes are reducing smoking or they are reducing the number of cigarettes smoked but increasing smoking intensity (Adda & Cornaglia, 2006).[24] Tobacco taxes are only justified from the public health perspective hence creating a financial burden especially to the vulnerable poor population group, (Yurekli & de Beyer, 2001) which therefore calls for careful implementation of the tax policy to make sure that the poor are not made worse off. Tobacco production and trade is a source of livelihood for most farmers in developing countries and key to economic development to these countries, tariffs and taxes proved to negatively affect developing countries by reducing demand for tobacco. High taxes, tariffs and tobacco control measures therefore have a significant negative effect on developing countries whose economies are heavily dependant on tobacco production and trade. While tobacco is important in the economies of developing countries, it has a lot of negative effects, that is, social, environmental and public. International tobacco control policies should therefore take into consideration the economic implications of tobacco control on countries whose economies depend on tobacco production and trade so that polices that balance economic interest and public health interests are effected.

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[24] (Adda & Cornaglia, 2006) argue in their paper "Taxes, Cigarette Consumption, and Smoking Intensity" that taxes do not actually reduce smoking as perceived but increases smoking intensity by cigarette consumers who would increase nicotine extraction per each cigarette consumed as prices go up due to high taxation, therefore increasing chances of smoking related diseases. Based on this, taxes as a way to reduce tobacco consumption which would "consequently" reduce tobacco consumption related diseases are not justified.

6 Results discussion and Conclusion

In this chapter, I first give what were noted as major limitations of this study and discuss the results from various simulation scenarios considered herein and draw conclusions from them with specific interest on addressing research questions outlined earlier on.

6.1 Limitations of the study

The definition of tobacco is wide and varied. Tobacco is classified in chapter 24 of the United Nations Harmonized System as tobacco and manufactured tobacco substitutes for which the sub-categories are many. Therefore effects of policy changes in one of the sub-categories could be misleading given that there are many sub-categories of the same product in question. The same applies also to tobacco products which are varied, that is, cigarettes, cigars, snuff, chewing tobacco, tobacco extracts and loose smoking tobacco. Focusing on one tobacco product could also give biased results as consumers could switch to other types of tobaccos given a change in policy on another, hence the overall demand for tobacco will either remain the same, increase or decrease when policy changes. Almost the same transportation costs in determining FOB prices for some countries could be a weak assumption especially given a difference in currencies and terrains in these countries. This means that transportation costs can therefore not be the same as assumed. Problems encountered in gathering data on domestic consumption and FOB prices for some countries led to this assumption being made without losing much detail and without effect to the robustness of the results of the study. The model also covers short time effects of changes in trade policies and does not take into account habits and addiction by consumers which determine long time consumption behavior and choices. It assumes all consumers are rational and behave in the same way. Tobacco smuggling is one major challenge which may hinder the effort to control tobacco and has since became a major problem worldwide (ASH, 2007, p. 6). Nevertheless, this thesis does not look into issues of tobacco smuggling as affecting the tobacco trade policy which should be highlighted as one limitation of this study. Both unmanufactured tobacco and Cigarettes are heavily smuggled globally, making it difficult to control amd measure the impact of tobacco control policies in trying to reduce its consumption. This therefore significantly undermines the international effort to control thereby reduce tobacco consumption. Theoretically, smuggling reduces the price of tobacco which would increase its demand therefore undermining tobacco tax and control policies consequently causing a serious harm to consumers by increasing overall use. (ASH, 2007, pp. 6-7).

6. 2 Discussion and Conclusion

The international tobacco market has for long been exposed to a myriad of trade restrictions due to the fact that the crop is regarded to have a number of negative effects that would cost Governments as well as people who use tobacco in a number of ways. Over the past years, the world has experienced liberalization in the trade of various agricultural commodities due to a number of trade agreements with the exception of tobacco, as liberalization is viewed to enhance trade flow and benefit consumers by providing variety and creating competition among producers who would thrive to produce and offer good quality products. The tobacco market is still restricted with a number of control measures and the trade in tobacco products, specifically cigarettes, is highly taxed especially in developed countries based on public health concerns. While the trade of tobacco is highly restricted and taxed, most developing countries' economies are agro-based with tobacco production being the major activity and contributing significantly to export earnings. This thesis analyzed the effects of changes in the tobacco tariff by both developed and emerging economies as well as changes in tobacco retailing taxes on developing countries that depend on tobacco production and exports. Gijsbert van Liemt (2002) noted that the share of developing countries on world tobacco markets has been increasing while that of developed countries has been decreasing. The aim of this thesis was to assess the overall welfare, price, output and trade quantities effect of tobacco trade barriers in the form of tariffs and cigarette taxes on developing countries that rely on tobacco exports. Further to this, was to assess how robust are the simulated results to changes in Armington elasticity levels.

Results from scenario one (10% point decrease in tobacco imports by China or scratching the tariff off) indicate that changes in the Chinese tobacco market has more significant impacts on developing countries and the world tobacco market in general. With the removal of the tariff restriction, all developing and other countries significantly increase their tobacco exports to China while at the same time reducing exports to other key markets like the EU, Russia, Turkey and the US. Exports to China in sub Saharan African developing countries will increase by a range of 16% to 27%, in Asia and western pacific 10% to 30%, which shows that China is a strategic market for tobacco and any changes in the Chinese tobacco trade policy will have significant effects on the world market for tobacco. The tariff removal by China would stimulate positive changes in world export prices received by all countries thereby giving an advantage to producers who would enjoy an increase in world prices and increase their tobacco output except for exports from China and Indonesia which

will experience a decline in price in all countries. The removal of tariff by China would increase world trade of tobacco which would mean a decrease in tobacco demanded and consumed worldwide due to the relatively higher consumer price which would reduce consumer welfare while at the same time increasing demand and consumption of tobacco in China. The tariff increase in China would have a positive effect in reducing tobacco consumption globally if the decrease in quantity demand experienced by the rest of the countries offsets the increase in quantity demand in China. Another biggest consumer of tobacco is the EU, (FAO, 2003), therefore, an analysis of the implications of changes in tobacco import restrictions and cigarette tax could be worth noting. Given that the EU increases its import tariff (scenario 2), there is a modest decrease in tobacco exports to the EU by countries which do not have a preferential tariff for example Brazil whose exports will reduce by 8.6% and the US and Japan whose exports would both shrink by 6.9% and 11.8% respectively. Developing countries benefit under this scenario as they have preferential tariff in the EU hence they would increase their exports to the EU while reducing exports to other markets as they would receive a higher price in the EU.

Producers in developing countries will receive positive changes in world prices since major contenders like Brazil and the US would have reduced their exports to the same export market while consumers experience a price hike thereby reducing their surplus due to the increased tariff. This would mean a reduction in quantities of tobacco demanded and consumed in developing countries. The changes in tariff by Brazil have no significant changes in other countries with a major price increase of 0.14% being experienced by Argentina when Brazil scratches off its import tariff. Brazil imports less quantities with most of the consumption being satisfied by own trade hence tariff changes would affect much the local market. Overall, trade restrictions in form of tariffs have the effect of trade diversion, with changes in one country's import tariff causing other trading partners to divert their trade to other countries depending on the direction of change of the tariff. As an extension of the model, cigarette taxes were used to assess the effect of increases in cigarette taxes on developing countries. This was done through cigarette taxes as tobacco import tariff equivalence. The simulated results with China increasing its cigarette taxes show a positive increase in the world prices of tobacco received by producers and also an increase in overall consumer prices of tobacco worldwide which would reduce demand for tobacco worldwide. The overall effect will be a decrease in consumption through reduced demand globally but an increase in output as producers would be attracted by increased producer prices. Increases of cigarette tax in the EU also shows the same effect as that noticed when China increases its

cigarette tax, hence drawing the same conclusion that high taxes on cigarettes increases prices for cigarettes and consequently reducing consumer welfare by reducing quantities demanded which would negatively affect tobacco producers as they would adjust their tobacco output downwards thereby reduced tobacco producers revenues. The reduction in tobacco supply as a result of high tax that reduce demand will have a lot of undesirable ripple effects in the tobacco industsry.

Conclusively, increases in tobacco trade restrictions through tariffs have been shown to affect developing countries through its effects on world prices, output, and consumer and producer welfare changes. The level of tariff also determines the quantities that each country will be willing to trade at the world market with increases in tariff reducing exports to the country that would have increased its tariff and vice versa. The analysis of cigarette markets through GSIM indicate a negative effect of increasing taxes on quantities consumed of tobacco thereby adding weight to the schools of thought that advocate increases in tax as a way to reduce tobacco consumption. The cigarette tax results show that, the cigarette tax policy has to be harmonized and inclusive in terms of all countries if a significant reduction in demand for tobacco has to be realized as it has been shown that its implementation in one or a few countries will only reduce demand in the country in which the tax has been implemented. The only problem with GSIM results is that they do not give the magnitude with which tobacco demand reduces when taxes increases by a certain percentage.

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List of Appendices

Appendix 1 - Changes of trade barriers in China

Appendix 1 - Table 5.1.5: Scenario 1 - Percentage change in trade values by country

Appendix 1 - Table 1- Trade Value and Quantities: Percentage change

Origin \ destination	MLW	TNZ	ZWE	ZAM	MOZ	SA	BRZ	ARG	US	BAG	INDO	IND	THA	EU	RUS	TUR	CHN	JPN	MLS	PHL	SLA	VIT	KOR	PAK	ROW
MLW	-1,0	0,0	4,6	0,0	0,0	0,9	0,9	4,9	0,4	0,0	0,0	0,0	0,0	-0,9	-1,1	-1,5	27,4	-1,7	-2,8	-1,6	0,0	0,0	-1,8	-5,0	-2,6
TNZ	1,0	-0,4	0,0	0,0	0,0	2,9	0,0	0,0	0,0	0,0	-6,4	0,0	0,0	1,1	0,8	0,5	0,0	0,3	-0,8	0,0	0,0	0,0	0,2	0,0	-0,6
ZWE	0,0	0,0	-7,9	0,0	-12,2	-11,6	0,0	0,0	-12,1	0,0	-20,9	-15,8	0,0	-13,4	-13,7	-14,0	16,0	0,0	-15,3	-14,1	0,0	-15,8	-14,3	-17,5	-15,1
ZAM	0,4	0,0	6,0	-0,1	0,0	2,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,4	0,2	-0,2	0,0	-0,3	0,0	-0,2	0,0	-1,9	-0,5	0,0	-1,2
MOZ	0,3	0,0	5,8	0,0	1,5	2,2	2,1	6,1	1,6	0,0	-7,1	0,0	0,0	0,3	0,1	-0,3	0,0	-0,4	-1,5	-0,3	0,0	0,0	-0,6	0,0	-1,3
SA	-1,3	-2,7	4,3	0,0	0,0	0,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-1,2	0,0	-1,8	0,0	0,0	0,0	-1,9	0,0	0,0	0,0	0,0	-2,9
BRZ	0,0	0,0	0,0	0,0	0,0	-0,7	-0,8	0,0	-1,2	-3,6	-10,0	0,0	-5,0	-2,5	-2,8	-3,1	25,9	-3,3	-4,4	-3,2	0,0	-4,8	-3,4	0,0	-4,2
ARG	0,0	0,0	-1,6	0,0	0,0	-5,3	-5,4	-1,3	-5,8	0,0	0,0	0,0	0,0	-7,1	-7,4	-7,7	21,7	-7,9	-9,0	0,0	0,0	-9,4	-8,0	0,0	-8,8
US	0,0	0,0	0,0	0,0	0,0	2,6	0,0	0,0	2,1	-0,3	-6,7	0,0	-1,7	0,8	0,7	0,0	0,0	0,0	-1,1	0,1	0,0	-1,5	-0,1	0,0	-0,9
BAG	0,0	0,0	0,0	0,0	0,0	2,7	0,0	0,0	2,2	-0,2	-6,5	-1,5	0,0	0,9	0,7	0,3	0,0	0,0	-0,9	0,0	0,0	-1,4	0,0	0,0	-0,7
INDO	0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0	7,2	0,0	-1,5	0,0	3,4	0,0	5,7	5,3	0,0	0,0	4,1	0,0	0,0	3,6	0,0	0,0	4,3
IND	0,0	0,0	7,6	0,0	0,0	3,9	3,9	7,9	3,4	0,0	-5,3	-0,3	-0,4	2,1	1,9	1,5	30,1	1,3	0,2	1,5	0,0	-0,2	1,2	0,0	0,5
THA	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	3,1	0,0	0,0	0,0	-0,7	1,8	1,6	1,2	0,0	1,1	0,0	1,2	0,0	-0,5	0,9	-2,3	0,2
EU	0,0	-0,6	6,4	0,0	0,0	2,7	0,0	0,0	2,2	-0,2	-6,6	0,0	0,0	0,9	0,6	0,3	29,0	0,0	-1,0	0,2	0,0	-1,5	0,0	0,0	-0,8
RUS	0,0	0,0	0,0	0,0	0,0	0,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,9	0,0	0,2
TUR	0,0	0,0	0,0	0,0	0,0	4,0	4,0	0,0	0,0	0,0	-5,3	0,0	0,0	2,2	2,0	1,6	30,2	0,0	0,3	1,5	0,0	-0,1	1,3	-1,9	0,5
CHN	0,0	0,0	21,5	0,0	0,0	17,8	0,0	0,0	0,0	14,9	8,5	0,0	13,5	16,0	15,7	15,4	-1,8	15,2	14,1	0,0	0,0	13,7	15,1	0,0	14,3
JPN	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,2	0,0	0,0	0,0	0,0	0,0	0,0	-0,7
MLS	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-27,4	0,0	-22,4	0,0	0,0	0,0	10,1	0,0	0,0	-20,6	0,0	0,0	0,0	0,0	-21,6
PHL	0,0	-0,4	6,6	0,0	0,0	2,9	0,0	0,0	2,4	0,0	-6,4	0,0	-1,4	1,1	0,8	0,5	0,0	0,3	-0,8	0,4	0,0	-1,2	0,2	0,0	-0,6
SLA	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-3,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,4	0,0	0,0	0,0	0,0	0,0	2,6
VIT	0,0	0,0	0,0	0,0	0,0	4,4	0,0	0,0	0,0	0,0	-4,9	0,0	0,1	2,6	2,3	0,0	0,0	0,0	0,0	0,0	0,0	0,2	0,0	0,0	0,9
KOR	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-1,3	0,0	0,0	0,0	0,5	0,0	0,0	0,0	0,0	0,0	0,0	0,2	0,0	-0,5
PAK	0,0	0,0	0,0	0,0	0,0	5,8	0,0	0,0	0,0	0,0	-3,5	0,0	0,0	4,0	3,7	3,4	0,0	0,0	2,1	3,3	1,2	0,0	3,1	-0,2	2,3
ROW	0,0	0,2	7,2	1,2	2,9	3,6	3,5	7,5	0,0	0,0	0,0	-0,7	0,0	1,7	1,5	1,1	0,0	1,0	0,0	1,1	-1,1	-0,6	0,8	0,0	0,1

Appendix 1 – Figure 5.1: Scenario 1, output changes

Appendix1- Figure 1:Elimination of tariff by China, output effects
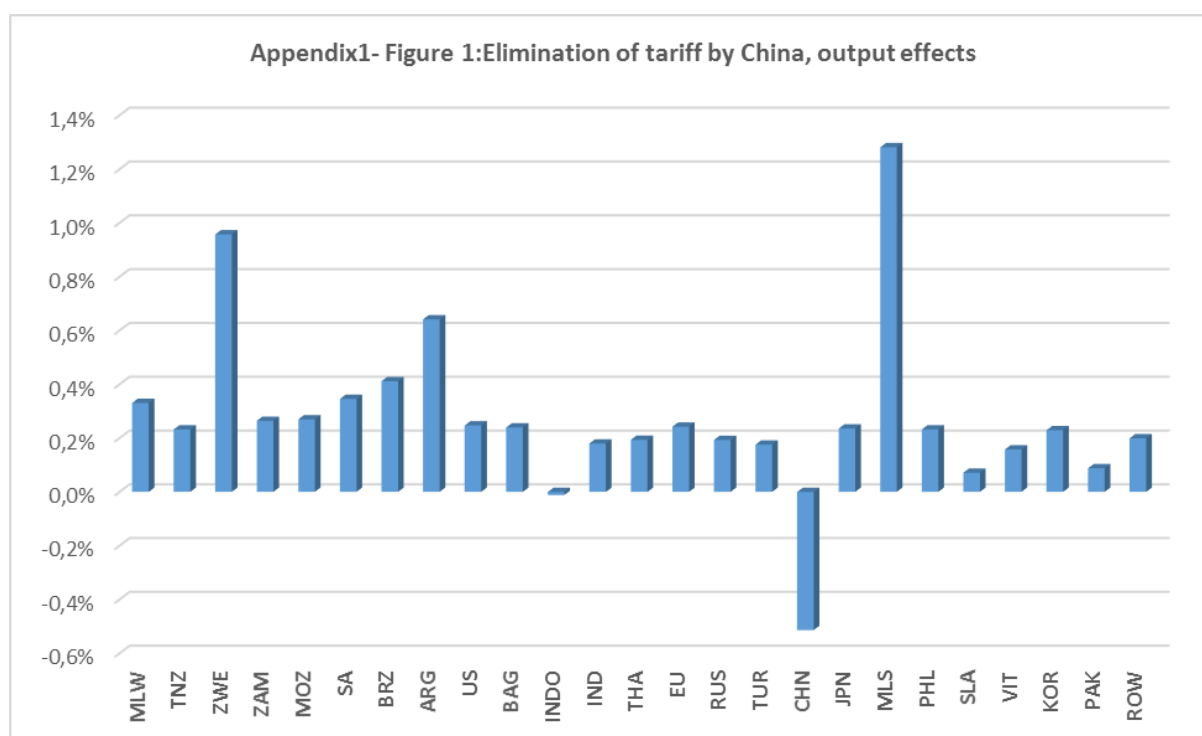
Appendix 1 – Table 5.1.6: Scenario 1, welfare changes

	A	B	C	D= A+B+C
	Producer surplus	Consumer surplus	Tariff revenue	Net welfare effect
MLW	6,7	-1,1	0,1	5,7
TNZ	3,6	-1,2	0,0	2,4
ZWE	22,1	-2,0	0,5	20,5
ZAM	1,6	-0,3	0,0	1,3
MOZ	2,7	-0,7	0,0	2,0
SA	2,5	-5,1	0,5	-2,1
BRZ	83,1	-33,9	0,0	49,1
ARG	16,5	-7,0	0,1	9,5
US	8,6	-15,8	3,6	-3,6
BAG	1,4	-0,9	0,0	0,4
INDO	-0,2	2,7	0,2	2,7
IND	15,3	-9,8	-0,2	5,3
THA	1,1	-2,9	0,6	-1,2
EU	12,5	-57,5	-2,1	-47,0
RUS	0,1	-10,5	0,1	-10,2
TUR	0,7	-4,0	0,2	-3,1
CHN	-140,1	194,1	-86,3	-32,3
JPN	0,9	-3,4	0,0	-2,6
MLS	0,6	-5,1	-0,3	-4,8
PHL	1,5	-2,2	0,0	-0,7
SLA	0,0	0,0	0,0	0,0
VIT	0,3	-2,0	0,1	-1,5
KOR	1,0	-3,1	0,0	-2,2
PAK	0,9	-0,8	0,0	0,1
ROW	19,5	-35,5	0,0	-15,9

Appendix 1 – table 5.1.7: Scenario 1, Core model solution, relative price changes

	country	new prices	change in supply	change in demand
		Relative price changes		
origin	MLW	1,32%	0,33%	0,33%
	TNZ	0,93%	0,23%	0,23%
	ZWE	3,83%	0,96%	0,96%
	ZAM	1,05%	0,26%	0,26%
	MOZ	1,08%	0,27%	0,27%
	SA	1,38%	0,35%	0,35%
	BRZ	1,65%	0,41%	0,41%
	ARG	2,57%	0,64%	0,64%
	US	0,99%	0,25%	0,25%
	BAG	0,96%	0,24%	0,24%
	INDO	-0,04%	-0,01%	-0,01%
	IND	0,72%	0,18%	0,18%
	THA	0,77%	0,19%	0,19%
	EU	0,97%	0,24%	0,24%
	RUS	0,77%	0,19%	0,19%
	TUR	0,70%	0,18%	0,18%
	CHN	-2,05%	-0,51%	-0,51%
	JPN	0,94%	0,24%	0,24%
	MLS	5,12%	1,28%	1,28%
	PHL	0,93%	0,23%	0,23%
	SLA	0,28%	0,07%	0,07%
	VIT	0,63%	0,16%	0,16%
	KOR	0,92%	0,23%	0,23%
	PAK	0,35%	0,09%	0,09%
	ROW	0,80%	0,20%	0,20%

Appendix 2 – Country abbreviations and Armington elasticities used

Appendix 2 - Table 5.1.8 - Country abbreviations and Armington elasticities used

	Country	Abbreviation	Supply Elasticity	Composite demand Elasticity	Substitution Elasticity
1	CHINA	CHN	0,2	-0,5	5
2	INDIA	IND	0,2	-0,5	5
3	BRAZIL	BRA	0,25	-0,46	5
4	UNITED STATES OF AMERICA	USA	0,25	-0,2	5
5	INDONESIA	INDO	0,2	-0,5	5
6	MALAWI	MWI	0,25	-0,1	5
7	ARGENTINA	ARG	0,25	-0,46	5
8	PHILLIPINES	PHN	0,2	-0,5	5
9	TANZANIA	TANZ	0,25	-0,46	5
10	ZIMBABWE	ZWE	0,25	-0,46	5
11	PAKISTAN	PAK	0,2	-0,5	5
12	EUROPEAN UNION	EU	0,2	-0,46	5
13	SOUTH KOREA	KOR	0,2	-0,5	5
14	TURKEY	TUR	0,25	-0,46	5
15	JAPAN	JPN	0,2	-0,5	5
16	MOZAMBIQUE	MZA	0,25	-0,46	5
17	SRI LANKA	SLA	0,2	-0,5	5
18	THAILAND	TND	0,2	-0,5	5
19	RUSSIA	RUS	0,25	-0,46	5
20	ZAMBIA	ZAM	0,25	-0,1	5
21	SOUTH AFRICA	SA	0,25	-0,46	5
22	MALAYSIA	MYA	0,2	-0,5	5
23	VIETNAM	VNM	0,2	-0,5	5
24	REST OF THE WORLD	ROW	0,2	-0,5	5
25	Bangladesh	BNG	0,2	-0,5	5

*the elasticities of substitution are based on the default value by Francois & Hall (2003).

* in literature in general, the value of 5 is often used (Fujita *et al*, 2000)

* Industry supply and compsite demand elasticities were obtained from ATPSM.

Appendix 3 – Valuing domestic consumption

Appendix 3 - Table 5.1.9, valuing domestic consumption

There seemed to be a difference in terms of figures reported in the two databasese, that is, FOASTAT and UNCOMTRADE. The former report in terms of gross weight while the later reports in terms of net weight. I focused on net weight hence to calculate domestic consumption for each country I had to formulate a gross weight to net weight coefficient which i constructed as below

Country	FAOSTAT database total exports (gross weight)	production (gross)	(Production-exports)	UNCOMTRADE database total exports (net weight)	Weight coversion coefficient COMTRADE exports/ FAOstat exports = A	Domestic consumption (Production-exports) X A	exports (net weight)	Production (net weight)	% exports	% domestic consumption
e.g MALAWI	160150	174928	14778	102072,44	0,637355229	9418,835581	102072,44	111491,276	0,9155	0,084480472

Appendix 4 – Changes of trade barriers in the EU

Appendix 4 - Table 5.2.1: Scenario 2, summary of effects

Summary of effects

	Welfare				other		
	Producer surplus	**Consumer surplus**	**Tariff revenue**	**Net welfare effect**	**Change in Overall Consumer Prices**	**Change in Output**	**Producer Price for Home Good**
	A	B	C	D= A+B+C			
MLW	6,65	-1,15	0,04	5,54	1,24%	0,33%	1,31%
TNZ	5,84	-1,94	0,00	3,90	1,51%	0,38%	1,52%
ZWE	3,98	-0,69	0,08	3,38	0,84%	0,17%	0,69%
ZAM	1,80	-0,31	0,00	1,49	1,19%	0,30%	1,19%
MOZ	3,75	-0,64	0,00	3,10	1,34%	0,37%	1,48%
SA	0,92	-1,53	-0,14	-0,75	0,50%	0,13%	0,51%
BRZ	-26,48	10,58	-0,11	-16,02	-0,51%	-0,13%	-0,53%
ARG	3,88	-1,72	-0,02	2,14	0,62%	0,15%	0,61%
US	-7,82	2,77	-2,00	-7,05	-0,26%	-0,22%	-0,89%
BAG	1,37	-0,70	0,12	0,78	0,77%	0,24%	0,94%
INDO	0,42	-0,97	-0,01	-0,55	0,14%	0,02%	0,10%
IND	15,89	-9,95	0,01	5,95	0,75%	0,19%	0,75%
THA	0,99	-2,53	0,49	-1,05	0,62%	0,17%	0,68%
EU	21,15	-143,61	11,04	-111,42	3,13%	0,41%	1,64%
RUS	0,07	-3,22	0,23	-2,92	0,37%	0,10%	0,39%
TUR	0,45	-1,79	0,13	-1,20	0,50%	0,12%	0,46%
CHN	15,81	-15,16	0,53	1,18	0,21%	0,06%	0,23%
JPN	0,04	-0,17	0,00	-0,12	0,05%	0,01%	0,05%
MLS	0,02	-0,09	0,62	0,55	0,02%	0,06%	0,23%
PHL	1,09	-1,01	0,05	0,13	0,51%	0,17%	0,67%
SLA	0,00	0,00	0,00	0,00	0,46%	0,02%	0,07%
VIT	0,19	-0,51	0,15	-0,18	0,20%	0,09%	0,34%
KOR	0,29	-0,89	0,27	-0,33	0,31%	0,07%	0,27%
PAK	0,90	-0,83	0,00	0,07	0,36%	0,09%	0,36%
ROW	12,56	-18,11	0,00	-5,55	0,46%	0,13%	0,51%

Appendix 4 – Table 5.2.2: Scenario 2, Trade at world prices change in values.

Trade at world prices: change in values

origin \ destination	MLW	TNZ	ZWE	ZAM	MOZ	SA	BRZ	ARG	US	BAG	INDO	IND	THA	EU	RUS	TUR	CHN	JPN	MLS	PHL	SLA	VIT	KOR	PAK	ROW
MLW	0,3	0,0	-0,3	0,0	0,0	-0,2	-0,2	-0,1	-2,3	0,0	0,0	0,0	0,0	18,7	-2,3	-0,3	-1,0	-1,1	-0,3	-0,3	0,0	0,0	-0,6	0,0	-1,8
TNZ	0,0	1,0	0,0	0,0	0,0	-0,1	0,0	0,0	0,0	0,0	-0,3	0,0	0,0	11,3	-1,7	-0,5	0,0	-0,6	-0,1	0,0	0,0	0,0	-0,5	0,0	-1,3
ZWE	0,0	0,0	0,4	0,0	0,3	-0,3	0,0	0,0	-0,1	0,0	-0,2	0,0	0,0	10,6	-0,2	0,0	-5,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,4
ZAM	0,6	0,0	-0,1	0,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	3,0	-0,4	-0,2	0,0	-0,5	0,0	0,0	0,0	-0,1	0,0	0,0	-0,3
MOZ	0,0	0,0	0,0	0,0	0,1	-0,1	-0,1	-0,1	0,0	0,0	0,0	0,0	0,0	9,0	-1,8	-0,5	0,0	-0,1	-0,1	-0,2	0,0	0,0	0,0	0,0	-1,3
SA	0,2	0,0	0,1	0,0	0,0	0,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
BRZ	0,0	0,0	0,0	0,0	0,0	1,6	-4,7	0,0	2,4	0,4	1,0	0,0	0,2	-92,3	12,9	4,0	13,2	3,0	1,0	1,5	0,0	1,9	2,0	0,0	18,7
ARG	0,0	0,0	0,0	0,0	0,0	0,0	-0,3	1,1	-1,5	0,0	0,0	0,0	0,0	8,3	-0,3	0,0	-1,8	-0,2	-0,2	0,0	0,0	0,0	-0,1	0,0	-0,2
US	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	4,0	0,1	1,1	0,0	0,7	-30,1	0,0	0,0	0,0	0,0	1,4	0,1	0,0	0,4	0,6	0,0	11,9
BAG	0,0	0,0	0,0	0,0	0,0	-0,1	0,0	0,0	-0,5	-0,3	0,0	0,0	0,0	3,0	0,0	-0,1	0,0	0,0	-0,1	0,0	0,0	0,0	-0,1	0,0	-0,1
INDO	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,3	0,0	0,8	0,0	0,0	0,0	0,1	0,0	0,0	0,0	-0,2	0,0	0,0	0,0	0,0	0,0	0,2
IND	0,0	0,0	0,0	0,0	0,0	-0,1	-0,3	0,0	-0,7	0,0	-0,4	4,9	-0,3	21,7	-1,4	-0,1	0,0	-0,1	-0,5	-0,1	0,0	-0,8	-0,2	0,0	-1,6
THA	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,2	0,0	0,0	0,0	0,0	2,2	-0,1	0,0	0,0	-0,1	-0,5	0,0	0,0	0,0	0,0	0,0	0,0
EU	0,0	0,0	0,0	0,0	0,0	-0,3	0,0	0,0	-0,7	0,0	-0,6	0,0	0,0	54,4	-3,8	-2,0	0,0	0,0	-0,6	-0,4	0,0	-0,7	-1,2	0,0	-17,7
RUS	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1
TUR	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,3	0,0	0,0	0,7	0,0	0,2	0,0	0,0	-0,1	0,0	0,0	0,0	0,0	0,0	0,0
CHN	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	-0,6	0,0	0,1	16,8	0,4	0,2	1,5	-0,1	-0,1	0,0	0,0	0,0	0,0	0,0	1,6
JPN	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0
MLS	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
PHL	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,4	0,0	-0,1	0,0	0,0	2,8	0,0	0,0	0,0	0,0	-0,4	-0,3	0,0	-0,1	0,0	0,0	-0,1
SLA	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
VIT	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,2	0,0	0,0	0,0
KOR	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,3	0,0	0,0
PAK	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,6	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,4	0,0
ROW	0,0	0,0	0,1	0,0	0,0	0,0	-0,1	0,0	0,0	0,0	0,0	0,0	0,0	15,6	-0,1	0,0	0,0	-0,1	0,0	0,0	0,0	-0,1	-0,1	0,0	0,5

Appendix 4 – Table 5.2.3: Scenario 2, summary of effects

Summary of Effects	welfare				other			
	Producer surplus	Consumer surplus	Tariff revenue	Net welfare effect	Change in Overall Consumer Prices	Change in Output	Producer Price for Home Good	Market Price for Home Good
	A	B	C	D= A+B+C				
MLW	6,65	-1,15	0,04	5,54	1,24%	0,33%	1,31%	1,31%
TNZ	5,84	-1,94	0,00	3,90	1,51%	0,38%	1,52%	1,52%
ZWE	3,98	-0,69	0,08	3,38	0,84%	0,17%	0,69%	0,69%
ZAM	1,80	-0,31	0,00	1,49	1,19%	0,30%	1,19%	1,19%
MOZ	3,75	-0,64	0,00	3,10	1,34%	0,37%	1,48%	1,48%
SA	0,92	-1,53	-0,14	-0,75	0,50%	0,13%	0,51%	0,51%
BRZ	-26,48	10,58	-0,11	-16,02	-0,51%	-0,13%	-0,53%	-0,53%
ARG	3,88	-1,72	-0,02	2,14	0,62%	0,15%	0,61%	0,61%
US	-7,82	2,77	-2,00	-7,05	-0,26%	-0,22%	-0,89%	-0,89%
BAG	1,37	-0,70	0,12	0,78	0,77%	0,24%	0,94%	0,94%
INDO	0,42	-0,97	-0,01	-0,55	0,14%	0,02%	0,10%	0,10%
IND	15,89	-9,95	0,01	5,95	0,75%	0,19%	0,75%	0,75%
THA	0,99	-2,53	0,49	-1,05	0,62%	0,17%	0,68%	0,68%
EU	21,15	-143,61	11,04	-111,42	3,13%	0,41%	1,64%	1,64%
RUS	0,07	-3,22	0,23	-2,92	0,37%	0,10%	0,39%	0,39%
TUR	0,45	-1,79	0,13	-1,20	0,50%	0,12%	0,46%	0,46%
CHN	15,81	-15,16	0,53	1,18	0,21%	0,06%	0,23%	0,23%
JPN	0,04	-0,17	0,00	-0,12	0,05%	0,01%	0,05%	0,05%
MLS	0,02	-0,09	0,62	0,55	0,02%	0,06%	0,23%	0,23%
PHL	1,09	-1,01	0,05	0,13	0,51%	0,17%	0,67%	0,67%
SLA	0,00	0,00	0,00	0,00	0,46%	0,02%	0,07%	0,07%
VIT	0,19	-0,51	0,15	-0,18	0,20%	0,09%	0,34%	0,34%
KOR	0,29	-0,89	0,27	-0,33	0,31%	0,07%	0,27%	0,27%
PAK	0,90	-0,83	0,00	0,07	0,36%	0,09%	0,36%	0,36%
ROW	12,56	-18,11	0,00	-5,55	0,46%	0,13%	0,51%	0,51%

Appendix 4 – Table 5.2.4: Scenario 2, Changes in intenal consumer prices

Internal consumer price changes

Producer prices	MLW	TNZ	ZWE	ZAM	MOZ	SA	BRZ	ARG	US	BAG	INDO	IND	THA	EU	RUS	TUR	CHN	JPN	MLS	PHL	SLA	VIT	KOR	PAK	ROW
0.0131 MLW	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131	0.0131
0.0152 TNZ	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152	0.0152
0.0069 ZWE	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069
0.0119 ZAM	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119	0.0119
0.0148 MOZ	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148	0.0148
0.0051 SA	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051
-0.0053 BRZ	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	0.0461	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053	-0.0053
0.0061 ARG	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061	0.0061
-0.0089 US	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	0.0422	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089	-0.0089
0.0094 BAG	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094
0.0010 INDO	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
0.0075 IND	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075
0.0068 THA	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068
0.0164 EU	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164
0.0039 RUS	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039
0.0046 TUR	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046
0.0023 CHN	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023
0.0005 JPN	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0521	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
0.0023 MLS	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023
0.0067 PHL	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067	0.0067
0.0007 SLA	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
0.0034 VIT	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034	0.0034
0.0027 KOR	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0581	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027
0.0036 PAK	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036
0.0051 ROW	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051

Appendix 5 – Changes in cigarette taxes

Appendix 5 - Table 5.2.5: Scenario 5, percentage changes in world trade values.

trade values and quantities
trade quantities: percent change

origin \ destination	MLW	TNZ	ZWE	ZAM	MOZ	SA	BRZ	ARG	US	BAG	INDO	IND	THA	EU	RUS	TUR	CHN	JPN	MLS	PHL	SLA	VIT	KOR	PAK	ROW
MLW	0,40	0,00	-1,32	0,00	0,00	-0,12	0,10	-1,09	-0,09	0,00	0,00	0,00	0,00	0,22	-0,05	-0,12	-9,24	-0,14	-0,21	0,81	0,00	0,00	0,55	3,20	0,65
TNZ	-0,26	0,40	0,00	0,00	0,00	-0,78	0,00	0,00	0,00	0,00	-3,67	0,00	0,00	-0,44	-0,71	-0,78	0,00	-0,80	-0,87	0,00	0,00	0,00	-0,12	0,00	-0,01
ZWE	0,00	0,00	2,57	0,00	4,11	3,77	0,00	0,00	3,80	0,00	0,88	5,69	0,00	4,10	3,83	3,77	-5,07	0,00	3,68	4,70	0,00	3,59	4,43	7,08	4,54
ZAM	-0,06	0,00	-1,78	0,09	0,00	-0,57	0,00	0,00	0,00	0,00	0,88	0,00	0,00	-0,24	-0,51	-0,57	0,00	-0,60	0,00	0,36	0,00	-0,75	0,09	0,00	0,20
MOZ	-0,03	0,00	-1,75	0,00	-0,21	-0,55	-0,33	-1,52	-0,52	0,00	-3,44	0,00	0,00	-0,21	-0,48	-0,55	0,00	-0,57	-0,64	0,38	0,00	0,00	0,12	0,00	0,22
SA	0,21	0,88	-1,51	0,00	0,03	-0,30	0,00	0,00	-0,28	0,00	-2,60	0,00	1,91	0,03	0,00	-0,31	-8,80	0,00	0,00	0,62	0,00	0,11	0,00	0,00	0,46
BRZ	0,00	0,00	0,00	0,00	0,00	0,29	0,51	0,68	0,32	1,61	-2,60	0,00	1,91	0,63	0,36	0,29	-8,80	0,27	0,20	1,22	0,00	0,11	0,96	0,00	1,06
ARG	0,00	0,00	0,45	0,00	0,00	1,65	1,87	0,00	1,68	0,00	0,00	0,00	0,00	1,99	1,72	1,65	-7,34	1,63	1,56	0,00	0,00	1,47	2,31	0,00	2,42
US	0,00	0,00	0,00	0,00	0,00	-0,52	0,00	0,00	-0,49	0,81	-3,41	0,00	1,10	-0,18	0,00	0,00	0,00	0,00	-0,61	0,41	0,00	-0,70	0,15	0,00	0,25
BAG	0,00	0,00	0,00	0,00	0,00	-1,04	0,00	0,00	-1,02	0,28	-3,94	0,88	0,00	-0,71	-0,98	-1,05	0,00	0,00	-1,13	0,00	0,00	-1,22	-0,38	0,00	-0,27
INDO	0,00	0,00	0,00	0,00	0,00	1,85	0,00	0,00	1,88	0,00	-1,04	0,00	3,47	0,00	1,92	1,85	0,00	0,00	1,76	0,00	0,00	1,67	0,00	0,00	2,62
IND	0,00	0,00	-2,79	0,00	0,00	-1,58	-1,37	-2,56	-1,56	0,00	-4,48	0,34	0,03	-1,25	-1,52	-1,58	-10,81	-1,61	-1,67	-0,65	0,00	-1,76	-0,92	0,00	-0,81
THA	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-1,13	0,00	0,00	0,00	0,46	-0,82	-1,09	-1,16	0,00	-1,18	-1,24	-0,22	0,00	-1,33	-0,49	2,16	-0,38
EU	0,00	0,55	-1,84	0,00	0,00	-0,64	0,00	0,00	-0,61	0,68	-3,53	0,00	0,00	-0,30	-0,57	-0,64	-9,80	0,00	-0,73	0,29	0,00	-0,82	0,02	0,00	0,13
RUS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-0,64	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-0,32	0,00	-0,21
TUR	0,00	0,00	0,00	0,00	0,00	0,24	0,45	0,00	0,00	0,00	-2,66	0,00	0,00	0,57	0,00	0,23	-8,86	0,00	0,15	1,17	0,00	0,06	0,90	3,55	1,01
CHN	0,00	0,00	8,31	0,00	0,00	9,52	0,00	0,00	0,00	10,84	6,62	0,00	11,13	9,85	9,58	9,51	-1,65	9,49	9,42	0,00	0,00	9,33	10,18	0,00	10,28
JPN	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,11	0,00	0,00	0,00	-0,25	0,00	0,00	0,00	0,00	0,00	0,00	0,54
MLS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,93	0,00	7,44	0,00	0,00	0,00	-2,86	0,00	0,00	6,76	0,00	0,00	0,00	0,00	6,59
PHL	0,00	0,00	-1,94	0,00	0,00	-0,73	0,00	0,00	-0,71	0,00	-3,63	0,00	0,88	-0,40	-0,67	-0,74	0,00	-0,76	-0,83	0,20	0,00	-0,91	-0,07	0,00	0,03
SLA	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-1,95	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,85	0,00	0,00	0,00	0,00	0,00	1,71
VIT	0,00	0,00	0,00	0,00	0,00	0,05	0,00	0,00	0,00	0,00	-2,85	0,00	1,66	0,38	0,11	0,00	0,00	0,00	0,00	0,00	0,00	-0,14	0,00	0,00	0,81
KOR	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,05	0,00	0,00	0,00	-0,87	0,00	0,00	0,00	0,00	0,00	0,00	-0,21	0,00	-0,10
PAK	0,00	0,00	0,00	0,00	0,00	-3,12	0,00	0,00	0,00	0,00	-6,02	0,00	0,00	-2,79	-3,06	-3,12	0,00	0,00	-3,21	-2,19	-1,18	0,00	-2,46	0,19	-2,35
ROW	0,00	0,25	-2,14	-0,27	-0,60	-0,94	-0,72	-1,91	0,00	0,00	0,00	0,98	0,00	-0,60	-0,87	-0,94	0,00	-0,96	0,00	-0,01	1,01	-1,12	-0,28	0,00	-0,17

Appendix 5 – Table 5.2.6: Scenario 5, summary of effects

Summary of Effects	welfare				other			
	Producer surplus	Consumer surplus	Tariff revenue	Net welfare effect	Change in Overall	Change in	Producer Price for	Market Price for Home
	A	B	C	D= A+B+C	Consumer	Output	Home	Good
MLW	-5,14	1,00	-0,14	-4,28	-1,0%	-0,3%	-1,0%	-1,0%
TNZ	-3,39	1,43	-0,17	-2,12	-0,9%	-0,2%	-0,9%	-0,9%
ZWE	-10,24	1,64	-0,38	-8,98	-1,4%	-0,4%	-1,8%	-1,8%
ZAM	-1,39	0,28	-0,04	-1,15	-0,9%	-0,2%	-0,9%	-0,9%
MOZ	-2,35	0,62	-0,06	-1,79	-1,1%	-0,2%	-0,9%	-0,9%
SA	-1,77	4,73	-0,80	2,16	-1,1%	-0,2%	-1,0%	-1,0%
BRZ	-55,10	32,72	-5,53	-27,92	-1,1%	-0,3%	-1,1%	-1,1%
ARG	-8,74	5,36	-0,89	-0,42	-1,4%	-0,3%	-1,4%	-1,4%
US	-8,16	13,29	-4,95	0,18	-1,1%	-0,2%	-0,9%	-0,9%
BAG	-1,20	1,22	-0,21	-0,20	-0,9%	-0,2%	-0,8%	-0,8%
INDO	-6,03	17,02	-2,42	8,57	-1,8%	-0,4%	-1,4%	-1,4%
IND	-15,32	13,93	-2,10	-3,50	-0,7%	-0,2%	-0,7%	-0,7%
THA	-1,17	4,40	-1,16	2,07	-0,8%	-0,2%	-0,8%	-0,8%
EU	-11,72	70,50	-20,08	38,70	-1,1%	-0,2%	-0,9%	-0,9%
RUS	-0,15	12,94	-1,86	10,93	-1,1%	-0,2%	-0,8%	-0,8%
TUR	-1,06	5,95	-1,44	3,46	-1,1%	-0,3%	-1,1%	-1,1%
CHN	-200,41	-444,70	566,39	-78,73	4,8%	-0,7%	-2,9%	-2,9%
JPN	-0,90	5,09	-0,76	3,43	-1,2%	-0,2%	-1,0%	-1,0%
MLS	-0,24	8,00	-2,76	5,01	-1,2%	-0,6%	-2,2%	-2,2%
PHL	-1,45	2,76	-0,47	1,48	-0,9%	-0,2%	-0,9%	-0,9%
SLA	-0,01	0,00	0,00	0,00	-0,7%	-0,3%	-1,2%	-1,2%
VIT	-0,56	3,82	-0,57	2,69	-1,2%	-0,3%	-1,0%	-1,0%
KOR	-0,94	4,02	-0,56	2,53	-1,0%	-0,2%	-0,9%	-0,9%
PAK	-1,03	1,36	-0,21	0,13	-0,4%	-0,1%	-0,4%	-0,4%
ROW	-20,80	38,66	0,00	17,86	-1,0%	-0,2%	-0,8%	-0,8%

Appendix 6 – cigarette tariff equivalence

Appendix 6 - Table 5.2.7: Cigarette tax to tobacco tariff equivalence conversion

| country | From WHO (2015) tobacco report appendix | | | | From Peterson (2004) | |
	specific excise	ad valorem excise	VAT sales tax	other taxes	Average Rp/PP ratio (Marketing Margin ratio)	Tax in tobacco tariff equivalence (1+t)/(Rp/Pp)
MLW	14,53	0	4,09	0	1,313	14
TNZ	14,43	0	15,25	0	1,101	27
ZWE	23,08	23,95	13,04	0	1,293	46
ZAM	0	20	1,36	0	1,284	17
MOZ	16,33	0	14,53	0	1,520	20
SA	36,52	0	12,28	0	1,366	36
BRZ	20,87	8,1	25	10,97	1,432	45
ARG	0	64,33	5,51	0	1,630	43
US	37,38	0	5,16	0	1,630	26
BAG	0	61	15	0	1,366	56
INDO	40,91	4,09	8,4	0	1,366	39
IND	42,45	1,27	16,67	0	1,366	44
THA	2,86	63,72	6,54	0	1,366	54
EU	-	-	-	-	1,232	62
RUS	23,88	8,5	15,25	0	1,432	33
TUR	1,63	65,25	15,25	0	1,432	57
CHN	0,6	29,3	14,53	0	1,561	28
JPN	56,95	0	7,41	0	1,561	41
MLS	41,67	8,93	4,76	0	1,561	35
PHL	63,55	0	10,71	0	1,561	48
SLA	59,15	3,91	10,71	0	1,366	54
VIT	0	32,5	9,09	0	1,561	27
KOR	52,9	0	9,09	0	1,561	40
PAK	46,17	0	14,53	0	1,366	44
ROW	0	0	0	0	1,366	0

*Blank on EU taxes because the taxes are a weighted average of all EU countries, hence tax for one EU member country was used, through common tax policy

Appendix 7 – Changes in trade barriers in Brazil

Appendix 7 - Table 5.2.8: Scenario 3, core model solutions.

Relative price changes

origin	new prices	change in supply	change in demand
MLW	0.0005	0.0001	0.0001
TNZ	0.0000	0.0000	0.0000
ZWE	0.0000	0.0000	0.0000
ZAM	0.0000	0.0000	0.0000
MOZ	0.0007	0.0002	0.0002
SA	0.0000	0.0000	0.0000
BRZ	-0.0006	-0.0001	-0.0001
ARG	0.0014	0.0004	0.0004
US	-0.0001	0.0000	0.0000
BAG	-0.0001	0.0000	0.0000
INDO	0.0000	0.0000	0.0000
IND	0.0006	0.0001	0.0001
THA	0.0002	0.0000	0.0000
EU	0.0000	0.0000	0.0000
RUS	0.0000	0.0000	0.0000
TUR	0.0008	0.0002	0.0002
CHN	0.0000	0.0000	0.0000
JPN	-0.0002	0.0000	0.0000
MLS	0.0000	0.0000	0.0000
PHL	0.0000	0.0000	0.0000
SLA	0.0000	0.0000	0.0000
VIT	-0.0001	0.0000	0.0000
KOR	0.0000	0.0000	0.0000
PAK	0.0000	0.0000	0.0000
ROW	0.0000	0.0000	0.0000

Appendix 7 – Table 5.2.9: Scenario 3, trade at world prices percentage changes

trade values and quantities

trade quantities: percent change

	destination																								
	MLW	TNZ	ZWE	ZAM	MOZ	SA	BRZ	ARG	US	BAG	INDO	IND	THA	EU	RUS	TUR	CHN	JPN	MLS	PHL	SLA	VIT	KOR	PAK	ROW
MLW	-0.1	0.0	-0.2	0.0	0.0	-0.2	60.5	0.4	-0.3	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2	0.0	0.0	-0.2	-0.2	-0.2
TNZ	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZWE	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.0	-0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZAM	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MOZ	-0.3	0.0	-0.3	0.0	-0.1	-0.4	60.4	0.3	-0.4	0.0	-0.4	0.0	0.0	-0.4	-0.4	-0.3	0.0	-0.5	-0.4	-0.4	0.0	0.0	-0.4	0.0	-0.4
SA	0.1	0.0	0.1	0.0	0.3	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BRZ	0.0	0.0	0.0	0.0	0.0	0.3	-0.4	0.0	0.2	0.2	0.3	0.0	0.5	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.0	0.2	0.3	0.0	0.3
ARG	0.0	0.0	-0.7	0.0	0.0	-0.7	49.0	-0.1	-0.8	0.0	0.0	0.0	0.0	-0.7	-0.7	-0.7	-0.7	-0.8	-0.7	0.0	0.0	-0.7	-0.7	0.0	-0.7
US	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BAG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INDO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IND	0.0	0.0	-0.2	0.0	0.0	-0.3	60.5	0.3	-0.4	0.0	-0.3	0.0	-0.1	-0.3	-0.3	-0.3	-0.3	-0.4	-0.3	-0.3	0.0	-0.3	-0.3	0.0	-0.3
THA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	0.0	0.0	0.1	-0.1	-0.1	-0.1	0.0	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1
EU	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RUS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TUR	0.0	0.0	0.0	0.0	0.0	-0.4	60.4	0.0	0.0	0.0	-0.4	0.0	0.0	-0.4	0.0	-0.4	-0.4	0.0	-0.4	-0.4	0.0	-0.4	-0.4	-0.4	-0.4
CHN	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JPN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
MLS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PHL	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SLA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VIT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PAK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW	0.0	0.0	0.1	0.0	0.3	0.0	-0.7	0.6	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 7 – Table 5.3.0: Scenario 3, Summary of effects

	Producer surplus	Consumer surplus	Tariff revenue	Net welfare effect	Change in Overall Consumer Prices	Change in Output	Producer Price for Home Good	Market Price for Home Good
	A	B	C	A+B+C				
MLW	0.23	-0.02	0.00	0.22	0.0%	0.0%	0.0%	0.0%
TNZ	-0.01	0.00	0.00	-0.01	0.0%	0.0%	0.0%	0.0%
ZWE	-0.01	-0.01	0.00	-0.02	0.0%	0.0%	0.0%	0.0%
ZAM	0.00	0.00	0.00	0.00	0.0%	0.0%	0.0%	0.0%
MOZ	0.18	-0.03	0.00	0.15	0.1%	0.0%	0.1%	0.1%
SA	0.00	0.01	0.00	0.01	0.0%	0.0%	0.0%	0.0%
BRZ	-2.79	3.08	-1.96	-1.67	-0.1%	0.0%	-0.1%	-0.1%
ARG	0.91	-0.39	0.00	0.53	0.1%	0.0%	0.1%	0.1%
US	-0.05	0.18	0.03	0.16	0.0%	0.0%	0.0%	0.0%
BAG	-0.01	0.01	0.00	0.00	0.0%	0.0%	0.0%	0.0%
INDO	-0.01	0.01	0.00	0.00	0.0%	0.0%	0.0%	0.0%
IND	1.25	-0.78	0.00	0.48	0.1%	0.0%	0.1%	0.1%
THA	0.03	-0.18	0.00	-0.16	0.0%	0.0%	0.0%	0.0%
EU	-0.05	0.24	-0.03	0.16	0.0%	0.0%	0.0%	0.0%
RUS	0.00	0.02	0.01	0.03	0.0%	0.0%	0.0%	0.0%
TUR	0.08	-0.02	0.02	0.08	0.0%	0.0%	0.1%	0.1%
CHN	-0.20	0.25	0.01	0.06	0.0%	0.0%	0.0%	0.0%
JPN	-0.02	0.06	0.00	0.05	0.0%	0.0%	0.0%	0.0%
MLS	0.00	0.00	0.00	0.00	0.0%	0.0%	0.0%	0.0%
PHL	0.00	0.00	0.00	-0.01	0.0%	0.0%	0.0%	0.0%
SLA	0.00	0.00	0.00	0.00	0.0%	0.0%	0.0%	0.0%
VIT	0.00	0.02	0.00	0.01	0.0%	0.0%	0.0%	0.0%
KOR	0.00	0.01	0.01	0.02	0.0%	0.0%	0.0%	0.0%
PAK	0.00	0.00	0.00	0.00	0.0%	0.0%	0.0%	0.0%
ROW	-0.06	0.09	0.00	0.04	0.0%	0.0%	0.0%	0.0%

Appendix 8 – simultenous removal of tariffs

Appendix 8 - Table 5.3.1: Scenario 4, summary of effects

	welfare				other			
	Producer surplus	Consumer surplus	Tariff revenue	Net welfare effect	Change in Overall Consumer Prices (%)	Change in Output (%)	Producer Price for Home Good (%)	Market Price for Home Good (%)
	A	B	C	D= A+B+C				
MLW	0.1647	-0.0051	0.0026	0.1622	0.0001	0.0001	0.0003	0.0003
TNZ	-0.0632	0.0210	0.0000	-0.0422	-0.0002	0.0000	-0.0002	-0.0002
ZWE	-0.0545	-0.0029	-0.0032	-0.0606	0.0000	0.0000	-0.0001	-0.0001
ZAM	-0.0138	0.0023	0.0000	-0.0114	-0.0001	0.0000	-0.0001	-0.0001
MOZ	0.1497	-0.0227	0.0000	0.1271	0.0005	0.0001	0.0006	0.0006
SA	-0.0181	0.0367	0.0035	0.0220	-0.0001	0.0000	-0.0001	-0.0001
BRZ	-3.3179	3.2948	-1.9643	-1.9874	-0.0016	-0.0002	-0.0007	-0.0007
ARG	0.8562	-0.3615	0.0031	0.4978	0.0013	0.0003	0.0013	0.0013
US	-0.1651	0.3005	-0.0235	0.1119	-0.0003	0.0000	-0.0002	-0.0002
BAG	-0.0283	0.0220	0.0025	-0.0038	-0.0002	0.0000	-0.0002	-0.0002
INDO	-0.0359	0.0572	0.0000	0.0213	-0.0001	0.0000	-0.0001	-0.0001
IND	1.0683	-0.6641	0.0041	0.4083	0.0005	0.0001	0.0005	0.0005
THA	0.0117	-0.1443	-0.0117	-0.1443	0.0004	0.0000	0.0001	0.0001
EU	-0.2307	1.2761	1.0787	2.1241	-0.0003	0.0000	-0.0002	-0.0002
RUS	-0.0019	0.1136	0.0039	0.1156	-0.0001	0.0000	-0.0001	-0.0001
TUR	0.0711	0.0136	0.0205	0.1052	0.0000	0.0002	0.0007	0.0007
CHN	-0.5985	0.7038	0.0192	0.1245	-0.0001	0.0000	-0.0001	-0.0001
JPN	-0.0231	0.0918	0.0000	0.0687	-0.0003	-0.0001	-0.0003	-0.0003
MLS	-0.0009	0.0568	-0.0076	0.0483	-0.0001	0.0000	-0.0001	-0.0001
PHL	-0.0189	0.0177	-0.0009	-0.0020	-0.0001	0.0000	-0.0001	-0.0001
SLA	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0000	-0.0001	-0.0001
VIT	-0.0076	0.0427	-0.0020	0.0331	-0.0002	0.0000	-0.0001	-0.0001
KOR	-0.0139	0.0443	0.0078	0.0381	-0.0002	0.0000	-0.0001	-0.0001
PAK	-0.0103	0.0089	-0.0001	-0.0015	0.0000	0.0000	0.0000	0.0000
ROW	-0.2770	0.4824	0.0000	0.2055	-0.0001	0.0000	-0.0001	-0.0001

Appendix 9 – Initial trade matrix at world prices

Appendix 9 - Table 5.3.2: Trade at world prices initial matrix

Origin \ Destination	MLW	TNZ	ZWE	ZAM	MOZ	SA	BRZ	ARG	US	BAG	INDO	IND	THA	EU	RUS	TUR	CHN	JPN	MLS	PHL	SLA	VIT	KOR	PAK	ROW	Totals
MLW	33.37	0.00	17.51	0.00	0.00	6.19	2.10	2.72	35.27	0.00	0.00	0.00	0.00	205.83	62.82	11.66	21.87	21.56	6.11	10.66	0.00	0.00	14.34	0.68	54.60	507.29
TNZ	9.98	126.21	0.00	0.00	0.00	1.40	0.00	0.00	0.00	0.00	6.18	0.00	0.00	137.49	38.27	13.10	0.00	9.92	1.78	0.00	0.00	0.00	9.85	0.00	30.71	384.89
ZWE	0.00	0.00	41.35	0.00	7.82	50.75	0.00	0.00	1.59	0.00	8.09	5.07	0.00	92.36	21.60	4.80	275.58	0.00	0.54	1.29	0.00	2.35	0.99	0.01	58.96	573.15
ZAM	40.82	0.00	5.45	25.74	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.75	13.48	8.84	0.00	11.24	0.00	1.53	0.00	2.12	0.72	0.00	9.48	151.32
MOZ	0.66	0.00	0.09	0.00	39.67	3.41	1.44	2.51	0.54	0.00	0.33	0.00	0.00	107.38	40.69	13.48	0.00	1.74	1.86	5.00	0.00	0.00	0.48	0.00	33.98	253.24
SA	3.68	0.05	3.49	0.00	0.05	153.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.64	0.00	2.19	0.00	0.00	0.00	5.31	0.00	0.00	0.00	0.00	8.81	181.94
BRZ	0.00	0.00	0.00	0.00	0.00	36.33	2036.72	0.00	271.54	7.13	38.15	0.00	4.98	990.84	342.97	92.56	435.01	128.78	44.79	35.10	0.00	62.93	56.78	0.00	451.32	5035.93
ARG	0.00	0.00	0.15	0.00	0.00	0.25	6.37	268.23	40.40	0.00	0.00	0.00	0.00	70.16	37.52	16.94	121.14	7.95	7.64	0.00	0.00	0.36	7.58	0.00	55.31	640.01
US	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	171.85	1.67	26.14	0.00	11.30	389.09	0.00	0.00	0.00	0.00	40.03	1.71	0.00	8.12	11.48	0.00	212.81	874.57
BAG	0.00	0.00	0.00	0.00	0.00	5.49	0.00	0.00	9.20	79.19	0.86	0.03	0.00	28.60	2.30	3.48	0.00	0.00	2.47	0.00	0.00	0.56	5.25	0.00	7.57	144.99
INDO	0.00	0.00	0.00	0.00	0.00	2.07	0.00	0.00	20.83	0.00	327.74	0.00	0.00	0.00	3.90	0.10	0.00	0.00	63.68	0.00	0.00	1.05	0.00	0.00	9.83	429.21
IND	0.00	0.00	2.48	0.00	0.00	18.09	4.71	0.07	16.44	0.00	15.77	1323.54	171.71	192.18	108.13	18.32	0.02	5.01	17.42	9.33	0.00	39.94	14.81	0.00	169.09	2127.09
THA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.16	0.00	0.00	0.00	75.46	19.21	7.75	0.39	0.00	4.64	17.22	2.42	0.00	1.28	3.17	0.39	7.08	145.18
EU	0.00	0.93	0.25	0.00	0.00	6.70	0.00	0.00	8.93	1.04	9.53	0.00	0.00	701.68	76.20	45.36	0.32	0.00	8.79	9.86	0.00	11.79	21.83	0.00	386.80	1290.01
RUS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.96	17.96
TUR	0.00	0.00	0.00	0.00	0.00	0.10	0.68	0.00	0.00	0.00	22.11	0.00	0.00	5.76	0.00	36.19	1.11	0.00	4.36	11.35	0.00	0.78	0.00	0.22	15.17	97.84
CHN	0.00	0.00	0.54	0.00	0.00	5.31	0.00	0.00	0.00	0.09	200.71	0.00	4.02	125.90	48.01	17.25	6235.57	20.57	13.16	0.00	0.00	22.78	7.73	0.00	135.16	6836.80
JPN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.27
MLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	7.86	0.00	0.00	2.01	0.00	0.00	0.00	0.00	0.10	10.77
PHL	0.00	0.00	0.32	0.00	0.00	1.16	0.00	0.00	10.64	0.00	4.32	0.00	1.90	24.38	3.31	0.06	0.00	1.47	14.39	82.18	0.00	5.17	0.94	0.00	12.91	163.16
SLA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.02	0.57
VIT	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	3.49	0.00	0.00	3.63	2.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	0.00	0.00	0.32	53.99
KOR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	1.61	0.00	0.00	0.00	0.00	0.00	0.00	106.01	0.00	0.81	108.58
PAK	0.00	0.00	0.00	0.00	0.00	1.55	0.00	0.00	0.00	0.00	2.93	0.00	0.00	4.70	0.42	0.91	0.00	0.00	0.70	6.28	0.07	0.00	0.12	225.66	5.46	248.80
ROW	0.00	0.42	3.62	0.00	0.38	1.23	1.77	1.08	0.00	0.00	0.00	0.13	0.00	127.93	30.91	3.77	0.00	6.94	0.00	7.66	0.24	11.64	7.99	0.00	2244.57	2450.30
Totals	88.51	127.61	75.24	25.74	47.92	294.39	2053.79	274.61	593.41	89.11	667.38	1328.93	269.38	3263.51	840.29	290.99	7098.49	311.11	245.26	191.70	0.31	215.30	270.10	226.96	3928.83	

Appendix 10 – Initial trade tariff matrix

Appendix 10 - Table 5.3.3: Initial tariff matrix

destination

origin \ dest	MLW	TNZ	ZWE	ZAM	MOZ	SA	BRZ	ARG	US	BAG	INDO	IND	THA	EU	RUS	TUR	CHN	JPN	MLS	PHL	SLA	VIT	KOR	PAK	ROW
MLW	1	1.25	1	1	1	1	1	1.14	1	1.25	1.05	1.05	1.3	1.72	1	1.25	1.1	1	3.298	1.07	1.75	1.3	1	1.05	1
TNZ	1.25	1	1	1	1	1	1	1.14	1	1.25	1.05	1.05	1.3	1.72	1	1.25	1.1	1	3.298	1.07	1.75	1.3	1	1.05	1
ZWE	1	1.25		1	1	1	1.14	1.14	1	1.25	1.05	1.05	1.3	1.72	1.038	1.25	1.1	1	3.298	1.07	1.75	1.3	1.2	1.05	1
ZAM	1	1	1		1	1	1	1.14	1	1.25	1.05	1.05	1.3	1.72	1	1.25	1.1	1	3.298	1.07	1.75	1.3	1	1.05	1
MOZ	1.25	1.25	1	1		1	1	1.14	1	1.25	1.05	1.05	1.3	1.72	1	1.25	1.1	1	3.298	1.07	1.75	1.3	1	1.05	1
SA	1.25	1.25	1.75	1	1		1	1.14	1	1.25	1.05	1.05	1.3	1.72	1.038	1.25	1.1	1	3.298	1.07	1.75	1.3	1.2	1.05	1
BRZ	1.25	1.25	2	1.15	1.025	1.088		1.112	2.302	1.25	1.05	1.05	1.3	1.938	1.038	1.25	1.1	1	3.298	1.07	1.75	1.3	1.2	1.05	1
ARG	1.25	1.25	2	1.15	1.025	1.088	1.112		2.302	1.25	1.05	1.05	1.3	1.72	1.05	1.25	1.1	1	3.298	1.07	1.75	1.3	1.2	1.05	1
US	1.25	1.25	2	1.15	1.025	1.926	1.14	1.14		1.25	1.05	1.05	1.3	1.938	1.05	1.25	1.1	1	3.298	1.07	1.75	1.3	1.12	1.05	1
BAG	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	1		1	1.05	1.3	1.72	1	1.25	1.1	1	3.298	1.07	1.75	1.3	1	1.05	1
INDO	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25		1	1.3	1	1.038	1.25	1.1	1	1.05	1.05	1.75	1.1	1	1.05	1
IND	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.03		1	1.72	1.038	1.25	1.1	1	3.298	1.07	1.75	1.3	1.12	1.05	1
THA	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.3		1	1.05	1.25	1.1	1	1.05	1.05	1.75	1.1	1	1.05	1
EU	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.05	1.3		1.05	1.25	1.1	1	3.298	1.07	1.75	1.3	1.13	1.05	1
RUS	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.05	1.3	1.72		1.25	1.1	1	3.298	1.07	1.75	1.3	1.2	1.05	1
TUR	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.05	1.3	1.72	1.05		1	1	3.298	1.05	1.75	1.3	1.2	1.05	1
CHN	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.05	1.3	1.72	1.038	1.25		1.1	3.298	1.07	1.75	1.3	1.2	1.05	1
JPN	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.05	1.3	1.938	1.05	1.25	1.1		3.298	1.07	1.75	1.3	1.2	1.05	1
MLS	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.05	1.3	1.72	1.038	1.25	1.1	1		1.07	1.75	1.3	1.2	1	1
PHL	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.05	1.3	1.72	1.038	1.25	1.1	1	1.05		1.75	1.1	1.05	1.05	1
SLA	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	1.259	1.25	1.05	1.05	1.3	1.72	1.038	1.25	1.1	1	3.298	1.07		1.3	1.2	1.05	1
VIT	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.3	1.72	1.05	1.05	1.25	1.1	1	1.05	1.07	1.75		1	1.05	1
KOR	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1	1.3	1.72	1.782	1.038	1.25	1.1	1	3.298	1.07	1.75	1.3		1.05	1
PAK	1.25	1.25	2	1.15	1.025	1.088	1.14	1.14	2.302	1.25	1.05	1.3	1.72	1	1.038	1.25	1.1	1	3.298	1.07	1.75	1.3	1.2		1
ROW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

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