Thesis for the degree of Master of Arts

An Analysis of the Economic Impact of a Potential Free Trade Agreement between Cameroon and the British Commonwealth of Nations Using a CGE Model

연산가능일반균형모형을 이용한 카메룬-영연방 국가간 자유무역협정의 경제적 영향분석

By

Mbante II Appolinaire Roland

Department of International and Area Studies,

The Graduate School,

Pukyong National University

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Advisor: Prof. Dr. Jong-Hwan Ko

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A thesis

by

Mbante II Appolinaire Roland

Approved by:

Prof. Jong-Hwan Ko
Supervisor and member

Prof. Sang Wuk Ahn
Member

Prof. Utai Uprasen
Member

February 22, 2019

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Mbante II Appolinaire Roland

Department of International and Area Studies, The Graduate School,

Pukyong National University

Abstract

This research investigates the economic impact of a potential Free Trade Agreement (FTA) between Cameroon and the British Commonwealth of Nations on several sectors of the economy under eight separate possible scenarios by applying a 50 and 100 percent cut of imported tariffs using a Computable General Equilibrium (CGE) model. That is, the same 50 percent and 100 percent cuts of tariffs apply to the scenarios with 9 sectors and 10 sectors in which an increase in the total factor productivity (TFP) is also considered as a result of the FTA. This study uses the GTAP database 9 which includes 57 commodities and 140 regions across the world. The 57 commodities were aggregated into 9 sectors, and 10 sectors when cocoa was split as an independent sector from the sector of fruits and vegetables. The 140 regions were aggregated into 9 regions in line with the research purpose. The results of this study show that Cameroon and the British Commonwealth of Nations' economic growth will be affected positively at different levels, but Cameroon will benefit the most in all scenarios. Finally, the FTA between Cameroon and the British Commonwealth of Nations are predicted to lead to both an increased the production in several sectors in both regions and an increase in bilateral trade for most trading sectors.

Keywords: GTAP model, GTAP Data Base, Tariffs, Total Factor Productivity, Splitcom, Cameroon and British Commonwealth of Nations.

연산가능일반균형모형을 이용한 카메룬-영연방국가간 자유무역협정의 경제적 영향 분석

Mbante Ⅱ Appolinaire Roland

한글 요약

본 연구는 (CGE) 연산가능일반균형모형을 모델을 사용하여 수입 관세를 50~100% 인하한 8개의 시나리오에서 카메룬과 영국연방 국가 간의 잠재적 자유무역 협정의 경제적 영향을 조사한다. 즉, TFA의 결과로 총 요인 생산성(TFP)의 증가를 고려하는 9개 부문과 10개 부문이 있는 시나리오에는 동일한 50%와 100%의 관세가 적용된다. 본 연구는 전 세계 57개 원자재와 140개 지역을 포함하는 GTAP 데이터베이스 9를 사용한다. 57개의 상품들은 9개 부문과 10개 부문으로 코코아가 과일과 야채 부문으로부터 독립된 부문으로 분할되었을 때 통합되었다.연구목적에 따라 9개 지역으로 집계된 140개 지역. 이 연구 결과는 카메룬과 영국연방의 경제성장이 다른 수준에서 긍정적인 영향을 받을 것이라는 것을 보여주지만, 카메룬은 모든 시나리오에서 가장 큰 이득을 볼 것이다. 마지막으로 카메룬과 영국연방간의 FTA는 두 지역의 여러 분야의 생산 증가와 대부분의 무역분야의 쌍무무역의 증가로 이어질 것으로 예측된다.

키워드: GTAP 모델, GTAP 데이터 베이스, 총 요인 생산성, Splitcom, 카메룬 및 영국연방

Dedication

To my lovely daughter

Mbante Kylie Rose Neng

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Acronyms

ASEAN	Association of Southeast Asian Nations
BCWN	British Commonwealth of Nations
CMR	Cameroon
CDE	Constant Difference of Elasticity
CES	Constant Elasticity of Substitution
CGE	Computable General Equilibrium
EFTA	European Free Trade Market
EU	European Union
EV	Equivalent Variation
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GDP per capita	Gross Domestic Product Per Capita
GTAP	Global Trade Analysis Project
NTBs	Non-Tariff Barriers
OECD	Organization for Economic Cooperation and Development
RTA	Regional Trade Agreements
TFP	Total Factor Productivity

TO	Trade Openness
TTP	Trans-Pacific Partnership
VOA	Value of Output at Agent's Prices of endowment commodities
VIPA	Import Payments from households
VDPA	Value of Domestic purchases by private households
VIGA	Value of Domestic purchases by Government
VIFA	Import payment from firms
VDFA	Value of domestic purchases by firms
VXMD	Value of exports at market price
UK	United Kingdom
USA	United States of America
USD	United States Dollars

Note: BCWN and CWN is used interchangeably to refer to the British Commonwealth of Nations.

Chapter 1 Introduction

1.1 Introduction

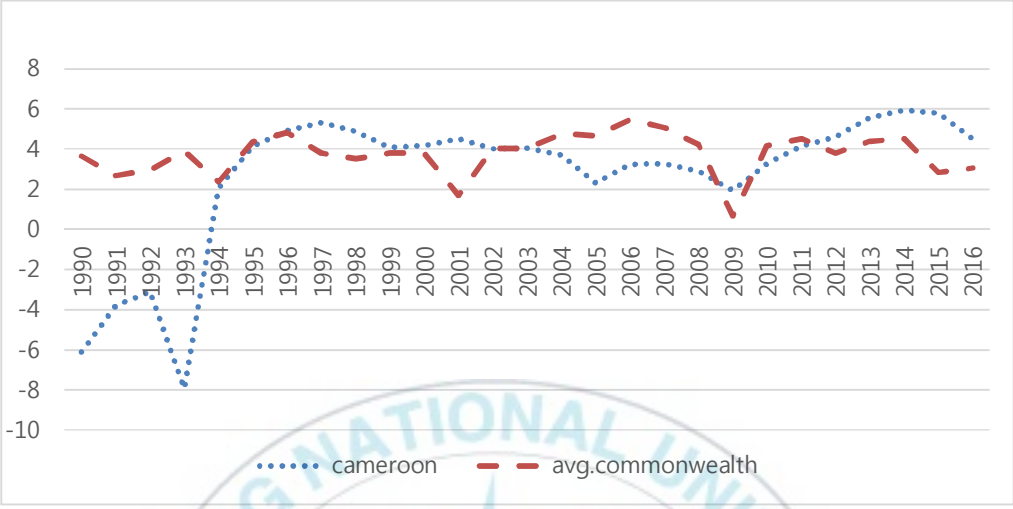
Increased trade between countries is said to contribute enormously towards the economic growth of trading partners. The phenomenal development of global information technology and communication sector together with efficient and cheaper means of transport has led to the global interlinkage of economies. This brings on-board abundant economic opportunities as well as challenges, especially in international trade. The current global economic integration efforts has led to an unprecedented upsurge in the uptake of the Free Trade Agreement (FTA) initiatives.

Presently, external trade is said to contribute immensely towards the economic growth of a country. Also, Free Trade Agreements (FTAs) which involve the abolishment of tariffs between trading parties, have both favorable and non-favorable economic effects on the trading partners. The importance of FTAs is increasing among less developed nations because of their contribution towards economic growth. This issue has enormous importance in both theoretical and empirical points of view. There are several studies on the role of FTAs in the development of the economies of trading countries such as Kolodko (2006), Feenstra (2007), Nag and Sikdar (2011).

The British Commonwealth of Nations was established between Britain and its colonies and one of the main objectives of the establishment of the BCWN was the enhancement of trade between Britain and its colonies. As a British colony, Cameroon joined the group in 1995. Since then, the trade volume of Cameroon to the British Commonwealth of Nations has improved drastically from a deficit balance of trade in 1996 to a surplus in balance of trade in 2016. However, there is an ongoing dialogue on a possible Free Trade Agreement between the British Commonwealth of Nations and Cameroon.

The signing of a free trade agreement between Cameroon and the British Commonwealth of Nations is very significant at different levels. It will increase Cameroon's productivity and economic growth by allowing domestic businesses access cheaper intermediary inputs, promote innovation, competition and introduce new technologies. Furthermore, the main exports by Cameroon to the British Commonwealth of Nations include petroleum, wood, cocoa, coffee, bananas, metal products, machinery, and equipment. Hence, Cameroon has achieved amazing development in trade and investment with the British Commonwealth of Nations partners and also participates in several FTAs with other countries.

<Figure 1> GDP Growth Rate (%) for Cameroon and the British Commonwealth of Nations (1990-2016)



Source: World Bank Database. https://data.worldbank.org/

<Table1> The British Commonwealth market size compared to other regions

Region	Population	GDP per capital (USD)	GDP at Purchasing power parity (million USD)
British Commonwealth Nations	2, 357, 512,000	44,114	382,456
European Union	442, 234,108	32,059	20,250,965
China	1, 410, 998,874	8,123	21,409,404
USA	326, 625,791	57,467	18,624,475
Korea	51, 031,051	27,539	1,872,132
Japan	127, 404,045	38,894	5,359,590

Source: World Bank Database. https://data.worldbank.org/indicator/SP.POP.TOTL

<Figure 2> Cameroon's Balance of Trade with the British Commonwealth of Nations 2009-2017 (USD million)

Source: World Integrated Trade Solution (WITS). http://wits.worldbank.org/

Between 2010 and 2015, the exports from the British Commonwealth of Nations to Cameroon increased continuously, followed by a sharp decline in 2015. The signing of an Economic Partnership Agreement between Cameroon and the European Union in 2014 might have been one of the main reasons for the decreased export to Cameroon. In 2016, exports by Cameroon to the British Commonwealth of Nations declined to US$ 600 million as a result of signing an EPA which pushed Cameroon to export more to the European Union.

1.2. Study Objective

This research aims to investigate the economic impact of a possible FTA between Cameroon and the British Commonwealth of Nations, by using a Computable General Equilibrium (CGE) model.

1.3 Significance of the Study

Cameroon as a member of the British Commonwealth of Nations, benefits from bilateral trade among the member states. Currently, the British Commonwealth of Nations has as objective of signing an FTA among its members. It is very crucial to investigate the possible benefits Cameroon might gain from signing a Free Trade Agreement with the British Commonwealth of Nations. Since this research is the first of its kind that pays attention to the British Commonwealth of Nations, it will contribute much to the existing literature.

Moreover, this research would help to provide useful information to be considered before and during the FTA negotiating period. This will be important for both Cameroon and the British Commonwealth of Nations to achieve their economic potentials by enjoying the benefits of globalization for the economic and social welfare of their economies. Consequently, the empirical results of this

study are important for policy formulation for Cameroon.

Research questions

- What will the impact of a Free Trade Agreement between Cameroon and the Commonwealth of Nations on GDP, welfare, export price, terms of trade and output be?
- To what extend will the split of cocoa from vegetable and fruit affect the economic growth of Cameroon and the British Commonwealth of Nations?

1.4 Scope of the Study

The scope of this study is limited to 14 countries belonging to the British Commonwealth of Nations, focusing on Australia, Canada, Cyprus, Britain, Ghana, India, Malta, Malaysia, Nigeria, New Zealand, Pakistan, Singapore, South Africa, and Kenya. These countries were selected given that they contribute 95 percent of Cameroon's total trade to the Commonwealth of Nations, based on the availability of data collected from the World Integration Trade Solution (WITS). The selection of products is grouped into 8 sectors which include: vegetable and fruits, rice, rest of agricultural crops, livestock meat, extraction, light manufacturing, heavy manufacturing, and services. In addition, the methodology used in this research is the Computable General

Equilibrium (CGE) model.

1.5 Outline of the Study

This thesis is organized as follows:

Chapter I gives a short background of the study and then explains the objectives, significance of the study and its scope.

Chapter II gives a review of the empirical literature describing the effects a possible FTA between Cameroon and BCWN.

Chapter III gives a vivid description of the CGE model and database.

Chapter IV shows the different scenarios carried out in this study

Chapter V provides a description of the empirical analysis and explains the meaning of the results.

Chapter VI provides the conclusion and policy recommendations according to the findings of the study and also shows the shortage and fields for further studies.

Chapter 2 Literature Review

The impact of Globalization has been a famous phenomenon in past decades and its significance has constantly increased. Nevertheless, most of the studies carried out on FTAs investigate the impact of possible FTAs between two or more regions. Several studies try to address this topic in the scholastic world to show the impact of FTA at different levels of liberalization. Meanwhile, the main point of integration is described by better market penetration and trade growth among trading partners. These studies do not usually take into account the split of particular sectors which are aggregated in the GTAP database. However, this current study takes that into account. The review of the literature in this section is discussed below in succession.

Taeko Yasutake (2004) examined the effect of a possible FTA between Philippine and Japan by abolishing tariffs on imports from Japan using a Computable General Equilibrium (CGE) Model. The study found out some gains in sectors like agriculture, which witnessed a great increase in its imports and a slight increase in the manufacturing sector. Even though there was a decline in income of the household, an increase in the welfare of the household was expected. However, inequality remains an important negative factor with richer households better equipped to benefit from the cheaper consumer goods. This study concludes that the Philippine economy benefits from an FTA with

Japan based on an increase in consumer welfare. In the future, welfare can increase if liberalization of foreign investment is included in the agreement.

Wignaraja, McQueen and Francois (2005) examined EU FTAs Considering 29 regions and 24 sectors using Global Trade Analysis Project (GTAP). Two simulated policy scenarios were carried out in this study. The first scenario investigated developing country actual EU FTA and the second scenario was on full EU - developing countries FTA. In the model, various FTAs of EU were tested and also the customs union agreement in industrial products with Turkey. Mexico, South Africa, Egypt, and Chile have their FTAs already operational while the fifth FTA (Mercosur) was still in negotiation. The goal of the study is to identify the main factors and their economic effects. The research identifies that potential benefits from an FTA are lost because of restrictions in products coverage and the rules of origin by the EU. These barriers hinder full liberalization, agricultural products trade is negatively affected and labor-intensive manufactures. Deeper integration is required to completely benefit from trade liberalization and this was only attained in the cases of Mexico, Chile, and Turkey. Also, Mercosur and South Africa would benefit from the FTA in terms of trade and welfare. Egypt is still liable to domestic distortions hindering trade liberalization, resulting in a significant loss to its economy. Furthermore, they concluded that bilateral negotiations are costly while multilateral agreements can be more efficient and competitive, leading to greater net effects

of trade liberalization.

Jackson (2006) investigates the Mexico-Japan FTA, based on the effect of cross-regional Free Trade Agreement on Foreign Direct Investment (FDI) and what role it plays to increase trade. The FTA was effective on the 1st of April, 2005. It comprises of persons, free trans-border flows of goods, services, and capital between the two countries. The elimination and reduction of tariffs implemented and quota restrictions were released. The study concluded that FDI and trade flow have positive effects on both nations. Even though these findings are positive, they are not yet conclusive since Mexico - Japan FTA has been effective for only a short period of time and therefore it's not possible to make conclusive deductions. Furthermore, the study suggests that the increase in both trade and FDI could be as a result of other factors such as (physical infrastructure, business environment, and an efficient transportation system), rather than the signing of the FTA.

Ecorys (2009) investigates the US and EU Free Trade Agreement by applying cuts of 25 percent and 50 percent in both tariffs and non-tariff barriers in two separate scenarios. The 50 percent reduction simulation shows an increase on GDP by 158 billion dollars annually for EU and 35 billion dollars in the USA compared to the non FTA scenario. The study also finds that USA exports would increase by 6.1 percent while EU's exports increased by 2.1

percent. Furthermore, the findings proved that the stage of integration between the EU-US FTA in automobile markets points to significant investment and trade deviation effects away from other countries towards EU and USA. The results from the simulation of the rest of the world indicate a decrease in output in some sectors like finance, automotive and electric machinery.

Nag and Sikdar (2011) in their research the economic impact of a Free Trade Agreement between India-ASEAN that came into force in January 2010 including Thailand, Singapore, and Malaysia. The findings suggested that there are many positive results that are crucial for both India and ASEAN. The result from the simulation indicates that the top ASEAN countries gain more in welfare while India is expected to export more to the market of small ASEAN countries. China from the experiment will record a significant loss in market shares.

Mevel and Karingi (2012) investigate the effects of a possible African continental Free Trade Agreement and Customs Union (CU). They used the MIRAGE CGE model to study the potential effects of the FTA and the CU. They found that a continental FTA would significantly contribute to increasing trade within the African continent and that the formation of a continental CU would not result in any additional increase in intra-African trade, as compared to the FTA.

Linyue Li (2012) tries to analyze the economic impact of Korea's possible Free Trade Agreements (FTAs) with China, Japan, ASEAN (10), the United States and EU (27) qualitatively and quantitatively. There are seven possible FTAs for Korea: Korea – China, Korea – Japan, Korea – China & Japan, Korea – China & Japan & ASEAN, Korea – ASEAN, Korea – United States, and Korea – EU. To conduct the assessment, both static and dynamic CGE models with 7 regions, 12 sectors and 5 endowments are employed. Assuming that skilled labor, unskilled labor, and capital are able to be mobile among the regions, and at the same time, land and natural resource are not mobile among the regions. The major finding is that Korea would benefit most from a Korea – China & Japan & ASEAN FTA, which is the largest possible FTA in East Asia. The results of this paper will be meaningful if it explores Korea's potential FTAs with major economies that contribute to the discussion on economic integration.

Shaikh (2012) analyzes and quantifies the potential economic cost and benefits of the prospective trade between India and Pakistan to both consumers, producers, and the government of the two countries. The export of dry dates, leather and clothes made out of cotton were conducted in two scenarios, which are: when normal trading relations between Pakistan and India will be restored and when there will be free trade between Pakistan and India in the presence of South Asian Free Trade Agreement (SAFTA). Following the analytical framework discussed by PO managerial (2001), they employed the simplified

static analysis by using the CGE model for policy implication, which reveals that Pakistan will benefit from peak-India trade on SAFTA. Results based on this research reveal that on SAFTA grounds, there will be net export benefits to Pakistan's economy.

Kim (2012) investigates the economic effects of possible Free Trade Agreements between ASEAN+3 countries and then compares the economic results of these simulations. His main findings are as follows: First, the trilateral FTA between Korea, China, and ASEAN (FTA_KCA) under the imperfectly competitive model would bring about a 1.02 percent increase in GDP for Korea. Second, according to the sectoral effects, he determined that the output of agricultural products would decrease when China joins the FTA. This is because China has a comparative advantage in the production of agricultural products.

Cheong et al. (2013) used the MIRAGE CGE model to assess the economic impacts of establishing an African continental FTA, with a focus on the effects of regional integration on agricultural production and employment. The results indicate that, in Africa as a whole, the establishment of the FTAs would increase continental exports, real income, and real wages for all categories of workers although the estimated changes are small. The formation of a larger FTA at the continental level would amplify these gains. In particular, agricultural and food exports would be significantly stimulated following the removal of relatively

high tariff barriers and unskilled workers employed in agriculture would see their purchasing power enhanced. Intra African trade as a share of Africa's total trade would increase by about 50 percent over a 12-year period, from 10.2 percent in 2010 to 15.5 percent in 2022.

Oduncu et al. (2014) examined the possible effects of Trans-Pacific Partnership (TPP) on Turkish economy in the context of twelve countries, including Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States (US) and Vietnam. By using the Global Trade Analysis Project (GTAP) database and a general equilibrium model, the effects of various scenarios on GDP and exports are studied. The obtained results show that Turkey could loss up to 1 percent of GDP if the 12 countries establish the TPP.

Antoine et al. (2016) examined the recent modifications of the Economic Partnership Agreement (EPA) between the European Union (EU) and West African (WA) countries which is still being criticized for its potential detrimental effects on WA countries. A dynamic multi-country, multi-sector computable general equilibrium trade model with modeling of the dual–dual economy and with a consistent tariff aggregator is used to simulate a series of new scenarios that include updated information on the agreement. He also goes beyond estimating macro-level economic effects to analyze of the impacts the

EPA on poverty. The policy simulation results show that the implementation of the EPA between the EU and WA countries would have marginal but positive impacts on Burkina Faso and Côte D'Ivoire and negative impacts on Benin, Ghana, Nigeria, Senegal, and Togo. The impact on poverty indicators would be marginal for Ghana and Nigeria. From the perspective of WA countries, this study supports the view that recent EU concessions are not sufficient and that domestic fiscal reforms are needed in WA countries.

Sindu et al. (2016) analyze the impact of trade liberalization on poverty in Ethiopia using a computable general equilibrium microsimulation approach. Two scenarios (complete tariff cut and uniform tariff scheme) suggest that further liberalization of trade has a negative short-run effect on the overall economy. The study finds that the agriculture-based manufacturing sector (in particular, textile and leather) is likely to be negatively affected by tariff reductions. In both scenarios, poverty levels are shown to increase by 2.8 percent at the national level compared to 2.3 percent under a uniform tariff scheme. In both scenarios, poverty increases more among entrepreneur households (3.2 percent in the uniform tariff cut scenario) than farm and wage earner households (0.9 percent and 1.5 percent, respectively). This is consistent with the theoretical argument that, previously-protected infant industries are negatively affected by trade liberalization and may require compensatory policies.

The European commission (2017) examined the economic, social, environmental and human rights impacts of possible bilateral EU-Australian and EU-New Zealand Free Trade Agreements. The quantitative analysis is based on the CGE model employed by DG Trade. EU trade and investment ties with both countries are close, and mutual trade and investment barriers with Australia and New Zealand are on average low, with occasional peaks. The study suggests overall positive effects of macroeconomic variables, with sectoral variances. GDP, trade and investment are expected to increase for the EU, Australia and New Zealand. The model predicts positive long term welfare effects from the two FTAs and limited but positive wage effects for workers in each trading partner. Both FTAs will have only a minimal impact on the environment and will not diminish human rights in the EU, Australia and New Zealand in general. Effects on GDP of third countries, in particular LDCs seem to be slightly negative but negligible.

Ali, Ashfaque (2017) investigates the possible impacts of Pakistan-Turkey free trade agreement (Pak-Turk FTA) on various sectors of their economy under four possible scenarios using computable general equilibrium model. Global Trade Analysis Project (GTAP) model has been extensively used in FTAs and other trade related studies to evaluate the economy-wide potential impact of economic policy reforms. This study uses the GTAP database7 which includes: 57 tradable commodities and 113 regions across the world. Their findings

suggest that: Turkey benefits more from the Free Trade Agreement as compared to Pakistan and there is a huge potential for bilateral trade in textile and chemical sector.

Ko, JH & Ito, S (2017) carried out a study on a quantitative assessment of the potential economic effects of a Japan-Korea free trade agreement (FTA) on agriculture in both regions at macroeconomic and microeconomic levels using a computable general equilibrium model. The GTAP model and GTAP database version 9 are used for this study. Three scenarios are assumed for the Japan-Korea FTA: a 50 percent cut of tariffs on all imports between Japan and Korea, a 75 percent cut of tariffs and a 100 percent cut of tariffs. Furthermore, they assumed that for each of the scenarios total factor productivity (TFP) of Japan and Korea are increased by 0.15 percent, as trade openness defined as a ratio of a sum of exports and imports to GDP increase by 1 percent as a result of the FTA and that labor supply increases by 0.8 percent, as real wage increases by 1 percent. Japan and Korea are forecasted to get more gains in terms of real GDP, welfare, exports and imports from the FTA. A higher degree of trade liberalization between Japan and Korea leads to bigger positive macroeconomic effects for both countries.

Chapter 3 GTAP Model and Data

3.1 GTAP Model

The establishment of an FTA among trading partners may produce positive or negative impacts on their economies. In order to investigate the effect of a Free Trade Agreement between Cameroon and the BCWN, the Global Trade Analysis Project (GTAP) model which was founded in 1992 is used. Meanwhile, the main objective is to quantitatively grip the impact of trade policies under the Uruguay Round negotiations and General Agreement on Tariffs and Trade (GATT).

The GTAP model and database are usually used for investigating multilateral trade agreements. The GTAP gives a range of products, including data, models, and software for multi-region general equilibrium analysis. The GTAP is a typical CGE model that depicts the behavior of households, governments and global sectors across each economy in the world. It is made up of regional models which are linked through international trade. Price and quantities are simultaneously determined in factor and commodity markets accounting relationship. The model is able to determine the effects of trade policies implemented at regional unilateral and global levels on the welfare.

The CGE model has become a beneficial tool in investigating a series of

different trade policy issues (Shoven and Whalley 1984; Srinvivasen and Halley 1986; and De Melo 1988). These models are used to study the economic effects of trade policies, such as tariff and non-tariff barriers (NTB) in a diversity of settings.

The GTAP model consists of three key factors of production (capital, labor, and land). Capital and labor are used in all industries and land is the only factor used by agricultural sectors. Capital and intermediate inputs are traded. GTAP has a standard form that involves many key assumptions. The first assumption is perfect competition, whereby a return to scale is constant. Second, is the application of the Armington assumption whereby there is imperfect substitution between goods and services. Third, factors endowment is fixed. Hence there is full employment of both labor and capital.

The standard GTAP model has a competitive economic environment. The regional household receives all the income in the standard GTAP model that is generated by the economy. The expenditure of the regional income must be on three levels: private expeniture, government expenditure and savings. Aggregate utility is generated by spending from regional income. The distribution of regional income into the three levels of expenditure is guarded by the capital regional utility function, which is specified as the Cobb-Douglas function.

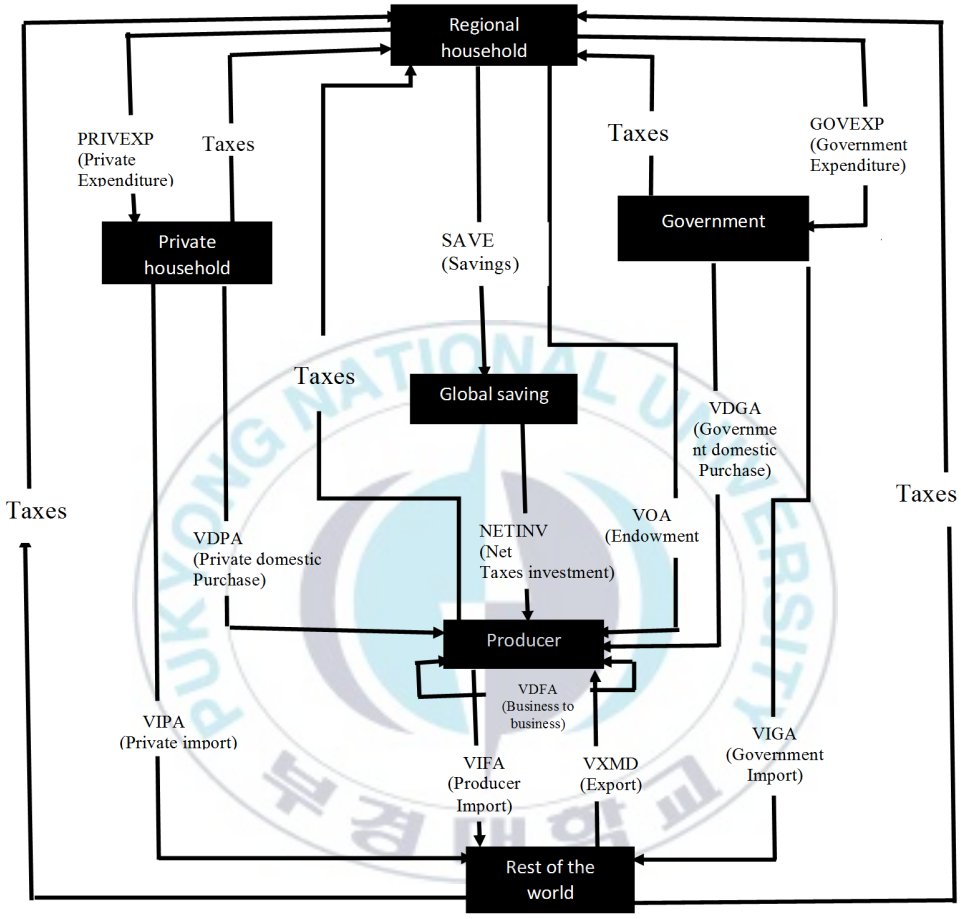
The production structure of the model is fairly multifaceted as it belongs to the category of top-down CGE model. Value-added factors of production are combined with intermediate goods at the top of the production structure. Armington assumption handles the bilateral trade flows between regions which are based on the knowledge that, imported intermediate goods are separable from domestically produced intermediate inputs. That is, firms first decide on the sourcing of their inputs and on the resulting composite import price. Then, they determine the optimal mix of imported and domestic goods.

The shape of the GTAP model as shown in (figure3), begins by examining how the regional household collects and distributes total income between the consumption and investment in an economy. The regional house is broken down into three units: government, private and savings. The classification of consumption expenditure is grouped into three types of units: private Spending on consumption, governmental spending on consumption and the rest as savings. While the private household receives gains from factor income in exchange for labor, land and capital is provided to the producer as output factors. Income tax, production and trade-related taxes are paid to the regional household by the private household (subsidies are calculated as negative taxes).

The regional household income (total of private household and government) is gotten by deducting the capital depletion portion from the sum of the factor

income of the private household and the production and trade-related taxes of the producer. Also, when the balance amount remaining after the consumption expenses of the regional household is deducted from its income, it is defined as the regional household's savings (Tawan Bootsumran 2005).

<Figure 3> Structure of the GTAP Model



Source: Martina BROCKMEIER (2001), a Graphical Exposition of the GTAP Model No.08 GTAP

Note: The arrows show the flow of financial transactions

On the other side, this model assumes that the producer is the entity that offers goods and services to the regional household in its own country or region or to overseas customers. Based on the factors of production of the household and on the domestic or overseas intermediate output, the producer provides goods and services and makes investments that correspond with the private household consumption expenditure, the governmental consumption expenditure, and exports.

Finally, in order for the savings and investments to be equitable at both the regional and global level, an entity (autonomous from regions) hypothetically called "global bank" is introduced in the GTAP model. When the regional household sends savings to the global bank, they are received as the net regional investment (gross investment minus depreciation).

In order to complete the model, it is necessary to introduce two global sectors. Firstly, the global transportation sector provides the services that account for the difference between the *fob* and the *cif* values for a particular commodity shipped along a specific route. Summing all routes and commodities gives the total demand for international transport services. The supply of these services is provided by individual regional economies, who export them to the global transport sector. There is insufficient information that would permit us to

associate regional transport services exports with particular commodities and routes. Therefore, all demand is met from the same pool of services, the price of which is a blend of all transport services exports.

The second required global sector is the global banking sector. This intermediate global savings and investment create a composite investment good, based on a portfolio of net regional investment (gross investment less deprecation) which is offered to regional households to satisfy their savings demand. Therefore, all savers face a common price for this savings commodity. A consistency check on the accounting relationships described up to this point involves separately computing the supply of the composite investment and the demand for aggregate savings. If all other markets are in equilibrium, such behaviors are not necessary to obtain full general equilibrium closure. Rather, it is the exhaustive accounting relationships outlined above that make our model a general equilibrium in nature. If anyone of them is not enforced, Walras' Law will fail to hold. The neoclassical limitation on the conduct of individual firms and the households do regularly acquire a full general balance closure. This is because, equilibrium are mostly used by several economists in quantities, rather than values. It is customary to display the accounting relations in the shape of the customary full general equilibrium relations (Hertel and Tsigas 1997). Equation 1 shows the market clearing conditions of marketable goods.

$$VOM(i,r) = VDM(i,r) + VST(i,r) + \sum_s VXMD(i,r,j) \quad (1)$$

where VOM (i,r) denotes the output of commodity i at market price in region r, VDM(i,r) denotes the domestic sales of commodity i at market price in region r, VST(i,r)stands for the exports of commodity i for the transportation value at market price from region r, VXMD(i,r,s) means the export of commodity i at market prices from region r to s. This equation could be modified with respect to the same quantities and a common domestic market price (PM) for i in region r as illustrates in (equation 2)

$$PM(i,r) \cdot QO(i,r) = PM(i,r) \cdot [QDS(i,j) + QST(i,r) + \sum_s QXS(i,r.s)] \quad (2)$$

where, PM(i,r) stands for the market price for commodity i in region r, QO (i, r) shows the output quantities of commodity i in region r, QDS(i,r) stands for the domestic sales of commodity i in region r, QST(i, r) stands for the export quantities of commodity i for transportations from region r, QXS(i,r,s) is the export quantities of commodity i from region r to s. By dividing equation 2 by PM(i,r) the clearing condition of the tradable commodity market form in

quantities is acquired

$$QO(i,r) = QDS(i,r) + QST(i,r) + \sum_s QXS(i,r,s) \quad (3)$$

This method can be used in any market clearing condition in quantities and turned to values by multiplying by the common price. Thus, the model's calibration problem is eased because only the value terms are needed in the GTAP database (Hertil and Tsigas, 1997).

The equations must be in a combination of weighted price and quantity changes so as to obtain the form of the accounting equation (market clearing equations) and linearize it (Hertel and Tsigas 1997). For example, it will be

$$QO(i,r) \cdot qo(i,r) = QDS(i,r) \cdot qds(i,r) + QST(i,r) \cdot qst(i,r) + \sum_s QXS(i,r,s) \cdot qxs(i,r,s) \quad (4)$$

whereby the lowercase variables are the percentage change. Again, both sides of the equation are multiplied by the common price PM(i,r) to acquire variables in value terms. The equation would be as follows for the marketable commodities:

$$VOM(i,r) \cdot qo(i,r) = VDM(i,r) + VST(i,r) \cdot qst(i,r) + \sum_s VXMD(i,r,s)\, qxs(i,r,s) \quad (5)$$

Where, VOM(i,r) is the output of commodity i at market price in region r, qo(i,r)

denotes the percentage change in the output quantities of commodity i in region r, VDM(i,r) shows the domestic sales of commodity i at market price in region r, qds(i,r) represents the percentage change in the domestic sales of commodity i in region r, VST(i,r) are the exports of commodity i for the transportation value at market price from region r, qst(i,r) is the percentage change in export quantities for commodity i for transportation from region r, VXMD(i,r,s) denotes the total exports of commodity i for the value at market prices from region r to region s, qxs(i,r,s) shows the percentage change in the export quantities of commodity i from region r to region s.

The following equations 6 and 7, enforce the equilibrium in the domestic market for the marketable commodities, whether it is imported from region r, (equation 6) or produced domestically (equation 7):

$$VIM(i,r) \cdot qim(i,r) = \sum_J VIFM(i,j,r) \cdot qfm(i,j,r) + VIPM(i,r) \cdot qpm(i,r) + VIGM(i,r) \cdot qgm(i,r) \quad (6)$$

where VIM(i,r) represents the value of imports of commodity i to region r at market price, qim(i,r) is the percentage change of imports of commodity i in region r. VIFM(i,j,r) means the total value of imported commodity i by firms from region j to region r at market price, qfm(i,j,r) indicates the percentage change of imports by firms of commodity i by firms from region j to region r at market price. VIPM(i,r) signifies the value of the imports by private

households at market prices, and qpm(i,r) shows the percentage change of imports by private households at market prices. VIGM (i,r) represents the value of imports by the government at market prices, and qgm(i,r) is its percentage change.

$$VDM(i,r) \cdot qds(i,r) = \sum_J VDFM(i,j,r) \cdot qfd(i,j,r) + VDPM(i,r) \cdot qpm(i,r) + VDGM(i,r) \cdot qgd(i,r) \quad (7)$$

where VDM(i,r) is the domestic sales of commodity i at market price in region r , qds(i,r) shows the percentage change of the domestic sales of commodity i in region r. VDFM(i,j,r) indicates the value of the domestic purchase by firms at market price, and qfd(i,j,r) denotes its percentage change. VDPM(i,r) signifies the value of domestic private household's purchases at market price and qpm(i,r) is its percentage change. VDGM(i,r) represents the value of domestic government's purchases at market price, and qgd(i,r) is the percentage change.

The following equation refers to the endowment commodities' market clearing for the non-marketable commodities. Equation 8 represents the mobile endowment presented in the common market price. Also, a slack variable is added to let the selectivity to exclude the market clearing condition and restore the rental rates in different endowment commodities:

$$VOM(i,r) \cdot qo(i,r) = \sum_J VFM(i,j,r) \cdot qfe(i,j,r) + VOM(i,r) \cdot$$

$$endwslack(i,r) \tag{8}$$

The following looks into the behavior of producers which is one of the basic elements in the economic structure of regions. First, producers own technologies that yield a constant return to scale. The calculation of intermediate demands and factors demands use the total output accordance with the Leontief production functions (figure 4). Thus, the substitution for intermediate demands and factor demand is constant.

$$q = Min\left(\frac{z_1}{a}, \frac{z_2}{b}\right) \tag{9}$$

where q represents the quantity output, z_1 is the quantity of input 1 and z_2 is the quantity of input 2, a and b are the technological determined constant. Furthermore, in Leontief production function, the elasticity of substitution is zero.

Land, labor, and capital which are factors of production, their quantities are presented in percentage change in the form *qfm(i,j,s)* and their demand is presented by the constant elasticity of substitution CES function. Furthermore, the producer purchase intermediate input that are produced domestically *qfd(i,j,s)* and intermediate (imports) *qfm(i,j,s)*. The imported intermediate input sourced by exporters *qxs(i,j,s)*.

The value-added nest is presented in the CES in the following equations:

$$QVA_P = \left(\sum_e \left(\delta_{e,p} . QFE_{e,p} \right)^{\frac{\sigma_p - 1}{\sigma_p}} \right)^{\frac{\sigma_p - 1}{\sigma_p}} \quad (10)$$

where *QVA* represent the value added quantities, and *QFE* is the quantities of primary factors of production, gotten from the demand function:

$$QFE_{e,p} = QVA_P \cdot SVA_{e,p} \cdot \left(\frac{PFE_{e,p}}{PVA_P} \right)^{-\sigma_P} \quad (11)$$

where *QFE* represent the quantities of primary factors of production, *QVA* is the value added quantities, *SVA* represent the share of endowment commodity i in the total cost of value added in sector j of r, *PFE* stands for the price of primary factors of production, *PVA* is the price of value added which is:

$$PVA_p = \left(\sum_e \left(SVA_{e,p} \cdot \left(PFE_{e,p} \right)^{\sigma_p} \right) \right)^{\frac{1}{-\sigma_p}} \quad (12)$$

where *PVA* is the price of value added, *SVA* shows the share of endowment commodity *i* in the total cost of value-added in sector *j* of *r,* and the price for primary factors of production denote *PFE*.

In addition, the equations below are the intermediate input nests in the linear form as in the GTAP specification: where

Imported goods:

$$qfm(i,j,s) = qf(i,j,s) - \sigma_D(i) \cdot [pfm(i,j,s) - pf(i,j,s)] \quad (13)$$

Domestic goods:

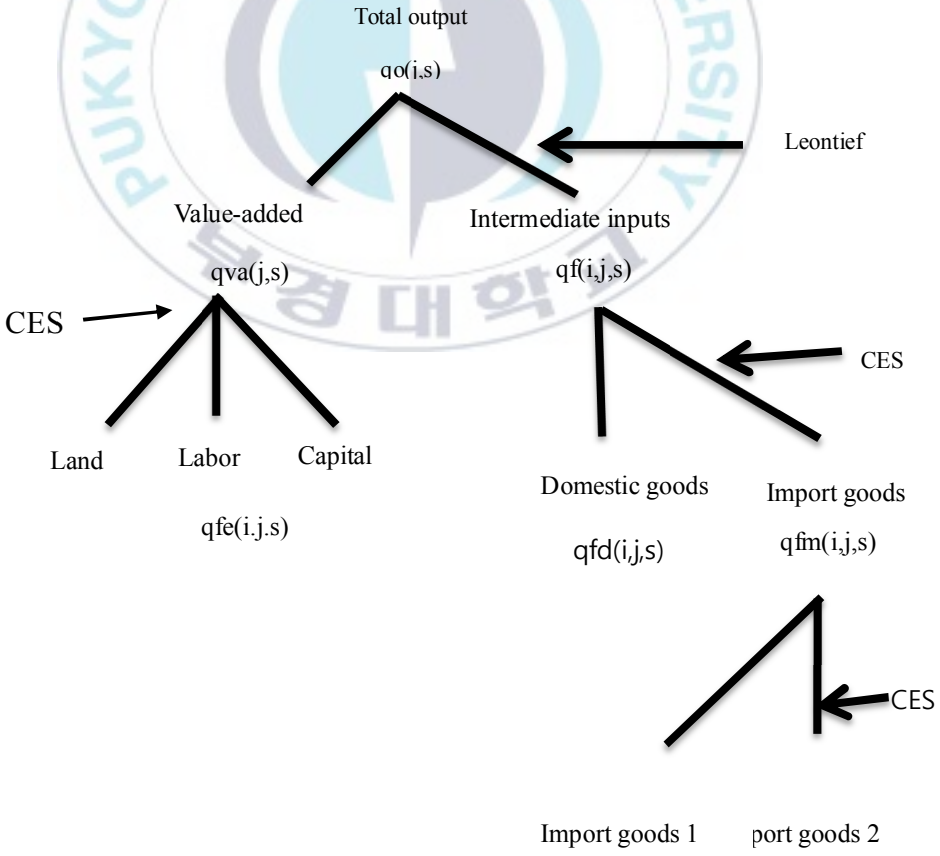
$$qfd(i,j,s) = qf(i,j,s) - \sigma_D(i) \cdot [pfm(i,j,s) - pf(i,j,s)]$$

(14)

The following equation is the nest for the imported goods by source:

$$qxs(i,r,s) = qim(i,s) - \sigma_M(i) \cdot [pms(i,r,s) - pim(i,s)] \quad (15)$$

<Figure 4> Structure of the Standard GTAP Production Function



qxs(i,r,s) qxs(i,r,s)

Source: Hertel and Tsigas (1997) page 39, chapter 2

Land, capital, and labor (value added) are projected as factor demands corresponding to the derived total output. Each demand is determined according to the constant elasticity of substitution (CES) production function and their quantities are presented in percentage change in the form $qfe(i,j,s)$.The intermediate demand is divided into domestic demands $qfd(i,j,s)$ and imports $qfm(i,j,s)$. The demands are determined according to the production function. Export of goods is defined as the difference between total output and domestic consumption $qxs(i,j,s)$ to meet the import demand of other countries (Hertel and Tsigas, 1997). The following equation shows the value added nest presented in the CES function:

$$QVA_p = \left(\sum_e \left(\delta_{e,p} \cdot QFE_{e,p} \right)^{\frac{\sigma_{p-1}}{\sigma_p}} . \right)^{\frac{\sigma_{p-1}}{\sigma_p}}$$

(16)

where QVA shows the value added quantities, and QFE represents the quantities of primary factors of production (land, labor and capital) obtained from the demand function

$$QFE_P = QVA_P \cdot SVA_{e,p} \cdot \left(\frac{PFE_{e,p}}{PVA_p}\right)^{-\sigma_p} \quad (17)$$

where QFE represents the quantities of primary factors of production, QVA represent the value added quantities, SVA is the share of endowment commodity i in the total cost of value added in sector j of r. PFE is the price of primary factor of production, PVA is the price of value added (price index), which is given by the formula below:

$$PVA_p = \left(\sum_e \left(SVA_{e,p} \cdot \left(PFE_{e,p}\right)^{-\sigma_p}\right)\right)^{\frac{1}{-\sigma_p}} \quad (18)$$

PVA is the price of value added, SVA shows the share of endowment commodity i in the total cost of value added in sector j of r, and PFE indicates the price of the primary factors of production. Moreover, the linear form represents the intermediate nest's equations as follows on the GTAP model can be displayed as follows:

Domestic goods:

$$qfd(i,j,s) = qf(i,j,s) - \sigma_D(i) \cdot [pfd(i,j,s) - pf(i,j,s)] \quad (19)$$

Imported goods:

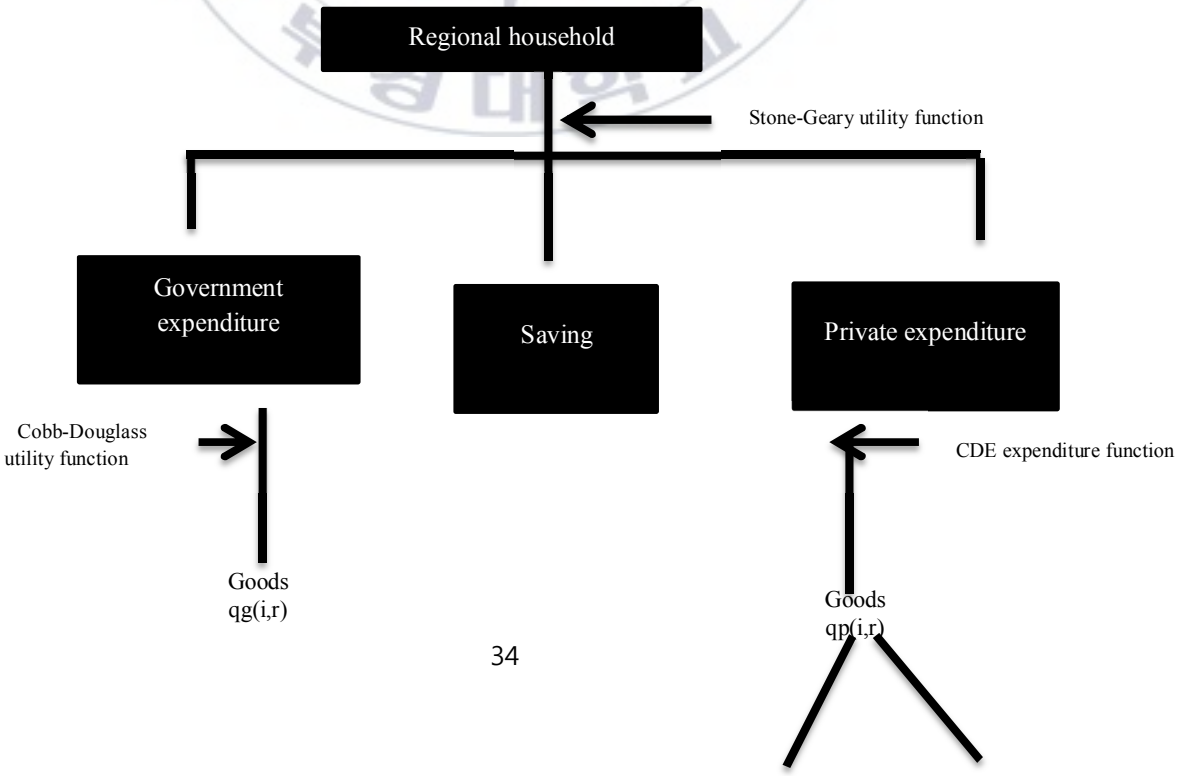
$$qfm(i,j,s) = qf(i,j,s) - \sigma_D(i) \cdot [pfm(i,j,s) - pf(i,j,s)] \quad (20)$$

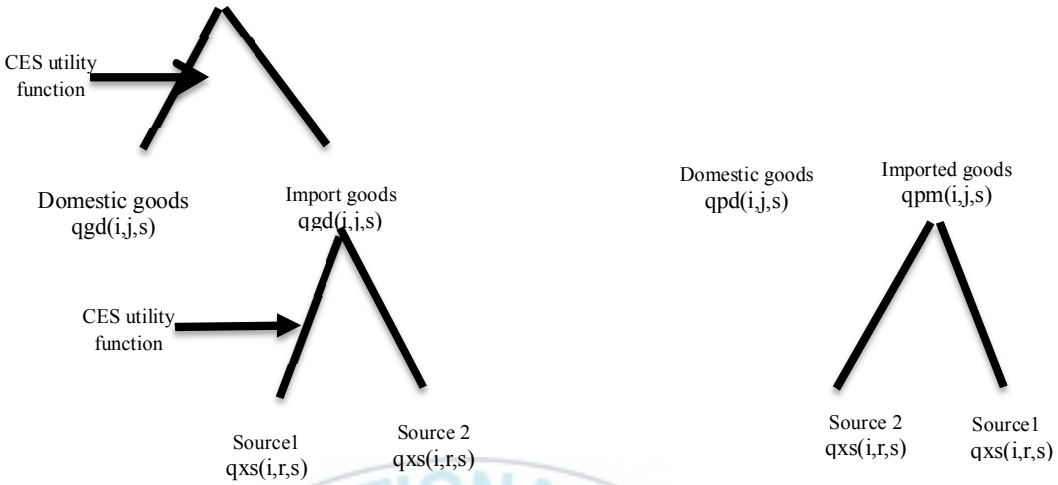
The equation below is the nest for imported goods by source:

$$qxs(i,r,s) = qim(i,s) - \sigma_M(i) \cdot [pms(i,r,s) - pim(i,s)] \quad (21)$$

The behavior of consumers (in regional economies) is controlled by the main goal to elevate the Stone-Geary utility function. It comprises of savings as an explanatory variable under budgetary boundaries. This behavior defines the expenditure of the government as a whole, private household and savings expenditures (Figure 5).

< Figure 5> Structure of consumer behavior





Source: Hertel and Tsigas (1997) page 40 chapter 2

The government expenditure is gotten from the Cobb-Douglas Function for demand by-products and from the CES functions for the demand of home and imported goods. Private household expenditure is defined by the constant difference of elasticity (CDE) function for expenditure in each of the goods classification. Demand for home and imported goods is determined by the CES function (Hertel and Tsigas, 1997).

$$\sum_{TRAD} B(i,r) \cdot UP(r)^{\beta(i,r)\gamma(i,r)} \cdot \left[\frac{PP(i,r)}{E(PP(r),UP(r))}\right]^{\beta(i.r)} \equiv 1 \qquad (22)$$

The vector of household price is denoted by PP(r). E represents the minimum expenditure needed to obtain the level of the private household utility UP(r).The minimum expenditure is utilized to normalize the individual's price. These scaled prices are powered by $\beta(i,r)$ and combined in additive form, γ

is utilized to clone the chosen income elasticity of demand. B(i,r) shows the shift term, which is a scale factor embodied in the budget share (Hertel and Tsigas). Equation 23 is the demand of the per capita private household for the marketable commodities.

$$qp(i,r) = \sum_{TRAD} EP(i,k,r) \cdot pp(k,r) + EY(i,r) \cdot [yp(r) - pop(r)] + pop(r) \quad (23)$$

The following equation is the private household's purchase of the domestic goods:

$$qpd(i,s) = qp(i,s) + \sigma_p(i) \cdot [pp(i,s) - ppd(i,s)] \quad (24)$$

The next equation is the private household's purchase of the imported goods:

$$qpm(i,s) = qp(i,s) + \sigma_p(i) \cdot [pp(i,s) - ppm(i,s)] \quad (25)$$

Lastly, is the equation for private household for all imported purchases by source:

$$qxs(i,r,s) = qim(i,s) - \sigma_M(i) \cdot [pms(i,s) - pim(i,s)] \quad (26)$$

The next five equations show the government expenditure presented in the Cobb-Douglas utility function, where a constant budget share is assumed:

$$pgove(r) = \sum_{TRAD\_COMM} \left(\frac{VGA(i,r)}{GOVEXP(r)}\right) \cdot pg(i,r) \quad (27)$$

$$qg(i,r) = ug(r) - [pg(i,r) - pgov(r)] \quad (28)$$

Pgove(r) in equation 21 denotes the price index for all the purchases of the government, and qg(i,r) in equation 29 indicates the conditional demand for the composite marketable goods. The following equation is the government's purchase of the domestic goods:

$$qgd(i,s) = qg(i,s) + \sigma_p(i) \cdot [pg(i,s) - pgd(i,s)] \quad (29)$$

The following equation is the government's purchases of the imported goods:

$$qgm(i,s) = qg(i,s) + \sigma_p(i) \cdot [pg(i,s) - pgm(i,s)] \quad (30)$$

The next equation represents the government's purchase of the imported goods by source:

$$qxs(i,r,s) = qim(i,s) + \sigma_M(i) \cdot [pms(i,s) - pim(i,s)] \quad (31)$$

3.2 Data

In this research, the GTAP model is used to evaluate the effects of a possible FTA between Cameroon and British Commonwealth of Nations. The study uses GTAP version 9 Database which contains data on 140 regions and 57 sectors

For the objective of this research, the GTAP database is aggregated into 9 regions and 9 sectors (in table 2-4 below).

<Table 2> Regional Aggregation

Region	Description	Comprising
CMR	Cameroon	Cameroon
BCWN	The British Commonwealth of Nations	Australia, Canada, Cyprus, Britain, Ghana, India, Malta, Malaysia, Nigeria, New Zealand, Pakistan, Singapore, South Africa and Kenya
EU25	European Union 25	Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France; Greece; Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Germany, Netherlands.
KR	Korea	Korea
CH	China	China
USA	U.S.A	United States of America
JP	Japan	Japan
THAI	Thailand	Thailand
ROW	Rest of the World	Rest of the World

Source: Author's Aggregation

<Table 3a> Sectoral Aggregation

Sector code	**Sector description**
RestV_F	Rest of Vegetables, fruit, nuts
Rice	Rice
Ragrcrop	Rest of agriculture crops
Lstk-prd	Livestock meat
Foodproc	Food processing
Extraction	Extraction
LightMnfc	Light Manufacturing
HeavyMnfc	Heavy manufacturing
Service	Service

Source: Author's aggregation

In table 3b, splitcom program is used to disaggregate Cocoa as an independent sector from the sector of vegetables and fruits into two separate sectors. Since cocoa cannot be classified as a sector of its own due to the fact that it's not available in the GTAP database, but it is being treated as part of vegetables and fruits. The splitcom program overcomes this barrier by creating sectors which cannot be found in the GTAP database. Cameroon is the 5th largest producer of cocoa in the world and cocoa contributes up to 18 percent of total export earnings. It will be of high necessity to see how a split of cocoa from vegetables and fruits will affect simulation results of a possible FTA between CMR and BCWN.

<Table 3b> New Sectoral Aggregations (after split)

Sector code	Sector description
Cocoa	Cocoa
RestV_F	Rest of Vegetables, fruit, nuts
Rice	Rice
Ragrcrop	Rest of agriculture crops
Lstk-prd	Livestock meat
Foodproc	Food processing

Extraction	Extraction
lightMnfc	Light Manufacturing
HeavyMnfc	Heavy manufacturing
Service	Service

Source: Author's aggregation

<Table 4> Factors Aggregation

Factors code	Factor description
Land	Land
Unsklab	Un-skill labor
Sklab	Skill labor
Capital	Capital
NatlRes	Natural resources

Source: Author's aggregation

The nature of this research focuses exclusively on a possible Free Trade Agreement between Cameroon and the British Commonwealth of Nations. The

regional aggregation is in terms of trade significances between Cameroon, the British Commonwealth of Nations and trading partners. The sectoral aggregation framework is formed to differentiate commodities that are significant in the ongoing analysis. The elasticity parameter (i.e. Armington elasticities of import / domestic substitution, primary factor substitution, and export demand elasticities) are very important for GTAP simulations. The ongoing research applies parameters that are standard in the GTAP database.

Table 5 shows the results of bilateral ad valorem tariff rates applied to various import sectors. There is a significant variation in the tariff rates between sectors. The rates indicated in the table below show that Cameroon maintains a high tariff rate on import from the British Commonwealth of Nations.

<Table 5a> Bilateral ad valorem tariff rates (%) applicable to different import Sectors

Sector	**Cameroon tariffs on import from the British Commonwealth of Nations**	**The British Commonwealth of Nations tariffs on import from Cameroon**
V_F	29.686	0.148
Rice	0	0
RAgrCrops	2.454	0.443
LstkMeat	8.342	0
ProcFood	20.099	2.733
Extraction	9.993	0.379
LightMnfc	18.614	1.354
HeavyMnfc	10.086	4.126
Services	0.000	0.000

Source: Author's aggregations

<Table 5b> New Bilateral ad valorem tariff rates (%) applicable to different import Sectors

Sectors	**Cameroon tariffs on import from the British Commonwealth of Nations**	**The British Commonwealth of Nations tariffs on import from Cameroon**
Cocoa	30.00	3.780
RestofV_F	29.686	0.148
Rice	0.000	0.000
RAgrCrops	2.454	0.443
LstkMeat	8.342	0.000
ProcFood	20.099	2.733
Extraction	9.993	0.379
LightMnfc	18.614	1.354
HeavyMnfc	10.086	4.126
Services	0.000	0.000

Source: version 9 GTAP database

In table 5b, the bilateral ad valorem tariff rates used are the weighted average tariff rate for the sectors of cocoa for Cameroon and the British

Commonwealth of Nations. This is calculated using the share of cocoa exports from Cameroon to individual countries multiplied by their tariffs and summed up to get the imported weighted average tariff rate for the bloc of British Commonwealth of Nations on Cameroon's export.

Weighted average tariff = $\sum[TR_{cocoa}^{C1-n} * \ (shex_{cocoa}^{1-n})]$ (32)

where *TR*: the import tariff rate on cocoa in individual countries.

Shex represents the share of export on cocoa to individual countries.

Furthermore, in this study, tax is altered in order to insert the new target weighted average tariff rate for Cocoa as mentioned above using the tool altertax to be able to run a simulation with the Run GTAP program. The Shock page is designed to make this easy to alter the tax rates. Next, this model is solved and the **Updated Data...Tax Rates** become the base rate in a new version based on the post-simulation database.

Altertax= $shock \ \ tms(i,s,r)$

where *shock tms:* import tax of *r* on *i* from *s*.

i signify tradable commodity from country s to country *r*

s signify the exporting country

r signify the importing country

Chapter 4 scenarios on the FTA between CMR and BCWN

To analyze the economic impact of Cameroon and the British Commonwealth of Nations FTA using a GTAP model, eight separate scenarios are run:

- Scenario 1: 50 percent import tariff cut by both Cameroon and the British Commonwealth of Nations.
- Scenario 2: 100 percent import tariff cut by Cameroon and the British Commonwealth of Nations.
- Scenario 3: 50 percent import tariff cut by both Cameroon and the British Commonwealth of Nations after the split of cocoa from vegetable and fruit.
- Scenario 4: 10 percent import tariff cut by both Cameroon and the British Commonwealth of Nations after the split of cocoa from vegetable and fruit.

- Scenario 5: Cameroon and the Commonwealth of Nations cut 50 percent of their tariffs on all import from both countries with an increase of primary factor augmenting technological change shock.
- Scenario 6: Cameroon and the Commonwealth of Nations cut 100 percent of their tariffs on all import from both countries with an increase of primary factor augmenting technological change shock
- Scenario 7: Cameroon and the Commonwealth of Nations cut 50 percent of their tariffs on all import including cocoa from both countries taking into account an increase of the primary factor augmenting technological change shock.
- Scenario 8: Cameroon and the Commonwealth of Nations cut 100 percent of their tariffs on all import including cocoa from both countries taking into account an increase of the primary factor augmenting technological change shock.

The 5th, 6th, 7th and 8th scenarios, are combined with the primary factor augmented technological shock in order to find out the long run economic growth of the country. It is assume that, in order for the economy to benefit from an FTA between Cameroon and the Commonwealth of Nations, primary factor augmented technology should be increased by 0.74 percent based on the econometric assumption which states that 1 percent increase in trade openness

will lead to 0.74 percent increase in total factor productivity (Rattsø and Stokke 2005). Thus, technical change in the context of economic development must result in more output for the same resources or the same amount of input. To calculate trade openness, simulations are run first based on the different scenario so as to collect the values of each elements to see the degree of openness.

$$TO = \frac{exports + imports}{GDP} \quad (33)$$

$$TO' = \frac{exports' + imports'}{GDP'} \quad (34)$$

$$= \frac{TO' - TO}{TO} * 100 \quad (35)$$

$$\text{TFP} = TO * 0.74 \quad (36)$$

where TO stands for the trade openness for the base year

TO' Refers to the trade openness after the run of simulations

GDP stands for the gross domestic product for the base year

GDP' Stands for the gross domestic product after the run of the simulations

$Exports$ stands for the export at the base year

$Exports'$ stands for the export after the run of the simulation

$Imports$ stands for the import at the base year

$Imports'$ stands for the import after the simulation

TFP stands for the Total Factor Productivity

Chapter 5 Simulation Results

This section focuses on discussing in detail the results of the empirical analysis. The objective is to use the GTAP model and run simulations to carry out quantitative analysis. This will help in showing the potential economic effects of the 8 free trade implementation options described above. The results are demonstrated in two parts, the macroeconomic effects and the microeconomic effects.

5.1. Macroeconomic effects.

The elimination of bilateral trade tariffs have a significant effect on the Cameroonian economy than on the British Commonwealth of Nation's economy. In scenario 1 and 2, the GDP of Cameroon increases by 0.0775 percent and 0.0553 percent respectively. Without the primary factor augmenting technological shock in scenario 1 and 2, there is just a slight increase in the British Commonwealth of Nations real GDP of 0.0001 percent and 0.0003 percent respectively. In scenario 3 and 4, with Cocoa split from Vegetable and Fruit, the results show a slight increase in Cameroon’s GDP from 0.0775 percent to 0.079 percent in scenario 3 and from 0.0553 percent to 0.0556 percent in scenario 4. However other regions in the four scenarios witness a negative impact on their GDP. This shows that the FTA is

profitable only to the member countries. In effect, the above results show that non-member countries will be at a disadvantage as a result of trade diversion.

In scenarios 1, 2, 3 and 4, the welfare which is projected by the Equivalent Variation (EV) is positive for the BCWN (US$ 57.767 million, US$ 143.123 million, US$ 57.754 million, US$ 143.086 million respectively) and positive for Cameroon in scenario 1 and 3 (US$ 5 million and US$ 4.990 million). While negative in scenarios 2 and 4 (US$ 29.339 million and US$ 29.234 million). The negative impact of welfare on a 100 percent cut is as a result of low tariff rate imposed on Cameroon's exports to the British Commonwealth of Nations before the simulation.

In the case of scenario 5, 6, 7 and 8, there is a greater increase in Cameroon's GDP (3.2157 percent, 7.977 percent, 3.215 percent and 7.978 percent) due to an increase in augmented technological change shock which was added into the scenarios. In scenario 7 and 8, bearing in mind that the augmented technological change shock results to an increase in Cameroon's GDP, Cocoa when split from Vegetable and Fruit also contribute to its significant increase. While the GDP for the British Commonwealth of Nations increases by 0.0001percent in scenario 5 and by 0.0003 percent in scenario 8. But the other regions witness a negative impact on their GDP in the same scenario. Moreover, the economy of Cameroon is likely to have a positive impact in its welfare amounting to (USD 847.5263 million, USD 2049.339 million, USD 847.612 million and USD 2073.732 million) respectively,

And the British Commonwealth of Nations will also witness a gain of (USD 54.6161 million, USD 143.51 million USD 54.63 million, USD 143.562 million) in all scenarios.

<Table 6> The effects of an FTA between Cameroon and the British Commonwealth of Nations on Welfare (USD million) and the GDP (% change)

	Sc1		**Sc2**		**Sc3**		**Sc4**	
Region	EV	GDP	EV	GDP	EV	GDP	EV	GDP
CMR	4.956	0.078	-29.339	0.055	4.99	0.079	-29.234	0.056
BCWN	57.767	0.0001	143.123	0.0003	57.754	0.0001	143.086	0.0003
EU25	-13.056	-0.000	-29.332	-0.000	-13.07	-0.000	-29.344	-0.000
KOR	-1.768	-0.000	-3.839	-0.000	-1.771	-0.000	-3.845	-0.000
CHN	-8.377	-0.000	-19.051	-0.000	-8.381	-0.000	-19.06	-0.000
JPN	-3.195	-0.000	-6.907	-0.000	-3.199	-0.000	-6.914	-0.000
THA	-0.646	-0.000	-1.598	-0.000	-0.645	-0.000	-1.594	-0.000
USA	-8.470	-0.000	-18.625	-0.000	-8.434	-0.000	-18.548	-0.000
ROW	-4.628	-0.000	-10.241	-0.000	-4.649	-0.000	-10.263	-0.000

Source: Author's simulations using the RunGTAP

<Table 7> The effects of an FTA on Welfare (USD million) and the GDP (% change)

Scenarios	**Sc5**		**Sc6**		**Sc7**		**Sc8**	
Region	EV	GDP	EV	GDP	EV	GDP	EV	GDP
CMR	847.5263	3.2157	2049.339	7.977	847.612	3.2158	2073.732	7.978
BCWN	54.6161	0.0001	143.51	0.0001	54.63	0.0001	143.562	0.003
EU25	-32.6629	-0.000	-73.728	-0.000	-33.02	-0.001	-74.96	-0.000
KOR	-4.366	-0.000	-9.609	-0.000	-4.37	-0.001	-9.676	-0.000
CHN	-16.1169	-0.000	-34.299	-0.000	-16.11	-0.001	-34.402	-0.000
JPN	-10.6675	-0.000	-23.855	-0.000	-10.68	-0.000	-24.046	-0.000
THA	-0.007	-0.000	-0.031	-0.000	-0.000	-0.000	-0.000	-0.000
USA	-27.2094	-0.000	-61.539	-0.000	-27.15	-0.000	-61.85	-0.000
ROW	-13.6358	-0.000	-29.572	-0.000	-13.920	-0.000	-30.378	-0.000

Source: Author's simulations using the RunGTAP

From table 8 to 11 below, the welfare decomposition originates from the allocation effect, terms of trade, and the investment trade for scenarios 1, 2, 3 and 4 respectively. From the scenarios carried out, Cameroon witnesses a gain in welfare in scenarios 1 and 3 and a loss in scenarios 2 and 4, as a result of a negative terms of trade and also a negative savings/investment. While the BCWN witness a gain in welfare due to a high performance in terms of trade and also in allocative efficiency.

However, tables 12 to 16 show that Cameroon witnesses a gain of (USD 847.5263 million, USD2049.339 million, USD 847.612 million, USD 2073.732 million) in welfare in scenarios 5, 6, 7 and 8 respectively, as a result of an increase in the augmented technological change shock added to the simulation which is made up of elements such as allocation efficiency, technological change. Nevertheless, the terms of trade and savings and investment keep declining, as well as non-member countries have negative effects on the disaggregated welfare.

<Table 8>The Welfare Decomposition effect of an FTA for Scenario 1 (USD million)

Regions	Allocation effect	Tech. change	Terms of trade	Investment trade	Total
CMR	19.751	0.000	-11.236	-3.559	4.956
BCWN	11.744	0.000	43.165	2.858	57.767
EU25	-2.854	0.000	-10.144	-0.057	-13.056
KOR	-0.180	0.000	-1.631	0.042	-1.768
CHN	-1.556	0.000	-7.688	0.867	-8.377
JPN	-0.214	0.000	-2.932	-0.049	-3.195
THA	-0.124	0.000	-0.528	0.006	-0.646
USA	-0.504	0.000	-6.493	-1.473	-8.47
ROW	-3.472	0.000	-2.519	1.363	-4.628
Total	22.592	0.000	-0.006	-0.002	22.583

Source: Author's simulations using the RunGTAP

<Table 9> The Welfare Decomposition effect of an FTA for Scenario 2 (USD million)

Region	Allocation effect	Tech. change	Terms of trade	Investment trade	Total
CMR	14.101	0.000	-33.247	-10.193	-29.339
BCWN	29.464	0.000	106.234	7.425	143.123
EU25	-5.926	0.000	-23.385	-0.021	-29.332
KOR	-0.380	0.000	-3.569	0.110	-3.839
CHN	-3.538	0.000	-17.787	2.274	-19.051
JPN	-0.462	0.000	-6.379	-0.066	-6.907
THA	-0.309	0.000	-1.307	0.018	-1.598
USA	-1.028	0.000	-14.642	-2.955	-18.625
ROW	-7.639	0.000	-5.989	3.387	-10.241
Total	24.284	0.000	-0.071	-0.021	24.192

Source: Author's simulations using the RunGTAP

<Table 10> The Welfare Decomposition effect of an FTA for Scenario 3 (USD million)

Region	Allocation effect	Tech change	Terms of trade	Investment trade	Total
CMR	19.784	0.000	-11.234	-3.559	4.990
BCWN	11.742	0.000	43.155	2.857	57.754
EU25	-2.870	0.000	-10.142	-0.058	-13.070
KOR	-0.181	0.000	-1.632	0.042	-1.771
CHN	-1.557	0.000	-7.688	0.865	-8.381
JPN	-0.214	0.000	-2.935	-0.050	-3.199
THA	-0.124	0.000	-0.527	0.006	-0.645
USA	-0.505	0.000	-6.461	-1.468	-8.434
ROW	-3.470	0.000	-2.543	1.363	-4.649
Total	22.606	0.000	-0.007	-0.002	22.597

Source: Author's simulations using the RunGTAP

<Table 11> The Welfare Decomposition effect of an FTA for Scenario 4 (USD million)

Region	Allocation effect	Tech change	Terms of trade	Investment trade	Total
CMR	14.188	0.000	-33.231	-10.191	-29.234
BCWN	29.46	0.000	106.204	7.421	143.086
EU25	-5.914	0.000	-23.407	-0.024	-29.344
KOR	-0.382	0.000	-3.572	0.11	-3.845
CHN	-3.539	0.000	-17.79	2.269	-19.060
JPN	-0.462	0.000	-6.384	-0.067	-6.914
THA	-0.309	0.000	-1.303	0.018	-1.594
USA	-1.032	0.000	-14.573	-2.943	-18.548
ROW	-7.634	0.000	-6.015	3.386	-10.263
Total	24.376	0.000	-0.071	-0.021	24.284

Source: Author's simulations using the RunGTAP

<Table 12> The Welfare Decomposition effect of an FTA for Scenario 5 (USD million)

Region	Allocation effect	Tech. change	Terms of trade	Investment trade	Total
CMR	102.441	716.6818	39.9326	-11.5291	847.5263
BCWN	8.820	0.000	42.0971	3.6989	54.6161
EU25	-11.3632	0.000	-22.6098	1.3102	-32.6629
KOR	-1.1172	0.000	-3.7191	0.4702	-4.3661
CHN	-5.6097	0.000	-16.6641	6.1569	-16.1169
JPN	-0.5348	0.000	-10.4536	0.3209	-10.6675
THA	-0.1553	0.000	0.0629	0.0855	-0.007
USA	-2.8266	0.000	-17.1706	-7.2123	-27.2094
ROW	-8.7203	0.000	-11.6846	6.7691	-13.6358
Total	80.9339	716.6818	-0.2091	0.0704	797.4769

Source: Author's simulations using the RunGTAP

<Table 13> The Welfare Decomposition effect of an FTA for Scenario 6 (USD million)

Regions	Allocation effect	Tech. change	Terms of trade	Investment trade	Total
CMR	205.74	1800.817	81.506	-38.723	2049.339
BCWN	23.987	0.000	108.531	10.992	143.51
EU25	-26.143	0.000	-51.988	4.403	-73.728
KOR	-2.56	0.000	-8.425	1.377	-9.609
CHN	-13.122	0.000	-39.144	17.967	-34.299
JPN	-1.267	0.000	-23.843	1.254	-23.855
THA	-0.401	0.000	0.112	0.258	-0.031
USA	-6.396	0.000	-39.24	-15.903	-61.539
ROW	-20.137	0.000	-28.394	18.959	-29.572
Total	159.7	1800.817	-0.885	0.584	1960.216

Source: Author's simulations using the RunGTAP

<Table 14> The Welfare Decomposition effect of an FTA for Scenario 7 (USD million)

Regions	**Allocation effect**	**Tech. change**	**Terms of trade**	**Investment trade**	**Total**
CMR	102.480	716.690	39.990	-11.540	847.612
BCWN	8.830	0.000	42.11	3.690	54.63
EU25	-11.890	0.000	-22.43	1.310	-33.02
KOR	-1.120	0.000	-3.72	0.470	-4.37
CHN	-5.610	0.000	-16.65	6.150	-16.11
JPN	-0.540	0.000	-10.46	0.320	-10.68
THA	-0.160	0.000	0.070	0.090	0.000
USA	-2.830	0.000	-17.11	-7.220	-27.15
ROW	-8.720	0.000	-120	6.800	-13.920
Total	80.450	716.69	-0.210	0.070	796.990

Source: Author's simulations using the RunGTAP

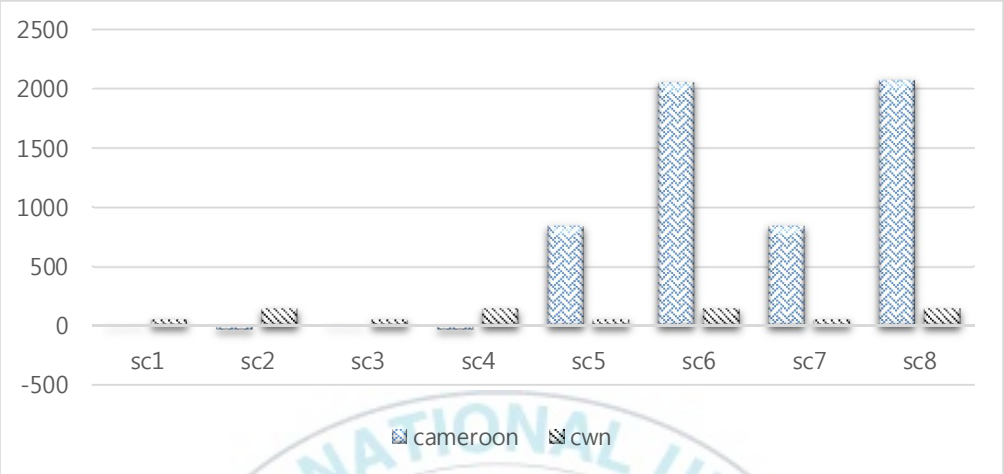
<Table 15> The Welfare Decomposition effect of an FTA for Scenario 8 (USD million)

Regions	Allocation effect	Tech. change	Terms of trade	Investment trade	Total
CMR	207.933	1822.173	82.794	-39.169	2073.732
BCWN	23.944	0.000	108.583	11.035	143.562
EU25	-27.545	0.000	-51.873	4.458	-74.96
KOR	-2.582	0.000	-8.487	1.393	-9.676
CHN	-13.224	0.000	-39.337	18.159	-34.402
JPN	-1.277	0.000	-24.039	1.27	-24.046
THA	-0.402	0.000	0.141	0.261	0.000
USA	-6.450	0.000	-39.354	-16.046	-61.85
ROW	-20.277	0.000	-29.338	19.237	-30.378
Total	160.121	1822.173	-0.910	0.598	1981.982

Source: Author's simulations using the RunGTAP

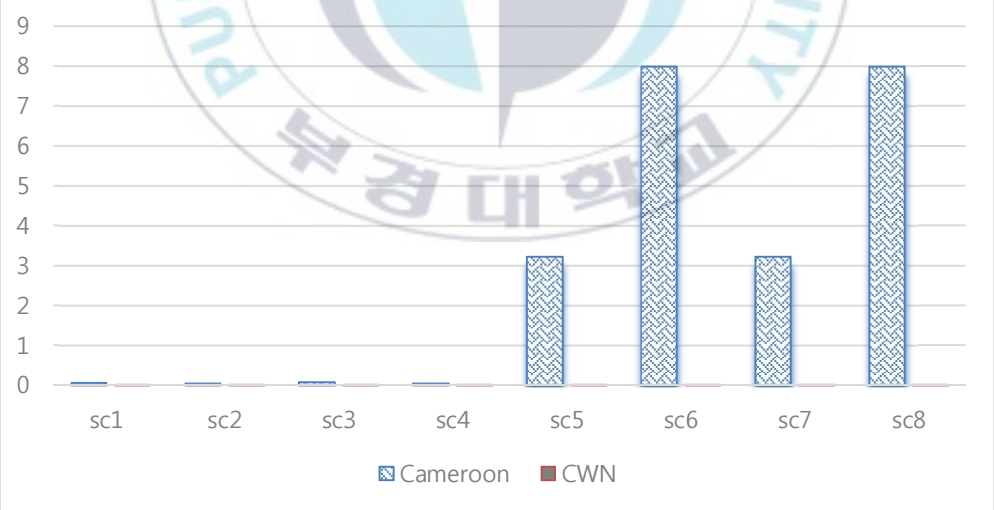
These results show the effect of Augmenting Technological Change shock, which has some positive effects on Cameroon (in an FTA between Cameroon and the British Commonwealth of Nations). Nevertheless, some losses were experienced in scenarios 1 and 2 in the case of Cameroon due to the domination of a negative terms of trade and a negative investment and savings on allocative efficiency. However, there is more gain in welfare in scenarios 5, 6, 7 and 8.

<Figure 6> The impacts of an FTA on Welfare (USD million)



Source: Author's simulations using the RunGTAP

<Figure 7> The impacts of an FTA on economic growth rate (% change)



Source: Author's simulations using the RunGTAP

Tables 16 and 17 illustrate the total value of imports at world price by both Cameroon and the BCWN. As we found out, sectors in scenarios I, 2, 3, 4, 5, 6, 7 and 8 like V_F, light manufacturing and heavy manufacturing, process food, rice, extraction, livestock meat experience some positive increase respectively. For the case of cocoa, there is an increase in the total import at world price in scenario 7 and 8 only when the primary factor augmented technological shock is included in the scenarios. Notwithstanding, these sectors show an increase in all the scenarios, this means extraction and V_F are sectors from which Cameroon imports the more.

Tables 18 and 19 show the effect of the FTA on the total bilateral exports between Cameroon and the British Commonwealth of Nations in the 8 scenarios. Based on the simulation results in scenario 1, Cameroon witnesses an increase on bilateral export in sectors like extraction and heavy manufacturing. In scenario 2, Cameroon exports increased in sectors like vegetable-fruit, livestock meat, extraction, light and heavy manufacturing, processed foods, rest of agricultural crops and services. In scenarios 5 and 6, when taking into account the total factor productivity shock, Cameroon's export increases in sectors such as rest of agricultural crops, process foods, light and heavy manufacturing, extraction and services. In scenarios 3 and 4, when cocoa is split from vegetable and fruits, Cameroon exports of cocoa at world price decreases in scenario 3 but increases in scenario 4. Based on the information mentioned in the table below, Cameroon's exports at world price would decline significantly mostly in scenario 8 in the case

of more trade openness. Also, the British Commonwealth of Nations exports at world price decreased especially in sectors like livestock meat and services, rice and rest of agricultural crops.

<Table 16> The effect of an FTA between CMR and BCWN on total trade bilateral import at world prices (% change)

Viwd	**Sc1**		**Sc2**		**Sc5**		**Sc6**	
	CMR	CWN	CMR	CWN	CMR	CWN	CMR	CWN
V_F	14.933	0.004	38.565	0.011	38.565	0.011	57.386	0.009
Rice	0.106	0.007	-0.02	0.018	-0.02	0.018	7.779	0.003
RAgrCrops	-0.143	0.008	-0.691	0.02	-0.691	0.02	4.768	0.009
LstkMeat	0.523	0.006	0.578	0.015	0.578	0.015	14.353	0.012
ProcFood	2.309	0.005	5.967	0.011	5.967	0.011	14.026	0.008
Extraction	13.998	0.003	30.396	0.006	30.396	0.006	33.463	0.001
LightMnfc	2.328	0.004	6.567	0.011	6.567	0.011	17.824	0.007
HeavyMnfc	0.196	0.002	0.585	0.006	0.585	0.006	6.152	0.001
Services	0.047	0.003	-0.337	0.009	-0.337	0.009	12.316	0.004

Source: Author's simulations using the RunGTAP

<Table 17> The effect of an FTA between CMR and BCWN on total trade bilateral import at world prices (% change)

Viwd	**Sc3**		**Sc4**		**Sc7**		**Sc8**	
	CMR	CWN	CMR	CWN	CMR	CWN	CMR	CWN
Cocoa	-0.038	0.004	-0.565	0.011	3.209	0.004	7.124	0.01
RestV_F	15.919	0.004	40.813	0.011	22.533	0.003	60.781	0.009
Rice	0.106	0.007	-0.02	0.018	3.338	0.001	7.778	0.004
RagrCrops	-0.143	0.008	-0.691	0.02	2.091	0.003	4.762	0.009
LstkMeat	0.523	0.006	0.58	0.015	6.154	0.005	14.343	0.012
ProcFood	2.310	0.005	5.969	0.011	5.544	0.003	14.023	0.008
Extraction	13.998	0.003	30.396	0.006	15.123	0.001	33.468	0.001
LightMnfc	2.328	0.004	6.567	0.011	6.95	0.003	17.821	0.007
HeavyMnfc	0.196	0.002	0.585	0.006	2.66	0	6.151	0.001
Services	0.047	0.003	-0.337	0.009	5.167	0.002	12.314	0.004

Source: Author's simulations using the RunGTAP

<Table 18> The effect of an FTA between CMR and BCWN on total trade bilateral export at world prices (% change)

Vxwd	**Sc1**		**Sc2**		**Sc3**		**Sc4**	
	CMR	CWN	CMR	CWN	CMR	CWN	CMR	CWN
V_F	-9.053	0.05	0.22	0.029	-0.103	0.012	-4.109	0.02
Rice	-18.671	0.019	-0.009	-0.015	-0.44	-0.005	-8.856	0.009
RagrCrops	-13.425	0.007	1.09	-0.015	0.143	-0.005	-6.167	0.005
LstkMeat	-13.498	-0.029	1.053	-0.023	-0.046	-0.009	-6.566	-0.011
ProcFood	-4.028	0.096	1.67	0.085	0.467	0.034	-2.085	0.037
Extraction	6.242	0.01	7.283	0.012	3.355	0.006	2.867	0.005
LightMnfc	-5.358	0.03	2.294	0.029	0.649	0.01	-2.797	0.009
HeavyMnfc	13.855	-0.006	11.029	0	4.593	0	5.357	-0.002
Services	-5.629	-0.009	0.331	-0.011	0.004	-0.004	-2.593	-0.003

Source author's simulations using the RunGTAP

<Table 19> The effect of an FTA between CMR and BCWN on Total trade bilateral export at world prices (% change)

Vxwd	**Sc5**		**Sc6**		**Sc7**		**Sc8**	
	CMR	CWN	CMR	CWN	CMR	CWN	CMR	CWN
Cocoa	-0.103	-0.002	0.227	-0.006	-3.56	-0.002	-7.726	-0.007
RestV_F	-0.106	0.012	0.212	0.028	-4.211	0.021	-9.298	0.052
Rice	-0.44	-0.005	-0.01	-0.015	-8.851	0.009	-18.661	0.019
RagrCrops	0.143	-0.005	1.089	-0.015	-6.159	0.005	-13.408	0.006
LstkMeat	-0.046	-0.009	1.051	-0.023	-6.558	-0.011	-13.481	-0.029
ProcFood	0.466	0.034	1.667	0.085	-2.082	0.037	-4.021	0.096
Extraction	3.355	0.006	7.283	0.012	2.867	0.005	6.242	0.01
LightMnfc	0.649	0.01	2.294	0.029	-2.793	0.009	-5.35	0.030
HeavyMnfc	4.593	0.000	11.028	0.00	5.36	-0.002	13.863	-0.006
Services	0.004	-0.004	0.331	-0.011	-2.591	-0.003	-5.626	-0.009

Source: Author's simulations using the RunGTAP

Table 20 below shows the terms of trade of Cameroon in the FTA and the Commonwealth of Nations. In International economics, the terms of trade is measured in percentage which is expressed as a ratio of the price of export commodities to the price of import commodities in a country. In the case of Cameroon and the Commonwealth of Nations, on a possible free trade agreement, this may lead to some positive and negative terms of trade for Cameroon. According to the result obtained in scenario 1, Cameroon records -0.183 percent change in value. In scenario 2 Cameroon still records a negative terms of trade of -0.533 percent change in value. When the total factor augmented technological shock is

introduced, the terms of trade of Cameroon witnesses some positive effects, scenario 5 shows a result of 0.665 percent change in value and also, in scenario 6, it records a 1.375% change in value. With the split of cocoa from vegetable and fruits, the terms of trade of Cameroon increase the most 0.666 percent change in value in scenario 7 and 1.398 percent change in value in scenario 8.

<Table 20> The effect of an FTA between CMR and BCWN on the Terms of trade for all regions

Tot	**Sc1**	**Sc2**	**Sc3**	**Sc4**	**Sc5**	**Sc6**	**Sc7**	**Sc8**
CMR	-0.183	-0.533	-0.183	-0.533	0.665	1.375	0.666	1.398
CWN	0.002	0.004	0.002	0.004	0.002	0.004	0.0015	0.004
EU25	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001	-0.004	-0.001
KOR	-0.000	-0.001	-0.000	-0.001	-0.000	-0.001	-0.006	-0.001
CHN	-0.000	-0.001	-0.000	-0.001	-0.000	-0.002	-0.008	-0.002
JPN	-0.000	-0.001	-0.000	-0.001	-0.001	-0.003	-0.011	-0.003
THA	-0.000	-0.001	-0.000	-0.001	-0.000	-0.000	0.000	-0.000
USA	-0.000	-0.001	-0.000	-0.001	-0.001	-0.002	-0.001	-0.002
ROW	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001	-0.002	-0.001

Source: Author's simulations using the RunGTAP

Tables 21 and 22 show trade balance represented by the change in USD million. The trade balance is represented by the difference between the total value of exported and the total value imported commodities of a country. According to the simulation results, Cameroon records a positive effect in trade balance in the first four scenarios in sectors like cocoa, rest of agricultural crops, heavy manufacturing. Sectors like rice and services witness a positive trade balance in scenario 1 in the

last four scenarios, Cameroon records a trade balance deficit in all sectors as a result

<Table 21> The effect of an FTA on Trade balance by sector

	Sc1		**Sc2**			**Sc3**		**Sc4**	
Sectors	CMR	CWN	CMR	CWN	Sectors	CMR	CWN	CMR	CWN
V_F	-2.246	0.671	-4.922	1.493	Cocoa	0.001	-0.182	0.006	-0.454
Rice	-0.212	-0.697	0.023	-1.863	RestV_F	-2.234	0.829	-4.856	1.850
RagrCrops	1.082	-4.341	7.455	-11.983	Rice	-0.212	-0.697	0.023	-1.861
LstkMeat	-0.100	-4.507	-0.029	-11.34	RagrCrops	1.083	-4.336	7.450	-11.967
ProcFood	-17.518	33.989	-44.217	84.221	LstkMeat	-0.001	-4.503	-0.029	-11.33
Extraction	-22.863	13.389	-49.68	27.852	ProcFood	-17.524	33.992	-44.239	84.235
LightMnfc	-27.815	15.605	-75.499	56.546	Extraction	-22.863	13.387	-49.681	27.844
HeavyMnfc	34.579	-25.637	80.07	-72.870	LightMnfc	-27.814	15.613	-75.506	56.572
Services	-0.610	-49.720	11.588	-126.937	HeavyMnfc	34.579	-25.628	80.057	-72.841
					Services	-0.611	-49.719	11.574	-126.925

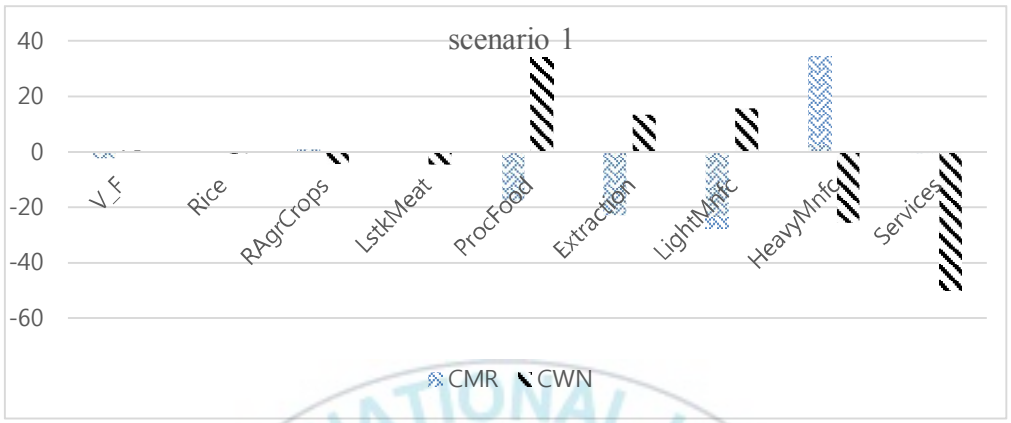
Source: Author's simulations using the RunGTAP

<Table 22> The effect of an FTA on Trade balance for by sector

DTBALi	**Sc5**		**Sc6**		DTBALi	**Sc7**		**Sc8**	
Sectors	CMR	CWN	CMR	CWN	Sectors	CMR	CWN	CMR	CWN
V_F	-10.340	2.012	-24.244	4.937	Cocoa	-0.040	-0.163	-0.089	-0.423
Rice	-6.650	0.582	-15.489	1.117	RestV_F	-10.476	2.316	-24.548	5.656
RagrCrops	-38.474	1.414	-84.185	0.703	Rice	-6.649	0.57	-15.486	1.089
LstkMeat	-1.618	-4.822	-3.638	-12.699	RagrCrops	-38.426	1.386	-84.081	0.644
ProcFood	-49.332	39.322	-121.948	100.681	LstkMeat	-1.617	-4.815	-3.635	-12.683
Extraction	-36.821	16.867	-83.154	36.233	ProcFood	-49.314	39.305	-121.91	100.644
LightMnfc	-113.141	22.578	-278.571	79.454	Extraction	-36.833	16.874	-83.18	36.248
HeavyMnfc	-22.059	-25.417	-38.263	-78.883	LightMnfc	-113.1	22.568	-278.478	79.433
Services	-128.091	-32.705	-294.261	-92.428	HeavyMnfc	-22.012	-25.434	-38.148	-78.918
					Services	-128.048	-32.753	-294.167	-92.534

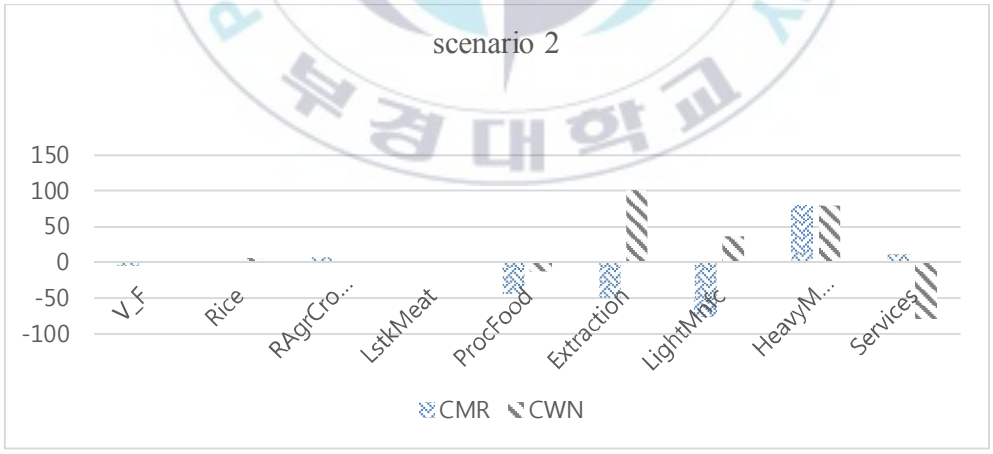
Source: Author's simulations using the RunGTAP

<Figure 8>The effect of an FTA CMR and BCWN on Trade balance (USD million)



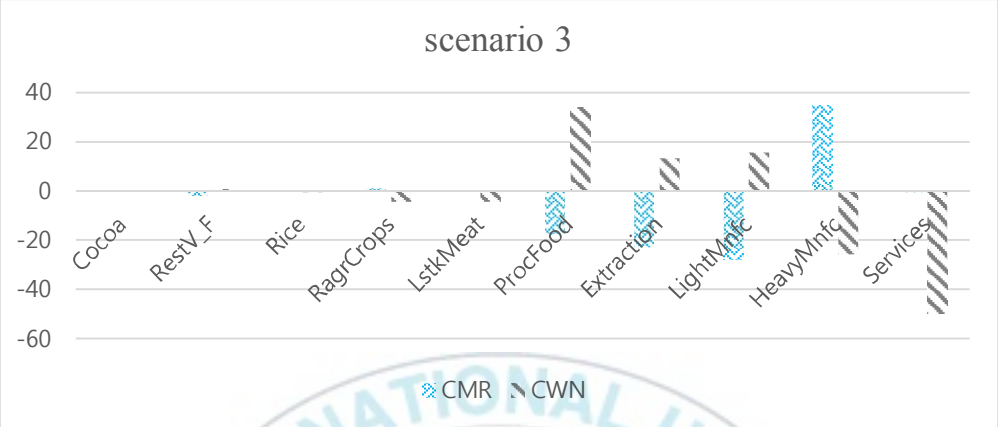
Source: Author's simulation using the RunGTAP

<Figure 9> The effect of an FTA CMR and BCWN on Trade balance (USD million)



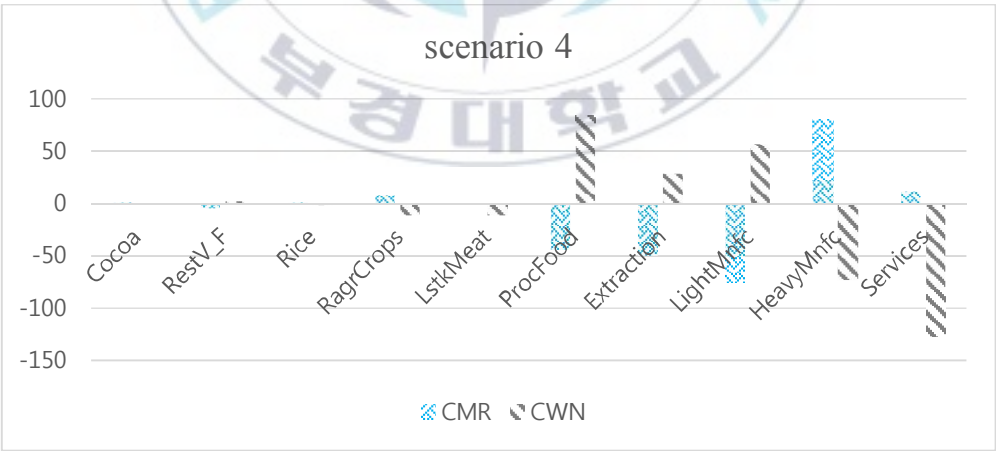
Source: Author's simulation using the RunGTAP

<Figure 10> The effect of an FTA CMR and BCWN on Trade balance (USD million)



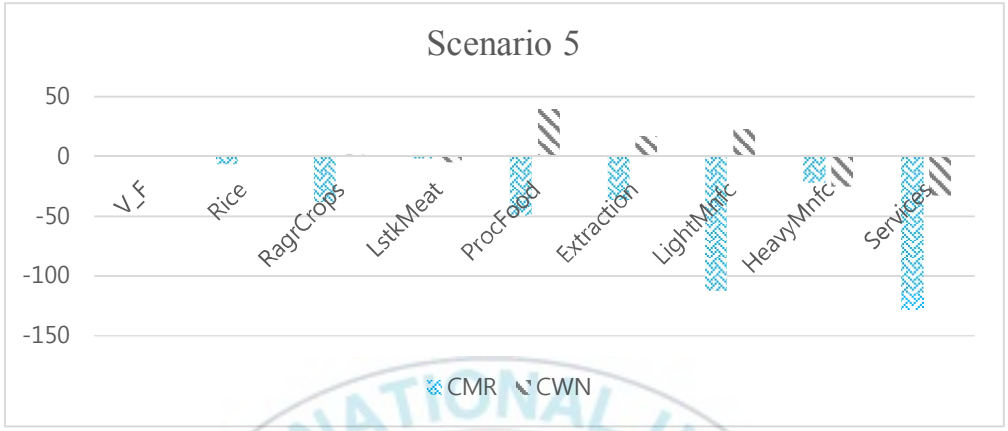
Source: Author's simulation using the RunGTAP model

<Figure 11>The effect of an FTA CMR and BCWN on Trade balance (USD million)



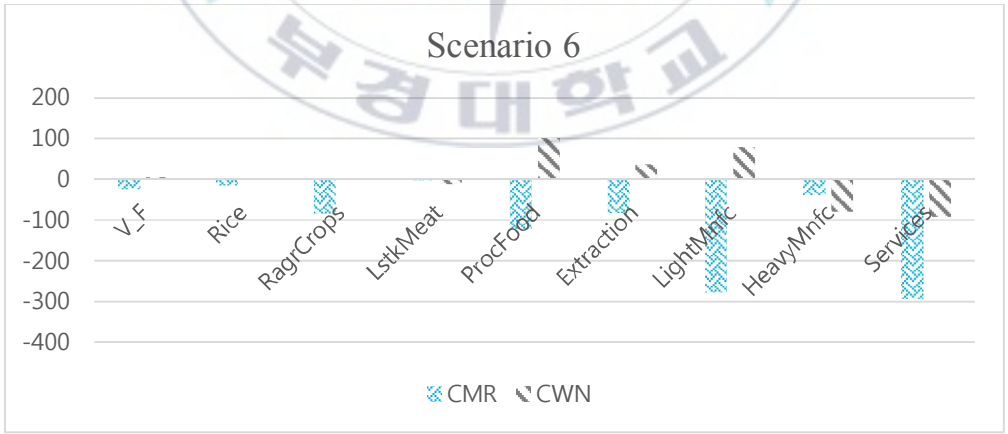
Source: Author's simulation using the RunGTAP

<Figure 12> The effect of an FTA between CMR and BCWN on Trade balance (USD million)



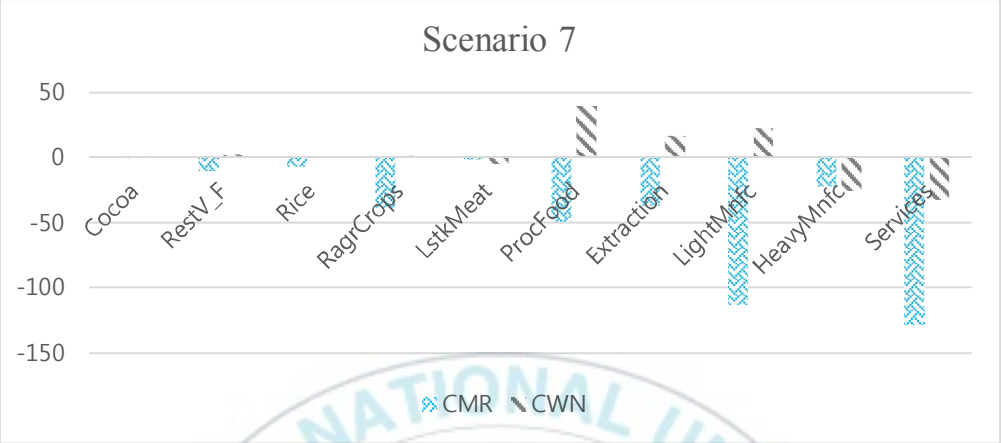
Source: Author's simulation using the RunGTAP

<Figure 13> The effect of an FTA between CMR and BCWN on Trade balance (USD million)



Source: Author's simulation using the RunGTAP

<Figure 14> The effect of an FTA between CMR and BCWN on Trade balance (USD million)



Source: Author's simulation using the RunGTAP

<Figure 15> The effect of an FTA between CMR and BCWN on Trade balance (USD million)

Source: Author's simulation using the RunGTAP

4.2 Microeconomic effects

Tables 18 and 19 show the effects of the FTA between Cameroon and the Commonwealth of Nations on value added, especially on produced commodities. The FTA shows that Cameroon has greater advantage over the British Commonwealth of Nations. When there an increase in the primary factor augmented technological change, Cameroon gains in sectors such as cocoa, livestock meat, heavy manufacturing and services increase in a long run from the liberalization (scenarios 5 to 8). From the simulations in scenarios 5 to 8, Cameroon also experiences some loss in sectors like rest of vegetable and fruits, rice, rest of agricultural crops, processed food, extraction and light manufacturing. The Commonwealth of Nations also benefits from the possible FTA in sectors like processed food, light manufacturing, and heavy manufacturing and services.

<Table 23> The effects of an FTA between Cameroon and the British Commonwealth of Nations on Value added (% change)

Sectors	Sc1		Sc2			Sc3		Sc4	
qva	CMR	CWN	CMR	CWN	Qva	CMR	CWN	CMR	CWN
V_F	-0.133	0.001	-0.364	0.002	Cocoa	-0.060	0.000	-0.227	0.000
Rice	-0.237	0.000	-0.019	-0.001	RestV_F	-0.145	0.001	-0.386	0.003
RAgrCrops	-0.095	0.000	0.073	0.000	Rice	-0.237	0.000	-0.019	-0.001
LstkMeat	-0.005	-0.001	-0.115	-0.002	RAgrCrops	-0.095	0.000	0.073	0.000
ProcFood	-0.654	0.005	-1.532	0.014	LstkMeat	-0.004	-0.001	-0.114	-0.002
Extraction	-0.238	-0.000	-0.37	0.000	ProcFood	-0.655	0.005	-1.533	0.014
LightMnfc	-0.566	0.001	-1.375	0.004	Extraction	-0.238	0.000	-0.37	0.000
HeavyMnfc	1.269	-0.002	2.968	-0.004	LightMnfc	-0.566	0.001	-1.375	0.004
Services	0.121	0.000	0.247	0.000	HeavyMnfc	1.269	-0.002	2.968	-0.004
CGDS	0.855	0.001	1.807	0.003	Services	0.121	0.000	0.247	0.000
					CGDS	0.855	0.001	1.807	0.003

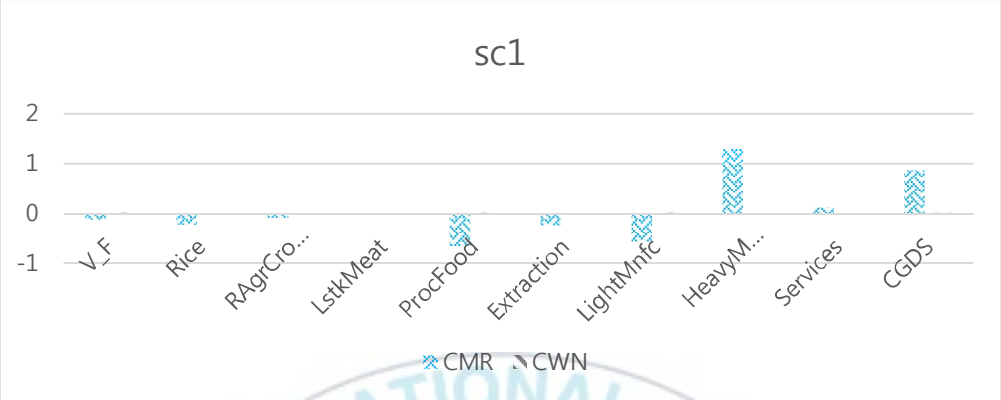
Source: Author's simulation using the RunGTAP

<Table 24> The effects of an FTA between Cameroon and the British Commonwealth of Nations on Value added (% change)

Sectors	Sc5		Sc6			Sc7		Sc8	
Qva	CMR	CWN	CMR	CWN	Qva	CMR	CWN	CMR	CWN
V_F	-0.164	0.0016	-0.47	0.004	Cocoa	0.150	0.000	0.206	0.001
Rice	-5.2576	0.0012	-11.435	0.003	RestV_F	-0.220	0.000	-0.598	0.005
RAgrCrops	-3.4264	0.0022	-7.532	0.005	Rice	-5.250	0.000	-11.545	0.003
LstkMeat	0.6607	-0.0008	1.399	-0.002	RAgrCrops	-3.420	0.000	-7.602	0.005
ProcFood	-0.8672	0.0061	-2.016	0.016	LstkMeat	0.660	0.000	1.416	-0.002
Extraction	-1.4897	0.0001	-3.395	0.000	ProcFood	-0.870	0.001	-2.019	0.016
LightMnfc	-1.5901	0.0011	-3.79	0.005	Extraction	-1.490	0.000	-3.428	0.000
HeavyMnfc	2.1008	-0.0023	5.016	-0.006	LightMnfc	-1.590	0.000	-3.812	0.005
Services	0.6491	-0.0002	1.473	-0.001	HeavyMnfc	2.100	0.000	5.043	-0.006
CGDS	8.7351	-0.0005	20.09	-0.001	Services	0.650	0.000	1.487	-0.001
					CGDS	8.730	0.000	20.282	-0.001

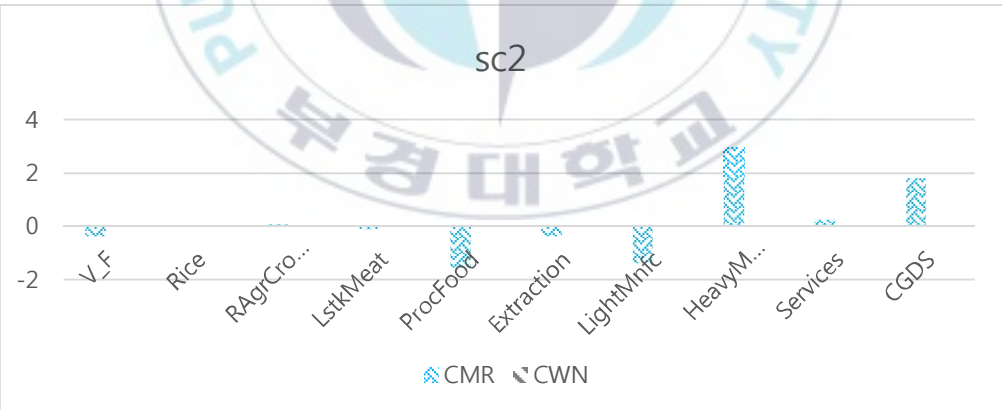
Source: Author's simulation using the RunGTAP

<Figure 16> The effects of an FTA between Cameroon and the British Commonwealth of Nations on Value added (% change)



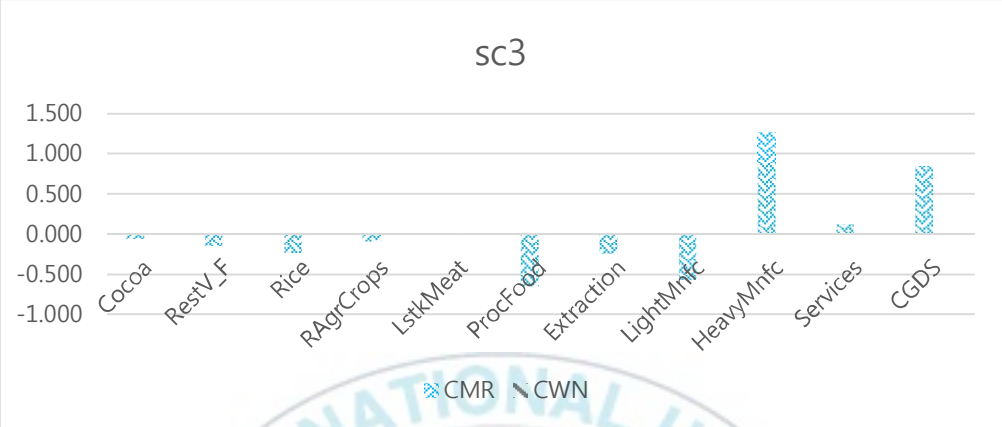
Source: Author's simulation using the RunGTAP

<Figure 17> The effects of an FTA between Cameroon and the British Commonwealth of Nations on Value added (% change)



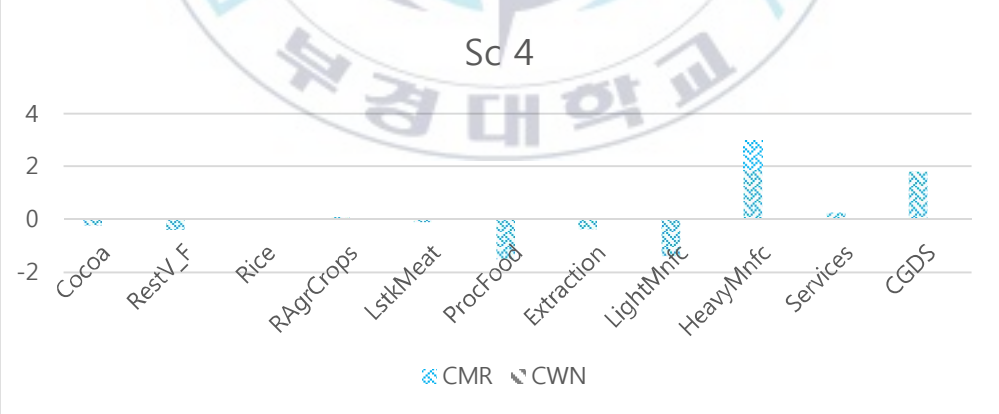
Source: Author's simulation using the RunGTAP

<Figure 18> The effects of an FTA between Cameroon and the British Commonwealth of Nations on Value added (% change)



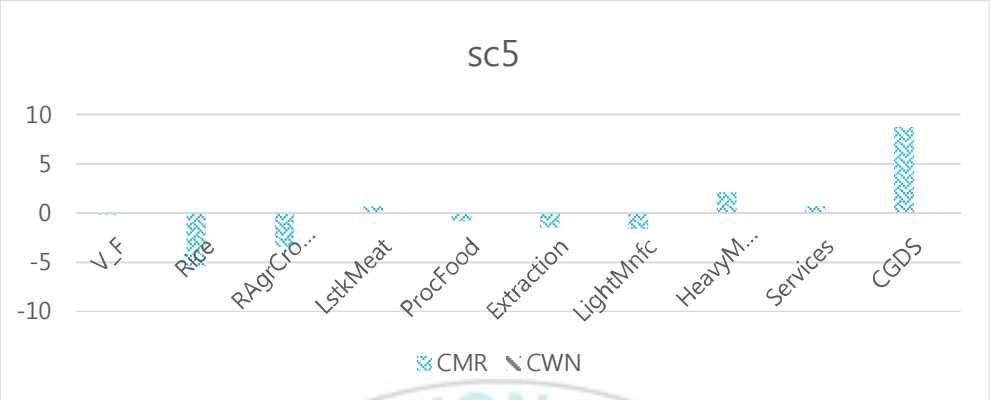
Source: Author's simulation using the RunGTAP

<Figure 19> The effects of an FTA between Cameroon and the British Commonwealth of Nations on Value added (% change)



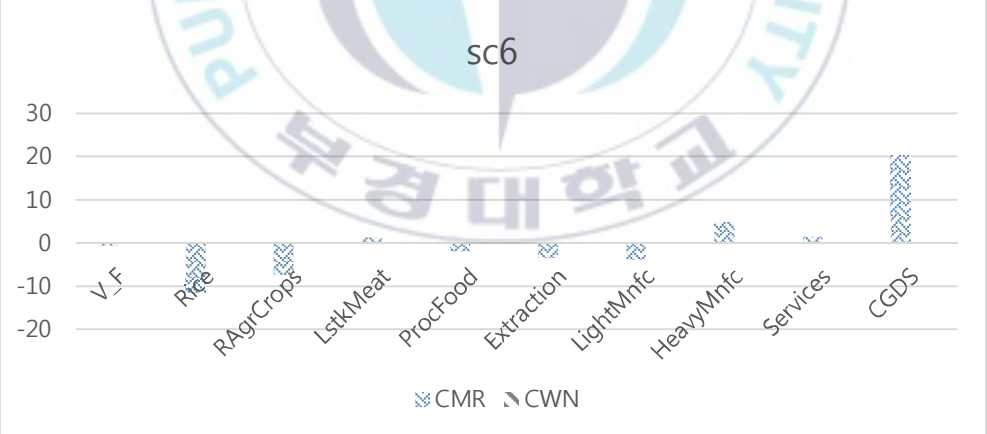
Source: Author's simulation using the RunGTAP

<Figure 20> The impact of an FTA between Cameroon and British Commonwealth of Nations on Value added (% change)



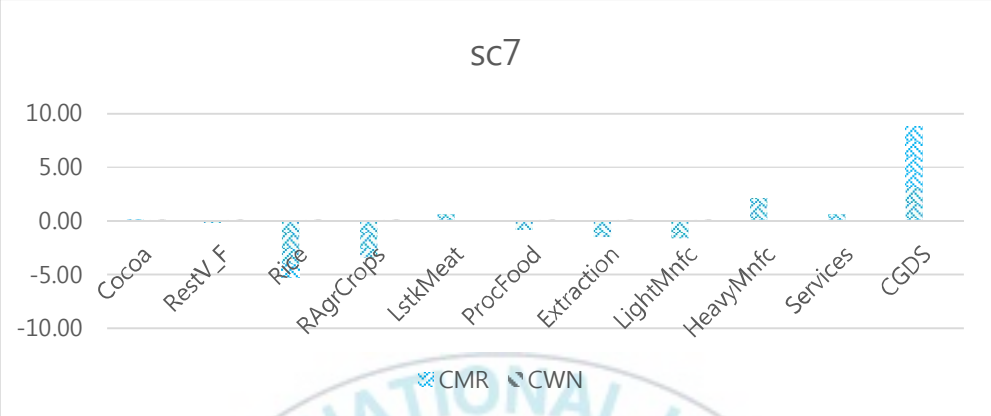
Source: Author's simulation using the RunGTAP

<Figure 21> The impact of an FTA between Cameroon and British Commonwealth of Nations on Value added (% change)



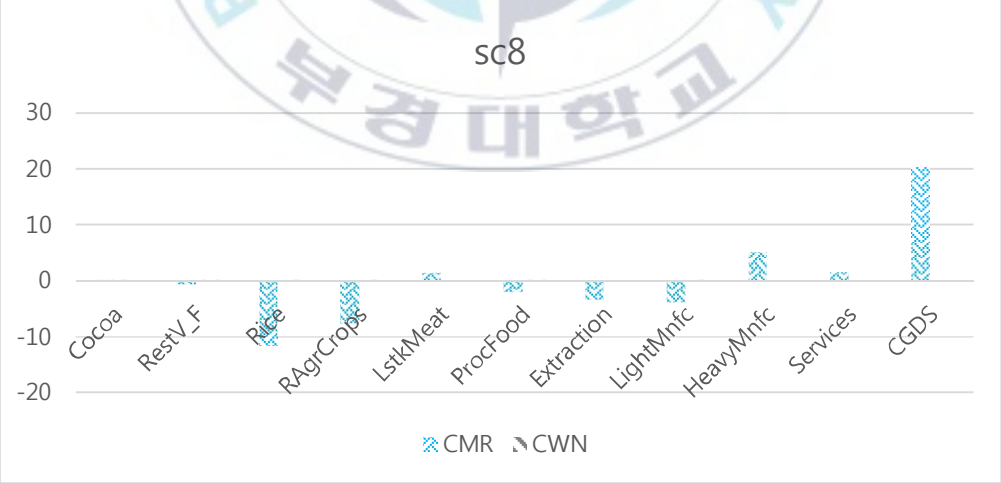
Source: Author's simulation using the RunGTAP

<Figure 22> The impact of an FTA between Cameroon and British Commonwealth of Nations on Value added (% change)



Source: Author's simulation using the RunGTAP

<Figure 23> The impact of an FTA between Cameroon and British Commonwealth of Nations on Value added (% change)



Source: Author's simulation using the RunGTAP

There is a consistency in trade as Cameroon sees a major growth in output in sectors such as in heavy manufacturing and in service sector in all the eight scenarios. Cameroon witnesses the highest production increase in sectors like cocoa, rest of Vegetable and Fruits, livestock meat, processed food, heavy manufacturing and services in scenario 8 when taking into consideration the primary factor augmented technological shock. On the other hand, the outputs for the British Commonwealth of Nations also have increased in sectors like V_F, rest of agricultural crops, processed foods, and light manufacturing.

Tables 25 and 26 below show the changes in production on output for both Cameroon and the British Commonwealth of Nations. Even though there is a negative result in output in the Cameroon and the British Commonwealth of Nations FTA, it does not necessarily mean an absolute output decline in the long term.

<Table 25> The impact of an FTA between Cameroon and British Commonwealth of Nations on Output (% change)

	Sc1		**Sc2**			**Sc3**		**Sc4**	
Qo	CMR	CWN	CMR	CWN	Qo	CMR	CWN	CMR	CWN
V_F	-0.133	0.001	-0.364	0.002	Cocoa	-0.060	0.000	-0.227	0.000
Rice	-0.237	0.000	-0.019	-0.001	RestV_F	-0.145	0.001	-0.386	0.003
RAgrCrops	-0.095	0.000	0.073	0.000	Rice	-0.237	0.000	-0.019	-0.001
LstkMeat	-0.005	-0.001	-0.115	-0.002	RAgrCrops	-0.095	0.000	0.073	0.000
ProcFood	-0.654	0.005	-1.532	0.014	LstkMeat	-0.004	-0.001	-0.114	-0.002
Extraction	-0.238	0.000	-0.37	0.000	ProcFood	-0.655	0.005	-1.533	0.014
LightMnfc	-0.566	0.001	-1.375	0.004	Extraction	-0.238	0.000	-0.37	0.000
HeavyMnf	1.269	-0.002	2.968	-0.004	LightMnfc	-0.566	0.001	-1.375	0.004
Services	0.121	0.000	0.247	0.000	HeavyMnf	1.269	-0.002	2.968	-0.004
CGDS	0.855	0.001	1.807	0.003	Services	0.121	0.000	0.247	0.000
					CGDS	0.855	0.001	1.807	0.003

Source: Author's simulation using the GTAP model

<Table 26> The impact of FTA between Cameroon and British Commonwealth of Nations on Output (% change)

	Sc5		Sc6			Sc7		Sc8	
Qo	CMR	BCWN	CMR	CWN	Qo	CMR	CWN	CMR	CWN
V_F	1.1938	0.0016	2.914	0.004	Cocoa	1.515	0.000	3.653	0.001
Rice	-3.9691	0.0012	-8.424	0.003	RestV_F	1.135	0.002	2.822	0.005
RAgrCrops	-2.113	0.0022	-4.388	0.005	Rice	-3.966	0.001	-8.502	0.003
LstkMeat	2.0296	-0.008	4.847	-0.002	RAgrCrops	-2.109	0.002	-4.423	0.005
ProcFood	0.481	0.0061	1.315	0.016	LstkMeat	2.030	-0.001	4.905	-0.002
Extraction	-0.1499	0.0001	-0.111	0.000	ProcFood	0.482	0.006	1.352	0.016
LightMnfc	-0.2517	0.0011	-0.519	0.005	Extraction	-0.149	0.000	-0.106	0.000
HeavyMnfc	3.4894	-0.002	8.587	-0.006	LightMnfc	-0.250	0.001	-0.503	0.005
Services	2.0179	-0.002	4.923	-0.001	HeavyMnfc	3.491	-0.002	8.657	-0.006
CGDS	10.2139	-0.005	24.173	-0.001	Services	2.029	-0.00	4.978	-0.001
					CGDS	10.214	-0.000	24.419	-0.001

Source: Author's simulation using the RunGTAP

Chapter 6 Conclusion and Recommendations

6.1 Conclusion

The main objective of this thesis is to measure the effects of a potential FTA between Cameroon and the British Commonwealth of Nations. To obtain this objective, CGE model is applied using the GTAP 9 database by simulating eight scenarios. This analysis concentrates on the welfare implications of a possible FTA by examining changes in sectoral output, imports, exports, and trade balance.

In the first and second scenarios we have a 50 percent and a 100 percent cuts in tariffs respectively for the trade between Cameroon and the British Commonwealth of Nations. Also, in the third and fourth scenarios, cocoa is split from vegetable and fruits and a 50 percent and a 100 percent cut respectively in tariffs is applied for trade between Cameroon and the British Commonwealth of Nations. In the fifth and sixth scenarios, total factor productivity is considered and a 50 percent and a 100 percent cut respectively in tariffs in trade between Cameroon and the British Commonwealth of Nations is applied. Lastly, the seventh and eighth scenarios have a 50 percent and a 100 percent cuts in tariffs respectively, and total factor productivity (TFP) with the split of cocoa from vegetable and fruits considered. In this simulation, two databases are used: the first include 9 sectors and 9 regions and second include 10 sectors as a result of the split of cocoa from

vegetable and fruit and 9 regions.

Several findings are drawn from the analysis. Firstly, Cameroon witnesses a higher economic growth than the British Commonwealth of Nations. Moreover, the welfare has a definite increase for the British Commonwealth of Nations than in Cameroon, but with more trade openness, Cameroon is expected to benefit the most in GDP and welfare. When there is a bilateral removal of tariffs, some production sectors in Cameroon will experience an increase in output, while some will be adversely affected. Amongst the eight scenarios, scenario 7 and 8 are preferable for implementation when TFP is considered. On the overall, simulations results show that both scenarios 7 and 8 provide best policy scenario that should be considered if Cameroon and the British Commonwealth of Nations decide to sign an FTA.

6. 2 Limitations of the model

There are limitations in every economic methodology. The main problem with the CGE model is the complicated nature of its equations. Again, according to Mukhppadhyay and Chkraborty (2012), the fixed nature of the GTAP static model is partially reflected in the results as it destabilizes the long-horizon forecast. In addition, not all regions are included in the GTAP database. Lastly, there is an omission in time effect in the static GTAP model. Thus, long term impacts are not shown.

6.3 Recommendation for future studies

This study focuses on the potential impacts of a possible agreement between Cameroon and the British Commonwealth of Nations by applying a CGE model. Firstly, in order to improve the simulation of Cameroon and the British Commonwealth of Nations potential FTA, NTBs and other shocks can be added to the scenarios to have different effects on both economies. Lastly, more realistic results that track changes in the economy over time will be obtained if a dynamic GTAP model is used rather than a static GTAP model.

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