Dissertation for the Degree of Ph. D. of Arts

Quantifying the Determinants of the GCC's and Korea's Exports and an Analysis of the Economic Impact of a Korea-GCC FTA

GCC 와 한국의 수출결정요인 분석과 한국-GCC 자유무역협정의 경제적 영향분석

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Abstract

This dissertation aims to quantify and analyze the determinants of the six Gulf Cooperation Council (GCC) countries and Korea and to evaluate the effects of the potential Korea-GCC FTA. First, to analyze the determinants of the exports of Korea and the GCC countries, two augmented gravity model of trade were applied to three sets of data for the seven countries. The three models: the Pooled OLS, the Fixed Effect (FE) and the Random Effect (RE) were applied to each of the three datasets that include the top 55, 45 and 35 trading partners for the GCC countries, and 80, 60 and 40 trading partners for Korea. The findings of the first gravity model in the study reveal that the exporter and importer GDPs have a positive and significant effect on Korea and five of the GCC countries, except for Qatar. The distance has a significant and negative effect on Korea and Oman. The exporter's GDP per capita has a significant and positive effect on those of Saudi Arabia, Bahrain, the UAE, and Oman. The exporter's population has a significantly positive effect on the six GCC countries. The importer's population has a significantly positive effect on those of Kuwait and Bahrain, and negative effect on Korea. The language has a significant and positive effect on those of Kuwait, Bahrain, and Oman. The FTA has a significantly positive effect on Saudi Arabia and Bahrain, and a significantly negative effect on those of Qatar and Oman. The economic block GCC has a significant and positive effect on those of Kuwait, Bahrain, and Qatar. The most applicable sets to explain the exports flow are: the 55 trading partners RE model for Kuwait and Oman, 45 trading partners RE model for the UAE, the 35 trading partners RE model for Qatar, the 35 trading partners pooled OLS model for Saudi Arabia and Oman, and the 60 trading partners RE model for Korea. The findings of the second gravity model in the study reveal that the exporter's GDP has a positive and significant effect on Korea, Saudi Arabia, the UAE, and Oman. The importer's GDP has a significant and positive effect on Korea and the six GCC countries. The distance has a significant and negative effect on those of Korea, Saudi Arabia, and Oman. The exporter's population has a significantly positive effect on those of Kuwait, Saudi Arabia, and Qatar. The importer's population has a significantly positive effect on those of Kuwait Bahrain and Qatar, and negative effect on Korea and Saudi Arabia. The language has a significant and positive effect on those of Kuwait, Bahrain, and Oman. The FTA has a significantly positive effect on those of Bahrain and Qatar and a significantly negative effect on Oman. The economic block GCC has a significant and positive effect on those of Kuwait and Bahrain and significantly negative effect on Saudi Arabia. The most appropriate sets to explain the exports flow are the 55 trading partners RE model for Kuwait, Saudi Arabia, Bahrain and Oman, 45 trading partners RE model for the UAE, 55 trading partners Pooled OLS model for Qatar, and the 60 trading partners RE model for Korea. Second, to evaluate the potential effect of a Korea-GCC FTA, the CGE model was applied by using the Global Trade Analysis Project (GTAP) and *applying six scenarios with different levels of trade liberation: 100, 75 and 50 percent cuts in tariffs, and the same cuts in tariffs in addition to the Total Factor Productivity (TFP). The results show that in term of the economic growth, Korea and the GCC countries witness different levels of positive effects, whereas Korea and the UAE are the most beneficial. Moreover, the welfare also has a positive increase for the six GCC countries and Korea, where Korea, the UAE, and Saudi Arabia are the most beneficial countries from signing the FTA in term of welfare, respectively. Also, with more open trade, the UAE is expected to gain the most in term of the economic growth then Korea, Qatar, Kuwait, Saudi Arabia Oman and Bahrain, respectively. Korea is expected to gain the most in welfare then UAE, Saudi Arabia, Kuwait, Qatar, Oman, and Bahrain, respectively. Moreover, Kuwait is expected to gain the most in terms of trade then Qatar, Oman, the UAE, Saudi Arabia, Bahrain, and Korea, respectively. Finally, The Korea-GCC FTA can motivate the development of the production of many sectors for each country and promote the bilateral exports for the most of the exporting sectors and the total exports.*

Dedication

To my late mother…

To my father… the role model

To my wife… my one and only love

To my brothers and sisters… my pillars

To my child… the joy and the future

Acknowledgement

To Professor Jong-Hwan Ko, my advisor and mentor: Thank you for sharing your knowledge and wisdom. I am grateful for the time that you devoted for supervising my work. Thank you for your encouragement, guidance, and positive criticism. To all of that and more, I am grateful for eternity.

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To the professors and the staff of the Department of International and Area Studies: It was a privilege to study with you. Thank you for the knowledge and the help that you gave me.

To the Public Authority of Applied Education and Training: Thank you for this lifetime opportunity.

To Dr. Dhari Al-Otaibi: You are a true brother and a lifetime friend. Thank you for everything.

Table of Content

Acronyms

ASEAN	The Association of Southeast Asian Nations
CDE	Constant Difference of Elasticity
CES	Constant Elasticity of Substitution
CGE	Computable General Equilibrium
COMESA	The Common Market for Eastern and Southern Africa
EAC	East African Community
ECM	Error Component Model
EFTA	European Free Trade Market
ELES	Extended Linear Expenditure System
EU	European Union
EV	Equivalent Variation
FE	Fixed Effect
FGLS	Feasible Generalized Least Squares
FTA	Free Trade Agreement
GAFTA	Greater Arab Free Trade Agreement
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GDP per capita	Gross Domestic Product Per Capita
GLS	Generalized Least Squared
GMATI	Gravity Model Adjusted Trade Intensity
GPML	Gamma Pseudo-Maximum- Likelihood
GSFTA	GCC Singapore Free Trade Agreement
GTAP	Global Trade Analysis Project
ICM	Islamic Common Market
ITN	International Trade Network

LAC	Latin America and the Caribbean
MERCOSUR	Mercado Común Del Sur (Southern Common Market)
ML	Maximum Likelihood
NLS	Nonlinear Least Squares
NMS	New Member States
NTBs	Non-Tariff Barriers
OECD	Organization for Economic Cooperation and Development
OIC	Organization of Islamic Cooperation
OLS	Ordinary Least Squared
OPEC	Organization of the Petroleum Exporting Countries
PP	Poison Probability
PPML	Pseudo Poisson Maximum Likelihood
PRC	People Republic of China
RE	Random Effect
RTA	Regional Trade Agreements
S.E.	Standard Error
TFP	Total Factor Productivity
TO	Trade Openness
TS-MM	Two Steps Methods of Moments
TTP	Trans-Pacific Partnership
UAE	United Arab Emirates
UK	United Kingdom
USA	United States of America
USD	United States Dollars

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Chapter 1 Introduction

1.1 Introduction to the Study

The Gulf Cooperation Council (GCC) was formed by Kuwait, Saudi Arabia, Bahrain, Qatar, the United Arab Emirates (UAE), and Oman in 1981. It was established to increase the economic integration and the political cooperation among its members. After two decades the Custom Union between the GCC countries was established in 2003, and its main achievements are: the elimination of the tariff and non-tariff barriers (NTBs) between the six members, unified custom measures, common tariffs on the imported external goods, the free movement of the citizen between the GCC members, and a national treatments of the goods of the GCC members.

The GCC countries have signed an active Free Trade Agreements (FTA) as a block with four parties that include 26 countries (with the GCC countries). Also, nine FTAs are under negotiation, and three FTAs are on hold. On the other hand, Korea has signed 15 effective FTAs that include 54 countries. Besides, 9 FTAs are under negotiations.

The Korea-GCC FTA's agreement talks were established in March 2007 during the visit of the South Korean president Roh Moo-hyun to the Middle East. In November of the same year, the Korea-GCC FTA talks were held in advance in Riyadh, Saudi Arabia. In July 2008 the first negotiating round was held in Seoul. In the following year, two more negotiation rounds were held in Riyadh and Seoul, respectively. However, the negotiations stopped in the same year for no obvious reasons.

This study traces the potential effects of the potential economic agreement Korea-GCC FTA by applying the Computable General Equilibrium model (CGE). To do so, it is essential to quantify the determinants of the exports for both parties in the FTA to evaluate the existing trade policies. Accordingly, the gravity model of trade is the model that will address this part of the study in the second chapter.

The CGE model and the gravity models are two popular methodologies to apply the quantitative analysis for the trade policies. The two methodologies can answer a wide range of questions. The gravity model focuses trade policy matters on the trade flows between countries or geographic regions. On the other hand, the general equilibrium model addresses the changes in the policy of one sector and how would the other sectors be affected. The main difference between the two methodologies is that the gravity model evaluates the past trading policies that were applied, while the CGE model measures the potential effects of new policies (Ivus & Strong, 2007).

The CGE model has many advantages compared with other models. One of the main advantages of the model is that in order to conduct a study, the researcher must understand the structure of the economy in details (Ivus & Strong, 2007). Another advantage is that it has the ability to conduct a full assessment of the trade liberalization by analyzing the cross-country and inter-industry's simulations (Ariyasajjakorn, Gander, Ratanakomut, & Reynolds, 2009). Moreover, labor market's specifications can reflect the reality, and it can also analyze profoundly the impact of the FTAs on the labor markets in a specific region (Kitwiwattanachai, Nelson, & Reed, 2010). Besides, the multi-sector CGE model and the Global Trade Analysis Project (GTAP) simulates the direct and indirect interactions between the sectors in the economy and the other economies with detailed results quantitatively (Mukhopadhyay, Thomassin, & Chakraborty, 2012). Another significant advantage of the model is that it can calculate the overall regional welfare, and the comparative advantage of the regional exports in the world's economy (Hermann, 1998).

1.2 Purpose of this Study

The primary two objectives of the study are: first, is to measure the potential effect of the potential FTA between Korea and the GCC countries. Second, to empirically measure the determinants of the exports for the six members of the GCC countries and South Korea. Therefore, to reach the first objective, the CGE model is applied by using the GTAP by simulating six scenarios. Consequently, the best scenario can be reached according to the simulation results. To reach the first objective, it is essential to investigate the determinants of the exports of the FTA's members. Therefore, the second objective will be presented before the first one.

To reach the second objective, to quantify the determinants of Korea and the GCC countries, an augmented gravity model of trade is used. The results of the second objective will show what are the variables that affect the exports and to what extent? Besides, the results will show which parameters are statically significant or not and whether these parameters have positive or negative effects. Besides, The economists widely use the gravity model of the trade for such analyzing goals.

The study will answer the two central questions:

Q1: To what extent can the determinants of the exports of the GCC countries and Korea affect their exports?

Q2: To what extent can the Free Trade Agreement between the GCC and Korea affect the economy and exports for each side?

The results will discuss the simulated scenarios that would benefit each member from the FTA the most. Moreover, the study will discuss the macroeconomic effects regarding welfare, GDP, exports and trade balance. The effects on the sectors will present the microeconomic effects on the FTA members. Finally, the study will show if the economic growth increase or not under the potential FTA.

1.3 Structure of the Study

This study is structured as follows: After chapter I for the introduction, chapter II will discuss and measure the determinants of the exports of the GCC countries and Korea, and it will include six sub-sections: introduction, literature review, methodology, data and procedure, empirical results and the chapter’s conclusion. Chapter III discusses the potential macroeconomic and the microeconomic impacts of a Korea-GCC FTA with the CGE approach, and it will include six sub-sections as well: introduction, literature review, model and data, scenarios, simulation results and the chapter’s conclusion. Finally, Chapter IV is the conclusion, the policy implications and the recommendations for future studies.

Chapter 2 The Determinants of the Exports of the GCC Countries' and Korea: Gravity Approach

2.1 Introduction

The purpose of this chapter is to empirically measure the determinants of the exports of the GCC countries and South Korea by using an augmented gravity model. To be able to understand the trade's structure of the GCC countries, it is essential to explain the characteristics of their exports with their trading partners. The GCC's main trading partners are mostly high economy countries because they rely heavily on the imports from the energy sector to maintain their economic growth. The main exporting products for the GCC countries are the crude oil, refined petroleum, and the natural gas. For instance, according to the World Bank, Kuwait's highest five exporting destinations are Korea, India, Japan, the USA, and China, respectively. Saudi Arabia's top exporting partners are China, Japan, the USA, Korea, and India, respectively. Bahrain's top exporting destinations are Saudi Arabia, the UAE, the USA, Korea and Japan, respectively. Qatar's top exporting destinations are Japan, Korea, India, China and the USA, respectively. The UAE's top exporting destinations are Japan, India, China, Oman and Saudi Arabia, respectively. Oman's top exporting destinations are China, Korea, the UAE, India, and Japan, respectively.

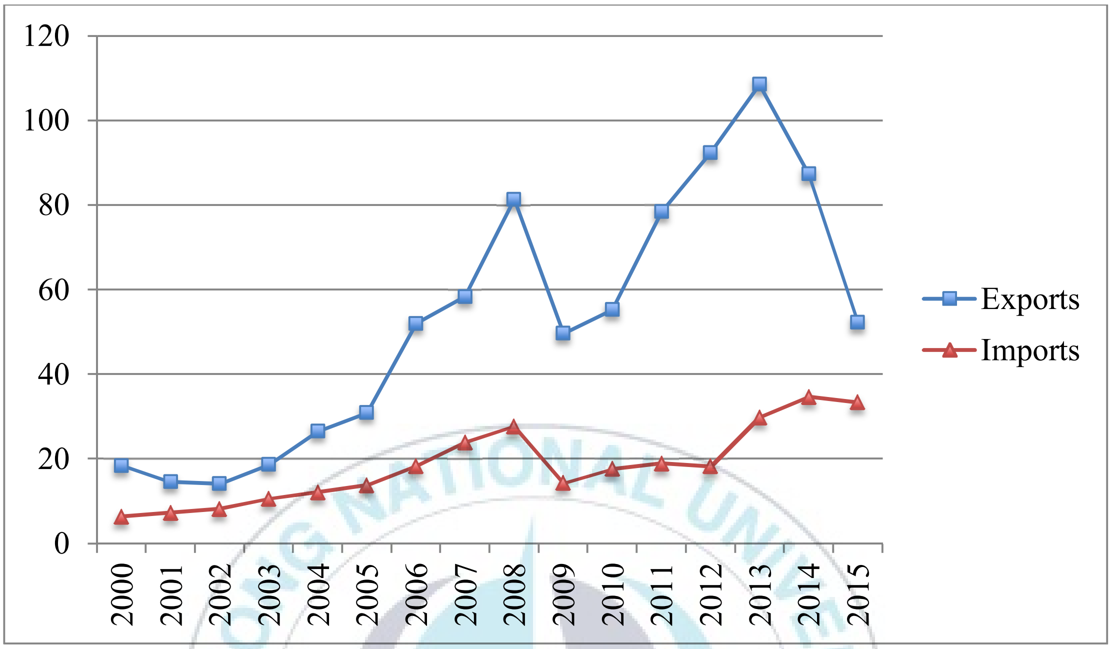
The reason for having high economies as the leading destinations for the GCC countries is that oil and natural gas is their main exporting product, except for Bahrain (see table 2-1). Moreover, Kuwait's share of oil and natural gas is 85 percent of its total exports. Saudi Arabia's share of oil and natural gas is 76 percent of its total exports. Bahrain's share of oil and natural gas is 23 percent of its total exports. Qatar's share of oil and natural gas is 85 percent of its total exports. The UAE's share of oil and natural gas is 50 percent of its total exports. Oman's share of oil and natural gas is 71 percent of its total exports.

Table 2-1 The GCC countries' GDP (billion $) and oil/ gas shares of exports (2015)

Country	GDP	Crude oil %	Refined oil%	Gas %	Other exports %
Kuwait	114.6	64	17	4	15
Saudi Arabia	651.7	55	10	2	33
Bahrain	31.1	-	22	1	77
Qatar	164.6	22	8	55	15
UAE	357.9	32	13	5	50
Oman	69.8	53	7	11	29

Source: Author's calculations from data extracted from the Observatory of the Economic Complexity, UNComtrade

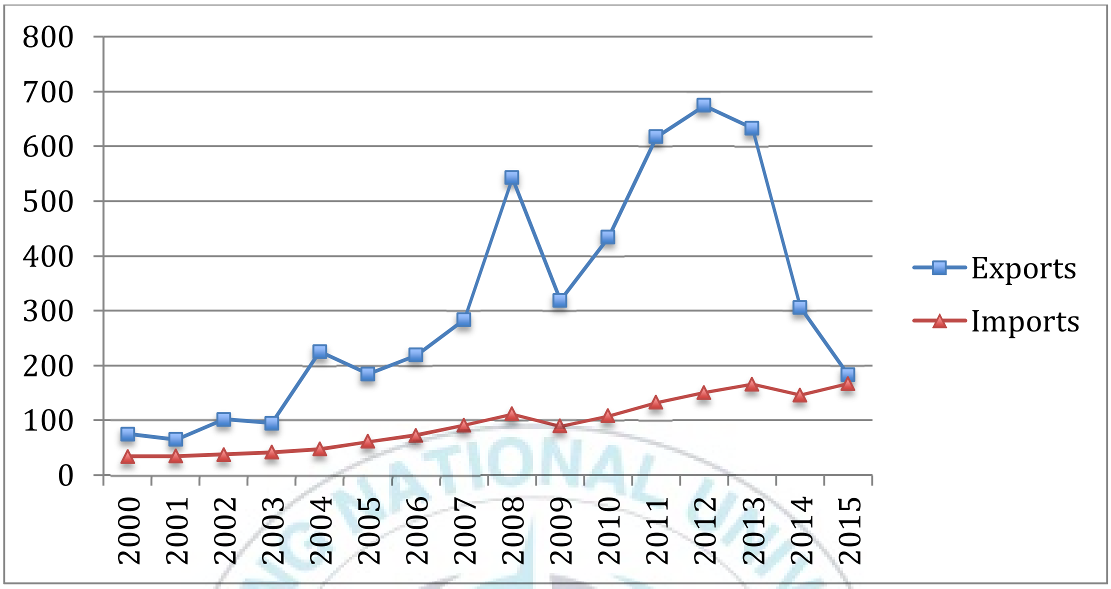
Figure 1 Kuwait's exports and imports ($ billions)



Source: Author's work using Observatory of economic complexity (OEC), UNComtrade

Figure 1 shows Kuwait's exports and imports for the period from 2000 to 2015. The exports values are higher than the imports value, which implies that Kuwait experience surplus in its total trade rather than a deficit. Furthermore, the exports value is driven by the world's oil prices. Therefore, if the oil prices increase, the exports value will increase accordingly. Although the gap between the exports and the imports steeply decreased in the last three years, it is still higher than at the beginning of the period. Another observation worth mentioning, the gap between exports and imports was not interrupted for the whole period.

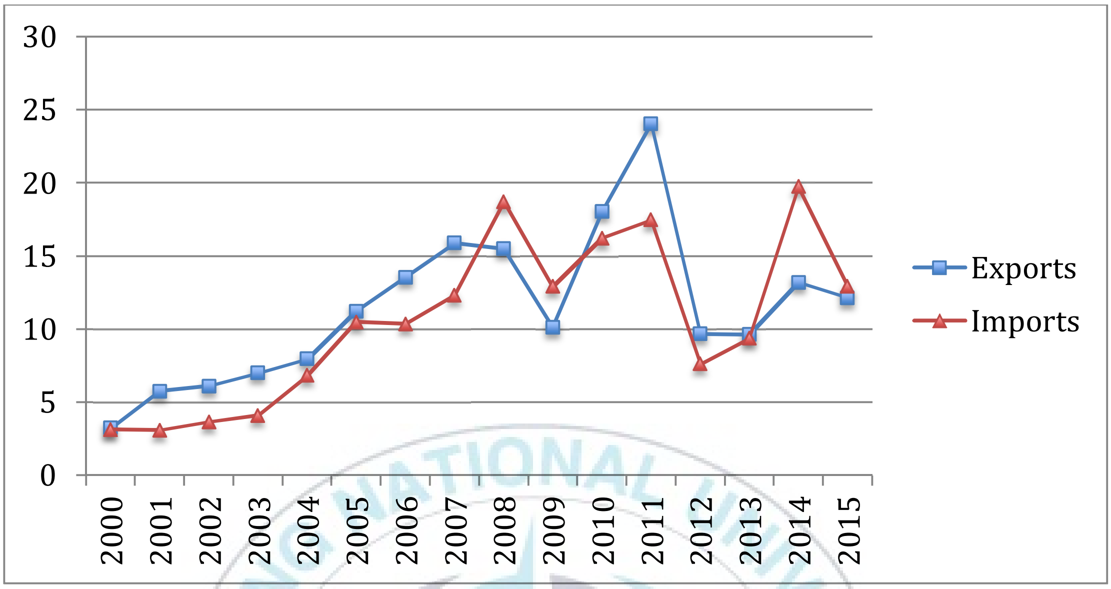
Figure 2 Saudi Arabia's exports and imports ($ billions)



Source: Author's work using Observatory of economic complexity (OEC), UNComtrade

Figure 2 shows Saudi Arabia's exports and imports for the period from 2000 to 2015. The exports values are higher than the imports values, which implies that it experiences a surplus in the total trade rather than a deficit. Furthermore, exports value is driven by the world's oil prices, same as Kuwait. Therefore, if the oil prices increase, the exports value will increase accordingly. Although the gap between the exports and the imports is high most of the period, it went down steeply and almost closes in the last year of the period. Moreover, the gap between the exports and the imports is lower at the end of the period than in the beginning. Another observation worth mentioning, the gap between exports and imports was not interrupted for the whole period.

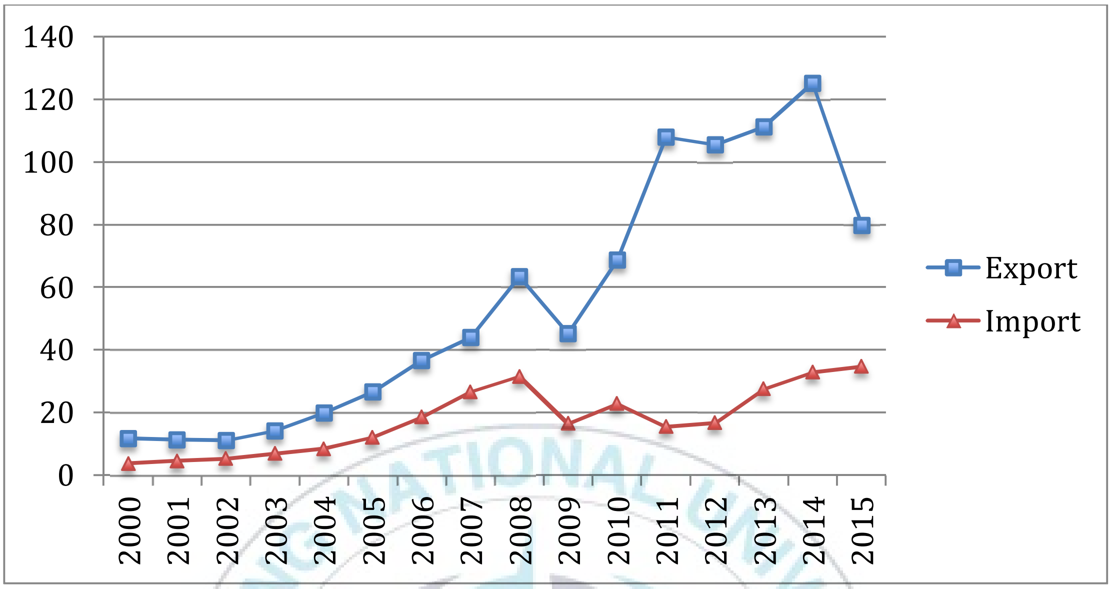
Figure 3 Bahrain's exports and imports ($ billions)



Source: Author's work using Observatory of economic complexity (OEC), UNComtrade

Figure 3 shows Bahrain's exports and imports for the period from 2000 to 2015. The imports value is higher than the exports value in the closing year, which implies that it experiences a deficit in the total trade rather than a surplus. Furthermore, the exports values are partially driven by the world's oil prices since Bahrain do not export oil as the primary product (see table 2-1). Therefore, the oil prices have a limited effect on Bahrain's exports. The exports and imports lines cross over the period four times. Moreover, there is no gap between the exports and the imports at the beginning of the period, however, there is a small one at the end of the period, which implies that there is a small deficit rather than the surplus in its trade balance. Another observation can be mentioned, the gap between exports and imports was interrupted three times during the whole period.

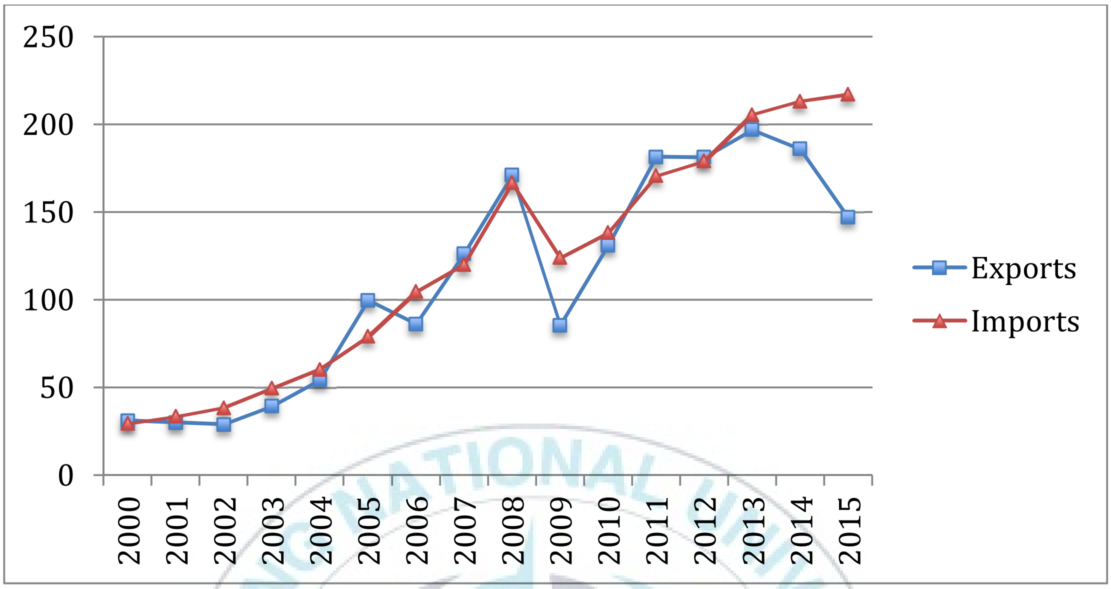
Figure 4 Qatar's exports and imports ($ billions)



Source: Author's work using Observatory of economic complexity (OEC), UNComtrade

Figure 4 shows Qatar's exports and imports for the period from 2000 to 2015. The exports value is higher than the imports value, which implies that Qatar experiences a surplus in its total trade rather than a deficit. Furthermore, the exports value is driven by the world's oil and natural gas prices. Therefore, if the oil and natural gas prices increase, the exports value increase accordingly. Although the gap between the exports and the imports steeply decreased, it is still higher than at the beginning of the period. Another observation worth mentioning that the gap between the exports and the imports was not interrupted for the whole period, and it is the highest among the GCC members and Korea.

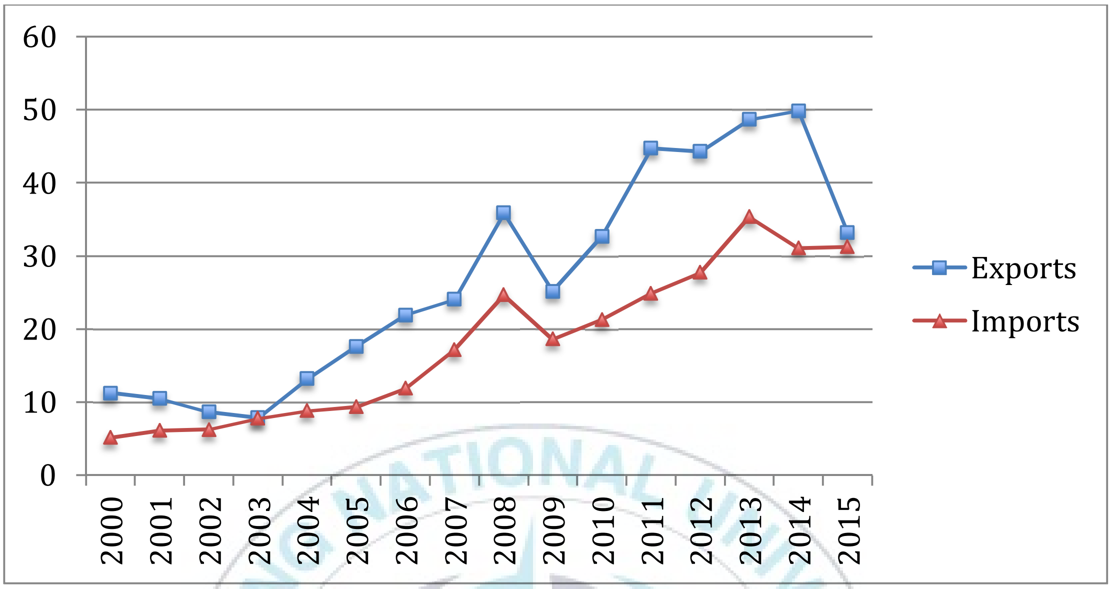
Figure 5 UAE's exports and imports ($ billions)



Source: Author's work using Observatory of economic complexity (OEC), UNComtrade

Figure 5 shows the UAE's exports and imports for the period from 2000 to 2015. The imports value is higher than the exports value at the closing year, which implies that it experiences a deficit in its total trade rather than a surplus. Furthermore, the exports value is partially driven by the world's oil prices since UAE's do not export oil as the primary product (see table 2-1). Therefore, if the oil prices increase the exports value will partially increase accordingly. The exports and the imports lines cross over the period five times. Moreover, there is no gap between exports and imports at the beginning of the period; however, there is an expanding one at the end of the period, which implies that there is a deficit rather than the surplus in total trade.

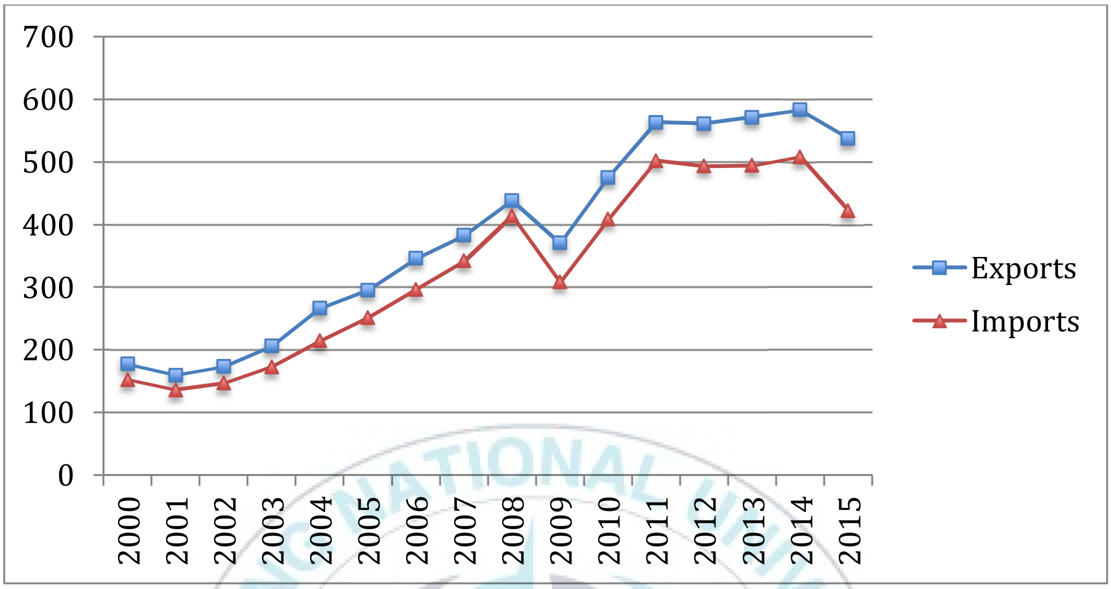
Figure 6 Oman's exports and imports ($ billions)



Source: Author's work using Observatory of economic complexity (OEC), UNComtrade

Figure 6 shows Oman's exports and imports for the period from 2000 to 2015. The exports value is higher than the imports value, which implies that it experiences a surplus in its total trade balance rather than a deficit. Furthermore, the exports value is driven by the world's oil prices. Therefore, if the oil prices increase, the exports value will increase accordingly. Although there is a gap between the exports and the imports most of the period, it went down steeply and almost closes in the last year of the period. Moreover, the gap between exports and imports is lower at the end of the period than in the beginning. Another observation is that the gap between the exports and the imports was interrupted once during for the whole period.

Figure 7 Korea's exports and imports ($ billions)



Source: Author's work using Observatory of economic complexity (OEC), UNComtrade

Figure 7 shows South Korea's exports and imports for the period from 2000 to 2015. The exports value is higher than the imports value, which implies that Korea experiences a surplus in its total trade rather than a deficit. The main feature of Korea's trade is that exports and imports are moving together, therefore, when exports increase then imports increase accordingly are the same degree. Another observation worth mentioning is that the gap between exports and imports was not interrupted for the whole period. Therefore, the studied period shows a surplus in Korea's international trade balance.

The seven tables below show the selected major 55 trading partners for the GCC countries individually and the major 80 trading partners for Korea. The selection of the countries is based on the exports value to the trading partner and data availability. In addition, the share of Kuwait's top 55 trading partners of its total exports is 98%. The share of Saudi Arabia's top 55 trading partners of its total exports is 99%. The share of Bahrain's top 55 trading partners of its total exports is 90%. The share of Qatar's top 55 trading partners of its total exports is 92%. The share of UAE's top 55 trading partners of its total exports is 89%. The share of Oman's top 55 trading partners of its total exports is 90%. Note: The share of Korea's top 80 trading partners of in total exports is 96%.

Table 2-2 Kuwait's top trading partners' ranking

Partners 1-15	Partners 16-30	Partners 31-45	Partners 46-55
Korea	UAE	Belgium	Argentina
India	KSA	Hong Kong	Tunisia
Japan	Vietnam	Iran	Uganda
USA	New Zealand	Morocco	Bangladesh
China	Austria	Denmark	Cyprus
Egypt	Lebanon	Switzerland	Canada
Singapore	Qatar	Greece	Ukraine
Pakistan	Italia	Sri Lanka	Kenya
Netherland	South Africa	Philippines	Tanzania
United Kingdom	Jordan	Algeria	Djibouti
Ethiopia	Germany	Yemen	
Indonesia	Turkey	Australia	
Malaysia	Bahrain	Nigeria	
France	Oman	Afghanistan	
Thailand	Spain	Belgium	

Source: World Integrated Trade Solution (WITS)

Table 2-3 Saudi Arabia's top trading partners' ranking

Partners 1-15	**Partners 16-30**	**Partners 31-45**	**Partners 46-55**
China	Pakistan	Oman	Sweden
Japan	Brazil	Portugal	Malta
USA	Philippines	Yemen	Chile
Korea	Egypt	Algeria	Cate D'Ivoire
India	Malaysia	Hong Kong	Colombia
Singapore	UK	New Zealand	Argentina
France	Morocco	Lebanon	Poland
Bahrain	Turkey	Mexico	Denmark
South Africa	Canada	Nigeria	Zambia
Thailand	Belgium	Australia	Cameroon
Spain	Greece	Russia	
Indonesia	Kuwait	Ukraine	
Italy	Ethiopia	Tanzania	
Jordan	Qatar	Switzerland	
Netherlands	Vietnam	Sri Lanka	

Source: World Integrated Trade Solution (WITS)

Table 2-4 Bahrain's top trading partners' ranking

Partners 1-15	Partners 16-30	Partners 31-45	Partners 46-55
Saudi	UK	Bangladesh	Philippines
UAE	Indonesia	Lebanon	Iran
USA	Italy	Canada	Czech
Korea	Nederland	Switzerland	Sweden
Japan	Belgium	Greece	New Zealand
India	Morocco	Hong Kong	Nigeria
Qatar	Pakistan	Yemen	Portugal
Oman	South Africa	Austria	Finland
Singapore	Jordan	Norway	Cyprus
Turkey	Malaysia	Denmark	Argentina
Egypt	Maldives	Tunisia	
Kuwait	Algeria	Sri Lanka	
France	Australia	Kenya	
China	Spain	Tanzania	
Thailand	Germany	Vietnam	

Source: World Integrated Trade Solution (WITS)

Table 2-5 Qatar’s top trading partners’ ranking

Partners 1-15	**Partners 16-30**	**Partners 31-45**	**Partners 46-55**
Japan	Spain	Mexico	Uganda
Korea	Malaysia	Hong Kong	Ireland
India	Oman	Algeria	Cyprus
China	Indonesia	Madagascar	Senegal
UAE	Philippines	Morocco	Chile
Singapore	Kuwait	Greece	Djibouti
UK	Australia	Canada	Lebanon
Thailand	New Zealand	Kenya	Cameroon
Italy	South Africa	Sri Lanka	Iran
USA	Pakistan	Cote D’Ivoire	Nepal
Belgium	France	Ethiopia	
Netherlands	Jordan	Portugal	
Turkey	Germany	Tunisia	
Egypt	Vietnam	Tanzania	
Saudi Arabia	Bahrain	Ukraine	

Source: World Integrated Trade Solution (WITS)

Table 2-6 The UAE's top trading partners' ranking

Partners 1-15	**Partners 16-30**	**Partners 31-45**	**Partners 46-55**
Japan	USA	Uganda	Kazakhstan
India	Australia	Algeria	Azerbaijan
China	UK	New Zealand	Mauritius
Oman	Bahrain	Malawi	Cameroon
Saudi Arabia	France	Georgia	Sweden
Korea	Sri Lanka	Madagascar	Norway
Singapore	Germany	Austria	Armenia
Thailand	South Africa	Russia	Colombia
Hong Kong	Italy	Mexico	Denmark
Switzerland	Netherland	Poland	Chile
Belgium	Jordan	Tunisia	
Kuwait	Tanzania	Canada	
Malaysia	Spain	Czech	
Qatar	Philippines	Bulgaria	
Turkey	Brazil	Greece	

Source: World Integrated Trade Solution (WITS)

Table 2-7 Oman's top trading partners' ranking

Partners 1-15	Partners 16-30	Partners 31-45	Partners 46-55
China	Iran	Bangladesh	Romania
Korea	Kuwait	France	Sweden
UAE	Netherlands	Jordan	Mauritius
India	Egypt	Canada	Ireland
Japan	Italy	Vietnam	Denmark
Saudi Arabia	Bahrain	Morocco	Russia
USA	Indonesia	Tanzania	Ukraine
Thailand	UK	Belgium	Greece
Pakistan	Spain	Lebanon	New Zealand
South Africa	Germany	Uganda	Austria
Yemen	Hong Kong	Poland	
Singapore	Australia	Philippines	
Malaysia	Turkey	Tunisia	
Qatar	Kenya	Portugal	
Sri Lanka	Algeria	Switzerland	

Source: World Integrated Trade Solution (WITS)

Table 2-8 Korea's top trading partners' ranking

Partners 1-20	Partners 21-40	Partners 41-60	Partners 61-80
China	Brazil	Greece	Guyana
USA	Norway	Iraq	Nigeria
Hog Kong	Russia	New Zealand	Cambodia
Vietnam	Slovakia	Liberia	Myanmar
Japan	Iran	Peru	Slovenia
Singapore	Italy	Uzbekistan	Kazakhstan
Mexico	France	Bangladesh	Romania
India	Nederland	Colombia	Finland
Australia	Czech Republic	South Africa	Congo
Saudi	Poland	Algeria	Portugal
UK	Angola	Israel	Guatemala
Germany	Egypt	Argentina	Morocco
Indonesia	Spain	Kuwait	Costa Rica
Malaysia	Belgium	Oman	Croatia
Marshal Islands	Panama	Austria	Sri Lanka
Thailand	Malta	Qatar	Brunei Darussalam
Turkey	Chile	Ecuador	Kenya
Philippines	Switzerland	Jordan	Bahrain
Canada	Denmark	Pakistan	Yemen
UAE	Hungary	Sweden	Tunisia

Source: World Integrated Trade Solution (WITS)

The first six tables above (tables 2-2, 2-3, 2-4, 2-5, 2-6 and 2-7) show the 55 major trading partners for Kuwait, Saudi Arabia, Bahrain, Qatar, UAE, and Oman, respectively, and the last table (table 2-8) shows the 80 major trading partners for Korea. According to the tables: first, the GCC countries and Korea have trading partners from all around the world. Second, from the top trading partners, all the

GCC countries have Korea as one of the top six exporting destinations. Third, the six GCC countries and Korea share India and Japan as one of the top ten trading partners. Fourth, five members of the GCC countries and Korea share the USA as one of the top ten trading partners except for UAE. Fifth, five members of the GCC countries and Korea share China as one of the top ten trading partners except for Bahrain. Sixth, five members of the GCC countries and Korea share Singapore as one of the top ten trading partners except for Oman. Finally, five members of the GCC countries and Korea share at least one GCC member as one of the top ten trading partners except for Kuwait.

The highest country that has GCC members as an export destination from the top ten destinations is Bahrain, where it has four of the GCC members (Saudi Arabia, UAE, Qatar, and Oman). UAE and Oman have two GCC members among the top ten trading partners (where UAE's partners are Oman and Saudi Arabia, and Oman's trading partners are UAE and Saudi Arabia). Moreover, Saudi Arabia and Qatar have one GCC member as one of the top ten trading partner (where Saudi Arabia's partner is Bahrain, and Qatar's partner is UAE). In addition, Kuwait has no GCC member as one of the top ten exports destinations. On the other hand, Korea has one of the GCC members as one of the top ten trading partners (which is Saudi Arabia). In addition, the GCC countries rank in Korea's exports were as the following: Saudi Arabia ranked the 10th, the UAE ranked the 20th, Kuwait ranked the 53rd, Oman ranked the 54th, Qatar ranked the 56th and Bahrain ranked the 78th.

2.2 Literature Review

The gravity model of trade was first introduced by Tinbergin (1962) as an empirical concept where he applied Newton's gravity law on the trade. Later on, Anderson (1979) developed the theoretical foundation for the gravity model of trade. However, other studies (e.g., Anderson and van Wincoop, 2003) argued that it is due to the absence of the theoretical background that the model suffers from an omitted variable bias compared to other models. They argued that bilateral trade depend on trade barriers between countries (multilateral resistance), after controlling for the size of trade (Nuroğlu and Kunst, 2013). In this section, some selected articles that used the model will be presented.

According to a study for Narayan & Nguyen (2016), by applying the gravity model for Vietnam's trade, trading with rich countries is more sensitive to the economic size (GDP), the distance, the exchange rate and the trading partner's openness than developing countries. However, the authors suggested that the policymakers should not ignore the trade with the developing countries to keep the economic ties with them. The study found that the product of the GDP had a positive effect at the 1 percent level of significance. Moreover, distance had a negative impact on trade at the 1 percent level of significance as well.

In their paper, Krisztin & Fischer (2015) argues that using the log-linear model by least squared is inappropriate. They argue that using this approach in the presence of log-linear leads to inconsistent estimated results. To solve this problem, they used Poison Probability (PP) with pseudo Maximum Likelihood (ML) methods. However, although using PPML leads to consistent, it is biased because origins of destination flows are ignored. To overcome this problem they suggested using eigenvector spatial filtering variants of the Poisson gravity model as well as pseudo ML estimation. According to their estimations by using this method, they found out that the exporter's GDP, the importer's GDP, common land borders, the FTA and the common language had positive relations with the exports. On the other hand, distance had a negative relation.

A study that made by Kitetu & Ko (2015) were made to assess Kenya and Korea's international trade competitiveness. By using three data sets for each country (70, 50 and 30), an augmented gravity model was applied. In their paper, the empirical estimations concluded that the product of GDP was positive for Kenya and Korea. Moreover, borders with Kenya had a positive impact on the exports, and the GDP per capita had a positive impact on exports only on the 50 trading partners' data set. As for Korea, the FTA had a positive impact on the exports only on the 30 trading partners data set. Moreover, distance and GDP per capita had negative effects on all Korea's data sets. In summary, the authors conclude that it is beneficial for both countries to increase economic integration by joining economic block and signing FTAs. Second, investing in infrastructure will reduce the negative impact of distance. Finally, they should sustain economic growth.

According to empirical analysis by Doumbe & Belinga (2015) for Cameroon and the twenty-eight EU countries, Cameroon's bilateral trades with EU are affected positively by the economic size (GDP) and the GDP per capita. Furthermore, sharing a common language and having a colonial relationship with the trading partners have a positive relationship as well. On the other hand, distance has a negative impact on trade as expected.

A study by Tumwebaze Karamuriro & Karukuz, (2015) were made to find the factors affecting Uganda's exports by using an augmented gravity model of trade. The authors used panel data for the period from 1980 to 2012. By using RE, FE, and pooled OLS the estimation results were as the following; the GDP of Uganda, the GDP of its trading partner, the real exchange rate, the common language, the importer's GDP per capita had a significant positive impact on Uganda's export. Moreover, joining economic blocks (COMESA and EAC) had a positive impact on the exports as well. However, the study found that Uganda's GDP per capita and the distance with its trading partner had a negative impact on export. Finally, the study suggests that the economic integration for Uganda should be deepened with its trading partners.

Bialynicka-Birula (2015) suggested that instead of using GDP or GDP per capita for applying gravity model of trade, it is acceptable to use a specific market like the art markets' turnover on internal markets as the exogenous variable instead. Therefore the author used the size of the art market for country *i,* and art market for county *j* over the distance between both countries. The author found that there is a significantly positive correlation between art markets and international trade in work of art. Furthermore, there is a statically significant negative relation for the distance of country *i,* and country *j.*

Another research by Fathelrahman, Muhammad, Washi, Skaik, and Sherif (2014) investigate the potential dairy trade between US and selected countries from EU at one side, and the GCC countries on the other side. The result showed a significant positive effect for the GDP and the population on the exports. However, distance had a significantly negative effect on the exports. Finally, the authors suggest that the used explanatory variables, which are the log of the GDP, the log of population, the log of distance and two binary variables EU member and sharing a border, are the best combinations in the gravity model for dairy products for the selected countries.

A study made by Ravishankar & Stack (2014) to analyze the integration of Eastern EU members with the new member stated (NMS) from Eastern Europe using gravity model approach using maximum likelihood. According to their estimation results, exporter's GDP, importer's GDP, GDP per capita's difference and importer's exchange rate were significantly positive on the exports. However, distance, landlocked and exporters' exchange rate had a significantly negative effect on export. According to the authors, investing in upgrading the infrastructure of transport will cut the transportation costs for the landlocked countries. Furthermore, by adopting the euro, the NMS countries will increase the efficiency of trade by eliminating the exchange rate friction.

According to the research paper that made by Chen & Li (2014), there are two methods for gauging bilateral trade barrier; one is the gravity models approach, and the other one is the trade intensity index approach. The authors integrated these two approaches and developed a new index of trade intensity based on gravity model approach. The new index is called "Gravity Model Adjusted Trade Intensity" (GMATI). This new index can show the short run trade barriers as well as controlling the long run barriers under a global trade context. The results of using GMATI index showed that China trades are less than its expected level, which means that China is facing a more difficult trade environment than the other average country in the world.

Xiong & Chen, (2014) proposed using two steps methods of moments (TS-MM) to deal with the challenges using gravity model. The two challenges are sample selection and heteroskedasticity. The TS-MM is consists of: the first step; the estimator explains why trade existed at all and focused on the extensive margin of trade. The second step, the estimator portrays the volume of trade by a gravity equation in its multiplicative form. This method allows the researcher to recognize trade's extensive margin from trade's intensive margin. According to the authors, this method is useful for other models applications with constant elasticity features (i.e., wage earnings models in labor economics).

An article by Sheng, Tang, & Xu (2014) made to examine the impact of the FTA between People's Republic of China (PRC) and the Association of Southern Asian Nations (ASEAN) on trade between the two partners. Their estimation results showed that the FTA had a significantly positive effect on the total trade flow between the two parties. In addition, the real GDP for importer and exporter, both GDP per capita, having a common language, sharing borders, and if importer and exporter are members of World Trade Organization (WTO) have a significant positive impact on bilateral trade. On the other hand, distance and island dummy have a significant negative impact on total trade.

Nuroğlu & Kunst, (2013) explain the bilateral trade flow for 15 EU member with different specifications of the gravity model. "*First, country and time fixed effect. Second, country-pair fixed effect. Third, a lagged dependent regressor together with time-varying country fixed effects. Also, finally, a lagged dependent regressor together with time-varying country fixed effects and time-invariant country- pair effects*[1]*"*. The result of the study showed that the dynamic gravity model with time varying importer and exporter fixed effect is the best model of all four models due to the high predictability and explanatory power.

Dueñas & Fagiolo (2013) studied whether gravity model can explain the international trade network (ITN). The authors argue that the gravity model is great at replicating the structure of the INT. Moreover, gravity model is a good model for estimation trade flows. However, it cannot predict the presence of the INT. The authors used standard specifications that most researchers used in the gravity model regression. They also augmented explanatory variables in the

[1] Nuroğlu & Kunst (2013)

equation that turned out to be insignificant but can increase the percentage of explained trade flow variance in the ITN.

In their paper (García, Navarro Pabsdorf, & Gómez Herrera, 2013) applied the gravity model of trade to find the determinants of trade flows between MERCOSUR countries. The authors used augmented gravity model using two estimation methods, pooled OLS and panel FE. The result of this paper showed that there is a positive effect for MERCOSUR but moderate. Moreover, their estimation results showed that pooled OLS leads to an incorrect conclusion that leads to a bias results, whereas panel FE had more realistic results. Also, as expected, exporter's GDP and importer's GDP turned out to have a positive impact on exports, and distance had a negative impact on exports. Moreover, the trade agreement had a positive impact on members differently. Other variables such as common language and mutual roots had a positive impact on trade; however, sharing a border had no significant impact on trade to this case study.

In his article (Martinez-Zarzoso, 2013) evaluate the best method for applying gravity model. The author used Monte Carlo simulation to compare the Gamma Pseudo-Maximum- Likelihood (GPML), Pseudo Poisson Maximum Likelihood (PPML), a Feasible Generalized Least Squares (FGLS) estimator and a Nonlinear Least Squares (NLS) estimator with the traditional techniques. The result showed that PPML was the least estimator that was affected by heteroskedasticity than other estimators in the term of bias and SEs compared with FGLS. Moreover, GPML showed the lowest biases.

In their article (Abidin, Bakar, & Sahlan, 2013) investigate the factors that affect the exports of Malaysia and the Organization of Islamic Cooperation (OIC) using gravity model. The results of their estimations showed that exporter's GDP and importer's GDP had a significant positive effect on exports. On the other hand GDPPC for the exporter, GDPPC for the importer, and distance had a significant negative effect on Malaysia's exports. The authors suggested that policymakers in Malaysia should focus on African members of OIC, which would fasten the process of establishing the Islamic Common Market (ICM).

In their study (Ekanayake, Mukherjee, & Veeramacheneni, 2010) estimated the effect of the regional trade agreements (RTA) in Asia and their effects on intra-regional trade using the gravity model of trade. The result of the study supported the previous researches that used gravity model. According to the authors' estimations, importer's GDP, exporter's GDP, language, colony, and RTA (if both countries are joining a regional trade agreement). On the other hand, variables like distance, the population of the exporter and the population of the importer and BTA (if two countries have bilateral trade agreement) had a significant negative impact on export, and sharing borders have no significant impact on exports.

In their paper (Aysu & Tekçe, 2009) tried to explore whether the trade flow between each country from the GCC members and their trading partners have changed, or developed in new relations through two sample periods. The authors used gravity model of trade for their estimating. According to the result of their paper, FE was the most appropriate model explaining the GCC countries' trade after testing static and dynamic gravity model and different estimating methods. Moreover, the results of their paper showed two unexpected results; one states that trading partner's per capita income is low for Kuwait, Saudi Arabia and UAE, which implies that their export commodities have inelastic demand. The other unexpected results are that distance had a positive impact on trade rather than negative, unlike what literature suggests. As the authors suggest, the reason for the positive effect of distance is that most of the neighboring countries of the

GCC are either have oil and gas reserves and do not need to import from the GCC countries or low-income countries. Another explanation for the positive impact of distance is that the main exporting destinations for the GCC countries are wealthier countries such as South Korea, Japan, and the US.

A research paper made by (Hegre, 2009) to analyze the nature of the omitted-variable bias in the literature on trade and conflict in the gravity model empirically and theoretically. The author argues that correcting the model's specifications leads to more accurate results in the relationship between trade and conflict rather than using traditional models. In summary, he concluded that there is a strong relationship between trade and conflict by using the right model. Also, the crucial to the trade relationship is trade efficiency rather than trade value and economic size.

According to a paper by (boughanmi, 2008), by using pool time-series-cross-sectional data, the exports from the GCC countries to the US and EU are intensive. Moreover, the GCC's exports to Mashreq countries were more than expected, however, although GAFTA was signed a decade ago, the GCC's exports to Maghreb countries was less than expected. In addition, the intra-trade among the GCC countries was low but higher than expected. Other than the first decade of its creation, the GCC's intra-trade change did not change significantly. The results of the estimation came out as the following; both GDPs for exporter and importer, exporter's population, borders and the GCC's member were positive. On the other hand, importer's population and distance were negative.

In their paper, (Anderson & Wincoop, 2003), show that there is no theoretical background for the estimated gravity equation. The result of this issue is that comparative static analysis is unfounded and that the equation has an omitted variables bias. Therefore, the authors develop an efficient method that corrects trade frictions' comparative statics. The results of their paper show that national borders between US and Canada by 44%, and 30% for other counties. They argue that the reasons for the negative impact are that (i) omitted variables bias, (ii) the small economic size of the exporting country, and (iii) border's ratio intra-national to international trade.

A research made by (Deardorff, 1998) to test if the gravity model works in the real world and if it is consistent with economic and trade theories. The author states that it is easy to justify gravity theory, even in its simple form; from classical and new trade theories. Moreover, he agrees that "*its use for empirical tests of any of them is suspect*" is correct, however, it is misleading. The reason for this assumption is that for about thirty years, gravity equation was not used to test trade theories.

In his paper (Bergstrand, 1985) states that the gravity model has no theoretical background. Therefore, gravity model is reduced partial equilibrium from the general equilibrium model of world trade. The author found that the exchange rate and the price had a significant impact on trade flows using gravity model. Moreover, elasticity between imported goods and domestic products is below unity in the context of the theoretical model, and the elasticity of export markets is more than the production of domestic and foreign markets.

2.3 Methodology

In this section, the methodology for measuring the factors that determine the exports of the GCC countries and Korea will be presented. To do so, the gravity model of trade is used as the methodology for the study. The gravity model of trade has many applications such as explaining migration, foreign direct investments (FDI), portfolio investments and exports. The gravity model of trade is originated from Newton's law of the universal gravitation. The law basically states that the attractive force between two masses is related to their size and inversely related to the distance between them (Abidin, Bakar, & Sahlan, 2013). Tinbergen (1962) applied Newton's law to determine International trade. The below equation is the application of Newton's law of the gravity model in the international trade.

$$F_{ij} = G\ \frac{M_i\ \cdot\ M_j}{D_{ij}}$$

(2.1)

where F_{ij} stands for trade flow from region i to region j, M_i denotes the economic mass of region i, M_j denotes economic the mass of region j, D_{ij} denotes the distance between region i and region j, and G is constant. To carry out the empirical analysis for the gravity model, logarithmic "*ln*" form should be used. Therefore, to convert it to the log and linear formula, it should be written as the following:

$$LnF_{ij} = \beta_0 + \beta_1 LnM_i + \beta_2 Ln\ M_j + \beta_3 lnD_{ij} + e_{ijt}$$

(2.2)

where F_{ij} denotes exports from country i to country j, M_i and M_j denotes the mass the economy of country *i,* and country *j* (or region) which can be presented by their GDP or GDP per capita, D_{it} denotes the distance between country i and country j, and e refers to the error term in the equation. In addition, to apply this form of the equation, the estimated equation would be as the following:

$$ln(EXP_{ijt}) = \beta_0 + \beta_1 \, ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) \\ + \beta_4 ln(GDPPC_{it}) + \beta_5 ln(GDPPC_{jt}) + \beta_6 ln(POP_{it}) \\ + \beta_7 ln(POP_{jt}) + \beta_8 BORDER_{ij} + \beta_9 LANG_{ij} + \beta_{10} FTA_{ijt} \\ + \beta_{11} GCC_{ijt} + e_{ijt} \tag{2.3}$$

Where EXP_{ijt} Denotes the exports of country i to its trading partner j over t time one year, GDP_{it} denotes exporter's GDP over time t, GDP_{jt} denotes importer's GDP over time t, DIS_{ij} denotes the distance between the exporter's capital city i and the importer's capital city j, $GDPPC_{it}$ denotes the GDP per capita of the exporter i over time t, $GDPPC_{jt}$ denotes the GDP per capita of the importer j over time t, POP_{it} denotes the population of the exporter i over time t, POP_{jt} denotes the population of the importer i over time t, $BORDER_{ij}$ denotes shared border between the exporter i and the importer j, $LANG_{ij}$ denotes the shared language between the exporter i and the importer j, FTA_{ij} denotes the effective free trade agreement between the exporter i and the importer, GCC_{ij} refers to the regional trading block member of the Gulf Cooperation Council, and e_{ijt} denotes error term. However, a singularity problem (near-singular matrix error) appeared upon applying this equation to the program because of the characteristics of the data between the exporter's GDP, the GDP per capita and the population. Therefore, the essential variables to the gravity model (the exporter's and importer's GDP, the distance) in addition to the dummy variables were used as a start, and the other variables were added one by one as in the following nine equations (2.3.1 to 2.3.9):

$$ln(EXP_{ijt}) = \beta_0 + \beta_1 ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + e_{ijt} \tag{2.3.1}$$

$$ln(EXP_{ijt}) = \beta_0 + \beta_1 ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + \beta_8 ln(GDPPC_{it}) + e_{ijt} \tag{2.3.2}$$

$$ln(EXP_{ijt}) = \beta_0 + \beta_1 ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + \beta_8 ln(GDPPC_{jt}) + e_{ijt} \tag{2.3.3}$$

$$ln(EXP_{ijt}) = \beta_0 + \beta_1 ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + \beta_8 ln(POP_{it}) + e_{ijt} \tag{2.3.4}$$

$$ln(EXP_{ijt}) = \beta_0 + \beta_1 ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + \beta_8 ln(POP_{jt}) + e_{ijt} \tag{2.3.5}$$

$$ln(EXP_{ijt}) = \beta_0 + \beta_1 ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + \beta_8 ln(POP_{jt}) + \beta_9 ln(GDPPC_{it}) + e_{ijt} \tag{2.3.6}$$

$$ln(EXP_{ijt}) = \beta_0 + \beta_1\, ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + \beta_8 ln(POP_{jt}) + \beta_9 ln(GDPPC_{jt}) + e_{ijt} \tag{2.3.7}$$

$$ln(EXP_{ijt}) = \beta_0 + \beta_1\, ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + \beta_8 ln(POP_{it}) + \beta_9 ln(POP_{jt}) + e_{ijt} \tag{2.3.8}$$

$$ln(EXP_{ijt}) = \beta_0 + \beta_1\, ln(GDP_{it}) + \beta_2 ln(GDP_{jt}) + \beta_3 ln(DIS_{ij}) + \beta_4 BORDER_{ij} + \beta_5 LANG_{ij} + \beta_6 FTA_{ijt} + \beta_7 GCC_{ijt} + \beta_8 ln(POP_{it}) + \beta_9 ln(POP_{jt}) + \beta_8 ln(GDPPC_{jt}) + e_{ijt} \tag{2.3.9}$$

The estimation results for Equation (2.3.1) showed good results, however not enough for the study purposes <see Appendix A-2>. The following step is to add the GDP per capita for the exporting country (Equation 2.3.2), however, the result showed a negative and significant effect on Kuwait's exports <see Appendix A-3>. Next, the GDP per capita of the importing country instead (Equation 2.3.3), and it had a negative effect as well <see Appendix A-4>. The population of the exporting country was added in Equation (2.3.4), but the result showed a negative effect for the exporting country' GDP <see Appendix A-5>. However, adding the importer's population in Equation (2.3.5) had good estimation results <see Appendix A-6>. The next step is to add the variables to the previous equation. Therefore, the exporter's GDP per capita is added in Equation (2.3.6), and it had a significantly negative effect on the exports again <see Appendix A-7>. The importer's GDP per capita is added in Equation (2.3.7) and the importer's GDP had a significant and negative effect on the exports <see Appendix A-8>. Next, the exporter's population is added to Equation (2.3.8) and the results were good again <see Appendix A-9>. The final test is adding the importer's GDP per capita to the previous equation as in Equation (2.3.9), and the importer's GDP had a negative sign <see Appendix A-10>.

After testing the nine previous equations, another approach is followed. Additionally, to avoid the singularity issue that is resulted from the similarity in the data characteristics of the exporter's variables (GDP, GDP per capita and population) the joint logarithmic product of variable M_i and M_j or GDPs is used (2.4);

$$Ln F_{ij} = \beta_0 + \beta_1 Ln(M_i . M_j) + \beta_2 lnD_{ij} + e_{ij} \tag{2.4}$$

therefore, the estimated equation would be as the following:

$$\begin{aligned} ln(EXP_{ijt}) = \beta_0 &+ \beta_1 ln(GDP_{it} . GDP_{jt}) + \beta_2 ln(DIS_{ij}) + \beta_3 ln(GDPPC_{it}) \\ &+ \beta_4 ln(GDPPC_{jt}) + \beta_5 ln(POP_{it}) + \beta_6 ln(POP_{jt}) + \beta_7 BORDER_{ij} \\ &+ \beta_8 LANG_{ij} + \beta_9 FTA_{ijt} + \beta_{10} GCC_{ijt} + e_{ijt} \end{aligned} \tag{2.5}$$

where EXP_{ijt} denotes exports by country *i* to its trading partner *j* over t time one year, $GDP_{it}.GDP_{jt}$ Denotes the product of exporter's GDP and importer's GDP over time *t*, DIS_{ij} denotes distance from exporter's capital city *i* to importer's capital city j, $GDPPC_{it}$ denotes GDP per capita of exporter *i* over time *t*, $GDPPC_{jt}$ denotes GDP per capita of importer *j* over time *t*, POP_{it} denotes the population of exporter *i* over time *t*, POP_{jt} denotes the population of importer *i* over time *t*, $BORDER_{ij}$ denotes shared border between exporter *i* and importer *j*, $LANG_{ij}$

denotes shared language between exporter i and importer j, FTA_{ij} denotes effective free trade agreement between exporter i and importer, GCC_{ij} refers to a regional trading block member of the GCC and e_{ijt} denotes error term. However, using the equation as it is, leads to unrealistic results <Appendix A-11>. Therefore, the same procedure that was applied to Equation (2.3) is applied to this equation. Therefore, few modifications such as eliminating variables needed to be done. Therefore, the importer's GDP per capita was eliminated. As a result, the final equation would be like the following.

Equation for the GCC Countries

$$\begin{aligned} ln(EXP_{ijt}) = \beta_0 + \beta_1 ln(GDP_{it}.GDP_{jt}) + \beta_2 ln(DIS_{ij}) + \beta_3 ln(GDPPC_{it}) \\ + \beta_4 ln(POP_{it}) + \beta_5 ln(POP_{jt}) + \beta_6 BORDER_{ij} ln + \beta_7 LANG_{ij} \\ + \beta_8 FTA_{ijt} + \beta_9 GCC_{ijt} + e_{ijt} \end{aligned} \tag{2.6}$$

Equation for Korea

$$\begin{aligned} ln(EXP_{ijt}) = \beta_0 + \beta_1 ln(GDP_{it}.GDP_{jt}) + \beta_2 ln(DIS_{ij}) + \beta_3 ln(GDPPC_{it}) \\ + \beta_4\, ln(POP_{it}) + \beta_5 ln(POP_{jt}) + \beta_6 FTA_{ijt} + e_{ijt} \end{aligned} \tag{2.7}$$

Where as:

Dependent variable

EXPijt denotes exports by country *i* to its trading partner *j* in time *t*

Explanatory variables

GDP_{it} denotes exporter's GDP at time *t*

GDP_{jt} denotes importer's GDP at time *t*

DIS_{it} denotes distance from exporter's capital city *i* to importer's capital city j

$GDPPC_{it}$ denotes GDP per capita of exporter *i* at time *t*

$GDPPC_{jt}$ denotes GDP per capita of importer *j* at time *t*

POP_{it} denotes the population of exporter *i* at time *t*

POP_{jt} denotes the population of importer *j* at time *t*

$BORDER_{ij}$ denotes shared border between exporter *i* and importer *j* (binary variable)

$LANG_{ij}$ denotes shared language between exporter *i* and importer *j* (binary variable)

FTA_{ijt} denotes effective free trade agreement between exporter *i* and importer (binary variable)

GCC_{ijt} refers to the membership of the Gulf Cooperation Council (binary variable)

e_{ijt} denotes error term

i denotes the exporting country

j denotes the importing country

t denotes period under observation which is 2000-2015

$\beta_1, \beta_2 \ldots \beta_9$ denotes coefficients to be estimated

β_0 denotes the intercept coefficient

2.4 Data and Procedures

This study conducted by using annual panel data for the period from 2000 to 2015 for the GCC countries and Korea, with their trading partners. The panel data has many advantages over the cross-sectional data and the time series data. First, controlling for *individual heterogeneity*. Second, panel data gives *more variabilities, more degree of freedom, more efficiency and less collinearity* among variables. Third, *dynamic of adjustments* are studied better by panel data. Fourth, panel data can detect and measure the effects that are hard to be identified in the time series data and the cross-sectional data. Fifth, the panel data is better to build and test more complicated models (Baltagi, 2005) and (Hsiao & Yanan, 2006). Therefore, using the panel data is more preferable over the time series and the cross-sectional data.

The endogenous variables for the GCC countries and Korea are their exports. The exports to their trading partners are in USD as the trading currency. In addition, the exports data were extracted from the UNComtrade. On the other hand, the exogenous variables are the distance that has been measured between trading partner's capitals by kilometers from http://www.distancefromto.net/. The GDP, GDP per capita and the population, were extracted from the World Bank database and the OECD database. In this study, the GCC countries and Korea are the exporting countries. The bilateral trading partners were chosen according to their share of the trade size with the exporting countries, and the data availability. The data includes three sets that include 55, 45 and 35 trading partners for the GCC countries, and 80, 60 and 40 trading partners for Korea. Moreover, the data covers 16 years that for the period from 2000 to 2015.

The gravity model is estimated by using panel data to carry out the empirical study to determine the exports of the six GCC countries and Korea. The gravity equations were estimated using the three-panel model for each data set; Pooled OLS model, Fixed effect model (FE) and Random Effect (RE) model. First, Pooled OLS model simply pools all the data together without any regards to the individuality differences among the countries or the observations. As a result, all individuals have the same intercept and slope. Although the pooled OLS model ignores the panel nature of the data, the least squares estimator is still consistent. However, it has unrealistic assumption that there is lack of correlation between errors. Moreover, the least square's standard errors are not correct. The standard error in the Pooled OLS is too small and misleading. To overcome this problem, the estimated regression uses cluster-robust standard error. Using this method makes the time series observations on individuals' clusters (Gujarati & Porter, 2004). Eventually, by pooling all the observations, the equation function of all the betas ($\beta_0, \beta_1, \beta_2 \ldots$) will be done without the subscripts *i* or *t,* as the following (2.8):

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + u_{it} \tag{2.8}$$

Second, the fixed effect model (FE) is a more common econometrics model that is used by researchers. The main characteristics that differentiate the FE model from the Pooled OLS model are that it takes into consideration the differences between the individuals. Therefore, all individuals have different intercept but with the same slope. The advantage of this model is that it allows the individual to be correlated with the exogenous variables. The FE removes the heterogeneity, in other words, variation between variables (Hsiao & Yanan, 2006). However, the main limitation of the fixed effect model is that it cannot estimate the time-invariant variables, such as the distance and the dummy variables. In addition, it does not recognize the variation within the individual dummy variable. However, in the estimated equations, the time-invariant variables are omitted in the FE regression model in this study (Gujarati & Porter, 2004). In the equation function, *i* subscript has been added the intercept (β_{0i}), therefore, it will be as the following (2.9):

$$Y_{it} = \beta_{0i} + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + u_{it} \tag{2.9}$$

The third model that was estimated is the random effect model (RE). In the RE model, it is assumed that the differences between the individuals are captured in the intercept. Furthermore, the sample individuals were randomly selected, rather than fixed, and the individual differences are included as in the below equation (2.10);

$$\beta_{0i} = \bar{\beta}_0 + e_i$$

(2.10)

where the individual's difference e_i are the random effect. Furthermore, the error term in the random effect has two combined errors, one for the individual, and one for the regression. Therefore, the RE is called the Error Components Model (ECM) as well. In the RE model, the intercept β_0 is the mean value of all the (cross-sectional) intercepts. In addition, the most appropriate method in the RE model is the generalized least squares (GLS) rather than the OLS. The RE model is preferred for lots of researches because it assumes that there is no correlation between the variables, which is unrealistic, and it removes heteroskedasticity accompanied with the cross-sectional data. Furthermore, RE model removes heterogeneity (variation between variables). The RE removes the variation within individual variables, unlike the FE and the pooled OLS models (Gujarati & Porter, 2004). Finally, by using the mean for the intercept in the RE model, the equation will be as the following (2.11);

$$Y_{it} = \bar{\beta}_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + v_{it}$$

(2.11)

Since there are three panel-models were applied (pooled OLS, FE and RE), it is necessary to choose the most appropriate model for each case. First, to choose between RE and FE, the random error v_{it} (Equation 2.12) must not be correlated with the exogenous variables. However, if the random error is correlated with the exogenous variables, then the OLS and the GLS estimators' parameters are bias and inconsistent (Baltagi, 2005).

$$v_{it} = u_{it} + e_{it} \tag{2.12}$$

To determine if the random error correlated with the exogenous variable *Hausman* were applied. In *Hausman* test, H_0: there is a correlation between the exogenous variables and the random error, hence the null hypothesis. On the other hand, H_1: there is no correlation between the exogenous variables and the random error, hence the alternative hypothesis. If the p-value of the Chi-square in *Hausman* test is significant, then the FE is consistent, and there is a correlation between the exogenous variables and the random error, hence; the FE model is preferred. However, if the Chi-square in *Hausman* test is insignificant, then the RE model is consistent, and there is no correlation between the exogenous variables and the random error, hence; the RE model is preferred for empirical analysis.

If the FE model is preferred, another test is required to choose between the FE model and the Pooled OLS. Since the FE model uses different intercept (β_{01}) rather than pooled OLS that pools all the intercepts (β_0), then *Wald* restriction test must be applied. Therefore, the null hypothesis and the alternative hypothesis as the following:

H_0: β_{01}=β_{02}=...= $\beta_{0,10}$

H_1: The β_{0i} are not equal

if the p-value of the Chi-square in *Wald* test is significant, then pooled OLS is consistent and β_{0i} are equal, hence pooled OLS is preferred. Moreover, if the Chi-square in *Wald* test is insignificant, then FE is consistent, and the β_{0i} are not equal, hence; FE is preferred for the empirical analysis.

To have an accurate result, the panel unit root tests were applied to all of the variables and the error terms as well for the estimated models. The unit root tests were applied to make sure that the variables are stationary. By adopting the method of Levin, Lin and Chu (2003), the null hypothesis and the alternative hypothesis for the panel unit root test is as the following:

$$H_0: \alpha = 0$$

$$H_1: \alpha < 0$$

wherein LLC method, the term α is assumed to be common across the cross-section, therefore, the t-statistic is used to decide if the null hypothesis (H_0) to be rejected, hence there is no unit root. However, if the H_0 could not be rejected, there is a unit root. The bellow table (2-9) shows the expected signs of the variables in the model.

In summary, this study is reported for the years from 2000 to 2015 for the six GCC countries and Korea with three sets of data with their major trading partners. Moreover, econometrics method was applied by using the Eviews software to analyze the data and to measure the determinants of exports using the gravity theory.

To determine the best econometrics model for each country, between RE and FE, *Hausman* test was applied. Moreover, to determine the best econometrics model for each country, between FE and Pooled OLS, *Wald* test was applied. The tests showed a different result for the best model for each country. However, all other results were presented as reference models.

Table 2-9 Variables and their expected signs

Variable	Expected signs	Reasons
Exporter's and importer's GDP Product of Exporters' and Importers' GDP	+	The GDP of the exporter determine the supply's size, and the importer's GDP determine the market size
Distance	-	Transportations cost more if the country is farther
	+	Most of the neighboring countries are either oil and gas exporters and do not need to import from the GCC countries, or have low income, and /or the main exporting destinations for the GCC countries are wealthier countries such as South Korea, Japan, and the US
Exporter's GDP Per Capita	+	More productivity leads to more exports
	-	A higher per capita may lead to consuming the local product and the need for more, hence fewer exports
Importer's GDP Per Capita	+	The higher productivity leads to the high demand for import
	-	The high productivity may lead to the lower demand for low-quality goods
Exporter's Population	+	Countries with a bigger population expected to have more exports
Importer's Population	+	Countries with a bigger population expected to have more import
	-	Higher population tends to decrease income per capita and thus causes the total demand on imports to decrease
Border	+	Having borders reduce transit cost which leads exports increase
	-	Having borders may increase the transit cost which leads exports to decrease, and Having large borders with one country and relatively smaller economy may

		lead to negative impact on exports, and omitted variable bias
Language	+	Common language has a significant positive impact on the trade since linguistic barrier can be a significant obstacle
	-	Low GDP and GDP per capita for same language speaking countries lead to the decrease in exports
Free Trade Agreement	+	Signing free trade agreements eliminate the trade barriers that lead to increases in exports and trade creation effect
	-	Trade diversion effect leads to decrease in exports
Trading Block (GCC)	+	Joining trading blocks reduce trade barriers and trade creation effect
	-	Trade diversion effect leads to decrease in exports

Source: (Tumwebaze Karamuriro & Karukuza, 2015), (Abidin et al., 2013), (Kitetu & Ko, 2015), (Ekanayake, Mukherjee, & Veeramachenen, 2010),(boughanmi, 2008), (Doumbe & Belinga, 2015) and (Anderson & Wincoop, 2003)

2.5 Empirical Results and Findings

2.5.1 Determinants of the Exports of the GCC Countries

In this section, the result of the determinants of the GCC countries' exports are measured by using gravity model and will be presented for each member individually in details. Furthermore, each member will be presented in three datasets; 55 countries analysis, 45 countries analysis, and 35 countries analysis. Variables for the estimation include the GCC member's GDP (GDP_{it}) and their trading partners' (GDP_{jt}), the product of the GCC member's GDP and trading partners' ($GDP_{it}.GDP_{jt}$), the GCC member's GDP per capita ($GDPPC_{it}$), distance between capitals for the GCC member's and its trading partner (DIS_{ij}), and the population of the GCC's member and its trading partner

(POP_{it}) and (POP_{jt}). Moreover, four binary (dummy) variables included in the model; borders $(BORDER_{ij})$ take one if the GCC' member share border with its trading partner and zero if otherwise, language $(LANG_{ij})$ takes one if GCC's member trading partner speaks Arabic and zero if otherwise, Gulf Cooperation Council member (GCC_{ij}) takes one if the trading partner is a member of the GCC and zero otherwise, and the Free Trade Agreement (FTA_{ij}) takes one if the FTA is effective and zero otherwise. The table below (2-10) shows the FTA status for the GCC countries.

Table 2-10 the status of the FTAs between the GCC members and their trading partners

Region	Status	Signing date	Date of effect
GCC-FTA	Finalized	Dec 2001	January 2003
Arab Countries (GAFTA)[2]	Finalized	March 2001	January 2005
GCC-EFTA Countries[3] FTA	Finalized	June 2009	July 2014
GCC-Singapore (GSFTA)	Finalized	December 2008	September 2013
GCC-New Zealand	On hold	October 2009	-
GCC-India	On hold	March 2006	-
GCC-Malaysia	On hold	January 2011	-
GCC-China (PRC) FTA	Under negotiation	-	-
GCC-Pakistan	Under negotiation	-	-
GCC-EU FTA	Under negotiation	-	-
GCC-Turkey	Under negotiation	-	-
GCC-MERCOSUR Countries[4]	Under negotiation	-	-
GCC-Japan	Under negotiation	-	-
GCC- Korea	Under negotiation	-	-
GCC-Australia	Under negotiation	-	
GCC-ASEAN[5]	Under	-	-

[2] Greater Arab Free Trade Agreement (GAFTA) include 15 countries; Bahrain, Egypt, Iraq, Jordan, Kuwait, Libya, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Tunisia, UAE and Yemen

[3] European Free Trade Association (EFTA) include 4 countries; Iceland, Norway, Liechtenstein and Switzerland

[4] South American regional block include 4 countries; Argentina, Brazil, Uruguay and Paraguay

	negotiation		

Source: Gulf Cooperation Council's official website http://www.gcc-sg.org/en-us/CooperationAndAchievements/Achievements/Pages/Default.aspx and Asia Regional Integration Center; Tracking Asian Integration https://aric.adb.org/fta-group

The Models for the GCC Countries[6]

The First Model:

$$
\begin{aligned}
ln(EXP_{ijt}) = \beta_0 &+ \beta_1 ln(GDP_{it} \cdot GDP_{jt}) + \beta_2 ln(DIS_{ij}) + \beta_3 ln(GDPPC_{it}) \\
&+ \beta_4 ln(POP_{it}) + \beta_5 ln(POP_{jt}) + \beta_6 BORDER_{ij} + \beta_7 LANG_{ij} \\
&+ \beta_8 FTA_{ijt} + \beta_9 GCC_{ijt} + e_{ijt}
\end{aligned} \tag{2.13}
$$

The Second Model:

$$
\begin{aligned}
ln\left(EXP_{ijt}\right) = \beta_0 &+ \beta_1\, ln(GDP_{it}) + \beta_2\left(GDP_{jt}\right) + \beta_3 ln\left(DIS_{ij}\right) + \beta_4\, ln(POP_{it}) \\
&+ \beta_5\, ln\left(POP_{jt}\right) + \beta_6 BORDER_{ij} + \beta_7 LANG_{ij} + \beta_8 FTA_{ijt} \\
&+ \beta_9 GCC_{ijt} + e_{ijt}
\end{aligned} \tag{2.14}
$$

Indigenous Variable

EXPijt Denotes exports by country i to its trading partner j over t time one year

Exogenous Variables

[5] Asian trading block include; Thailand, Indonesia, Vietnam, Malaysia, Philippines, Singapore, Myanmar, Cambodia, Laos and Brunei

[6] The reported results are in the First model (equation 2.13), yet the results of the Second model (equation 2.14) are presented for comparison

GDP_{it}	denotes exporter's GDP at time *t*
GDP_{jt}	denotes importer's GDP at time *t*
DIS_{it}	denotes distance from exporter's capital city *i* to importer's capital city j
$GDPPC_{it}$	denotes GDP per capita of exporter *i* at time *t*
POP_{it}	denotes the population of exporter *i* at time *t*
POP_{jt}	denotes the population of importer *j* at time *t*
$BORDER_{ij}$	denotes shared border between exporter *i* and importer *j* (binary variable)
$LANG_{ij}$	denotes shared language between exporter *i* and importer *j* (binary variable)
FTA_{ijt}	denotes effective free trade agreement between exporter *i* and importer (binary variable)
GCC_{ijt}	refers to the membership of the Gulf Cooperation Council (binary variable)
e_{ijt}	denotes error term
i	denotes the exporting country
j	denotes the importing country
t	denotes period under observation which is 2000-2015
$\beta_1, \beta_2, \ldots, \beta_9$	denotes coefficients to be estimated
β_0	denotes the intercept coefficient

Kuwait

Table 2-11 Estimation of Kuwait's exports for 55 partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-35.50325*** (8.882200)	-36.81656*** (7.109575)	-36.16120*** (5.472014)
Ln(GDPi · GDPj)	0.211384 (0.152937)	0.288176 (0.242978)	0.240176* (0.143835)
LnDISTANCE	-0.190970 (0.347757)	-	-0.216699 (0.455571)
LnGDPPCi	-0.221837 (0.335455)	-0.249090 (0.376907)	-0.211391 (0.264866)
LnPOPi	1.724102*** (0.587554)	1.673509*** (0.573485)	1.721545*** (0.410536)
LnPOPj	0.653927*** (0.587554)	0.508120 (0.553805)	0.615256*** (0.194574)
BORDER	-0.740973* (0.587554)	-	-0.705812 (2.103646)
LANGUAGE	1.361472** (0.589350)	-	1.541997* (0.815398)
FTA	0.556274 (0.589350)	-	0.196859 (0.238026)
GCC	2.682194*** (0.589350)	-	2.672136** (1.317097)
Number of observations	880	880	880
R-squared	0.333777	0.756436	0.211179
Adjusted R-squared	0.326885	0.739229	0.203019
S.E. of regression	2.145618	1.335479	1.333912
F-statistic	48.42981	43.96165	25.87907
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-12 Estimation of Kuwait's exports for 55 partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-35.50325*** (8.882200)	-36.81656*** (7.109575)	-36.16120*** (5.472014)
LnGDPi	-0.010453 (0.231357)	0.039086 (0.193858)	0.028786 (0.181809)
LnGDPj	0.211384 (0.231357)	0.288176 (0.242978)	0.240176* (0.143835)
LnDISTANCE	-0.190970 (0.347757)	-	-0.216699 (0.455571)
LnPOPi	1.945939*** (0.540021)	1.922599*** (0.453281)	1.932935*** (0.455571)
LnPOPj	0.653927*** (0.243891)	0.508120 (0.553805)	0.615256*** (0.194574)
BORDER	-0.740973 (0.516711)	-	-0.705812 (2.103646)
LANGUAGE	1.361472** (0.516711)	-	1.541997* (0.815398)
FTA	0.556274 (0.403418)	-	0.196859 (0.238026)
GCC	2.682194*** (0.926634)	-	2.672136** (1.317097)
Number of observations	880	880	880
R-squared	0.333777	0.756436	0.211179
Adjusted R-squared	0.326885	0.739229	0.203019
S.E. of regression	2.145618	1.335479	1.333912
F-statistic	48.42981	43.96165	25.87907
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-13 *Hausman* test for Kuwait's 55 partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-13) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in the Table (2-11) show the empirical findings for Kuwait's bilateral trade with its 55 trading partners. The intercept's result is -36.16120, and it is significant at the 1% level. The sign of the distance's coefficient is negative as expected; however it is insignificant. The product of Kuwait's and its trading partner's GDP is 0.240176 statically significant at the 10% significance level. Therefore, if the product of their GDPs increases by 1%, Kuwait's exports will increase by 0.240176 %. Hence, most of the literature argues that GDP is economies the driving force. The sign of Kuwait's GDP per capita is negative; however, it is insignificant. Kuwait's population is 1.721545 statically significant at the 1% significance level. Therefore, if Kuwait's population increases by 1%, Kuwait's exports will increase by 1.721545%. Moreover, Kuwait's trading partner's population coefficient is 0.615256 statically significant at 1% significance level, hence, if Kuwait's trading partner's population increases by 1% Kuwait's exports will increase by 0.615256%. The sign of border is negative; however, it is insignificant. The coefficient of sharing a common language and the GCC member are 1.541997 and 2.672136 statically significant at the 10% and

5% significance level, respectively. The FTA coefficient is positive as expected however it is insignificant.

The results in Table (2-12) show the empirical findings for Kuwait's bilateral trade with its 55 trading partners. The intercept's result is -36.16120, and it is significant at the 1% level. The sign of the distance's coefficient is negative as expected; however, it is insignificant. Kuwait's trading partner's GDP is 0.240176 statically significant at the 10% significance level. Therefore, if Kuwait trading partner's GDP increases by 1%, Kuwait's exports will increase by 0.24%. Kuwait's population is 1.932935 statically significant at the 1% significance level. Therefore, if Kuwait's population increases by 1%, Kuwait's exports will increase by 1.93%. Moreover, Kuwait's trading partner's population coefficient is 0.615256 statically significant at 1% significance level, hence, if Kuwait's trading partner's population increases by 1% Kuwait's exports will increase by 0.615256%. The sign of border is negative; however, it is insignificant. The coefficient of sharing a common language and the GCC member are 1.541997 and 2.672136 statically significant at the 10% and 5% significance level, respectively. The FTA coefficient is positive as expected however it is insignificant.

Table 2-14 Estimation of Kuwait's exports for 45 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-41.98021*** (9.708878)	-43.35514*** (7.034730)	-42.60164*** (5.997691)
Ln(GDPi · GDPj)	0.011566 (0.207803)	0.337281 (0.247602)	0.172516 (0.166055)
LnDISTANCE	0.123072 (0.332983)	-	0.003949 (0.166055)
LnGDPPCi	0.176549 (0.392458)	-0.194423 (0.387553)	0.020179 (0.295261)
LnPOPi	2.201079*** (0.613369)	1.544389*** (0.584226)	1.922011*** (0.456521)
LnPOPj	0.835416*** (0.274894)	0.832590* (0.547353)	0.780590*** (0.217648)
BORDER	-0.727785 (0.589241)	-	-0.930064 (2.136195)
LANGUAGE	1.254668* (0.782820)	-	1.707619* (0.953215)
FTA	0.592228 (0.483628)	-	0.130449 (0.240865)
GCC	3.314199*** (1.107128)	-	3.146515** (1.416645)
Number of observations	720	720	720
R-squared	0.347816	0.775601	0.256199
Adjusted R-squared	0.339549	0.759548	0.246771
S.E. of regression	2.105494	1.270420	1.270226
F-statistic	42.07214	48.31681	27.17296
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-15 Estimation of Kuwait's exports for 45 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-41.98021*** (9.708878)	-43.35514*** (7.034730)	-42.60164*** (5.997691)
LnGDPi	0.188115 (9.708878)	0.142858 (0.202922)	0.192695 (0.193703)
LnGDPj	0.011566 (0.207803)	0.337281 (0.247602)	0.172516 (0.166055)
LnDISTANCE	0.123072 (0.332983)	-	0.003949 (0.489119)
LnPOPi	2.024530*** (0.489409)	1.738812*** (0.471159)	1.901832*** (0.444376)
LnPOPj	0.835416*** (0.274894)	0.832590* (0.547353)	0.780590*** (0.444376)
BORDER	-0.727785 (0.589241)	-	-0.930064 (2.136195)
LANGUAGE	1.254668* (0.782820)	-	1.707619* (0.953215)
FTA	0.592228 (0.782820)	-	0.130449 (0.240865)
GCC	3.314199*** (0.782820)	-	3.146515** (1.416645)
Number of observations	720	720	720
R-squared	0.347816	0.775601	0.256199
Adjusted R-squared	0.339549	0.759548	0.246771
S.E. of regression	2.105494	1.270420	1.270226
F-statistic	42.07214	48.31681	27.17296
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-16 *Hausman* test for Kuwait's 45 trading partners (eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-16) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-14) show the empirical findings for Kuwait's bilateral trade with 45 trading partners. The intercept's result is -42.60164 and significant at 1% level. The sign of the distance's coefficient is not negative unlike other studies; however, it is insignificant. The product of Kuwait and its trading partner's GDP is positive but not significant. Hence, most of the literature argues that GDP is economies the driving force. The sign of Kuwait's GDP per capita is positive; however, it is insignificant. Kuwait's population is 1.922011 statically significant at 1% significance level, therefore if Kuwait's population increase by 1%, Kuwait's exports will increase by 1.922011%. Moreover, if Kuwait's trading partner's population is 0.780590 statically significant at 1% significance level, hence, if Kuwait's trading partner's population increases by 1% Kuwait's exports will increase by 0.780590%. The sign of border is unlike the literature suggested negative; however, it is insignificant. The coefficient for sharing a common language and GCC member are 1.707619 and 3.146515 statically significant at 10%

and 5% significance level, respectively. The FTA coefficient is positive as expected however it is insignificant.

The results in Table (2-15) show the empirical findings for Kuwait's bilateral trade with 45 trading partners. The intercept's result is -42.60164 and significant at 1% level. The sign of the distance's coefficient is not negative unlike other studies; however, it is insignificant. Kuwait's GDP and its trading partner's GDP is positive but insignificant. Kuwait's population is 1.901832 statically significant at 1% significance level, therefore if Kuwait's population increase by 1%, Kuwait's exports will increase by 1.9%. Moreover, Kuwait's trading partner's population is 0.780590 statically significant at 1% significance level, hence, if Kuwait's trading partner's population increases by 1% Kuwait's exports will increase by 0.78%. The sign of border is negative; however it is insignificant. The coefficient for sharing a common language and GCC member are 1.707619 and 3.146515, and statically significant at 10% and 5% significance level, respectively. The FTA coefficient is positive as expected however it is insignificant.

Table 2-17 Estimation of Kuwait's exports for 35 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-39.25824*** (8.192336)	-40.55891*** (6.101851)	-39.06450*** (6.291013)
Ln(GDPi · GDPj)	-0.136297 (0.299583)	0.455172* (0.256339)	0.189114 (0.183324)
LnDISTANCE	0.069101 (0.373348)	-	-0.105652 (0.539469)
LnGDPPCi	0.434955 (0.515674)	-0.331301 (0.394305)	0.026744 (0.309585)
LnPOPi	2.311853*** (0.621190)	1.089860* (0.394305)	1.666315*** (0.309585)
LnPOPj	0.913539*** (0.284203)	0.807437* (0.488192)	0.805904*** (0.309585)
BORDER	-0.658373 (0.646012)	-	-1.056578 (2.030977)
LANGUAGE	1.399585 (1.077867)	-	2.074320* (1.128273)
FTA	0.346461 (0.322569)	-	0.091572 (0.227790)
GCC	2.926956*** (1.059868)	-	2.510213* (1.451584)
Number of observations	560	560	560
R-squared	0.402284	0.819456	0.297450
Adjusted R-squared	0.392503	0.806287	0.285953
S.E. of regression	1.908260	1.077568	1.079763
F-statistic	41.12995	62.22938	25.87355
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author’s estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-18 Estimation of Kuwait's exports for 35 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-39.25824*** (8.192336)	-40.55891*** (6.101851)	-39.06450*** (6.291013)
LnGDPi	0.298658 (8.192336)	0.123872 (0.198031)	0.215858 (0.190340)
LnGDPj	-0.136297 (0.299583)	0.455172* (0.256339)	0.189114 (0.183324)
LnDISTANCE	0.069101 (0.299583)	-	-0.105652 (0.539469)
LnPOPi	1.876898*** (0.418027)	1.421161*** (0.256339)	1.639571*** (0.4278723)
LnPOPj	0.913539*** (0.284203)	0.807437* (0.488192)	0.805904*** (0.222842)
BORDER	-0.658373 (0.646012)	-	-1.056578 (2.030977)
LANGUAGE	1.399585 (1.077867)	-	2.074320* (1.128273)
FTA	0.346461 (0.322569)	-	0.091572 (0.227790)
GCC	2.926956*** (1.059868)	-	2.510213* (1.451584)
Number of observations	560	560	560
R-squared	0.402284	0.819456	0.297450
Adjusted R-squared	0.392503	0.806287	0.285953
S.E. of regression	1.908260	1.077568	1.079763
F-statistic	41.12995	62.22938	25.87355
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author’s estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-19 *Hausman* test for Kuwait's 35 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-19) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-17) show the empirical findings for Kuwait's bilateral trade with 35 trading partners. The intercept's result -39.06450 is significant at 1% level. The sign of the distance's coefficient is negative as other studies suggested, however, it is insignificant. The product of Kuwait and its trading partner's GDP is positive but not significant. The sign of Kuwait's GDP per capita is positive; however, it is insignificant. Kuwait's population is 1.666315 and statically significant at the 1% significance level, therefore if Kuwait's population increases by 1%, Kuwait's exports will increase by 1.666315%. Moreover, if Kuwait's trading partner's population is 0.805904 statically significant at the 1% significance level, hence, if Kuwait's trading partner's population increases by 1%, Kuwait's exports will increase by 0.805904%. The sign of border is unlike the literature suggested negative; however, it is insignificant. The coefficient for sharing a common language and GCC member are 2.074320 and 2.510213 statically significant at 10% significance level. The FTA coefficient is positive as expected however it is insignificant.

The results in Table (2-18) show the empirical findings for Kuwait's bilateral trade with 35 trading partners. The intercept's result -39.06450 is significant at 1% level. The sign of the distance's coefficient is negative as other studies suggested, however, it is insignificant. Kuwait's GDP and its trading partner's GDP are positive but insignificant. Kuwait's population is 1.639571 and statically significant at the 1% significance level, therefore if Kuwait's population increases by 1%, Kuwait's exports will increase by 1.64%. Moreover, if Kuwait's trading partner's population is 0.805904 statically significant at the 1% significance level, hence, if Kuwait's trading partner's population increases by 1%, Kuwait's exports will increase by 0.805904%. The sign of border is negative; however it is insignificant. The coefficient for sharing a common language and GCC members are 2.074320 and 2.510213 and statically significant at the 10% significance level. The FTA coefficient is positive as expected however it is insignificant.

Estimation Summary for Kuwait's Exports

The estimation's results is tested using *Hausman* test. The results proved that the RE is the best model for the three estimated data sets. The values of the R-squared is 0.211179, 0.256199 and 0.297450 for the 55, 45 and 35 data sets, respectively. Moreover, the Standard Error (S.E.) of regression was the highest in the 55 data set (which is 1.333912) then 45 (1.270226) and 35 (1.079763). The values of the F-statistics is 25.87907, 25.87907 and 25.87355 for the 55, 45 and 35 data sets, respectively, while the p-value for the F statistics was significant at 1% level of significance.

The coefficients signs for the empirical results consist with the study's expectations. The results showed that distance and Kuwait's GDP per capita is a negative but insignificant impact on Kuwait's exports. The GDPs has a significant impact on exports, and Kuwait's population and the population of its trading partner have a significant positive impact on Kuwait's trade. Furthermore, sharing language and GCC membership are strong determinants of Kuwait's exports positively. The S.E. of regression is the highest for 55 countries, then 45 and countries. The F-statistics has the same trend, where it was the highest for the 55 trading partners, and the lowest is in the 35 trading partners. The p-values for F-statistics are significant at 1% level of significance for all the data sets. In summary, the 55 dataset is the best model for Kuwait.

Saudi Arabia

Table 2-20 Estimation for Saudi Arabia's exports for 55 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-58.24801*** (10.34803)	-63.07544*** (9.694864)	-62.07002*** (10.40585)
Ln(GDPi · GDPj)	1.137210*** (10.34803)	1.926873*** (9.694864)	1.710454*** (0.182216)
LnDISTANCE	-0.685553* (10.34803)	-	-0.643444* (0.456983)
LnGDPPCi	0.142084 (0.294890)	-0.582461** (0.270279)	-0.373822* (0.456983)
LnPOPi	2.429552*** (0.630594)	2.938430*** (0.270279)	2.581793*** (0.689378)
LnPOPj	0.053359 (0.187562)	-1.343672*** (0.305065)	-0.509038*** (0.689378)
BORDER	0.376547 (0.187562)	-	0.165157 (1.530844)
LANGUAGE	1.169407** (0.499218)	-	1.440695* (0.955812)
FTA	0.491921* (0.321344)	-	-0.046404 (0.955812)
GCC	-0.258868 (0.573732)	-	-2.753671** (1.398765)
Number of observations	880	880	880
R-squared	0.399849	0.905684	0.624738
Adjusted R-squared	0.393641	0.899021	0.620856
S.E. of regression	1.755981	0.716589	0.724845
F-statistic	64.40399	135.9272	160.9314
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-21 Estimation for Saudi Arabia's exports for 55 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-51.71736*** (10.25311)	-54.28316*** (9.935607)	-53.90025*** (10.58871)
LnGDPi	0.699871*** (0.236443)	0.421808** (0.223957)	0.563819*** (0.218298)
LnGDPj	0.626472*** (0.155227)	0.971687*** (0.127991)	0.794710*** (0.103751)
LnDISTANCE	-0.843429** (0.404844)	-	-0.770237** (0.446642)
LnPOPi	2.043873*** (0.744990)	3.286758*** (0.894668)	2.640620*** (0.882102)
LnPOPj	-0.012194 (0.212341)	-1.585750*** (0.328329)	-0.545950*** (0.151745)
BORDER	0.874363* (0.549145)	-	0.842654 (1.482292)
LANGUAGE	1.147842** (0.471621)	-	1.304881 (0.925818)
FTA	0.518117* (0.312720)	-	0.029943 (0.140031)
GCC	-0.949480 (0.696000)	-	-3.437120*** (1.379353)
Number of observations	880	880	880
R-squared	0.427893	0.902415	0.611569
Adjusted R-squared	0.421975	0.895521	0.607551
S.E. of regression	1.714464	0.728902	0.738570
F-statistic	72.29936	130.8999	152.1977
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-22 ***Hausman*** **test for Saudi Arabia 55 trading partners (Eviews 8)**

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	6	1.0000

Hausman test summary table (2-22) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 6 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-20) show the empirical findings for Saudi Arabia's bilateral trade with 55 trading partners. The intercept's result is -62.07002 and significant at the 1% level. The sign of the distance's coefficient is negative as other studies suggested, and its coefficient is -0.643444, and it is significant at the 10% significance level. The product of Saudi Arabia's and its trading partner's GDP is 1.710454, and it is significant at the 1% significance level. Hence, most of the literature argues that GDP is economies the driving force. The sign of Saudi Arabia's GDP per capita is negative (-0.373822), and it is significant at the 10% significance level. Saudi Arabia's population is 2.581793 statically significant at 1% significance level, and therefor if Saudi Arabia's population increases by 1%, its exports will increase by 2.58%. Moreover, Saudi Arabia's trading partner's population is -0.509038 and statically significant at the 1% significance level, hence, if Saudi Arabia's trading partner's population increases by 1% Saudi Arabia's exports will decrease by 0.51%. The sign of border is positive; however, it is insignificant. The coefficient of sharing a common language and the GCC membership are 1.440695 and -2.753671 statically significant at the 10% significance level and the 5% significance level, respectively. The FTA coefficient is negative unlike its expected results; however, it is insignificant.

The results in Table (2-21) show the empirical findings for Saudi Arabia's bilateral trade with 55 trading partners. The intercept's result is -53.90025 and significant at the 1% level. The sign of the distance's coefficient is negative as other studies suggested, and its coefficient -0.770237 is significant at the 5% significance level. Saudi Arabia's GDP and its trading partner's GDP are 0.563819 and 0.794710, and they are both significant at the 1% significance level. Saudi Arabia's population is 2.640620 statically significant at the 1% significance level, therefore if Saudi Arabia's population increase by 1% its exports will increase by 2.64%. Moreover, if Saudi Arabia's trading partner's population is -0.545950 statically significant at the 1% significance level, hence, if Saudi Arabia's trading partner's population increases by 1% Saudi Arabia's exports will decrease by 0.55%. The sign of the border is positive; however, it is insignificant. The coefficient of the GCC membership is -3.437120 and statically significant at the 1% significance. The FTA coefficient is positive like its expected results; however it is insignificant.

Table 2-23 Estimation of Saudi Arabia's exports for 45 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-49.29274*** (10.20443)	-53.40751*** (9.482216)	-50.58023*** (10.26650)
Ln(GDPi · GDPj)	0.711227*** (10.20443)	1.838057*** (0.187946)	1.575573*** (10.26650)
LnDISTANCE	-0.277242 (10.20443)	-	-0.560732 (0.456615)
LnGDPPCi	0.534100** (10.20443)	-0.426069* (0.255117)	-0.204517 (0.456615)
LnPOPi	2.282711*** (10.20443)	2.224704*** (0.255117)	2.130523*** (0.456615)
LnPOPj	-0.032471 (10.20443)	-1.107407*** (0.279116)	-0.616307*** (0.145267)
BORDER	0.570562 (0.575585)	-	0.110415 (0.145267)
LANGUAGE	0.614886 (0.530851)	-	0.773142 (0.869209)
FTA	0.551860** (0.530851)	-	0.067359 (0.124490)
GCC	-0.117509 (0.565269)	-	-2.228823* (0.124490)
Number of observations	720	720	720
R-squared	0.346627	0.894313	0.651541
Adjusted R-squared	0.338345	0.886753	0.647124
S.E. of regression	1.537828	0.636217	0.642505
F-statistic	41.85212	118.2909	147.5049
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author’s estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-24 Estimation of Saudi Arabia's exports for 45 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-44.40560*** (10.24094)	-43.53228*** (9.697435)	-42.44860*** (10.45370)
LnGDPi	0.846202*** (0.206016)	0.429612** (0.217392)	0.585641*** (0.212976)
LnGDPj	0.439615*** (0.135076)	1.046858*** (0.121825)	0.811616*** (0.102006)
LnDISTANCE	-0.380735 (0.429247)	-	-0.632343 (0.452163)
LnPOPi	1.499178** (0.746242)	2.401144*** (0.874209)	1.979567** (0.864284)
LnPOPj	-0.041876 (0.193899)	-1.423240*** (0.299894)	-0.654724*** (0.149861)
BORDER	0.963025* (0.541964)	-	0.875996 (1.343548)
LANGUAGE	0.723694* (0.498334)	-	0.836125 (0.853930)
FTA	0.598233* (0.262275)	-	0.151828 (0.125594)
GCC	-0.539801 (0.603191)	-	-3.025602** (1.260389)
Number of observations	720	720	720
R-squared	0.363664	0.891220	0.639879
Adjusted R-squared	0.355597	0.883439	0.635314
S.E. of regression	1.517647	0.645460	0.653656
F-statistic	45.08469	114.5297	140.1735
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author’s estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-25 *Hausman* test for Saudi Arabia's 45 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	6	1.0000

Hausman test summary (table 2-25) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 6 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-23) show the empirical findings for Saudi Arabia's bilateral trade with 45 trading partners. The intercept's result is -50.58023 and significant at the 1% level. The sign of the distance's coefficient is negative as other studies suggested, however, it is insignificant. The product of Saudi Arabia's and its trading partner's GDP is 1.575573 at the 1% significance level. The sign of Saudi Arabia's GDP per capita is negative and insignificant. Saudi Arabia's population is 2.130523 statically significant at 1% significance level, therefore if Saudi Arabia's population increase by 1%, its exports will increase by 2.13%. Moreover, Saudi Arabia's trading partner's population is -0.616307 and statically significant at the 1% significance level, hence, if Saudi Arabia's trading partner's population increases by 1% Saudi Arabia's exports will decrease by 0.62%. The sign of border, language, and the FTA are positive the same as the literature suggest; however they are insignificant. The coefficient of GCC membership is -2.228823 statically significant at the 10% significance level.

The results in Table (2-24) show the empirical findings for Saudi Arabia's bilateral trade with 45 trading partners. The intercept's result is -42.44860 and significant at the 1% level. The sign of the distance's coefficient is negative as other studies suggested, however, it is insignificant. Saudi Arabia's GDP and its trading partner's GDP are 0.585641 and 0.811616, and they are significant at the 1% significance level. Saudi Arabia's population is 1.979567 and statically significant at the 5% significance level, therefore if Saudi Arabia's population increases by 1%, its exports will increase by 1.98%. Moreover, Saudi Arabia's trading partner's population is -0.654724 and statically significant at the 1% significance level, hence, if Saudi Arabia's trading partner's population increases by 1% Saudi Arabia's exports will decrease by 0.65%. The sign of border, language, and the FTA are all positive, the same as what the literature suggested, however, they are insignificant. The coefficient of GCC membership is -2.228823 and statically significant at the 10% significance level.

Table 2-26 Estimation of Saudi Arabia's exports for 35 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-56.19582*** (11.55684)	-60.44029*** (9.986278)	-54.75770*** (10.88689)
Ln(GDPi · GDPj)	0.513100** (11.55684)	1.809411*** (0.196210)	1.471144*** (0.174502)
LnDISTANCE	-0.494339 (0.508665)	-	-0.960571* (0.518727)
LnGDPPCi	0.411974* (0.508665)	-0.560025** (0.196210)	-0.296015 (0.252661)
LnPOPi	3.066683*** (0.627703)	2.711972*** (0.196210)	2.615969*** (0.252661)
LnPOPj	0.100926 (0.228890)	-1.043533*** (0.196210)	-0.431594*** (0.252661)
BORDER	0.241460 (0.704700)	-	-0.625282 (0.252661)
LANGUAGE	0.213641 (0.704700)	-	0.885145 (0.252661)
FTA	0.679464** (0.286932)	-	0.087209 (0.252661)
GCC	0.014988 (0.656968)	-	-1.295301 (1.284057)
Number of observations	560	560	560
R-squared	0.366048	0.889095	0.667811
Adjusted R-squared	0.355674	0.881006	0.662376
S.E. of regression	1.378060	0.592214	0.599493
F-statistic	35.28592	109.9133	122.8540
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-27 Estimation of Saudi Arabia's exports for 35 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-53.12488*** (11.01274)	-49.69310*** (10.12843)	-48.46232*** (10.95222)
LnGDPi	0.576649*** (0.214085)	0.126167 (0.228623)	0.349648* (0.222055)
LnGDPj	0.392039** (0.176254)	1.231048*** (0.139463)	0.857442*** (0.112703)
LnDISTANCE	-0.591074 (0.438141)	-	-0.988134** (0.507167)
LnPOPi	2.500305*** (0.754339)	3.165455*** (0.912281)	2.641215*** (0.898647)
LnPOPj	0.081857 (0.227232)	-1.615103*** (0.313729)	-0.486224*** (0.171811)
BORDER	0.683143 (0.696426)	-	0.436752 (1.336655)
LANGUAGE	0.366602 (0.516047)	-	1.006882 (0.859012)
FTA	0.686031** (0.290452)	-	0.119665 (0.131212)
GCC	-0.387836 (0.683600)	-	-2.050215* (1.272974)
Number of observations	560	560	560
R-squared	0.391457	0.887776	0.659581
Adjusted R-squared	0.381499	0.879590	0.654011
S.E. of regression	1.350161	0.595726	0.607290
F-statistic	39.31091	108.4600	118.4064
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-28 *Hausman* test for Saudi Arabia's 35 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	16.961817	5	0.0046

Table 2-29 Wald restriction test for Saudi Arabia's 35 trading partners (Eviews 8)

Test Statistic	Value	df	Probability
F-statistic	14.92143	(9, 550)	0.0000
Chi-square	134.2929	9	0.0000

Null Hypothesis: C(1)=C(2), C(2)=C(3), C(3)=C(4), C(4)=C(5), C(5)=C(6), C(6)=C(7), C(7)=C(8), C(8)=C(9), C(9)=C(10)

Hausman test summary table (2-28) shows that the Chi-Sq. statistics is 16.961817 and the Chi-Sq. d.f. is 5 and the probability is 0.0046. The result indicates that there is a correlation between the exogenous variables and the random error. Hence *Hausman* test indicates that the FE is a better model to choose rather than RE model. Furthermore, Wald restriction test summary (table 2-29) shows that F-statistic and Chi-square values are 14.92143 and 134.2929, respectively with probability 1% significance level, hence intercepts are not equal, and FE is the best model for the available data. However, pooled OLS was chosen as the best to fit gravity model rather than FE.

The results in Table (2-26) show the empirical findings for Saudi Arabia's bilateral trade with 35 trading partners. The intercept in the pooled OLS regression result is -56.19582 significant at 1% level. The sign of the distance's coefficient is negative as other studies suggested, however, it is insignificant. The product of Saudi Arabia's and its trading partner's GDP is 0.513100 at 5% significance level. The sign of Saudi Arabia's GDP per capita is positive, 0.411974 and significant at the 10% significance level. Saudi Arabia's population is 3.066683 and statically significant at the 1% significance level, therefore if Saudi Arabia's population increases by 1%, its exports will increase by 3.07%. Moreover, Saudi Arabia's trading partner's population is positive as well; however, it is insignificant. The sign of border, common language and GCC are the same as the literature suggested positive; however, they are insignificant. The coefficient of the FTA is 0.679464 and statically significant at the 5% significance level.

The results in Table (2-27) show the empirical findings for Saudi Arabia's bilateral trade with 35 trading partners. The intercept in RE regression result is -48.46232 significant at 1% level. The distance's coefficient is negative as other studies suggested (-0.988134) and significant at the 5% level of significance. Saudi Arabia's GDP and its trading partner's GDP are 0.349648 and 0.857442 and significant at the 10% and 1% significance level, respectively. Saudi Arabia's population is 2.641215 and statically significant at the 1% significance level, therefore if Saudi Arabia's population increases by 1%, its exports will increase by 2.64%. Moreover, Saudi Arabia's trading partner's population is negative (-0.486224) and significant at the 1% significance level. The sign of border, common language, and the FTA are the same as the literature suggested positive; however they are insignificant. The coefficient of the GCC membership is -2.050215 and statically significant at the 10% significance level.

Estimation summary for Saudi Arabia's Exports

The estimation's results are tested using *Hausman* test. The results proved that RE is the best model for the 55 and 45 datasets in the analysis, and pooled OLS is the best for the 35 trading partners data set. The values of the R-squared are 0.624738, 0.651541 and 0.366048 for the 55, 45 and 35 data sets, respectively. Moreover, the Standard Error (S.E.) of the regression is the highest in the 55 dataset (which is 0.724845) then 45 datasets (0.642505) and 35 datasets (1.378060). The values of the F-statistics were 160.9314, 147.5049 and 35.28592 for the 55, 45 and 35 data sets, respectively, while the p-value for the F statistics was significant at 1% level of significance.

The coefficients signs for the empirical results consistent with the study's expectations, except for the GCCs in RE models. The results showed that distance and Saudi Arabia's GDP per capita is negative and has a significant impact on Saudi Arabia's exports. The product of the GDP's has a significant positive impact on exports, and Saudi Arabia's population and the population of its trading partners has a significant strong positive impact on Saudi Arabia's exports; however its trading partner has a significantly strong negative impact on its trade. Furthermore, sharing borders have an insignificant positive impact on its exports. Sharing a language affects the exports positively. The GCC and the FTA are unexpectedly negative in RE results and positive in pooled OLS. The S.E. of regression is the highest for 35 countries, then 55 and 45 countries. The F-statistics have a different trend where it is the highest for 55 countries and the lowest 35 countries. The p-values for F-statistics are significant at the 1% level of significance for all the data sets. In summary, the 35 countries pooled OLS estimation has the closest compatibility with the economic theories.

Bahrain

Table 2-30 Estimation of Bahrain's exports for 55 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-33.71654*** (4.757352)	-44.34899*** (5.439105)	-35.60648*** (3.762467)
Ln(GDPi · GDPj)	0.056403*** (4.757352)	0.349847*** (0.133978)	0.061928*** (0.017486)
LnDISTANCE	0.812723** (0.334155)	-	0.785305** (0.345775)
LnGDPPCi	0.872094** (0.471253)	0.753081* (0.133978)	0.965531** (0.462222)
LnPOPi	1.181555*** (0.471253)	0.360173 (0.440872)	1.151237*** (0.383383)
LnPOPj	0.481288*** (0.106768)	1.527781*** (0.412558)	0.561306*** (0.116832)
BORDER	0.061101 (0.555594)	-	-0.158840 (0.116832)
LANGUAGE	1.449812*** (0.396846)	-	1.671103*** (0.605453)
FTA	0.801618*** (0.301888)	-	0.525799*** (0.179538)
GCC	4.055257*** (0.876571)	-	4.188137*** (1.068266)
Number of observations	880	880	880
R-squared	0.497171	0.802026	0.323250
Adjusted R-squared	0.491970	0.788040	0.316249
S.E. of regression	1.595179	1.030367	1.034604
F-statistic	95.57905	57.34487	46.17284
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-31 Estimation of Bahrain's exports for 55 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-30.78380*** (5.197887)	-41.98400*** (5.514794)	-31.09083*** (3.897180)
LnGDPi	0.672869 (0.511509)	0.784657* (0.476105)	0.641668 (0.467396)
LnGDPj	0.489058*** (0.148139)	0.692567*** (0.197533)	0.614576*** (0.121270)
LnDISTANCE	0.431702 (0.340470)	-	0.326576 (0.358006)
LnPOPi	0.173039 (0.853788)	-0.418276 (0.831967)	0.079998 (0.825594)
LnPOPj	0.276906* (0.148879)	1.201696*** (0.434358)	0.271306** (0.136393)
BORDER	0.240809 (0.432836)	-	0.074242 (1.517637)
LANGUAGE	1.743849*** (0.435132)	-	1.996986*** (0.617344)
FTA	0.654758** (0.289337)	-	0.506434*** (0.178969)
GCC	2.951555*** (0.816782)	-	2.698296** (1.133192)
Number of observations	880	880	880
R-squared	0.496715	0.803326	0.332906
Adjusted R-squared	0.491509	0.789432	0.326005
S.E. of regression	1.595902	1.026977	1.026071
F-statistic	95.40476	57.81768	48.24044
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-32 *Hausman* test for Bahrain's 55 trading partners (2000-2015)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	6	1.0000

Hausman test summary (table 2-32) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 6 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-30) show the empirical findings for Bahrain's bilateral trade with 55 trading partners. The intercept's result is -31.09083 and significant at the 1% level. The sign of the distance's coefficient is positive unlike its expected results, and its coefficient is 0.785305 at 5% significance level. According to Aysu and Tekce (2009), the reason for the positive effect of distance is that most of the neighboring countries of the GCC member either have oil and gas reserves and do not need to import from the GCC countries or have low income. Another explanation for the positive impact of distance is that the main exporting destinations for the GCC countries are wealthier countries such as South Korea, Japan, and the USA. The product of Bahrain's and its trading partner's GDPs is 0.061928 at the 1% significance level. The sign of Bahrain's GDP per capita is positive 0.965531 at 5% significance level. Bahrain and its trading partner's populations are 1.151237 and 0.561306 and statically significant at the 1% significance level. Therefore if Bahrain's population increases by 1%, its exports will increase by 1.15%. Moreover, if Bahrain's trading partner's population increases by 1%, Bahrain’s exports will increase by 0.56%. The coefficient for sharing a common language, the FTA, and the GCC membership are 1.671103, 0.525799 and 4.188137, respectively, are all statically significant at the 1% significance level.

The results in Table (2-31) show the empirical findings for Bahrain’s bilateral trade with 55 trading partners. The intercept’s result is -31.09083 and significant at the 1% level. The sign of the distance’s coefficient is positive, however insignificance. Bahrain’s trading partner’s GDP is 0.614576 at the 1% significance level. Bahrain trading partners’ population is 0.271306 statically significant at the 1% significance level. Therefore if Bahrain’s trading partner’s population increases by 1%, Bahrain’s exports will increase by 0.27%. The coefficient of sharing a common language, the FTA, and the GCC membership are 1.996986, 0.506434 and 2.698296, respectively, are all statically significant at the 1%, 1% and 5% significance level, respectively.

Table 2-33 Estimation of Bahrain's exports for 45 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-37.24653*** (4.662319)	-46.80275*** (5.178728)	-39.39509*** (4.394811)
Ln(GDPi · GDPj)	0.053163*** (4.662319)	0.330226** (5.178728)	0.058436*** (4.394811)
LnDISTANCE	0.755593* (4.662319)	-	0.702519* (4.394811)
LnGDPPCi	0.799091* (4.662319)	0.702902 (0.526336)	0.914254** (4.394811)
LnPOPi	1.555628*** (4.662319)	0.753599* (0.472621)	1.517185*** (4.394811)
LnPOPj	0.471595*** (4.662319)	1.425735*** (0.472621)	0.572538*** (4.394811)
BORDER	0.112907 (4.662319)	-	-0.150127 (1.478238)
LANGUAGE	1.346353*** (4.662319)	-	1.584820*** (1.478238)
FTA	0.652715** (0.307483)	-	0.380306** (1.478238)
GCC	3.977694*** (1.018002)	-	4.101510*** (1.157699)
Number of observations	720	720	720
R-squared	0.505045	0.809626	0.388022
Adjusted R-squared	0.498771	0.796008	0.380264
S.E. of regression	1.522368	0.971199	0.976073
F-statistic	80.49703	59.45093	50.01909
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-34 Estimation of Bahrain's exports for 45 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-33.53198*** (4.957545)	-42.08035*** (5.251973)	-32.64199*** (4.553159)
LnGDPi	0.656928 (0.561157)	0.538950 (0.492952)	0.566719 (0.484350)
LnGDPj	0.459833*** (0.151227)	0.978243*** (0.217541)	0.678935*** (0.128226)
LnDISTANCE	0.266827 (0.418296)	-	0.014956 (0.446086)
LnPOPi	0.592038 (0.969148)	0.011787 (0.860392)	0.472707 (0.855226)
LnPOPj	0.257396* (0.169738)	0.769266** (0.425309)	0.211181 (0.148353)
BORDER	0.346266 (0.416365)	-	0.145348 (1.467676)
LANGUAGE	1.520411*** (0.469632)	-	1.847221*** (0.631653)
FTA	0.469936* (0.290483)	-	0.352801** (0.171080)
GCC	2.662770*** (0.943842)	-	1.991891* (1.235270)
Number of observations	720	720	720
R-squared	0.515346	0.813899	0.404037
Adjusted R-squared	0.509203	0.800586	0.396483
S.E. of regression	1.506442	0.960239	0.962748
F-statistic	83.88477	61.13673	53.48326
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-35 *Hausman* test for Bahrain's 45 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-35) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-33) show the empirical findings for Bahrain's bilateral trade with 45 trading partners. The intercept's result is -39.39509 and significant at the 1% level. The sign of the distance's coefficient is positive unlike its expected results, and its coefficient is 0.702519 at the 10% significance level. According to Aysu and Tekce (2009), the reason for the positive effect of distance is that most of the neighboring countries of the GCC are either have oil and gas reserves and do not need to import from the GCC countries or low-income countries. Another explanation for the positive impact of distance is that the main exporting destinations for the GCC countries are wealthier countries such as South Korea, Japan, and the US. The product of Bahrain and its trading partner's GDP is 0.058436 at the 1% significance level. The sign of Bahrain's GDP per capita is positive 0.914254 at the 5% significance level. Bahrain's and its trading partner's population are 1.517185 and 0.572538 statically significant at the 1% significance level. Therefore if Bahrain's population increases by 1%, its exports will increase by 1.52%. Moreover, if Bahrain's trading partner's population increases by 1%, Bahrain's exports will increase by 0.57%. The coefficient for sharing a common language, the FTA, and the GCC member are 1.584820, 0.380306 and 4.101510 are all statically significant at the 1%, 5%, and 1% significance level, respectively.

The results in Table (2-34) show the empirical findings for Bahrain's bilateral trade with 45 trading partners. The intercept's result is -32.64199 and significant at the 1% level. The sign of the distance's coefficient is positive, however insignificance. Bahrain's trading partner's GDP is 0.614576 at the 1% significance level. Bahrain's and its trading partners' population are positive, however insignificant. The coefficient of sharing a common language, the FTA, and the GCC membership are 1.847221, 0.352801 and 1.991891, respectively, are all statically significant at the 1%, 5%, and 10% significance level, respectively.

Table 2-36 Estimation of Bahrain's exports for 35 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-32.75146*** (4.662519)	-42.77668*** (5.168331)	-34.63150*** (4.877284)
Ln(GDPi · GDPj)	0.034415** (4.662519)	0.517841*** (0.178608)	0.046694* (4.877284)
LnDISTANCE	0.638426 (4.662519)	-	0.625035 (0.479711)
LnGDPPCi	0.744364 (4.662519)	0.416170 (0.592668)	0.806724* (0.479711)
LnPOPi	1.477348*** (4.662519)	0.335937 (0.530251)	1.423664*** (0.479711)
LnPOPj	0.431557*** (4.662519)	1.175935*** (0.399803)	0.518368*** (0.142746)
BORDER	0.354368 (0.520150)	-	0.067672 (0.142746)
LANGUAGE	0.901520* (0.469464)	-	1.175564* (0.142746)
FTA	0.848326*** (0.469464)	-	0.679390*** (0.189875)
GCC	3.486990*** (0.469464)	-	3.624962*** (1.282743)
Number of observations	560	560	560
R-squared	0.455317	0.797056	0.386656
Adjusted R-squared	0.446404	0.782254	0.376619
S.E. of regression	1.501483	0.941671	0.942591
F-statistic	51.08454	53.84761	38.52480
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-37 Estimation of Bahrain's exports for 35 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-29.61259*** (5.001570)	-40.99025*** (5.299681)	-29.13932*** (4.913211)
LnGDPi	0.613066 (0.620961)	0.735748 (0.550376)	0.516909 (0.539150)
LnGDPj	0.387516* (0.214573)	0.689507*** (0.239494)	0.546231*** (0.156224)
LnDISTANCE	0.244184 (0.437650)	-	0.094022 (0.475009)
LnPOPi	0.619935 (1.074345)	-0.068650 (0.956423)	0.568335 (0.947099)
LnPOPj	0.208302 (0.215837)	0.949369** (0.436080)	0.179905 (0.173724)
BORDER	0.569698* (0.387418)	-	0.409304 (1.488476)
LANGUAGE	1.114027* (0.596297)	-	1.369109** (0.746566)
FTA	0.669762** (0.310198)	-	0.642976*** (0.190214)
GCC	2.323957** (1.045117)	-	1.923882 (1.339230)
Number of observations	560	560	560
R-squared	0.476474	0.797011	0.396909
Adjusted R-squared	0.467907	0.782206	0.387041
S.E. of regression	1.472033	0.941775	0.936274
F-statistic	55.61870	53.83264	40.21880
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-38 *Hausman* test for Bahrain's 35 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-38) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-37) show the empirical findings for Bahrain's bilateral trade with 35 trading partners. The intercept's result is -34.63150 and significant at the 1% level. The sign of the distance's coefficient is positive unlike its expected results; however, it is insignificant. The product of Bahrain and its trading partner's GDP is 0.046694 at the 10% significance level. The sign of Bahrain's GDP per capita is positive 0.806724 at the 10% significance level. Bahrain's and its trading partner's population are 1.423664 and 0.518368 statically significant at the 1% significance level. Therefore if Bahrain's population increases by 1%, its exports will increase by 1.42%. Moreover, if Bahrain's trading partner's population increases by 1%, Bahrain's exports will increase by 0.52%. The coefficient for sharing a common language, the FTA and GCC member are 1.175564, 0.679390 and 3.624962 are all statically significant at 10%, 1%, and 1% significance level, respectively.

The results in Table (2-38) show the empirical findings for Bahrain's bilateral trade with 35 trading partners. The intercept's result is -29.13932 and significant at the 1% level. The sign of the distance's coefficient is positive, however insignificance. Bahrain's trading partner's GDP is 0.546231 at the 1% significance level. Bahrain's and its trading partners' population are positive, however insignificant. The coefficient for sharing a common language and the FTA are 1.369109 and 0.642976, respectively, are all statically significant at the 5% and 1% significance level, respectively.

Estimation Summary for Bahrain's exports

The estimation's results were tested using Hausman test. The results proved that RE is the best model for the 55, 45 and 35 datasets in the analysis. The values of the R-squared were 0.323250, 0.388022 and 0.386656 for the 55, 45 and 35 data sets, respectively. Moreover, the Standard Error (S.E.) of the regression was the highest in the 55 dataset (which is 1.034604) then 45 datasets (0.976073) and 35 datasets (0.942591). The values of the F-statistics were 46.17284, 50.01909 and 38.52480 for the 55, 45 and 35 data sets, respectively, while the p-value for the F-statistics was significant at the 1% level of significance for all the data sets.

The coefficients' signs were for the empirical results consisted with the study's expectations, except for the distance in all models. The results showed that distance and Bahrain's GDP per capita is positive and has a significant impact on Bahrain's exports. The product of the GDP's has a significant positive impact on its exports. Moreover, Bahrain's population and its partner's population have a significant positive impact on Bahrain's exports. Furthermore, sharing borders have an insignificant negative impact on its exports in the 55 and 45 data sets. Sharing a language, the GCC and the FTA affect exports positively. The R-squared is the highest in the 45 datasets then 35 datasets then 55 datasets. The S.E. of regression is the highest for the 55 countries dataset, then the 45 dataset and the 35 countries dataset. The F-statistics has a different trend where it is the highest for the 45 datasets then 55 dataset, and the lowest was for the 35 countries dataset.

The p-values for the F-statistics are all significant at the 1% level of significance for all the data sets. In summary, the 45 dataset is the best model statically, and the 35 dataset has the closest compatibility with the economic theories.

Qatar

Table 2-39 Estimation of Qatar's exports for 55 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-45.74867*** (5.419593)	-0.393429 (9.142114)	-45.75367*** (5.656593)
Ln(GDPi · GDPj)	0.049676* (0.028230)	-0.256951* (0.149845)	0.035240 (0.031661)
LnDISTANCE	1.053036** (0.028230)	-	1.039305* (0.544128)
LnGDPPCi	-0.184428 (0.028230)	0.364291 (0.149845)	0.155308 (0.315113)
LnPOPi	2.365917*** (0.028230)	3.100341*** (0.149845)	2.362380*** (0.267197)
LnPOPj	0.784960*** (0.193193)	-1.444045** (0.149845)	0.620461*** (0.206377)
BORDER	0.696837 (1.446821)	-	1.092591 (1.689712)
LANGUAGE	-0.258398 (0.811340)	-	0.248314 (1.012058)
FTA	0.726318 (0.811340)	-	-0.907622*** (0.259401)
GCC	5.546880*** (1.328504)	-	5.857514*** (1.663162)
Number of observations	880	880	880
R-squared	0.393735	0.825652	0.470561
Adjusted R-squared	0.387464	0.813335	0.465084
S.E. of regression	2.473325	1.365357	1.371336
F-statistic	62.77963	67.03411	85.91665
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-40 Estimation of Qatar's exports for 55 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-42.33062*** (5.234963)	1.437401 (9.111348)	-44.70153*** (5.260283)
LnGDPi	-0.360445 (0.383955)	0.448812 (0.331589)	0.149061 (0.318969)
LnGDPj	0.661639*** (0.163258)	-0.916558*** (0.266643)	0.112552 (0.156899)
LnDISTANCE	0.270325 (0.424412)	-	0.829983* (0.520013)
LnPOPi	2.564062**** (0.749244)	2.627224*** (0.570182)	2.215199*** (0.562563)
LnPOPj	0.356522* (0.232906)	-0.905183 (0.639283)	0.591677*** (0.221738)
BORDER	0.829908 (1.251052)	-	1.212244 (1.557621)
LANGUAGE	0.124539 (0.687226)	-	0.240541 (0.937935)
FTA	0.391043*** (0.543937)	-	-0.903506*** (0.257469)
GCC	2.936671 (1.104810)	-	5.270668*** (1.639196)
Number of observations	880	880	880
R-squared	0.458670	0.827510	0.468867
Adjusted R-squared	0.453070	0.815325	0.463373
S.E. of regression	2.337120	1.358062	1.378529
F-statistic	81.90584	67.90866	85.33432
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-41 *Hausman* test for Qatar's 55 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-41) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of Hausman test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-39) show the empirical findings for Qatar's bilateral exports with the 55 trading partners dataset. The intercept's result is -45.75367 and significant at the 1% level. The sign of the distance's coefficient is positive unlike its expected result; its coefficient is 1.039305 at the 10% level of significance. According to Aysu and Tekce (2009), the reason for the positive effect of distance is that most of the neighboring countries of the GCC are either have oil and gas reserves or do not need to import from the GCC countries or they are low-income countries. Another explanation for the positive impact of distance is that the main exporting destinations for the GCC countries are wealthier countries such as South Korea, Japan, and the USA. The product of Qatar and its trading partner's GDP is positive but insignificant. The sign of Qatar's GDP per capita is positive and insignificant. Qatar's population and its trading partner's populations 2.362380 and 0.620461 are statically significant at the 1% significance level. Therefore if Qatar's population increases by 1%, its exports will increase by 2.362380%. Moreover, if Qatar's trading partner's population increases by 1%, Qatar's exports will increase by 0.620461%. The sign of the borders is not the same as the literature suggested positive; however it is insignificant. The coefficient for sharing a common language is positive but insignificant as well. The coefficients of the FTA and the GCC member are -0.907622, 5.857514 are all statically significant at the 1% significance level, respectively. The sign of the FTA is unlike what the literature suggests negative. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect, rather than trade creation effect that leads to a positive impact on the exports.

The results in Table (2-40) show the empirical findings for Qatar's bilateral exports with the 55 trading partners dataset (The reported result is the Pooled OLS). The intercept's result is -42.33062 and significant at the 1% level. The sign of the distance's coefficient is positive unlike its expected result, yet it is insignificant. Qatar's GDP is negative but insignificant. Qatar's trading partner's GDP is 0.661639 and significant at the 1% significance level. Qatar's population and its trading partner's populations are 2.564062 and 0.356522 are statically significant at the 1% and the 10% significance level, respectively. Therefore if Qatar's population increases by 1%, its exports will increase by 2.56%. Moreover, if Qatar's trading partner's population increases by 1%, Qatar's exports will increase by 0.36%. The coefficient for sharing a common language and GCC are positive but insignificant as well. The coefficient of the FTA is 0.391043 and statically significant at the 1% significance level, respectively.

Table 2-42 Estimation of Qatar's exports for 45 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-43.79153*** (7.196805)	4.711541 (9.748832)	-40.01963*** (7.361852)
Ln(GDPi · GDPj)	0.055781* (0.029155)	-0.342106** (9.748832)	0.036085 (0.036646)
LnDISTANCE	1.051681* (0.612528)	-	0.902820 (0.681827)
LnGDPPCi	-0.519622 (0.029155)	0.086250 (0.406777)	-0.251101 (0.036646)
LnPOPi	2.823855*** (0.412745)	3.675137*** (0.406777)	2.853411*** (0.297788)
LnPOPj	0.527585** (0.239630)	-1.727919*** (0.406777)	0.249478 (0.245982)
BORDER	0.900856 (1.263974)	-	1.114079 (1.730344)
LANGUAGE	-0.903897 (0.847276)	-	-0.569362 (1.730344)
FTA	0.372582 (0.600812)	-	-0.751274*** (0.278655)
GCC	5.403474*** (1.732670)	-	4.824045** (2.090966)
Number of observations	720	720	720
R-squared	0.326990	0.801002	0.485206
Adjusted R-squared	0.318459	0.786766	0.478680
S.E. of regression	2.448736	1.369695	1.381902
F-statistic	38.32917	56.26855	74.35472
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-43 Estimation of Qatar's exports for 45 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-38.86551*** (7.029175)	7.234043 (9.705393)	-39.37971*** (6.976215)
LnGDPi	-0.696953* (0.432280)	0.160197 (0.367463)	-0.132690 (0.356305)
LnGDPj	0.548244*** (0.198568)	-1.099181*** (0.286559)	-0.146817 (0.184584)
LnDISTANCE	0.163758 (0.549992)	-	0.905617 (0.668991)
LnPOPi	3.415165*** (0.810640)	3.436696*** (0.630652)	3.071271*** (0.625304)
LnPOPj	0.200840 (0.276964)	-1.129525* (0.672601)	0.387786* (0.267441)
BORDER	0.868311 (0.959338)	-	1.207165 (1.662539)
LANGUAGE	-0.483073 (0.763983)	-	-0.638559 (1.126322)
FTA	0.311472 (0.550750)	-	-0.746683*** (0.276171)
GCC	2.496393* (1.460266)	-	4.958082** (2.088972)
Number of observations	720	720	720
R-squared	0.358416	0.804000	0.484155
Adjusted R-squared	0.350284	0.789979	0.477616
S.E. of regression	2.390881	1.359339	1.384914
F-statistic	44.07074	57.34299	74.04255
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-44 *Hausman* test for Qatar's 45 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-44) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-42) show the empirical findings for Qatar's bilateral exports with 45 trading partners. The intercept's result is -40.01963 is significant at 1% level. The sign of the distance's coefficient is positive unlike its expected results; however it is insignificant. The product of Qatar and its trading partner's GDP is positive but insignificant. The sign of Qatar's GDP per capita is negative and insignificant. Qatar's population is 2.853411 statically significant at the 1% significance level. Therefore if Qatar's population increases by 1%, its exports will increase by 2.853411%. However, Qatar trading partner's population is positive but insignificant. The coefficient for sharing a common language is negative but insignificant. The coefficients of the FTA and GCC member are -0.751274 and 4.824045 are statically significant at the 1% and the 5% significance level, respectively. The sign of the FTA is unlike what the literature suggests negative. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect, which lead to positive impact on exports.

The results in Table (2-43) show the empirical findings for Qatar's bilateral exports with the 45 trading partners. The intercept's result is -39.37971 is significant at the 1% level. The sign of the distance's coefficient is positive unlike its expected results; however it is insignificant. The sign of Qatar's GDP and its trading partner's GDP are negative but insignificant. Qatar's population is 3.071271 statically significant at the 1% significance level. Therefore if Qatar's population increases by 1%, its exports will increase by 3.07%. Also, Qatar trading partner's population is 0.387786 and statically significant at the 10% level of significance. The coefficient for sharing a common language is negative but insignificant. The coefficients of the FTA and GCC member are -0.746683 and 4.958082 are statically significant at the 1% and the 5% significance level, respectively. The sign of the FTA is unlike what the literature suggests negative. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect, which lead to positive impact on exports.

Table 2-45 Estimation of Qatar's exports for 35 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-34.62000*** (3.463161)	-10.11992 (9.590259)	-34.59346*** (7.745939)
Ln(GDPi · GDPj)	0.026638*** (0.010732)	0.076188 (9.590259)	0.029350 (0.038086)
LnDISTANCE	0.325629* (0.010732)	-	0.270974 (0.038086)
LnGDPPCi	-0.221610 (0.632058)	-0.204847 (0.441795)	0.051028 (0.038086)
LnPOPi	2.771457*** (0.632058)	2.952012 (0.395650)	2.740521*** (0.038086)
LnPOPj	0.340823*** (0.632058)	-1.201135 (0.630045)	0.215810 (0.239296)
BORDER	0.738535* (0.446300)	-	0.868411 (1.605979)
LANGUAGE	-1.875131*** (0.446300)	-	-1.473836 (1.605979)
FTA	0.356044 (0.446300)	-	-0.761256*** (0.274228)
GCC	3.205766*** (0.446300)	-	3.208427* (2.105968)
Number of observations	560	560	560
R-squared	0.348501	0.799558	0.553798
Adjusted R-squared	0.337840	0.784939	0.546496
S.E. of regression	2.195142	1.251014	1.247946
F-statistic	32.68960	54.69104	75.84717
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-46 Estimation of Qatar's exports for 35 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-33.90349*** (6.763924)	-5.212347 (9.541956)	-33.08640*** (7.348886)
LnGDPi	-0.357592 (0.410767)	0.313593 (0.382128)	0.159897 (0.370285)
LnGDPj	0.381091 (0.299533)	-0.881711*** (0.312914)	-0.156294 (0.209203)
LnDISTANCE	-0.013414 (0.518362)	-	0.256856 (0.684489)
LnPOPi	3.045458*** (0.718926)	2.982337*** (0.653253)	2.664846*** (0.647718)
LnPOPj	0.109336 (0.274343)	-0.530834 (0.655672)	0.321370 (0.266979)
BORDER	0.767873 (0.619919)	-	0.946148 (1.559918)
LANGUAGE	-1.419816* (0.872951)	-	-1.704104 (1.230314)
FTA	0.323792 (0.510971)	-	-0.744102*** (0.272529)
GCC	1.851235 (1.427432)	-	3.280792* (2.076399)
Number of observations	560	560	560
R-squared	0.368614	0.802510	0.553244
Adjusted R-squared	0.358282	0.788105	0.545934
S.E. of regression	2.160991	1.241770	1.249487
F-statistic	35.67775	55.71323	75.67755
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-47 *Hausman* test for Qatar's 35 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-47) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-45) show the empirical findings for Qatar's bilateral trade with the 35 trading partners. The intercept's result is -34.59346 significant at the 1% level. The sign of the distance's coefficient is positive unlike its expected results; however it is insignificant. The product of Qatar and its trading partner's GDP is positive but insignificant. The sign of Qatar's GDP per capita is positive and insignificant as well. Qatar's population is 2.740521 statically significant at the 1% significance level. Therefore if Qatar's population increases by 1%, its exports will increase by 2.740521%. However, Qatar trading partner's population is positive but insignificant. The coefficient for sharing a common language is negative but insignificant as well. The coefficients of the FTA and the GCC membership are -0.761256 and 3.208427 are statically significant at the 1% and the 10% significance level, respectively. The sign of the FTA is negative unlike what the literature suggests. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect, which lead to positive impact on exports.

The results in Table (2-46) show the empirical findings for Qatar's bilateral trade with the 35 trading partners. The intercept's result is -33.08640 significant at the 1% level. The sign of the distance's coefficient is positive unlike its expected results; however it is insignificant. Qatar's GDP is positive and its trading partner's GDP negative, but both of them are insignificant. Qatar's population is 2.664846 statically significant at the 1% significance level. Therefore if Qatar's population increases by 1%, its exports will increase by 2.66%. Qatar's trading partner's population is positive but insignificant. The coefficient for sharing a common language is negative but insignificant as well. The coefficients of the FTA and the GCC membership are -0.744102 and 3.280792 are statically significant at the 1% and the 10% significance level, respectively. The sign of the FTA is negative unlike what the literature suggests. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect, which lead to positive impact on exports.

Estimation Summary for Qatar's exports

The estimation's results were tested using Hausman test. The results proved that RE is the best model for the 55, 45 and 35 datasets in the analysis. The values of the R-squared were 0.470561, 0.485206 and 0.553798 for the 55, 45 and 35 data sets, respectively. Moreover, the Standard Error (S.E.) of regression was the highest in the 45 data set (which is 1.381902) then 55 (1.371336) and 35 (1.247946). The values of the F-statistics were 85.91665, 74.35472 and 75.84717 for the 55, 45 and 35 data sets, respectively. An addition, the p-value for the F-statistics was significant at 1% level of significance for all the data sets.

The coefficients signs for the empirical results are consisted with the study's expectations, except for the distance and the FTA in all models. The results showed that distance has an insignificant positive impact on Qatar's export. Qatar's GDP per capita was positive and have a significant impact on Qatar's exports. The product of the GDP's has an insignificant positive impact on exports on 55 and 35 datasets, and insignificant negative impact on Qatar's exports for the 45 datasets. Moreover, Qatar's population has a significant positive impact on Qatar's exports. Qatar's trading partner's population has a significant impact only on the 55 the data set. Furthermore, sharing borders have an insignificant positive impact on its exports in all datasets. Sharing a language has insignificant relation with exports. Also, the FTA affects exports negatively, and the GCC affects it positively. The R-squared is highest for 35 then 45 then 55 data sets. The S.E. of regression is the highest for 45 countries, then 55 and 35 countries. The F-statistics has a different trend where it is the highest for 55 countries then the 35, and the lowest in the 45 countries. The p-values for F-statistics are significant at 1% level of significance for all the data sets. In summary, the 45 dataset is the best model statically, and the 35 dataset has the closest compatibility with the economic theories.

The United Arab Emirates

Table 2-48 Estimation of UAE's exports for 55 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-32.89539*** (6.117948)	-35.09649*** (3.985606)	-31.12096*** (4.950070)
Ln(GDPi · GDPj)	0.405118*** (0.154464)	0.398263*** (3.985606)	0.399110*** (0.087741)
LnDISTANCE	-0.679036 (0.577697)	-	-0.657991 (0.493677)
LnGDPPCi	1.230471*** (0.395040)	1.220151*** (0.272072)	1.224792*** (0.258553)
LnPOPi	0.863767*** (0.340998)	0.808681*** (0.199104)	0.797688*** (0.171390)
LnPOPj	0.198797 (0.210787)	0.077674 (0.256306)	0.166858 (0.160604)
BORDER	0.840164* (0.583495)	-	0.898555 (1.630233)
LANGUAGE	-0.278459 (0.466659)	-	-0.135937 (1.073554)
FTA	0.334266 (0.466659)	-	-0.042599 (1.073554)
GCC	0.716421 (1.308569)	-	0.823839 (1.073554)
Number of observations	880	880	880
R-squared	0.363724	0.928078	0.632766
Adjusted R-squared	0.357142	0.922997	0.628967
S.E. of regression	1.777227	0.615092	0.615190
F-statistic	55.25913	182.6572	166.5624
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-49 Estimation of UAE's exports for 55 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-31.91747*** (5.720805)	-34.86163*** (3.985654)	-30.85489*** (4.950718)
LnGDPi	1.511374*** (0.258614)	1.593193*** (0.224533)	1.598800*** (0.223244)
LnGDPj	0.405213*** (0.154752)	0.405769*** (0.103524)	0.404526*** (0.087825)
LnDISTANCE	-0.678870 (0.577975)	-	-0.663273 (0.493711)
LnPOPi	-0.221068 (0.314624)	-0.388403* (0.259473)	-0.402606* (0.258399)
LnPOPj	0.198572 (0.210840)	0.070025 (0.256396)	0.161764 (0.160615)
BORDER	0.840441 (0.583446)	-	0.903350 (1.630237)
LANGUAGE	-0.281074 (0.466520)	-	-0.134346 (1.073564)
FTA	0.339056 (0.416228)	-	-0.041109 (0.131859)
GCC	0.714557 (1.309215)	-	0.800937 (1.770043)
Number of observations	880	880	880
R-squared	0.363179	0.927984	0.632277
Adjusted R-squared	0.356591	0.922896	0.628473
S.E. of regression	1.777989	0.615494	0.615611
F-statistic	55.12890	182.3999	166.2127
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-50 *Hausman* test for UAE's 55 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.279437	5	0.6570

Hausman test summary (table 2-50) shows that the Chi-Sq. statistics is 3.279437 and the Chi-Sq. d.f. is 5 and the probability is 0.6570. Therefore, there is no correlation between the exogenous variables and the random error; hence, RE is the best model to the available data.

The results in Table (2-48) show the empirical findings for the UAE's bilateral trade with the 55 trading partners. The intercept's result -31.12096 is significant at the 1% level. The sign of the distance's coefficient is negative the same as its expected results; however it is insignificant. The product of the UAE's GDP and its trading partner's GDP is 0.399110 statically significant at the 1%. The sign of the UAE's GDP per capita is 1.224792 and statically significant at the 1%. The UAE's population is 0.797688 statically significant at the 1% significance level. Therefore if the UAE's population increases by 1%, its exports will increase by 0.797688%. The UAE's trading partner's population is positive but insignificant. The sign of border and the GCC are positive as the literature suggested; however, they are insignificant. The coefficient for sharing a common language and the FTA are negative but insignificant.

The results in Table (2-49) show the empirical findings for the UAE's bilateral trade with the 55 trading partners. The intercept's result -30.85489 is significant at the 1% level. The sign of the distance's coefficient is negative the same as its expected results; however, it is insignificant. The UAE's GDP and its trading partner's GDP are 1.598800 and 0.404526 and statically significant at the

1%. The UAE’s population is -0.402606 statically significant at the 10% significance level. Therefore if the UAE’s population increases by 1%, its exports may decrease by 0.40%. The UAE's trading partner’s population is positive but insignificant. The sign of border and the GCC are positive as the literature suggested; however, they are insignificant. The coefficient for sharing a common language and the FTA are negative but insignificant.

Table 2-51 Estimation of UAE's exports for 45 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-33.51883*** (6.356915)	-28.14541*** (3.740021)	-28.36205*** (5.528189)
Ln(GDPi · GDPj)	0.344213*** (0.137521)	0.714278*** (0.114820)	0.594007*** (0.094815)
LnDISTANCE	-0.131500 (0.551325)	-	-0.440700 (0.094815)
LnGDPPCi	1.181501*** (0.342480)	0.609224** (0.278743)	0.819934*** (0.260428)
LnPOPi	1.056063*** (0.285847)	0.395721* (0.210721)	0.586873*** (0.177760)
LnPOPj	0.030523 (0.242176)	-0.516975** (0.244771)	-0.227064 (0.166403)
BORDER	1.096055** (0.242176)	-	1.369217 (1.527064)
LANGUAGE	-0.767487* (0.513500)	-	-0.488352 (1.027425)
FTA	0.328500 (0.513500)	-	-0.130320 (0.124025)
GCC	1.459773 (1.304037)	-	0.410041 (1.785047)
Number of observations	720	720	720
R-squared	0.353182	0.929054	0.690809
Adjusted R-squared	0.344983	0.923979	0.686890
S.E. of regression	1.613302	0.549613	0.550402
F-statistic	43.07572	183.0601	176.2576
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-52 Estimation of UAE's exports for 45 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-32.68235*** (6.101614)	-27.86554*** (3.738841)	-28.01804*** (5.528362)
LnGDPi	1.418894*** (0.240116)	1.292193*** (0.222961)	1.383318*** (0.221101)
LnGDPj	0.344032*** (0.137895)	0.725527*** (0.114902)	0.601651*** (0.094903)
LnDISTANCE	-0.130964 (0.551646)	-	-0.450012 (0.553632)
LnPOPi	0.000309 (0.277024)	-0.186032 (0.256746)	-0.203672 (0.255986)
LnPOPj	0.030351 (0.242224)	-0.527695** (0.244771)	-0.234111 (0.166393)
BORDER	1.096434* (0.570529)	-	1.376071 (1.527063)
LANGUAGE	-0.770281* (0.513392)	-	-0.486234 (1.027442)
FTA	0.332631 (0.382810)	-	-0.128865 (0.124082)
GCC	1.459039 (1.304693)	-	0.374537 (1.785099)
Number of observations	720	720	720
R-squared	0.352623	0.928986	0.690400
Adjusted R-squared	0.344417	0.923906	0.686476
S.E. of regression	1.613998	0.549877	0.550772
F-statistic	42.97043	182.8705	175.9202
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-53 *Hausman* test for UAE's 45 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.797396	5	0.3264

Hausman test summary (table 2-53) shows that the Chi-Sq. statistics is 3.279437 and the Chi-Sq. d.f. is 5 and the probability is 0.6570. Therefore, there is no correlation between the exogenous variables and the random error; hence, RE is the best model to the available data.

The results in Table (2-51) show the empirical findings for the UAE's bilateral trade with the 45 trading partners. The intercept's result -28.36205 is significant at the 1% level. The sign of the distance's coefficient is negative the same as its expected results; however it is insignificant. The product of the UAE's GDP and its trading partner's GDP is 0.594007 statically significant at the 1%. The sign of the UAE's GDP per capita is 0.819934, and it is statically significant at the 1%. The UAE's population is 0.586873 statically significant at the 1% significance level. Therefore if the UAE's population increases by 1%, its exports will increase by 0.59%. However, UAE trading partner's population is negative and insignificant. The sign of border and GCC are positive as the literature suggested; however, they are insignificant. The coefficient for sharing a common language and the FTA are negative and insignificant.

The results in Table (2-52) show the empirical findings for the UAE's bilateral trade with the 45 trading partners. The intercept's result -28.01804 is significant at the 1% level. The sign of the distance's coefficient is negative the same as its expected results; however it is insignificant. The UAE's GDP and its trading partner's GDP are 1.383318 and 0.601651 statically significant at the 1%.

The UAE's population and the UAE trading partner's population are negative and insignificant. The sign of border and GCC are positive as the literature suggested; however, they are insignificant. The coefficient for sharing a common language and the FTA are negative and insignificant.

Table 2-54 Estimation of UAE's exports for 35 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-29.61849*** (5.857677)	1.154104*** (3.581609)	-23.56932*** (4.988394)
Ln(GDPi · GDPj)	0.335973*** (0.122241)	1.154104*** (3.581609)	0.664784*** (0.093450)
LnDISTANCE	-0.216608 (0.122241)	-	-0.661121 (0.482087)
LnGDPPCi	1.124522*** (0.122241)	1.154104 (3.581609)	0.698243*** (0.482087)
LnPOPi	0.963439*** (0.122241)	1.154104 (0.222663)	0.396878** (0.482087)
LnPOPj	0.030551 (0.170600)	1.154104*** (0.240515)	-0.323915** (0.482087)
BORDER	1.119424** (0.496406)	-	1.513073 (1.154104)
LANGUAGE	-1.183511** (0.496406)	-	-0.960053 (1.154104)
FTA	0.435090 (0.366160)	-	-0.130293 (1.154104)
GCC	0.875880 (0.978832)	-	-0.523711 (1.154104)
Number of observations	560	560	560
R-squared	0.464245	0.916604	0.718459
Adjusted R-squared	0.455478	0.910522	0.713852
S.E. of regression	1.225500	0.496780	0.500662
F-statistic	52.95429	150.6931	155.9485
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-55 Estimation of UAE's exports for 35 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-28.87744*** (5.629234)	-23.34916*** (3.579262)	-23.12729*** (4.988856)
LnGDPi	1.364785*** (0.227442)	1.173460*** (0.228824)	1.323821*** (0.226310)
LnGDPj	0.335496*** (0.122726)	0.911665*** (0.121639)	0.673728*** (0.093550)
LnDISTANCE	-0.215619 (0.426541)	-	-0.672725 (0.482136)
LnPOPi	-0.047815 (0.263147)	-0.255833 (0.264532)	-0.263051 (0.263400)
LnPOPj	0.030586 (0.170681)	-0.797782*** (0.240446)	-0.332548** (0.150644)
BORDER	1.119637** (0.496319)	-	1.521908 (1.154099)
LANGUAGE	-1.185906** (0.528009)	-	-0.958860 (0.948085)
FTA	0.438884 (0.365037)	-	-0.128581 (0.122054)
GCC	0.876078 (0.979285)	-	-0.566578 (1.507315)
Number of observations	560	560	560
R-squared	0.463560	0.916542	0.717969
Adjusted R-squared	0.454781	0.910455	0.713354
S.E. of regression	1.226284	0.496966	0.501102
F-statistic	52.80855	150.5699	155.5710
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-56 *Hausman* test for UAE's 35 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	12.271813	5	0.0312

Table 2-57 Wald test for UAE's 35 trading partners (Eviews 8)

Test Statistic	Value	df	Probability
F-statistic	15.86227	(9, 550)	0.0000
Chi-square	142.7605	9	0.0000

Null Hypothesis: C(1)=C(2), C(2)=C(3), C(3)=C(4),
C(4)=C(5), C(5)=C(6), C(6)=C(7), C(7)=C(8), C(8)=C(9),
C(9)=C(10)

Hausman test summary (table 2-56) shows that the Chi-Sq. statistics is 12.271813 and the Chi-Sq. d.f. is 5 and the probability is 0.0312. The result indicates that there is a correlation between the exogenous variables and the random error. Hence *Hausman* test indicates that the FE is a better model to choose rather than RE model. Furthermore, *Wald* restriction test summary (table 2-57) shows that F-statistic and Chi-square values are 15.86227 and 142.7605, respectively with probability 1% significance level, hence intercepts are not equal, and FE is the best model for the data. However, pooled OLS was chosen as the best to fit gravity model rather than FE.

The results in Table (2-54) show the empirical findings for the UAE's bilateral trade with the 35 trading partners datasets. The intercept's result -

29.61849 is significant at the 1% level. The sign of the distance's coefficient is negative the same as its expected results; however it is insignificant. The product of the UAE's GDP and its trading partner's GDP is 0.335973 statically significant at the 1% level. The UAE's GDP per capita is 1.124522, and it is statically significant at the 1%. The UAE's population is 0.963439 and statically significant at 1% significance level. Therefore if the UAE's population increases by 1%, its exports will increase by 0.96%. On the other hand, the UAE's trading partner's population is positive and insignificant. The border is 1.119424 and statically significant at the 5% significance level. The coefficient for sharing a common language is -1.183511 and statically significant at the 5% significance level. The GCC and the FTA are positive as the literature suggested; however, they are insignificant.

The results in Table (2-55) show the empirical findings for the UAE's bilateral trade with the 35 trading partners dataset. The intercept's result -28.87744 is significant at the 1% level. The sign of the distance's coefficient is negative the same as its expected results; however it is insignificant. The UAE's GDP and its trading partner's GDP are 1.364785 and 0.335496, and statically significant at the 1% level. The UAE's population is negative and insignificant. On the other hand, the UAE's trading partner's population is positive and insignificant. The border is 1.119637 and statically significant at the 5% significance level. The coefficient for sharing a common language is 1.119637 and statically significant at the 5% significance level. The GCC and the FTA are positive as the literature suggested; however, they are insignificant.

Estimation Summary for the UAE's exports

The estimation's results were tested using *Hausman* test for all three data sets and Wald restriction test in the 35 datasets. The results proved that RE is the best model for the 55 and 45, and pooled OLS in 35 datasets. The values of the R-squared were 0.632766, 0.632766 and 0.464245 for the 55, 45 and 35 data sets, respectively. Moreover, the Standard Error (S.E.) of regression was the highest in the 35 dataset (which is 1.225500) then the 55 datasets (0.615190) and the 45 datasets (0.550402). The values of the F-statistics were 166.5624, 176.2576 and 52.95429 for the 55, 45 and 35 data sets, respectively, while the p-value for the F-statistics was significant at the 1% level of significance for all the data sets.

The coefficients signs were for the empirical results consisted with the study's expectations, except for the language and the FTA in all models. The results showed that distance has a negative insignificant positive impact on the UAE's export. The UAE's GDP per capita was positive and have a significant impact on the UAE's exports. The product of the GDP's has an insignificant positive impact on the exports in all of the datasets. Moreover, the UAE's population has a significant strong positive impact on the UAE's exports. The UAE's trading partner's population has insignificant impact UAE's exports. Furthermore, sharing borders have a significant positive impact on its exports only on the 35 datasets. Sharing a language has a significant negative impact on its exports only on the 35 datasets. Also, the FTA and the GCC membership do not have a significant impact on the UAE's exports. The R-squared is highest for 45 then 55, then 35 data sets. The S.E. of regression is the highest for the 35 countries dataset, then the 55 countries dataset and the 45 countries dataset. The F-statistics has a different trend where it is the highest for the 45 countries dataset then the 55 datasets, and the lowest is the 35 countries dataset. The p-values for the F-statistics are significant at the 1% level of significance for all the datasets. In summary, the 45 trading partners dataset is the best model statically and the closest to the economic theories.

Oman

Table 2-58 Estimation of Oman's exports for 55 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-40.95812*** (6.485703)	-29.30137*** (8.054324)	-40.68264*** (7.098569)
Ln(GDPi · GDPj)	0.573524*** (0.203146)	0.834017*** (0.281183)	0.645522*** (0.174951)
LnDISTANCE	-1.039901** (0.431366)	-	-1.186887** (0.174951)
LnGDPPCi	0.693872* (0.424716)	0.347957 (0.524286)	0.694854* (0.364111)
LnPOPi	1.132291** (0.475427)	1.020667* (0.542322)	1.097785*** (0.419053)
LnPOPj	0.357087* (0.475427)	-1.290725** (0.524286)	0.231483 (0.206435)
BORDER	0.980758* (0.582141)	-	1.068863 (1.315435)
LANGUAGE	0.966793 (0.711340)	-	1.352192* (0.845146)
FTA	-0.180115 (0.451397)	-	-0.880344*** (0.268328)
GCC	1.071805 (0.962895)	-	0.740858 (1.536212)
Number of observations	880	880	880
R-squared	0.377889	0.736334	0.331180
Adjusted R-squared	0.371453	0.717707	0.324261
S.E. of regression	2.273533	1.523640	1.519583
F-statistic	58.71824	39.53083	47.86648
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-59 Estimation of Oman's exports for 55 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-40.95812*** (6.485703)	-29.30137*** (8.054324)	-40.68264*** (7.098569
LnGDPi	1.267396*** (0.315169)	1.181974*** (0.285860)	1.340376*** (0.238021)
LnGDPj	0.573524*** (0.203146)	0.834017*** (0.281183)	0.645522*** (0.174951)
LnDISTANCE	-1.039901** (0.431366)	-	-1.186887* (0.619475)
LnPOPi	0.438419 (0.431366)	0.672710 (0.477040)	0.402930 (0.469586)
LnPOPj	0.357087* (0.204144)	-1.290725** (0.595907)	0.231483 (0.206435)
BORDER	0.980758* (0.582141)	-	1.068863 (1.315435)
LANGUAGE	0.966793 (0.711340)	-	1.352192* (0.845146)
FTA	-0.180115 (0.451397)	-	-0.880344*** (0.268328)
GCC	1.071805 (0.962895)	-	0.740858 (1.536212)
Number of observations	880	880	880
R-squared	0.377889	0.736334	0.331180
Adjusted R-squared	0.371453	0.717707	0.324261
S.E. of regression	2.273533	1.523640	1.519583
F-statistic	58.71824	39.53083	47.86648
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-60 *Hausman* test for Oman's 55 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (Table 2-55) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-53) show the empirical findings for Oman's bilateral trade with 55 trading partners dataset. The intercept's result is -40.68264 and significant at the 1% level. The sign of the distance's coefficient is negative like its expected results, its coefficient -1.186887 and significant at the 5% level of significance. The product of Oman's and its trading partner's GDP is 0.645522 at the 1% level of significance. Oman's GDP per capita is 0.694854 at the 10% significance level. Oman's population is 1.097785 and statically significant at the 1% significance level. Therefore if Oman's population increases by 1%, its exports will increase by 1.1%. Moreover, Oman's trading partner's population sign is positive but insignificant. The sign of the border and the GCC are the same as the literature suggested positive; however they are insignificant. The coefficient for sharing a common language 1.352192 is significant at the 10% level. The coefficient of the FTA -0.880344 is statically significant at the 1% level. The sign of the FTA is unlike what the literature suggests negative. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect, which lead to positive impact on exports.

The results in Table (2-54) show the empirical findings for Oman's bilateral trade with 55 trading partners dataset. The intercept's result is -40.68264 and significant at the 1% level. The sign of the distance's coefficient is negative like its expected results, its coefficient -1.186887 and significant at the 10% level of significance Oman's GDP 1.340376 and its trading partner's GDP 0.645522 are significant at the 1% level of significance. Oman's population is positive but insignificant. Moreover, Oman's trading partner's population sign is positive but insignificant as well. The sign of the border and the GCC are the same as the literature suggested positive; however they are insignificant. The coefficient for sharing a common language 1.352192 is significant at the 10% level. The coefficient of the FTA -0.880344 is statically significant at the 1% level of significance. The sign of the FTA is unlike what the literature suggests negative. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect, which lead to positive impact on exports.

Table 2-61 Estimation of Oman's exports for 45 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-35.03734*** (7.029639)	-22.78800*** (8.455580)	-33.72131*** (7.567523)
Ln(GDPi · GDPj)	0.670859*** (0.225135)	1.235017*** (0.336353)	0.803253*** (0.189562)
LnDISTANCE	-1.401244*** (0.526276)	-	-1.633116*** (0.648150)
LnGDPPCi	0.843583** (0.480247)	-0.002601 (0.602616)	0.755912** (0.390329)
LnPOPi	0.714436 (0.529765)	0.180561 (0.645327)	0.588836 (0.469244)
LnPOPj	0.208521 (0.529765)	-1.882678*** (0.659399)	0.016956 (0.469244)
BORDER	0.960931* (0.574330)	-	1.054670 (1.272951)
LANGUAGE	0.581856 (0.574330)	-	0.900482 (0.856732)
FTA	-0.378502 (0.426246)	-	-0.982048*** (0.272146)
GCC	0.298873 (1.055590)	-	-0.327140 (1.546700)
Number of observations	720	720	720
R-squared	0.380733	0.717640	0.350607
Adjusted R-squared	0.372883	0.697441	0.342375
S.E. of regression	2.192429	1.522848	1.517069
F-statistic	48.50187	35.52906	42.59207
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-62 Estimation of Oman's exports for 45 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-35.03734*** (7.029639)	-22.78800*** (8.455580)	-33.72131*** (7.567523)
LnGDPi	1.514442*** (0.358496)	1.232416*** (0.316307)	1.559165*** (0.258005)
LnGDPj	0.670859*** (0.225135)	1.235017*** (0.336353)	0.803253*** (0.189562)
LnDISTANCE	-1.401244** (0.526276)	-	-1.633116*** (0.648150)
LnPOPi	-0.129147 (0.499962)	0.183161 (0.525788)	-0.167077 (0.517281)
LnPOPj	0.208521 (0.241984)	-1.882678*** (0.659399)	0.016956 (0.236485)
BORDER	0.960931* (0.574330)	-	1.054670 (1.272951)
LANGUAGE	0.581856 (0.766159)	-	0.900482 (0.856732)
FTA	-0.378502 (0.426246)	-	-0.982048*** (0.272146)
GCC	0.298873 (1.055590)	-	-0.327140 (1.546700)
Number of observations	720	720	720
R-squared	0.380733	0.717640	0.350607
Adjusted R-squared	0.372883	0.697441	0.342375
S.E. of regression	2.192429	1.522848	1.517069
F-statistic	48.50187	35.52906	42.59207
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-63 *Hausman* test for Oman's 45 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-63) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-61) show the empirical findings for Oman's bilateral trade with the 45 trading partners dataset. The intercept's result -33.72131 is significant at 1% level. The sign of the distance's coefficient is negative like its expected results, its coefficient -1.633116 at the 1% level of significance. The product of Oman's and its trading partner's GDP is 0.803253 at the 1% level of significance. Oman's GDP per capita is 0.755912 at the 5% significance level. Moreover, Oman's population and its trading partner's signs are positive but insignificant. The sign of border and language are the same as the literature suggested positive; however they are insignificant as well. The coefficient of the FTA is -0.982048 and statically significant at the 1% significance level. The sign of the FTA is negative unlike what the literature suggests. The coefficient of the GCC membership is negative unlike its expected result; however it is insignificant. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect that leads to a positive impact on exports.

The results in Table (2-62) show the empirical findings for Oman's bilateral trade with the 45 trading partners dataset. The intercept's result -33.72131 is significant at 1% level. The sign of the distance's coefficient is negative like its expected results, its coefficient -1.633116 at the 1% level of significance. Oman's GDP 1.559165 and its trading partner's GDP 0.803253 are at the 1% level of significance. Moreover, Oman's population and its trading partner's signs are positive but insignificant. The sign of border and language are the same as the literature suggested positive; however they are insignificant as well. The coefficient of the FTA is -0.982048 and statically significant at the 1% significance level. The sign of the FTA is negative unlike what the literature suggests. The coefficient of the GCC membership is negative unlike its expected result as well; however it is insignificant. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect that leads to a positive impact on exports.

Table 2-64 Estimation of Oman's exports for 35 trading partners for Equation (2.13)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-35.24159*** (8.306996)	-24.51179*** (9.258631)	-33.25815*** (8.425756)
Ln(GDPi · GDPj)	0.547585*** (0.198491)	1.234656*** (0.370089)	0.823442*** (0.226692)
LnDISTANCE	-1.178637* (0.672602)	-	-1.661461** (0.696416)
LnGDPPCi	1.249975*** (0.447776)	0.192394 (0.674383)	0.967705** (0.460753)
LnPOPi	0.900677* (0.504212)	0.100391 (0.733390)	0.535124 (0.552266)
LnPOPj	0.113433 (0.282800)	-1.791306*** (0.702877)	-0.105239 (0.268368)
BORDER	1.162198** (0.511973)	-	1.154811 (1.264332)
LANGUAGE	0.114853 (0.849055)	-	0.790861 (1.088519)
FTA	-0.335308 (0.849055)	-	-1.333749*** (0.335761)
GCC	0.267179 (1.194955)	-	-0.641059 (1.681334)
Number of observations	560	560	560
R-squared	0.339294	0.676645	0.367194
Adjusted R-squared	0.328482	0.653061	0.356839
S.E. of regression	2.176547	1.564465	1.550422
F-statistic	31.38247	28.69035	35.46051
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-65 Estimation of Oman's exports for 35 trading partners for Equation (2.14)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-35.24159*** (8.306996)	-24.51179*** (9.258631)	-33.25815*** (8.425756)
LnGDPi	1.797559*** (0.394163)	1.427050*** (0.363080)	1.791147*** (0.300025)
LnGDPj	0.547585*** (0.198491)	1.234656*** (0.370089)	0.823442*** (0.226692)
LnDISTANCE	-1.178637* (0.672602)	-	-1.661461** (0.696416)
LnPOPi	-0.349298 (0.615156)	-0.092004 (0.610011)	-0.432581 (0.598843)
LnPOPj	0.113433 (0.282800)	-1.791306*** (0.702877)	-0.105239 (0.268368)
BORDER	1.162198** (0.511973)	-	1.154811 (1.264332)
LANGUAGE	0.114853 (0.849055)	-	0.790861 (1.088519)
FTA	-0.335308 (0.528430)	-	-1.333749*** (0.335761)
GCC	0.267179 (1.194955)	-	-0.641059 (1.681334)
Number of observations	560	560	560
R-squared	0.339294	0.676645	0.367194
Adjusted R-squared	0.328482	0.653061	0.356839
S.E. of regression	2.176547	1.564465	1.550422
F-statistic	31.38247	28.69035	35.46051
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-66 *Hausman* test for Oman's 35 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-66) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-64) show the empirical results for Oman's bilateral trade with the 35 trading partners dataset. The intercept's result -33.25815 is significant at the 1% level. The sign of the distance's coefficient is negative as expected, and its coefficient -1.661461 is at the 5% level of significance. The product of Oman's and its trading partner's GDP is 0.823442 at the 1% level of significance. The GDP per capita of Oman is 0.967705 at 5% significance level. Moreover, Oman's population sign is positive, and its trading partner's population is negative, but both are insignificant. The sign of border and language are the same as the literature suggested positive; however they are insignificant. The coefficient of the FTA is -1.333749 and statically significant at the 1% level. The sign of the FTA is negative unlike what the literature suggests. The coefficient of the GCC is negative unlike its expected result; however it is insignificant. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect that leads to a positive impact on exports.

The results in Table (2-65) show the empirical results for Oman's bilateral trade with the 35 trading partners dataset. The intercept's result -33.25815 is significant at the 1% level. The sign of the distance's coefficient is negative as expected, and its coefficient -1.661461 is at the 5% level of significance. Oman's GDP 1.791147 and its trading partner's GDP 0.823442 are at the 1% level of significance. Moreover, Oman's population and its trading partner's population are negative, but both are insignificant. The sign of border and language are the same as the literature suggested positive; however they are insignificant. The coefficient of the FTA is -1.333749 and statically significant at the 1% level. The sign of the FTA is negative unlike what the literature suggests. The coefficient of the GCC is negative unlike its expected result; however it is insignificant. Schaak (2015) argues that the reason for the negative effect for the FTAs is due to the trade diversion effect rather than trade creation effect that leads to a positive impact on exports.

Estimation Summary for Oman's exports

The estimation's results were tested using *Hausman* test for all three data sets. The results proved that the RE regression is the best model for the 55 and 45, and 35 datasets. The values of the R-squared were 0.331180, 0.350607 and 0.367194 for the 55, 45 and 35 datasets, respectively. Moreover, the Standard Error (S.E.) of the regression was the highest in the 35 dataset (which is 1.550422) then the 55 datasets (1.519583) and the 45 datasets (1.517069). The values of the F-statistics were 47.86648, 42.59207 and 35.46051 for the 55, 45 and 35 datasets, respectively, and the p-value for the F-statistics were significant at 1% level of significance for all the datasets' regressions.

The coefficients signs for the empirical results consisted with the study's expectations, except for the FTA in all of the models. The results showed that the distance has a significant negative impact on Oman's exports. Oman's GDP per capita is positive and has a significant impact on Oman's exports. The product of the GDP's has a significant positive impact on exports on all datasets. Moreover, Oman's population has a significant positive impact on Oman's exports only on 55 dataset and insignificant on the rest. Oman's trading partner's population has insignificant impact on Oman's exports. Furthermore, sharing borders have an insignificant positive impact on its exports in all of the datasets. Sharing a language has a significant positive impact on its exports only on the 55 datasets. Also, the FTA has a significant negative impact on Oman's exports, and the GCC have no significant impact on exports. The R-squared is highest for the 35 datasets, then the 45 datasets then the 55 datasets. The S.E. of regression is the highest for the 35 countries dataset, then the 55 and the 45 countries dataset. The F-statistics has a different trend where it is the highest for 55 countries dataset then the 45, and the lowest is the 35 countries dataset. The p-values for F-statistics are significant at the 1% level of significance for all of the datasets. In summary, the 55 dataset is the best model statically and the closest to the economic theories.

2.5.2 Determinants of Korea's Exports

The results of the determinants of Korea's exports by using an augmented gravity model are presented in details. Furthermore, the results will be presented in three kinds of datasets; 80 countries trading partners, 60 countries trading partners, and 40 countries trading partners. The variables for the estimation include Korea's GDP (GDP_{it}), its trading partner's GDP(GDP_{jt}), the products of their GDPs ($GDP_{it}.GDP_{jt}$), Korea's GDP per capita ($GDPPC_{it}$), the distance between the capital of Korea and its trading partners' (DIS_{ij}), and the population of Korea and its trading partners' (POP_{it}) and (POP_{jt}). Moreover, only one binary (dummy) variable is included in the model that is the Free Trade

Agreement (FTA_{ij}) takes one if the FTA were effective and zero otherwise. The table below (2-67) shows the FTAs status for Korea.

Table 2-67 the status of the FTA between Korea and its trading partners

Region	Status	Signing date	Date of effect
Korea-Chile FTA	Finalized	February 2003	April 2004
Korea-Singapore FTA	Finalized	August 2005	March 2006
Korea-EFTA FTA	Finalized	December 2005	September 2006
Korea-ASEAN FTA	Finalized	August 2006	June 2007
Korea-India CEPA	Finalized	March 2006	January 2010
Korea-EU FTA	Finalized	October 2010	July 2011
Korea-Peru FTA	Finalized	March 2011	August 2011
Korea-US FTA	Finalized	June 2006	March 2012
Korea-New Zealand FTA	Finalized	March 2015	December 2015
Korea-China FTA	Finalized	June 2015	December 2015
Korea-Canada FTA	Finalized	June 2014	January 2015
Korea-Colombia FTA	Finalized	February 2013	July 2016
Korea-Turkey FTA	Finalized	April 2012	May 2013
Korea-Vietnam FTA	Finalized	May 2015	December 2015
Korea-Australia FTA	Finalized	April 2014	December 2014
Korea-Mexico FTA	Under negotiation	-	-
Korea-GCC FTA	Under negotiation	-	-
Korea-Indonesia FTA	Under negotiation	-	-
Korea-Japan FTA	Under negotiation	-	-
Regional Comprehensive Partnership	Under negotiation	-	-
Korea-Ecuador FTA	Under negotiation	-	-
Korea-Eurasia Economic Union FTA	Under negotiation	-	-
Korea-Central America FTA	Under negotiation	-	-
Korea-Israel FTA	Under negotiation	-	-

Asia-Pacific Trade Agreement	Finalized	July 1975	June 1976

Source: Ministry of Foreign affairs and Trade-Korea, and Asia Regional Integration Center; Tracking Asian Integration https://aric.adb.org/fta-country

The models for Korea[7]

The First Model

$$\ln(EXP_{ijt}) = \beta_0 + \beta_1 \ln(GDP_{it} \cdot GDP_{jt}) + \beta_2 ln(DIS_{ij}) + \beta_3 \ln(GDPPC_{it}) + \beta_4 \ln(POP_{it}) + \beta_5 \ln(POP_{jt}) + \beta_6 FTA_{ijt} + e_{ijt} \tag{2.15}$$

The Second Model

$$\ln\left(EXP_{ijt}\right) = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \left(GDP_{jt}\right) + \beta_3 ln\left(DIS_{ij}\right) + \beta_4 \ln(POP_{it}) + \beta_5 \ln\left(POP_{jt}\right) + \beta_6 FTA_{ijt} + e_{ijt} \tag{2.16}$$

Where as:

Endogenous variable

EXPijt Denotes exports by country i to its trading partner j over t time one year

Exogenous variables

GDP_{it} denotes exporter's GDP at time *t*

GDP_{jt} denotes importer's GDP at time *t*

DIS_{it} denotes distance from exporter's capital city *i* to importer's capital city j

[7] The reported results are in the First model (equation 2.13), yet the results of the Second model (equation 2.14) are presented for comparison

$GDPPC_{it}$	denotes GDP per capita of exporter *i* at time *t*
POP_{it}	denotes the population of exporter *i* at time *t*
POP_{jt}	denotes the population of importer *j* at time *t*
FTA_{ijt}	denotes effective free trade agreement between exporter *i* and importer (binary variable)
e_{ijt}	denotes error term
i	denotes the exporting country
j	denotes the importing country
t	denotes period under observation which is 2000-2015
$\beta_1, \beta_2 \dots \beta_6$	denotes coefficients to be estimated
β_0	denotes the intercept coefficient

Table 2-68 Estimation of Korea's exports for 80 trading partners for Equation (2.15)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-77.25299 (64.42756)	-6.488204	-9.956547 (29.51709)
Ln(GDPi · GDPj)	0.476771*** (0.132535)	0.869398***	0.725494*** (0.052159)
LnDISTANCE	-0.922521*** (0.132535)	-	-0.957433*** (0.230546)
LnGDPPCi	0.432726* (0.267520)	-0.194565	0.040647 (0.230546)
LnPOPi	3.901169 (3.858674)	-0.724937	-0.175124 (1.753278)
LnPOPj	0.043836 (3.858674)	-0.668066***	-0.209948*** (0.077911)
FTA	-0.239850 (0.258635)	-	-0.026391 (0.051843)
Number of observations	1280	1280	1280
R-squared	0.536824	0.926826	0.579369
Adjusted R-squared	0.534641	0.921748	0.577387
S.E. of regression	1.170787	0.480101	0.483291
F-statistic	245.9025	182.5130	292.2347
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-69 Estimation of Korea's exports for 80 trading partners for Equation (2.16)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-77.25299 (64.42757)	-6.488204 (28.24387)	-9.956547 (29.51709)
LnGDPi	0.909496*** (0.171027)	0.674832*** (0.131162)	0.766141*** (0.128735)
LnGDPj	0.476771*** (0.132535)	0.869398*** (0.062291)	0.725494*** (0.052159)
LnDISTANCE	-0.922521*** (0.246992)	-	-0.957433*** (0.230546)
LnPOPi	3.468443 (3.833643)	-0.530372 (1.786951)	-0.215770 (1.834908)
LnPOPj	0.043836 (0.112321)	-0.668066*** (0.174710)	-0.209948*** (0.077911)
FTA	-0.239850 (0.258635)	-	-0.026391 (0.051843)
Number of observations	1280	1280	1280
R-squared	0.536824	0.926826	0.579369
Adjusted R-squared	0.534641	0.921748	0.577387
S.E. of regression	1.170787	0.480101	0.483291
F-statistic	245.9025	182.5130	292.2347
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-70 *Hausman* test for Korea's 80 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-70) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and its probability is 1.0000. The result of *Hausman* test indicates that the RE model is the best one to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-68) show the empirical findings for Korea's bilateral trade with the 80 trading partners dataset. The intercept's result is negative and insignificant. The sign of the distance's coefficient is negative like its expected results. Its coefficient is -0.957433 at the 1% level of significance. The product of Korea's and its trading partner's GDP is 0.725494, and it is significant at the 1% level. The GDP per capita of Korea is positive but insignificant. Moreover, Korea's population's sign is negative and insignificant. Its trading partner's population is -0.209948 at the 1% level of significance. The sign of the FTA is negative but statically insignificant. The sign of the FTA is unlike what the literature suggests negative.

The results in Table (2-69) show the empirical findings for Korea's bilateral trade with the 80 trading partners dataset. The intercept's result is negative and insignificant. The sign of the distance's coefficient is negative like its expected results. Its coefficient is -0.957433 at the 1% level of significance. Korea's GDP

0.766141 and its trading partner's GDP 0.725494 are significant at the 1% level. Moreover, Korea's population's sign is negative and insignificant. Its trading partner's population is -0.209948 at the 1% level of significance. The sign of the FTA is negative but statically insignificant. The sign of the FTA is unlike what the literature suggests negative.

Table 2-71 Estimation of Korea's exports for 60 trading partners for Equation (2.15)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-51.31747 (52.77881)	-7.979672	-27.68970 (32.06504)
Ln(GDPi · GDPj)	0.332316** (0.146870)	1.009731***	0.753382*** (32.06504)
LnDISTANCE	-1.057941*** (0.215169)	-	-1.125810*** (0.232884)
LnGDPPCi	0.785945*** (0.306885)	-0.352039**	0.058463 (0.165130)
LnPOPi	2.760969 (3.193984)	-0.588145	0.999715 (1.903793)
LnPOPj	0.040161 (0.108915)	-1.057694***	-0.385322*** (0.084125)
FTA	0.087789 (0.187945)	-	-0.074176 (0.055536)
Number of observations	960	960	960
R-squared	0.535075	0.924252	0.618272
Adjusted R-squared	0.532148	0.918926	0.615869
S.E. of regression	1.094070	0.455441	0.464098
F-statistic	182.7991	173.5352	257.2571
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-72 Estimation of Korea's exports for 60 trading partners for Equation (2.16)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-51.31747 (52.77881)	-7.979673 (30.91748)	-27.68970 (32.06504)
LnGDPi	1.118261*** (0.198441)	0.657692*** (0.143029)	0.811845*** (0.140345)
LnGDPj	0.332316** (0.146870)	1.009731*** (0.069919)	0.753382*** (0.057169)
LnDISTANCE	-1.057941*** (0.215169)	-	-1.125810*** (0.232884)
LnPOPi	1.975024 (3.182144)	-0.236106 (1.954343)	0.941253 (1.995918)
LnPOPj	0.040161 (0.108915)	-1.057694*** (0.184447)	-0.385322*** (0.084125)
FTA	0.087789 (0.187945)	-	-0.074176 (0.055536)
Number of observations	960	960	960
R-squared	0.535075	0.924252	0.618272
Adjusted R-squared	0.532148	0.918926	0.615869
S.E. of regression	1.094070	0.455441	0.464098
F-statistic	182.7991	173.5352	257.2571
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-73 *Hausman* test for Korea's 80 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-73) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-71) show the empirical findings for Korea's bilateral trade with the 60 trading partners dataset. The intercept's result is negative and significant. The sign of the distance's coefficient is negative like its expected results, its coefficient -1.125810 at the 1% level of significance. The product of Korea's and its trading partner's GDP is 0.753382 at the 1% level of significance. The GDP per capita of Korea is positive but insignificant. Moreover, Korea's population sign is positive but insignificant. Its trading partner's population is -0.385322 at the 1% level of significance. The sign of the FTA is negative but statically insignificant. The sign of the FTA is unlike what the literature suggests negative.

The results in Table (2-72) show the empirical findings for Korea's bilateral trade with the 60 trading partners dataset. The intercept's result is negative and significant. The sign of the distance's coefficient is negative like its expected results, its coefficient -1.125810 at the 1% level of significance. Korea's GDP

0.811845 and its trading partner's GDP 0.753382 are significant at the 1% level. Moreover, Korea's population sign is positive but insignificant. Its trading partner's population is -0.385322 at the 1% level of significance. The sign of the FTA is negative but statically insignificant. The sign of the FTA is unlike what the literature suggests negative.

Table 2-74 Estimation of Korea's exports for 40 trading partners for Equation (2.15)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-141.3804* (86.28553)	-30.00271 (39.54637)	-65.22768* (41.94273)
Ln(GDPi · GDPj)	0.302394** (0.138803)	0.994369*** (0.091386)	0.723353*** (0.073560)
LnDISTANCE	-1.062861*** (0.208999)	-	-1.227933*** (0.241162)
LnGDPPCi	0.793865*** (0.282070)	-0.340789* (0.235998)	0.093841 (0.216220)
LnPOPi	7.991855* (5.130061)	0.771116 (2.397444)	3.261833 (2.475768)
LnPOPj	0.004629 (0.107166)	-1.118970*** (0.295292)	-0.395532*** (0.098499)
FTA	-0.269392 (0.260909)	-	-0.124496* (0.066753)
Number of observations	640	640	640
R-squared	0.550470	0.898567	0.595362
Adjusted R-squared	0.546209	0.891249	0.591527
S.E. of regression	0.989996	0.484644	0.492123
F-statistic	129.1896	122.7861	155.2268
Prob(F-statistic)	0.000000	0.000000	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-75 Estimation of Korea's exports for 40 trading partners for Equation (2.16)

Variables	Pooled OLS	Fixed Effect	Random Effect
C	-141.3804* (86.28553)	-30.00271 (39.54637)	-65.22768* (41.94273)
LnGDPi	1.096259*** (0.218574)	0.653579*** (0.187987)	0.817193*** (0.183550)
LnGDPj	0.302394** (0.138803)	0.994369*** (0.091386)	0.723353*** (0.073560)
LnDISTANCE	-1.062861*** (0.208999)	-	-1.227933*** (0.241162)
LnPOPi	7.197990 (5.069437)	1.111906 (2.516194)	3.167992 (2.602250)
LnPOPj	0.004629 (0.107166)	-1.118970*** (0.295292)	-0.395532*** (0.098499)
FTA	-0.269392 (0.260909)	-	-0.124496* (0.066753)
Number of observations	640	640	640
R-squared	0.550470	-30.00271	0.595362
Adjusted R-squared	0.546209	0.653579	0.591527
S.E. of regression	0.989996	0.994369	0.492123
F-statistic	129.1896	1.111906	155.2268
Prob(F-statistic)	0.000000	-1.118970	0.000000

Source: Author's estimations

Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-76 *Hausman* test for Korea's 80 trading partners (Eviews 8)

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

Hausman test summary (table 2-76) shows that the Chi-Sq. statistics is 0.000000 and the Chi-Sq. d.f. is 5 and the probability is 1.0000. The result of *Hausman* test indicates that the random effect is the best model to choose. Although some researchers argue that the results have no meaningful information, Kitetu and Ko (2015) argue that the result is reliable and there is no correlation between the exogenous variables and the random error.

The results in Table (2-74) show the empirical findings for Korea's bilateral trade with the 40 trading partners dataset. The intercept's result is -65.22768 at the 10% level of significance. The sign of the distance's coefficient is negative like its expected results, its coefficient -1.227933 at the 1% level of significance. The product of Korea's and its trading partner's GDP is 0.723353 at the 1% level of significance. The GDP per capita of Korea is positive but insignificant. Moreover, Korea's population sign is positive but insignificant. Its trading partner's population is -0.395532 at the 1% level of significance. The FTA is -0.124496 at the 10% significance level. The sign of the FTA is unlike what the literature suggests contrary.

The results in Table (2-75) show the empirical findings for Korea's bilateral trade with the 40 trading partners dataset. The intercept's result is -65.22768 at the 10% level of significance. The sign of the distance's coefficient is negative like its expected results, its coefficient -1.227933 at the 1% level of significance. Korea's GDP 0.817193 and its trading partner's GDP 0.723353 are significant at the 1% level. Moreover, Korea's population sign is positive but insignificant. Its trading partner's population is -0.395532 at the 1% level of significance. The FTA is -0.124496 at the 10% significance level. The sign of the FTA is negative unlike what the literature suggests.

Estimation Summary for Korea's exports

The estimation's results were tested using *Hausman* test for all three data sets. The results proved that the RE model is the best model for the 80, the 60, and the 40 datasets. The values of the R-squared were 0.579369, 0.618272 and 0.595362 for the 80, the 60 and the 40 datasets, respectively. Moreover, the Standard Error (S.E.) of regression was the highest in the 40 datasets (which is 0.492123) then the 80 datasets (0.483291) and the 60 datasets (0.464098). The values of the F-statistics were 292.2347, 257.2571 and 155.2268 for the 80, 60 and 40 data sets, respectively, while the p-value for the F-statistics was significant at the 1% level of significance for all of the datasets.

The coefficients signs for the empirical results are consisted with the study's expectations, except for the FTA in all of the models. The results showed that the distance has a significant negative impact on Korea's exports. Korea's GDP per capita was positive and have an insignificant impact on Korea's exports. The product of the GDP's has a significant positive impact on the exports for all of the datasets. Moreover, Korea's population has an insignificant positive impact on Korea's exports in all of the datasets. Korea's partner's population has a significant and negative impact on Korea's exports. Also, the FTA has a significant and negative impact on Korea's exports in the 40 countries dataset and insignificant on the 80 and the 60 countries datasets. The R-squared is the highest for the 60 then the 40 then the 80 countries datasets. The S.E. of regression is the highest for the 40 countries dataset, then the 80 countries dataset and the 60 countries dataset. The F-statistics has a different trend where it is the highest for the 80 countries dataset then the 60 countries dataset and the lowest is the 40 countries dataset. The p-values for the F-statistics are at the 1% level of significance for all of the datasets. In summary, the 60 countries dataset is the best model statically and the closest to the economic theories.

2.6 Conclusion

The purpose of this chapter is to measure the determinations of the exports of the six GCC countries and Korea. To seek this objective, three datasets were included in the study that includes 55, 45 and 35 trading partners for the GCC countries. As for Korea, the estimations included 80, 60 and 40 trading partners. For each dataset, three different models were applied, the pooled OLS model, the FE model, and the RE model. In addition, to choose the best model, *Hausman* test were applied to choose between the RE and the FE models, and *Wald* restriction test was applied to choose between the FE and the pooled OLS models, hence the FE was not used due to its limitations in estimating the constant variables over time such as the distance and the dummy variables, and the distance is essential to the gravity model. However, the FE model was added to enrich the literature. In addition, two main equations are used in the study: the first equation (which have the reported results) includes the product of the exporting countries' GDP and the importing countries' GDP. The second equation includes the exporting countries' GDP and the importing countries' GDP separately. In order to proceed with the gravity model, *Eviews 8* was used as the supporting program to conduct the estimations. The research used balanced panel data for 16 years, and the period was from 2000 to 2015.

The results of *Hausman* test's summary for the estimations proved that the RE model is the best model for Kuwait (55 trading partners), UAE (45 trading partners), Oman (55 trading partners) and Korea (60 trading partners) with chi-squared statistics of 0.0000000 and statistical significance of 1.00000 while the Chi-Sq. d.f. 5. Moreover, datasets that could not reject *Hausman* test's hypothesis at 5% used pooled OLS. Therefore, three countries used pooled OLS; Saudi Arabia (35 trading partners), Bahrain (35 trading partners) and Qatar (35 trading partners). The two Tables below (2-77 and 2-78) shows the summary of the signs for the variable in all estimations for the two equations, and the next Tables (2-79 and 2-80) show the best estimations summary for the seven countries for the two equations as well.

Table 2-77 All variables' signs after estimations of the equations with the GDP's products (Pooled OLS, FE and RE)

Country	Set	Model	Variable									
			c	GDPi.j	DISij	GDPPCi	Popi	Popj	Border	Lang	FTA	GCC
KW	55	P-OLS	-		-		+	+		+		+
		FE	-				+					
		RE	-	+	-		+	+	-	+		+
	45	P-OLS	-				+	+		+		+
		FE	-				+	+				
		RE	-				+	+		+		+
	35	P-OLS	-				+	+				+
		FE	-	+			+	+				
		RE	-				+	+				+
SA	55	P-OLS	-	+	-		+			+	+	
		FE	-	+		-	+	-				
		RE	-	+	-	-	+	-		+		-
	45	P-OLS	-	+		+	+	-			+	
		FE	-	+		-	+	-				
		RE	-	+			+	-				-
	35	P-OLS	-	+		+	+				+	
		FE	-	+		-	+	-				
		RE	-	+	-	-	+	-				
BH	55	P-OLS	-	+	+	+	+	+		+	+	+
		FE	-	+		+		+				
		RE	-	+	+	+	+	+		+	+	+
	45	P-OLS	-	+	+	+	+	+		+	+	+
		FE	-	+			+	+				
		RE	-	+	+	+	+	+		+	+	+
	35	P-OLS	-	+			+	+		+	+	+
		FE	-	+				+				
		RE	-	+		+	+	+		+	+	+
QT	55	P-OLS	-	+	+		+	+				+
		FE	-	-			+	-				
		RE	-		+		+	+			-	+
	45	P-OLS	-	+	+		+	+				+
		FE	-	-			+	-				
		RE	-				+				-	+
	35	P-OLS	-	+	+		+	+	+	-		+

		FE										
		RE	-				+				-	+
UAE	55	P-OLS	-	+		+	+		+			
		FE	-	+		+	+					
		RE	-	+		+	+					
	45	P-OLS	-	+		+	+		+	-		
		FE	-	+		+	+	-				
		RE	-	+		+	+					
	35	P-OLS	-	+		+	+		+	-		
		FE	+	+				+				
		RE	-	+		+	+	-				
OM	55	P-OLS	-	+	-	+	+	+	+			
		FE	-	+			+	-				
		RE	-	+	-	+	+			+	-	
	45	P-OLS	-	+	-	+			+			
		FE	-	+				-				
		RE	-	+	-	+					-	
	35	P-OLS	-	+	-	+	+		+			
		FE	-	+				-				
		RE	-	+	-	+					-	
KR	80	P-OLS		+	-	+			n/a	n/a		n/a
		FE		+				-	n/a	n/a		n/a
		RE		+	-			-	n/a	n/a		n/a
	60	P-OLS		+	-	+			n/a	n/a		n/a
		FE		+		-		-	n/a	n/a		n/a
		RE		+	-			-	n/a	n/a		n/a
	40	P-OLS	-	+	-	+			n/a	n/a		n/a
		FE		+		-		-	n/a	n/a		n/a
		RE	-	+	-			-	n/a	n/a	-	n/a

Table 2-78 All variables' signs after estimations of the equations with the separated GDPs (Pooled OLS, FE and RE)

Country	Set	Model	Variable									
			c	GDPi	GDPj	DISij	Popi	Popj	Border	Lang	FTA	GCC
KW	55	P-OLS	-				+	+		+		+
		FE	-				+					
		RE	-		+		+	+		+		+
	45	P-OLS	-				+	+		+		+
		FE	-				+	+				
		RE	-				+	+		+		+
	35	P-OLS	-				+	+				+
		FE	-		+		+	+				
		RE	-				+	+		+		+
SA	55	P-OLS	-	+	+	-	+		+	+	+	
		FE	-	+	+		+	-				
		RE	-	+	+	-	+	-				-
	45	P-OLS	-	+	+		+		+	+	+	
		FE	-	+	+		+	-				
		RE	-	+	+		+	-				-
	35	P-OLS	-	+	+		+				+	
		FE	-		+		+	-				
		RE	-	+	+	-	+	-				-
BH	55	P-OLS	-		+		+			+	+	+
		FE	-	+	+			+				
		RE	-		+			+		+	+	+
	45	P-OLS	-		+			+		+	+	+
		FE	-		+			+				
		RE	-		+					+	+	+
	35	P-OLS	-		+				+	+	+	+
		FE	-		+			+				
		RE	-		+					+	+	
QT	55	P-OLS	-		+		+	+			+	
		FE	-		-		+					
		RE	-			+	+	+			-	+
	45	P-OLS	-	-	+		+					+
		FE	-		-		+	-				
		RE	-				+	+			-	+
	35	P-OLS	-				+			-		

		FE			-			+				
		RE	-				+				-	+
UAE	55	P-OLS	-	+	+							
		FE	-	+	+		-					
		RE	-	+	+		-					
	45	P-OLS	-	+	+				+	-		
		FE	-	+	+			-				
		RE	-	+	+							
	35	P-OLS	-	+	+				+	-		
		FE	-	+	+			-				
		RE	-	+	+			-				
OM	55	P-OLS	-	+	+	-		+	+			
		FE	-	+	+			-				
		RE	-	+	+	-				+	-	
	45	P-OLS	-	+	+	-			+			
		FE	-	+	+			-				
		RE	-	+	+	-					-	
	35	P-OLS	-	+	+	-			+			
		FE	-	+	+			-				
		RE	-	+	+	-					-	
KR	80	P-OLS		+	+	-			n/a	n/a		n/a
		FE		+	+			-	n/a	n/a		n/a
		RE		+	+	-		-	n/a	n/a		n/a
	60	P-OLS		+	+	-			n/a	n/a		n/a
		FE		+	+			-	n/a	n/a		n/a
		RE		+	+	-		-	n/a	n/a		n/a
	40	P-OLS	-	+	+	-			n/a	n/a		n/a
		FE		+	+			-	n/a	n/a		n/a
		RE	-	+	+	-		-	n/a	n/a	-	n/a

Table 2-79 Estimation summary for the best results of the seven countries with the product of GDPi and GDPj

Variables	KW-RE-55	SA-35-OLS	BH-35-OLS	QTR-35-RE	UAE-RE-45	OMN-RE-55	KR-RE-60
C	-36.16120*** (5.472014)	-56.19582*** (11.55684)	-34.63150*** (4.877284)	-34.59346*** (7.745939)	-28.36205*** (5.528189)	-40.68264*** (7.098569)	-27.68970 (32.06504)
Ln(GDPi・GDPj)	0.240176* (0.143835)	0.513100** (11.55684)	0.046694* (4.877284)	0.029350 (0.038086)	0.594007*** (0.094815)	0.645522*** (0.174951)	0.753382*** (32.06504)
LnDISTANCE	-0.216699 (0.455571)	-0.494339 (0.508665)	0.625035 (0.479711)	0.270974 (0.038086)	-0.440700 (0.094815)	-1.186887** (0.174951)	-1.125810*** (0.232884)
LnGDPPCi	-0.211391 (0.264866)	0.411974* (0.508665)	0.806724* (0.479711)	0.051028 (0.038086)	0.819934*** (0.260428)	0.694854* (0.364111)	0.058463 (0.165130)
LnPOPi	1.721545*** (0.410536)	3.066683*** (0.627703)	1.423664*** (0.479711)	2.740521*** (0.038086)	0.586873*** (0.177760)	1.097785*** (0.419053)	0.999715 (1.903793)
LnPOPj	0.615256*** (0.194574)	0.100926 (0.228890)	0.518368*** (0.142746)	0.215810 (0.239296)	-0.227064 (0.166403)	0.231483 (0.206435)	-0.385322*** (0.084125)
BORDER	-0.705812 (2.103646)	0.241460 (0.704700)	0.067672 (0.142746)	0.868411 (1.605979)	1.369217 (1.527064)	1.068863 (1.315435)	n/a
LANGUAGE	1.541997* (0.815398)	0.213641 (0.704700)	1.175564* (0.142746)	-1.473836 (1.605979)	-0.488352 (1.027425)	1.352192* (0.845146)	n/a
FTA	0.196859 (0.238026)	0.679464** (0.286932)	0.679390*** (0.189875)	-0.761256*** (0.274228)	-0.130320 (0.124025)	-0.880344*** (0.268328)	-0.074176 (0.055536)
GCC	2.672136** (1.317097)	0.014988 (0.656968)	3.624962*** (1.282743)	3.208427* (2.105968)	0.410041 (1.785047)	0.740858 (1.536212)	n/a
Number of observations	880	560	560	560	720	880	960
R-squared	0.211179	0.366048	0.386656	0.553798	0.690809	0.331180	0.618272
Adjusted R-squared	0.203019	0.355674	0.376619	0.546496	0.686890	0.324261	0.615869
S.E. of regression	1.333912	1.378060	0.942591	1.247946	0.550402	1.519583	0.464098
F-statistic	25.87907	35.28592	38.52480	75.84717	176.2576	47.86648	257.2571
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Source: Author's estimations. Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

Table 2-80 Estimation summary for the best results of the seven countries with separated GDPs

Variables	KW-RE-55	SA-RE-55	BH- RE-55	QTR-OLS-55	UAE-RE-45	OMN-RE-55	KR-RE-60
C	-36.16120*** (5.472014)	-53.90025*** (10.58871)	-31.09083*** (3.897180)	-42.33062*** (5.234963)	-28.01804*** (5.528362)	-40.68264*** (7.098569	-27.68970 (32.06504)
LnGDPi	0.028786 (0.181809)	0.563819*** (0.218298)	0.641668 (0.467396)	-0.360445 (0.383955)	1.383318*** (0.221101)	1.340376*** (0.238021)	0.811845*** (0.140345)
LnGDPj	0.240176* (0.143835)	0.794710*** (0.103751)	0.614576*** (0.121270)	0.661639*** (0.163258)	0.601651*** (0.094903)	0.645522*** (0.174951)	0.753382*** (0.057169)
LnDISTANCE	-0.216699 (0.455571)	-0.770237** (0.446642)	0.326576 (0.358006)	0.270325 (0.424412)	-0.450012 (0.553632)	-1.186887* (0.619475)	-1.125810*** (0.232884)
LnPOPi	1.932935*** (0.455571)	2.640620*** (0.882102)	0.079998 (0.825594)	2.564062**** (0.749244)	-0.203672 (0.255986)	0.402930 (0.469586)	0.941253 (1.995918)
LnPOPj	0.615256*** (0.194574)	-0.545950*** (0.151745)	0.271306** (0.136393)	0.356522* (0.232906)	-0.234111 (0.166393)	0.231483 (0.206435)	-0.385322*** (0.084125)
BORDER	-0.705812 (2.103646)	0.842654 (1.482292)	0.074242 (1.517637)	0.829908 (1.251052)	1.376071 (1.527063)	1.068863 (1.315435)	n/a
LANGUAGE	1.541997* (0.815398)	1.304881 (0.925818)	1.996986*** (0.617344)	0.124539 (0.687226)	-0.486234 (1.027442)	1.352192* (0.845146)	n/a
FTA	0.196859 (0.238026)	0.029943 (0.140031)	0.506434*** (0.178969)	0.391043*** (0.543937)	-0.128865 (0.124082)	-0.880344*** (0.268328)	-0.074176 (0.055536)
GCC	2.672136** (1.317097)	-3.437120*** (1.379353)	2.698296** (1.133192)	2.936671 (1.104810)	0.374537 (1.785099)	0.740858 (1.536212)	n/a
Number of observations	880	880	880	880	720	880	960
R-squared	0.211179	0.611569	0.332906	0.458670	0.690400	0.331180	0.618272
Adjusted R-squared	0.203019	0.607551	0.326005	0.453070	0.686476	0.324261	0.615869
S.E. of regression	1.333912	0.738570	1.026071	2.337120	0.550772	1.519583	0.464098
F-statistic	25.87907	152.1977	48.24044	81.90584	175.9202	47.86648	257.2571
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Source: Author's estimations. Note: Statistical significance is presented with asterisks after the coefficient where, ***, **, *, implies 1%, 5% and 10% significance in two tailed t-test. Standard error is presented bellow the coefficient in parenthesis.

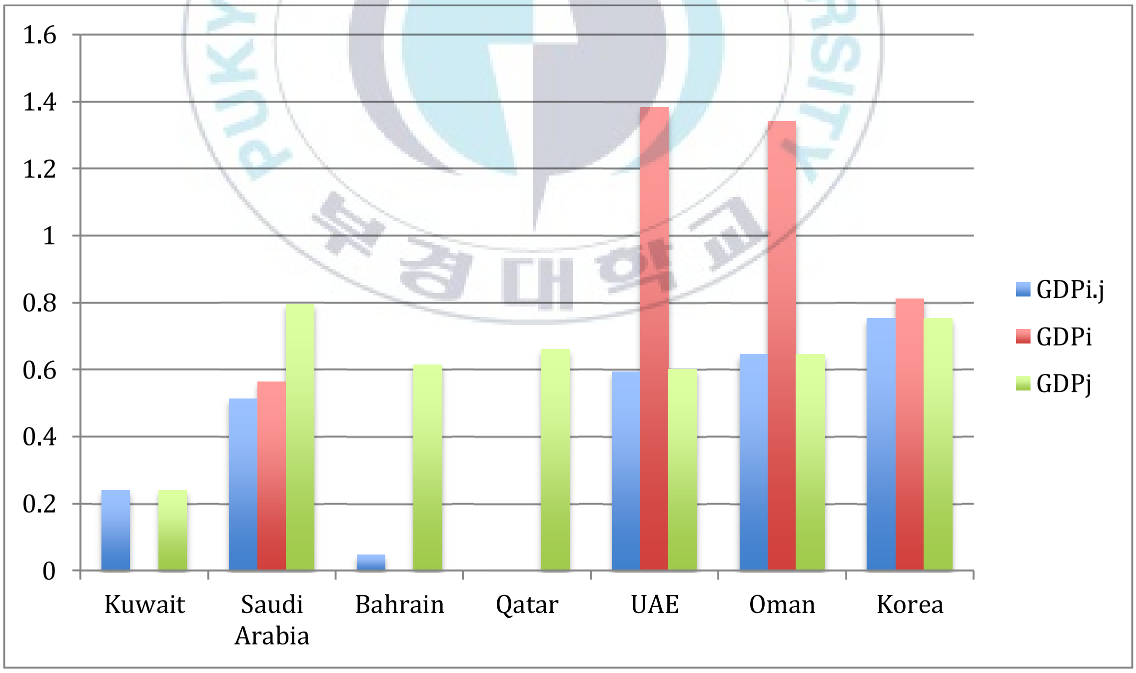
The Figures 8 to 15 show the comparison for the best-estimated results for the six GCC countries and Korea for the two equations. Figure 8 shows the differences between the results of the exporters' and importers' GDPs and their product. In addition, six countries have significant positive effects on its exports. The order of the highest affected country to the lowest is Korea, Oman, UAE, Saudi Arabia, Kuwait then Bahrain, respectively, and Qatar was insignificant.

Figure 9 shows the differences between the results of the distance. Also, two countries have significant negative effects on their exports. The order of the lowest affected country to the highest is Oman then Korea, respectively. Moreover, UAE, Saudi Arabia, Kuwait, Bahrain, and Qatar were insignificant. Figure 10 shows the differences between the results of the exporter's GDPs per capita. Besides, four countries have significant positive effects on their exports. The order of the highest affected country to the lowest is UAE, then Bahrain, Oman then Saudi Arabia, respectively. Moreover, Kuwait and Korea were insignificant.

Figure 11 shows the differences between the results of exporter's populations. In addition, six countries have significant positive effects on exports. The order of the highest affected country to the lowest is Saudi Arabia, then Qatar, Kuwait, Bahrain, Oman then UAE, respectively. Moreover, Korea's was insignificant. Figure 12 shows the differences between the results of importer's populations in the two equations. In addition, two countries have significant positive effects on exports, and one country have a significant negative on exports. The order of the highest affected country to the lowest is Kuwait, then Bahrain then Korea, respectively. Moreover, Qatar, UAE, and Oman were insignificant.

Figure 13 shows the differences between the results of the sharing a language. In addition, three countries have significant positive effects on exports. The order of the highest affected country to the lowest is Kuwait, then Oman and Bahrain, respectively. Moreover, Saudi Arabia, Qatar, and UAE were insignificant. Figure 14 shows the differences between the results of the FTAs. Also, two countries have significant positive effects on exports, and two countries have significant negative effects on exports. The order of the highest affected country to the lowest is Saudi Arabia, then Bahrain, Qatar then Oman, respectively. Moreover, Kuwait, UAE, and Korea were insignificant. Figure 15 shows the differences between the results of being a GCC member. In addition, three countries have significant positive effects on exports. The order of the highest affected country to the lowest is Bahrain, then Qatar and Kuwait, respectively. Moreover, Saudi Arabia, UAE, Oman, and Korea were insignificant.

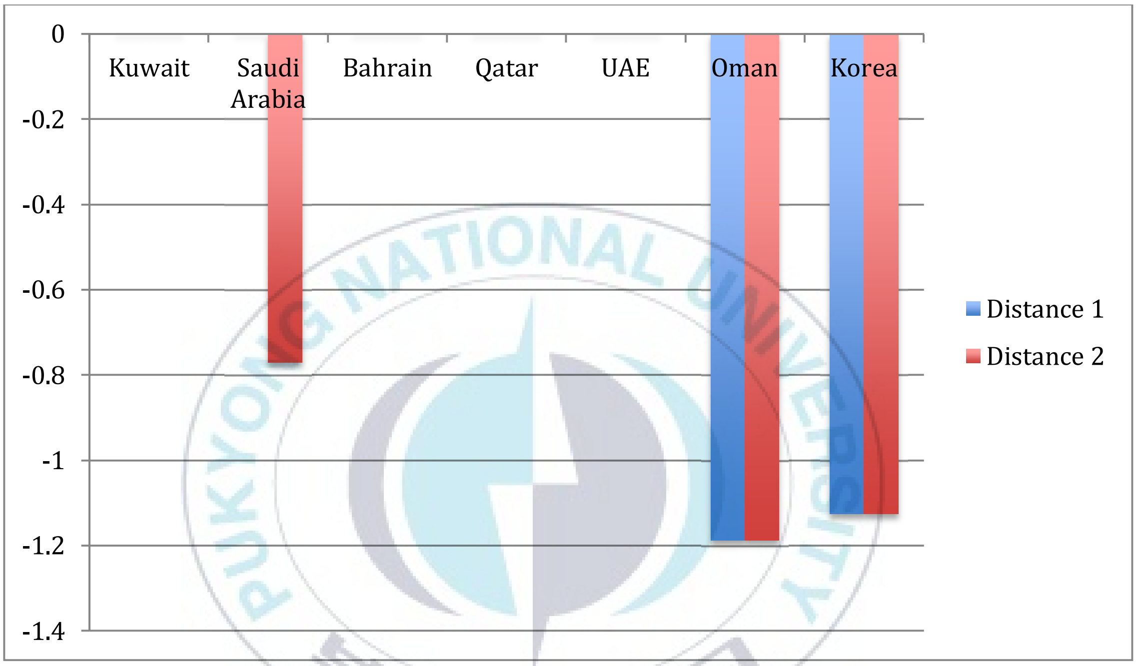
Figure 8 Comparative estimation results for the product of the GDP's coefficient (GDPi.j) in Table (2-79), and the separated GDPs' coefficients (GDPi and GDPj) estimations in Table (2-80) for the seven countries (%)



Source: Author's estimations.

Note: Country with zero means the results are insignificant.

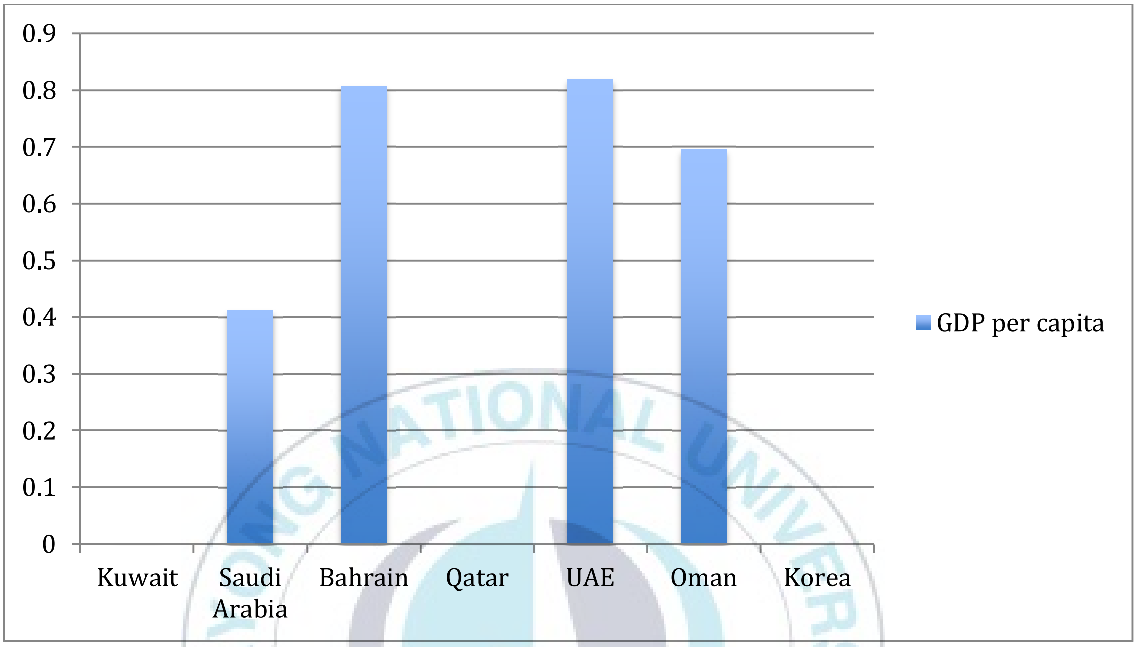
Figure 9 Comparative estimation results for the Distance's coefficient (Distance 1) in Table (2-79), and the Distance's coefficient (Distance 2) in Table (2-80) for the seven countries (%)



Source: Author's estimations.

Note: Country with zero means the results are insignificant.

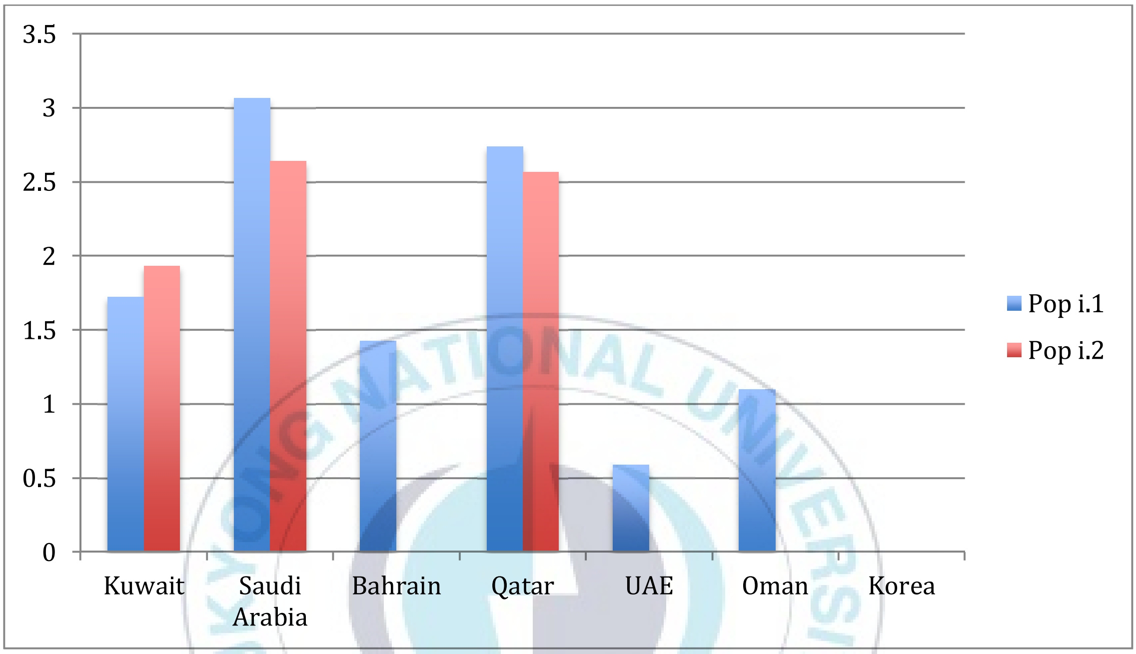
Figure 10 The estimation results for the GDP per capita in Table (2-79) for the seven countries (%)



Source: Author’s estimations.

Note: Country with zero means the results are insignificant.

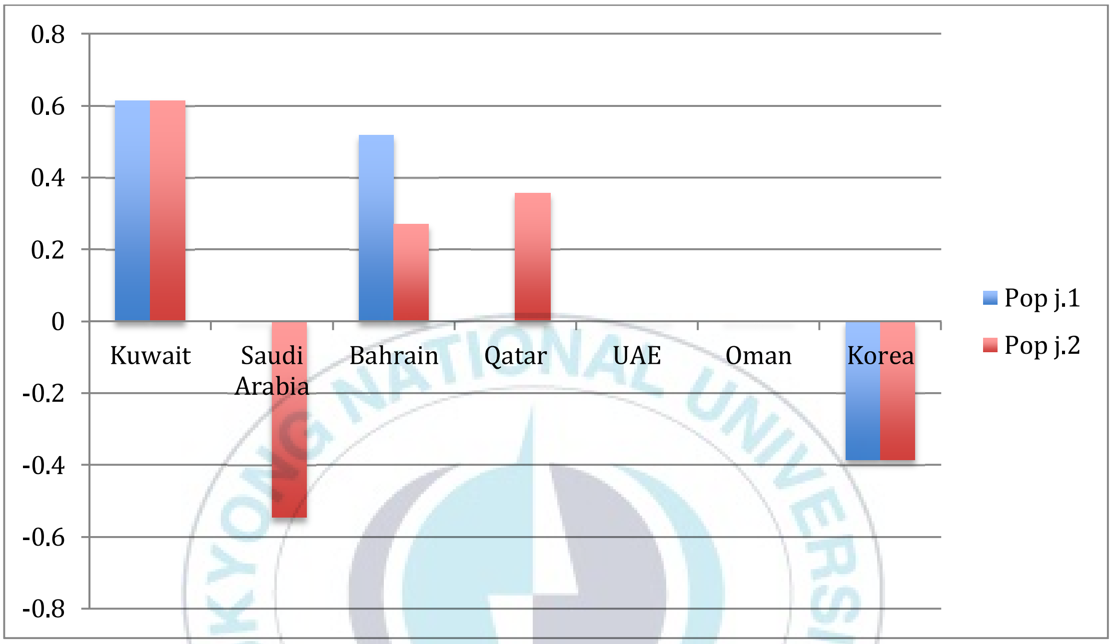
Figure 11 Comparative estimation results for the exporter's population's coefficient (Pop i.1) in Table (2-79), and the exporter's population's coefficient (Pop i.2) in Table (2-80) for the seven countries (%)



Source: Author's estimations.

Note: Country with zero means the results are insignificant.

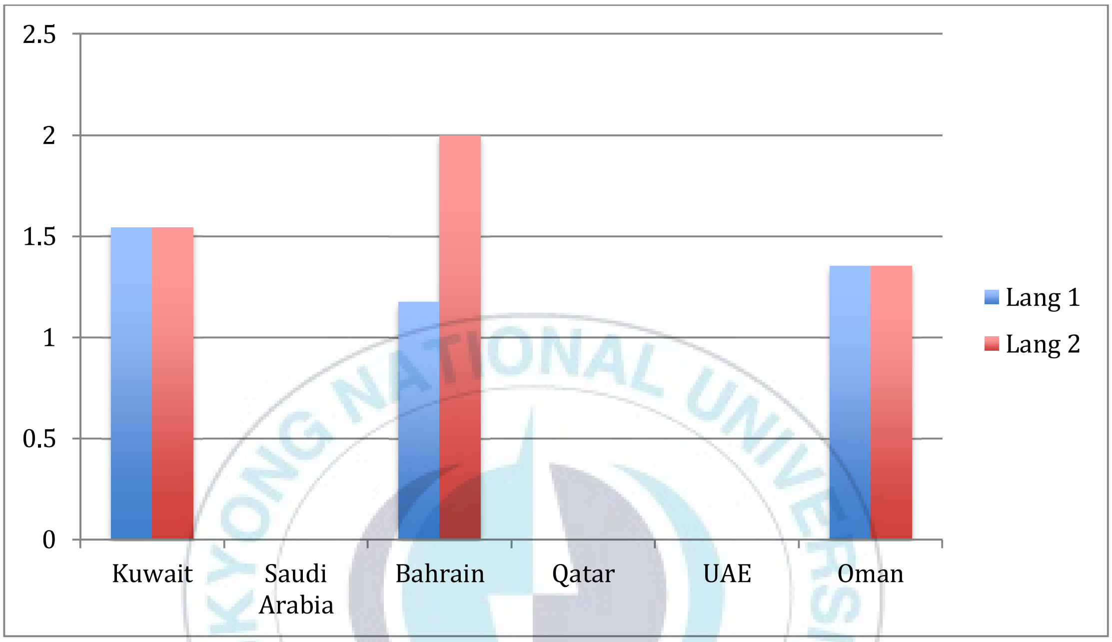
Figure 12 Comparative estimation results for importer population's coefficient (Pop j.1) in Table (2-79), and the importer population's coefficient (Pop j.2) in Table (2-18) for the seven countries (%)



Source: Author's estimations.

Note: Country with zero means the results are insignificant.

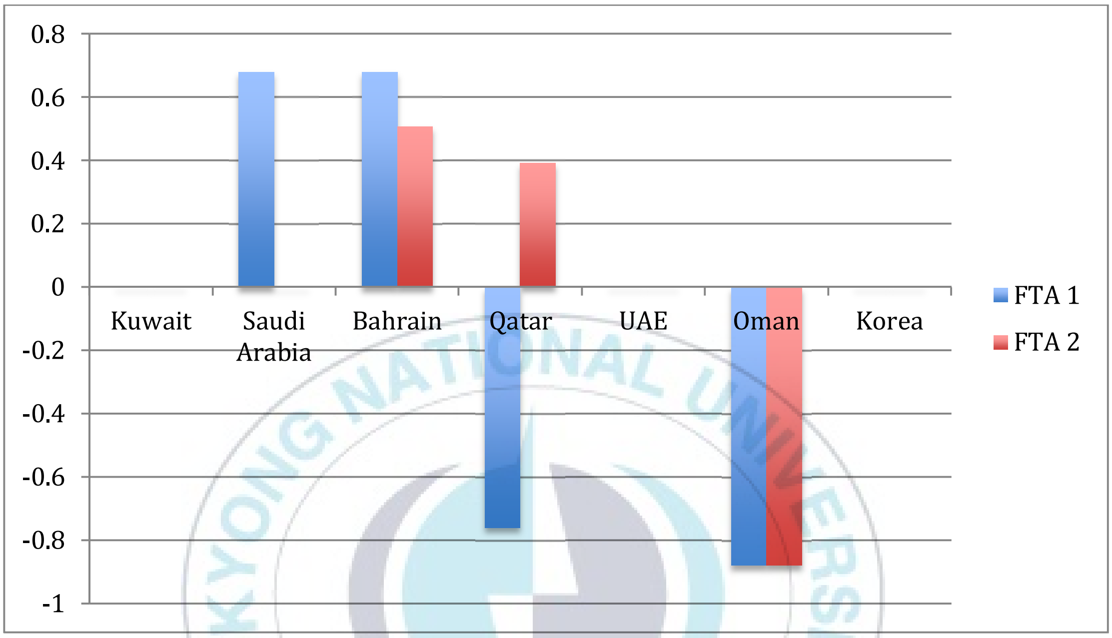
Figure 13 Comparative estimation results for the Language's coefficient (Lang 1) in Table (2-79), and the Language's coefficient (Lang 2) in Table (2-80) for the GCC countries (%)



Source: Author's estimations.

Note: Country with zero means the results are insignificant.

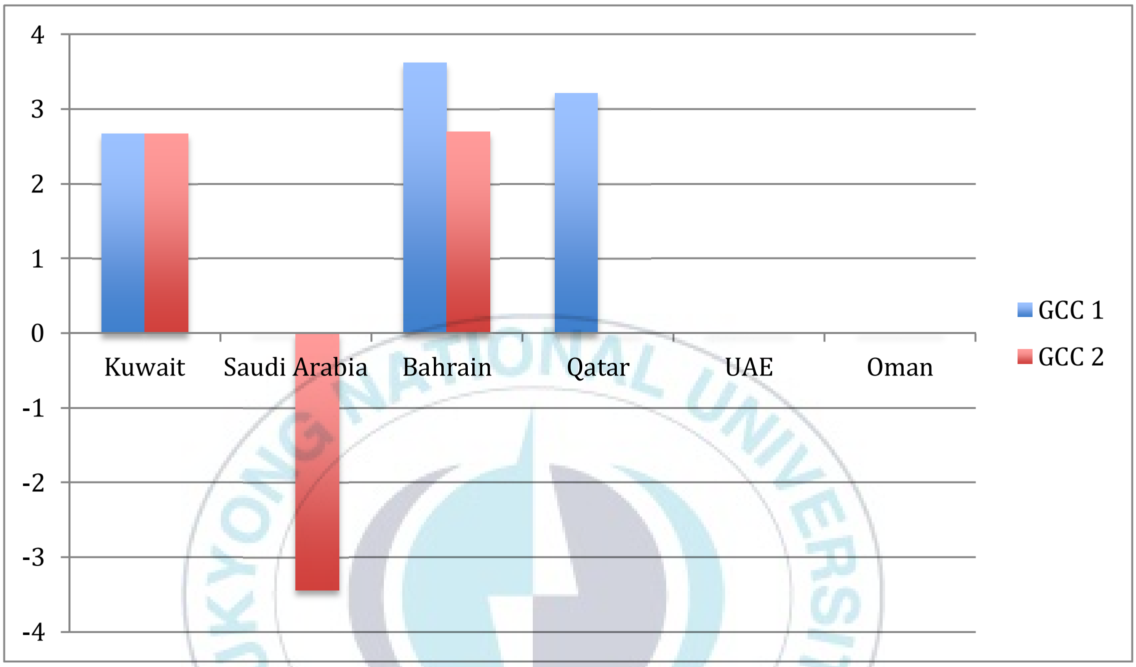
Figure 14 Comparative estimation results for the FTA's coefficient (FTA 1) in Table (2-79), and the FTA's coefficient (FTA 2) in Table (2-80) for the seven countries (%)



Source: Author's estimations.

Note: Country with zero means the results are insignificant.

Figure 15 Comparative estimation results for the GCC's coefficient (GCC 1) in Table (2-79), and the GCC's coefficient (GCC 2) in Table (2-80) for the GCC countries (%)



Source: Author's estimations.

Note: Country with zero means the results are insignificant.

Chapter 3 The Economic Impacts of a Korea-GCC FTA: A CGE Approach

3.1 Introduction

The purpose of this chapter is to analyze the possible effects of the potential Korea-GCC FTA empirically. Besides, the microeconomic and the macroeconomic effects will be presented later in this chapter. The primary goal of this chapter is to find how would the economy respond to the economic changes that follow the trade liberation in three different levels and six different scenarios. The central question for this chapter is: Will the economic growth for Korea and the GCC countries increase under establishing a Free Trade Agreement between Korea and the GCC countries? Also, what are the leading trade effects?

To be able to answer these questions, it is essential to understand the trade structure of the GCC countries and Korea, and it is essential to explain the characteristics of their bilateral exports. The GCC countries are some of the leading oil exporting countries in the world (see Table 3-1) unlike Korea, which exports many varieties of products. Korea's main exports to the GCC countries are transportation equipment, automobiles, machinery, metal products, construction, and electronics. In addition, Korea's highest exports destination from the GCC countries is Saudi Arabia then the UAE, Kuwait, Oman, Qatar and Bahrain with total exports of goods and services of USD 8674 million, USD 7214 million, USD 1566 million, USD 952 million, USD 612 million and USD 199 million, respectively (see Table 3-2).

In addition, the GCC's main trading partners are mostly high economy countries, and Korea is a primary destination for their exports (as mentioned in Chapter 2) because Korea relies heavily on importing from the energy sector to maintain its economic growth. The main exporting products for the GCC countries to Korea are the crude oil, natural gas, and petroleum products. In addition, the GCC's highest exporting country to Korea is Saudi Arabia followed by the UAE, Kuwait, Qatar, Oman and Bahrain with total exports of USD 32246 million, USD 18798 million, USD 15566 million, USD 10046 million, USD 4150 million and USD 893 million, respectively (see Table 3-3). Therefore, the Korea-GCC FTA can play a significant role in securing the energy demand to sustain its economic growth.

To seek the potential effect and quantify the changes in the economies of the GCC countries and Korea, the following questions must be considered: First, What are primary effects of the Korea-GCC FTA regarding welfare, GDP, trade, price, and output? Second, does the economic growth of the GCC countries and Korea increase with the potential Korea-GCC FTA? Since the ultimate goal of the CGE model is to find 'How the economy response and interact to the economy changes upon applying new policy?' (Ivus & Strong, 2007). The simulation results will provide clear answers to the changes in Korea's and GCC countries' economy.

Table 3-1 Top 20 oil-exporting countries in 2016

No.	Factor code	Included in the GTAP dataset	Oil production 2016 (barrel/day)	OPEC and GCC members
1	Russia	Yes	10,551,497	-
2	Saudi Arabia	Yes	10,460,710	(OPEC and GCC)
3	United States	Yes	8,875,817	-
4	Iraq	Unavailable in GTAP	4,451,516	(OPEC)
5	Iran	Yes	3,990,956	-
6	China	Yes	3,980,650	-
7	Canada	Yes	3,662,694	-
8	UAE	Yes	3,106,077	(OPEC and GCC)
9	Kuwait	Yes	2,923,825	(OPEC and GCC)
10	Brazil	Yes	2,515,459	-
11	Venezuela	Yes	2,276,967	(OPEC)
12	Mexico	Yes	2,186,877	-
13	Nigeria	Yes	1,999,885	(OPEC)
14	Angola	Unavailable in GTAP	1,769,615	(OPEC)
15	Norway	Yes	1,647,975	-
16	Kazakhstan	Yes	1,595,199	-
17	Qatar	Yes	1,522,902	(OPEC and GCC)
18	Algeria	Unavailable in GTAP	1,348,361	(OPEC)
19	Oman	Yes	1,006,841	(GCC)
20	United Kingdom	Yes	939,760	EU28

Source: US Energy Information Administration (EIA), International Energy Statistics.

Table 3-2 Korea's exports to the GCC countries by product in percentage

Product	Kuwait	Saudi Arabia	Bahrain	Qatar	UAE	Oman
Agriculture	0.02	0.01	0.03	0.03	0.01	0.01
OIL	0.00	0.00	0.00	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00	0.00	0.00
OthMining	0.00	0.00	0.02	0.01	0.01	0.00
PrcFood	0.34	0.19	0.54	0.24	2.49	0.31
TextWapp	2.29	4.01	3.94	1.45	6.96	0.64
PetroCoalPrd	0.03	0.98	0.08	0.05	0.11	0.02
OthChem	4.05	7.95	12.73	5.37	9.14	10.36
MetalPrd	12.22	17.36	7.48	17.40	19.12	13.45
Automobiles	18.86	21.48	43.36	26.55	17.10	42.40
OthTrnsEq	33.71	0.27	0.07	0.00	0.58	0.01
Electronics	3.08	4.15	3.48	3.34	12.39	2.64
Machinery	14.89	24.61	21.13	21.95	26.61	23.16
OthMnf	1.50	0.52	0.46	0.68	1.49	0.57
Utilities	0.01	0.01	0.01	0.02	0.00	0.00
Construction	0.41	10.05	0.02	0.77	0.13	0.01
Trade	0.63	0.38	0.81	2.40	0.42	1.12
Transport	2.22	0.66	2.55	5.08	0.88	0.67
Communic	0.17	0.15	0.17	0.91	0.16	0.07
Financial	0.37	0.91	0.86	3.14	0.55	0.29
OthServ	5.21	6.33	2.27	10.62	1.85	4.28
Total %	100	100	100	100	100	100
Total exports $ million	1,566	8,674	199	612	7,214	952

Source: Aguiar, Narayanan and McDougall (2016)

Table 3-3 The GCC countries' exports to Korea by products in percentage

Product	Kuwait	Saudi Arabia	Bahrain	Qatar	UAE	Oman
Agriculture	0.00	0.00	0.00	0.00	0.00	0.00
OIL	83.87	87.43	0.00	33.93	88.09	49.95
GAS	0.00	0.00	0.00	39.64	0.12	40.62
Other Mining	0.00	0.00	0.00	0.00	0.00	0.25
Processed Food	0.00	0.13	0.78	0.00	0.02	0.12
TextWapp	0.00	0.01	0.09	0.00	0.03	0.00
PetroCoalPrd	13.00	7.54	70.29	21.04	8.25	1.37
OthChem	2.05	3.38	1.44	2.88	0.06	2.51
MetalPrd	0.22	0.21	20.07	1.05	1.25	4.03
Automobiles	0.00	0.01	0.02	0.02	0.01	0.02
OthTrnsEq	0.00	0.04	0.00	0.00	0.00	0.00
Electronics	0.00	0.01	0.01	0.01	0.04	0.00
Machinery	0.06	0.01	0.02	0.02	0.55	0.02
OthMnf	0.02	0.04	0.05	0.01	0.07	0.01
Utilities	0.00	0.01	0.03	0.01	0.01	0.01
Construction	0.00	0.09	0.66	0.05	0.06	0.01
Trade	0.01	0.27	0.41	0.11	0.14	0.25
Transport	0.12	0.28	2.63	0.40	0.46	0.36
Communic	0.41	0.02	0.70	0.06	0.06	0.04
Financial	0.02	0.07	1.20	0.20	0.21	0.03
OthServ	0.23	0.46	1.61	0.57	0.60	0.41
Total %	100	100	100	100	100	100
Total exports $ million	15,566	32,246	893	10046	18798	4150

Source: Aguiar, Narayanan and McDougall (2016)

3.2 Literature Review

In the last two decades, globalization was the main characteristic that drives the global economy (Kolodko, 2006). By signing FTAs, the barriers that used to complicate the global trades were banished. Moreover, countries with products to export were racing to sign as many FTAs with their trading partners. Therefore, doing empirical researches is a must to reach the most benefits from signing the FTAs. In this section, some selected articles that used the CGE model will be presented.

Kikuchi, Yanagida, and Vo (2017) made a study about the effects of the four mega FTAs (EU-Vietnam FTA, the Trans-Pacific Partnership, the Regional Comprehensive Economic Partnership and the Asia-Pacific FTA) on Vietnam using the static CGE model. The study measures the effects of capital-labor supply changes, accumulation, and the productivity growth that are resulted from the trade liberalization. Their results showed that the EU-Vietnam FTA affect its GDP positively by 8.1%, the Trans-Pacific Partnership affect its GDP positively by 13.2%, the Trans-Pacific Partnership without the U.S. affect its GDP positively by 6.5%, the Regional Comprehensive Economic Partnership affect its GDP positively by 9.2% and the Asia-Pacific FTA has the most considerable effect on its GDP by 27.1%.

A study by Mold and Mukwaya (2017) is made to evaluate the economic effect of the potential Tripartite Free Trade Area on industrial production, consumption, and trade on the 26 African countries. The authors used the GTAP to simulate the potential effect of the FTA. Their results showed that the intra-trade would increase by 29% due to the elimination of the tariff barrier between the members. Moreover, their results show an aggregate welfare increase by USD 2.4 billion for the 26 members.

Qi and Zhang After (2017) applied the GTAP to measure the economic impact of the China-Australia FTA. Their study focused on the FTA's effects on the rest of the world and New Zealand besides the two parties. Their results show that China and Australia benefit significantly in exports, GDP, factor prices and economic welfare from the full or partial implementation of the FTA. However, the rest of the world and New Zealand would suffer from adverse effects. Also, although the FTA would benefit both parties, China would benefit more than Australia. As consequence of the FTA, Australia would lose jobs that would transfer to China.

Kompas, van Ha, Nguyen and Long (2017) argue that the CGE model is too large and difficult to solve. Therefore, they built an inter-portal GTAP version that has a significant dimension and can be simply focused on any subset of GTAP regions without using different approaches. The authors simulated FTA scenario for Vietnam focusing on the Trans-Pacific Partnership (TTP). Their simulations results showed that Vietnam has a considerable gain from the TTP within the first ten years despite the assumption of the gradual linear of the barriers in the trade.

A study by Siddig, Grethe and Abdelwahab (2016) to assess abolishing the preferential Egyptian exports of the natural gas to Israel that happened in 2012 through a GTAP simulation. Their results showed that the Egyptian economy has a positive effect as a result of abolishing the treaty. The positive effect on the Egyptian economy is originated from the difference between the world price of the gas and the preferential price to Israel. In addition, the abolishment of the treaty resulted in a higher supply to the Egyptian domestic market and the other international markets. Moreover, the gas production may fall. However, its higher price covers the losses and adds benefits. In addition, Egypt's GDP and welfare increase by 1.3% and 1%, respectively.

A study by Megiato, Massuquettia and de Azevedo (2016) is made to assess the integration between the EU and Brazil through an FTA agreement using the GTAP. Their study aims to identify the sectors that would benefit from the economic integration according to their technological intensity. Their results showed that Brazil would benefit in term of welfare and GDP. However, it would lead to decrease in Brazil's production and exports, and an increase in its imports from the EU, as well as its comparative advantage. Also, Brazil would witness an increase in its GDP by 0.56%.

Britz and van der Mensbrugghe (2016) discuss avoiding the bias in the large-scale CGE models by decreasing the pre-model aggregations. They argue that this improvement approach removes the small transactions. They conclude their study by emphasizing that the pre-model aggregations should be avoided as much as possible. Moreover, their improvement approach allows the CGE analysis to have reasonable solution times even with extremely disaggregated datasets.

Avetisyan, Heatwole, Rose and Roberts (2015) analyze the macroeconomic effect reduction of the waiting time at the U.S. land freight border crossings using the CGE model by adding one customs officer to the twelve mainland freight border crossings of the US. Their findings suggest that the US's GDP would witness increase by USD 350 thousand and the creation of 3.58 additional jobs. Besides the US, Canada would witness an increase in its GDP as well, while Mexico would witness a decrease in its GDP.

Meng (2015) took another approach regarding applying the GTAP. The global economy consists of many currencies, which is difficult to replicate in the GTAP model. Therefore the model converts the values in USD to avoid this problem. This approach does not consider the importance of the exchange rate in the international trade. The author revises the GTAP model by adding the exchange rates to the regions to adopt a multi-currency framework. The exchange rates are presented in the model by the Chinese Yuan. The simulation results show that using this method leads to consistent results with the trades and the macroeconomic theories that explain the economic structure of China's international trade.

Engelbert, Bektasoglu, and Brockmeier (2014) made a study to assess the Turkish foreign policy toward joining the EU or the GAFTA. The authors focused on the elimination of the tariffs and the NTBs simultaneously in their study using the GTAP database by accounting 24 sectors. However, they focus on the food and agriculture sectors because those sectors are the most protected sectors. Their simulation results show that Turkey would gain from joining the EU explicitly, on the other hand, Turkey's gains from joining the GAFTA is more limited. Moreover, their results show that Turkey's welfare's gains are higher from the removal of the NTBs than the elimination of tariffs on its imports.

Narayanan and Khorana (2014) examine the tariff escalation that is adopted in the developing countries, which have low global exports shares for the coffee, and high exports shares for the cotton textiles. This controversy raises the question of the effect of the tariff escalation on the competitiveness. The authors' study seeks the effect of the tariff escalation on the exports of coffee and cotton textiles. Therefore, they eliminate those two sectors to examine economy-wide trade and welfare effects. Their results show that the elimination of the tariff escalation leads to mixed effects on exports, depending on the economic structure of the country. Moreover, the shock leads to a potential global increase of more than USD 0.7 billion, mostly from the cotton sector.

Mukhopadhyay, Thomassin, and Chakraborty (2012) examine the effect of the trade reforms for the Latin America and the Caribbean (LAC) with the EU and India in 2020 using the CGE model. Their empirical results show that the LAC-EU tariff reduction is beneficial for both parties in the short term. The LAC-India tariff reduction is beneficial for both parties in the long term. The increases in the exports cover the losses in the tariff cuts and cause the trade creation and the trade diversion effects.

Yu, Cheng, and Yang (2010) assess the potential effect of the potential Sino-Australia FTA effects on the local Chinese dairy industry using the GTAP. The reason for making this study is that the local dairy industry had a substantial impact after establishing an FTA with New Zealand. The simulation results show that China and Australia would adjust their production structure according to their comparative advantage. Also, the FTA would increase China’s dairy exports by USD 0.29 million and imports by USD 16.83 million from Australia. Moreover, the FTA would affect other countries’ dairy industry negatively, especially in New Zealand because it has an economic structure similar to Australia.

Ariyasajjakorn, Gander, Ratanakomut, and Reynold (2009) made a study to assess the effect of the FTA on the income distribution within ASEAN, and with ASEAN’s trading partners. The study is applied to 57 sectors and 87 countries using the GTAP database. The results show that the less developed countries in ASEAN acquire fewer benefits compared to the other higher economy countries because the trade liberalization tends to raise the capital-intensive outputs more than the labor-intensive output. These effects tend to expand the income gap between the low-income and high-income households within ASEAN.

A conference paper made by Anderson and Uprasen (2008), to measure the impact of the fifth integration of the EU on the third world countries, in particular, ASEAN. The enlargement was happened, by joining ten countries to the EU-15. The study focuses on the macroeconomics, regional structure, and welfare. Moreover, the study covered 11 regions and 35 sectors using the GTAP model by applying three scenarios with the elimination of the tariffs and the NTBs. The results of their study showed that the integration between EU-15 and the new ten members leads to marginal negative effects on ASEAN. However, by breaking down the industries, ASEAN countries expected to gain in some sectors like in leather, business services, clothing, chemicals, transport equipment, air transport, textile, and gains.

Jin, Koo, and Sul (2006) evaluate the economic effect of an FTA between Japan, Korea, and China on the world economy focusing on the trade creation and trade diversion effects. The results show that there is a definite trade diversion between the FTA members and the ROW. This effect is evident between high manufacturing countries, especially China and the USA. The results also show that there is trade creation that increases in the intra-industry trade between the FTA members, except for the agriculture and service/utility sectors. The FTA also has a negative impact on the non-members.

Lee and van der Mensbrugghe (2004) assess the effect of the EU enlargement on the East Asian countries. The results of their study show that the EU enlargement has a limited effect on the East Asian economies on the macroeconomic levels. Moreover, there is a trade diversion from the East Asian countries, and however maybe there are chances of market increase in some sectors that have a comparative advantage. Moreover, the EU enlargement has a small positive effect on East Asian countries with the EU and globally. The enlargement would threat the processed food, textiles, apparel and transport equipment sectors would affect mainly low-income ASEAN countries and China.

3.3 Model and Data

3.3.1 Model

Reaching an FTA agreement requires a complicated trade analysis due to the complexity of the international trade relations between countries. In order to see through compilations and analyze it, the Global Trade Analysis Project (GTAP) program is the supporting program that is used in this study to apply the static CGE model. The GTAP was established in 1992 by a group of researchers and policymakers to apply a quantitative analysis of the international trade policies.

The GTAP model database is a multi-region open economy database that is used for analyzing the international trade agreements. In addition, the GTAP is a standard CGE model that can measure the changes in the in the economic behavior of the governments and the private households around the world according to the sectors. Therefore, it includes software and data for multi-region general equilibrium analysis. The GTAP 9 database includes 57 sectors and 140 regions. The model can detect the effect of the trade policy changes in the tariffs and NTBs on the welfare, employment, trade and other effects.

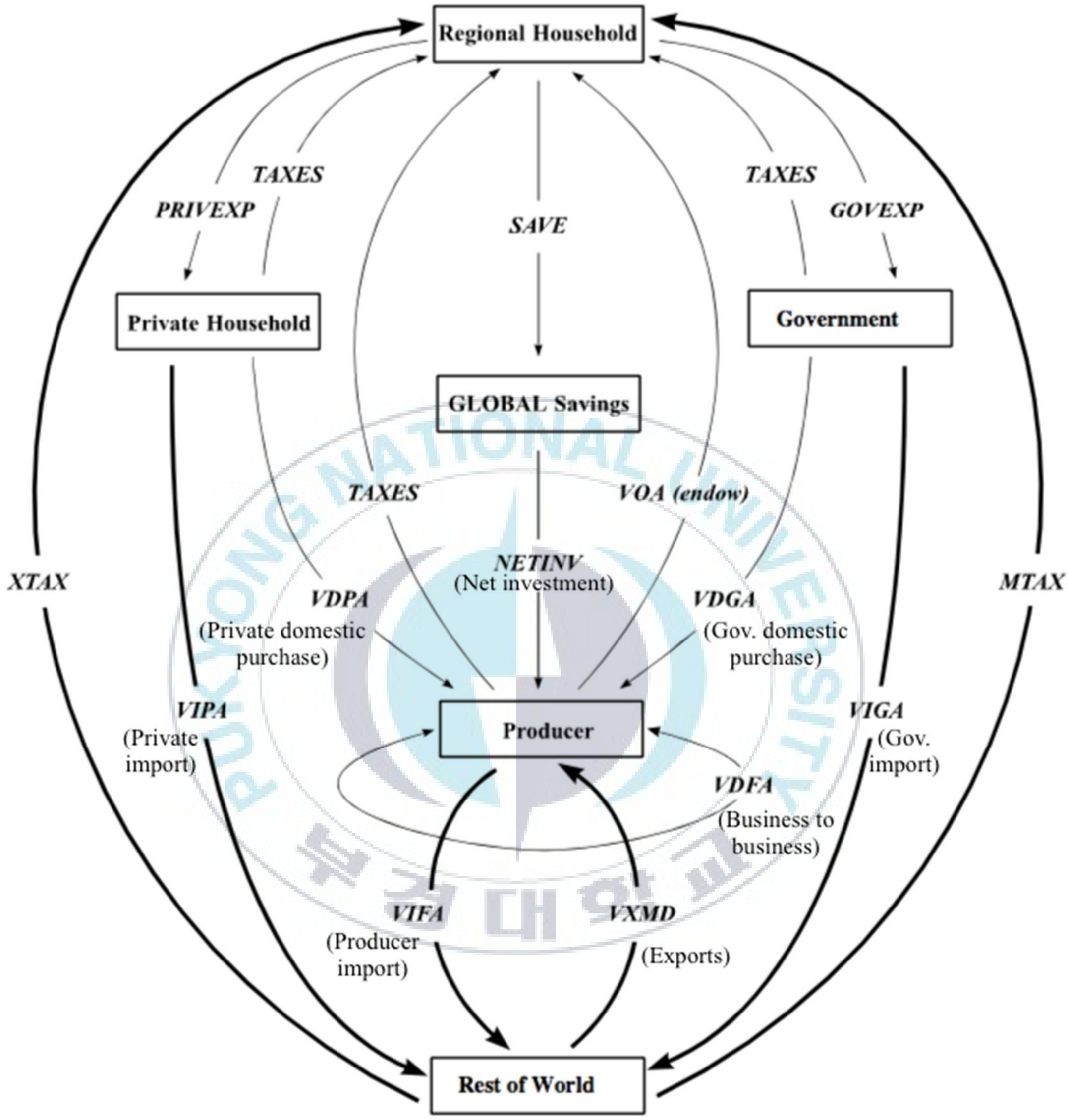
The model includes the three production factors: the land (which is used for agriculture), labor (which include skilled labor and unskilled labor) and capital. The capital and the intermediate inputs can move between the regions, while the land and the labor cannot. The standard GTAP model has three assumptions: the first assumption is that there is a perfect competition where the constant return to the scale is assumed. Second, there is no perfect substitution in the services and the goods between the exporting economies and the importing economies, and the imported goods are sorted by their origins according to Armington's assumption. The third assumption is that there is full employment and the total capital is fixed.

Figure 16 shows the structure of the multi-region open economy GTAP model. In the model, the regional household collects all the taxes and income in the economy. According to Cobb-Douglas utility function, the income is distributed in three forms of the final demand: the private household expenditure (PRIEXP) that flows toward the private household, the government expenditure (GOVEXP) that flows toward the government, and the savings (SAVE) that flows toward the global savings. Moreover, the regional household collects the regional income that consists of the Value of Output at Agents Prices (VOA) from the producers as endowment commodities (Brockmeier, 1996).

In addition, the components of the final demand are consisted of the government's expenditure, investments, and the private household expenditure. First, the government's expenditure is consisted by: the government's purchases as the Value of Domestic Government Purchases at Agent's Price (VDGA) that flows toward the producers, and the government's purchases as Value of Imports by Government at Agent's Price (VIGA) that flows toward the rest of the world. Second, the private household's purchases are consisted of: the Value of Domestic Purchases by the Private Household at Agents' Price (VDPA) that flows toward the producers, and the Value of Imports by the Private Household at Agents' Price (VIPA). Third, the savings are exhausted by the investments (NETINV) that flow from the global savings toward the producers, which is exhausted under of the assumption of zero profit, the producers purchase from other producers that are represented by the Value of Domestic Purchases of the Intermediate Inputs by Firms at Agents' price (VDFA) and the primary factors of production VOA. Also, the producers' purchase of imported goods (VIFA) from the rest of the world, and export goods (VXMD) to the rest of the world as well (Brockmeier, 1996).

The government, private household and the producers pay taxes (TAXES) the regional household. In addition, the regional household collects taxes from the rest of the world by the imports taxes (MTAX) and the exports taxes (XTAX). Therefore, the regional household income consists of the local taxes, the VOA, the imports taxes and the exports taxes. Additionally, the subsidies are calculated as negative taxes in the model (Brockmeier, 1996).

Figure 16 Is the structure of the GTAP model



Source: M. Brockmeier (2001)
Note: The arrows show the money flows

The neoclassical restrictions on the behavior of the individual firms and the households do not always obtain a full general equilibrium closure. Because many economists are used on seeing the equilibrium in quantities, rather than values, it is customary to demonstrate the accounting relations in the form of the customary general equilibrium relationships (Hertel and Tsigas, 1997). Equation 3.1 shows the market clearing condition for the tradable commodities.

$$VOM(i,r) = VDM(i,r) + VST(i,r) + \sum_{s} VXMD(i,r,s) \tag{3.1}$$

where *VOM(i,r)* represents the output of commodity *i* at market price in region *r*, *VDM(i,r)* represents the domestic sales of commodity *i* at market price in region *r*, *VST(i,r)* represents the exports of commodity *i* for the transportation value at market price from region *r, VXMD(i,r,s)* represents the exports of commodity *i* for the value at market prices from region *r* to region *s*. This equation could be adjusted regarding the same quantities and a common domestic market price *(PM)* for *i* in region *r* (Equation 3.2):

$$PM(i,r) \cdot QO(i,r) = PM(i,r) \cdot [QDS(i,r) + QST(i,r) + \sum_{s} QXS(i,r,s)] \tag{3.2}$$

where $PM(i,r)$ is the market price for commodity *i* in region *r*, QO(i,r) is the output quantities of commodity *i* in region *r*, $QDS(i,r)$ is the domestic sales of commodity *i* in region *r*, $QST(i,r)$ is the exports quantities of commodity *i* for transportations from region *r*, $QXS(i,r,s)$ is the exports quantities of commodity *i* from region *r* to region *s*. By dividing Equation 3.2 by $PM(i,r)$ the clearing condition of the tradable commodity market form in quantities is acquired (Equation 3.3):

$$QO(i,r) = QDS(i,r) + QST(i,r) + \sum_{s} QXS(i,r,s)$$
(3.3)

in the same way, this method can be applied to any market clearing condition in quantities and convert it to values by multiplying by the common price. This simplifies the model's calibration problem because only the value terms are required in the GTAP database (Hertil and Tsigas, 1997).

To acquire the form of the accounting equation (market clearing equations) and linearize it, the equations must be in a combination of weighted price and quantity changes. For example, the will be (Hertil and Tsigas, 1997):

$$QO(i,r) \cdot qo(i,r) = QDS(i,r) \cdot qds(i,r) + QST(i,r) \cdot qst(i,r) + \sum_{s} QXS(i,r,s) \cdot qxs(i,r,s)$$
(3.4)

where the lowercase variables are the percentage change. In addition, to obtain the variables in value terms both side of the equation are multiplied by the common price *PM(i,r)* then the equation would be as the following (for the tradable commodities):

$$VOM(i,r) \cdot qo(i,r) = VDM(i,r) \cdot qds(i,r) + VST(i,r) \cdot qst(i,r) + \sum_{s} VXMD(i,r,s)\, qxs(i,r,s)$$
(3.5)

where *VOM(i,r)* represents the output of commodity *i* at market price in region *r*, $qo(i,r)$ is the percentage change in the output quantities of commodity *i* in region *r, VDM(i,r)* represents the domestic sales of commodity *i* at market price in region

r, $qds(i,r)$ is the percentage change in the domestic sales of commodity i in region r, *VST(i,r)* represents the exports of commodity i for the transportation value at market price from region r, $qst(i,r)$ is the percentage change in exports quantities of commodity i for transportations from region r, *VXMD(i,r,s)* represents the total exports of commodity i for the value at market prices from region r to region s, $qxs(i,r,s)$ is the percentage change in the exports quantities of commodity i from region r to region s.

The next two equations (3.6) and (3.7) enforce the equilibrium in the domestic market for the tradable commodities, whether it is imported from region r (Equation 3.6), or produced domestically (Equation 3.7):

$$\begin{aligned} VIM(i,r) \cdot qim(i,r) \\ &= \sum\nolimits_j VIFM(i,j,r) \cdot qfm(i,j,r) + VIPM(i,r) \cdot qpm(i,r) \\ &+ VIGM(i,r) \cdot qgm(i,r) \end{aligned} \tag{3.6}$$

where $VIM(i,r)$ is the value of imports of commodity i to region s at market price, $qim(i,r)$ is the percentage change of imports of commodity i in region r, $VIFM(i,j,r)$ is the total value of imported commodity i by firms from region j to region r at market price, $qfm(i,j,r)$ is the percentage change of imports by firms of commodity i by firms from region j to region r at market price, $VIPM(i,r)$ is the value of the imports by private households at market prices, and $qpm(i,r)$ is percentage change of the imports by private households at market prices. $VIGM(i,r)$ is the value of imports by the government at market prices, and $qgm(i,r)$ is its percentage change.

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

(3.7)

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

The next equation refers to the endowment commodities' market clearing for the non-tradable commodities. Equation (3.8) shows the mobile endowment presented in the common market price. In addition, a slack variable is added to allow the selectivity to exclude the market clearing condition and repair the rental rates in the separate endowment commodities:

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

(3.8)

Figure 17 represents the production tree represented by the structure of the producer's behavior. The inverted tree is presented mainly by the producer's possession of the technologies. The intermediate input demand and the factor demand to the total output *qo(j,s)* are driven by the Leontief production function. The total output's level is irrelevant, because of the assumption of the constant return to the scale (Hertel and Tsigas, 1997). Leontief production function's equation is the following:

$$q = Min\left(\frac{z_1}{a}, \frac{z_2}{b}\right) \tag{3.9}$$

where q is the quantity produced outputs, $z_1$is the quantity of input 1 and z_2 is the quantity of input 2, *a* and *b* are the technological determined constant. In addition, the elasticity of substitution is zero in Leontief production function.

The factors of production (value-added) are land, labor and capital (Figure 17). Their quantities are presented in the percentage change in form *qfe(i,j,s)* and their demand is presented by the Constant Elasticity of Substitution (CES) function. Moreover, the producers purchase intermediate inputs that are produced domestically *qfd(i,j,s)* and internationally (imports) *qfm(i,j,s)*. The imported intermediate inputs are sourced by exporters *qxs(i,j,s)* (Hertel and Tsigas, 1997). The value-added nest is presented in the CES function in the following equations:

$$QVA_p = \left(\sum_e (\delta_{e,p} \cdot QFE_{e,p})^{\frac{\sigma_p - 1}{\sigma_p}}\right)^{\frac{\sigma_p - 1}{\sigma_p}} \tag{3.10}$$

where *QVA* is the value added quantities, and QFE is the quantities of primary factors of production (land, labor, and capital), derived from the demand function:

$$QFE_{e,p} = QVA_p \cdot SVA_{e,p} \cdot \left(\frac{PFE_{e,p}}{PVA_p}\right)^{-\sigma_p} \tag{3.11}$$

where the *QFE* is the quantities of primary factors of production, *QVA* is 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:

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

(3.12)

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

In addition, the intermediate input nest's equations are presented in the linear form as following in the GTAP specification:

Imported goods:

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

(3.13)

Domestic goods:

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

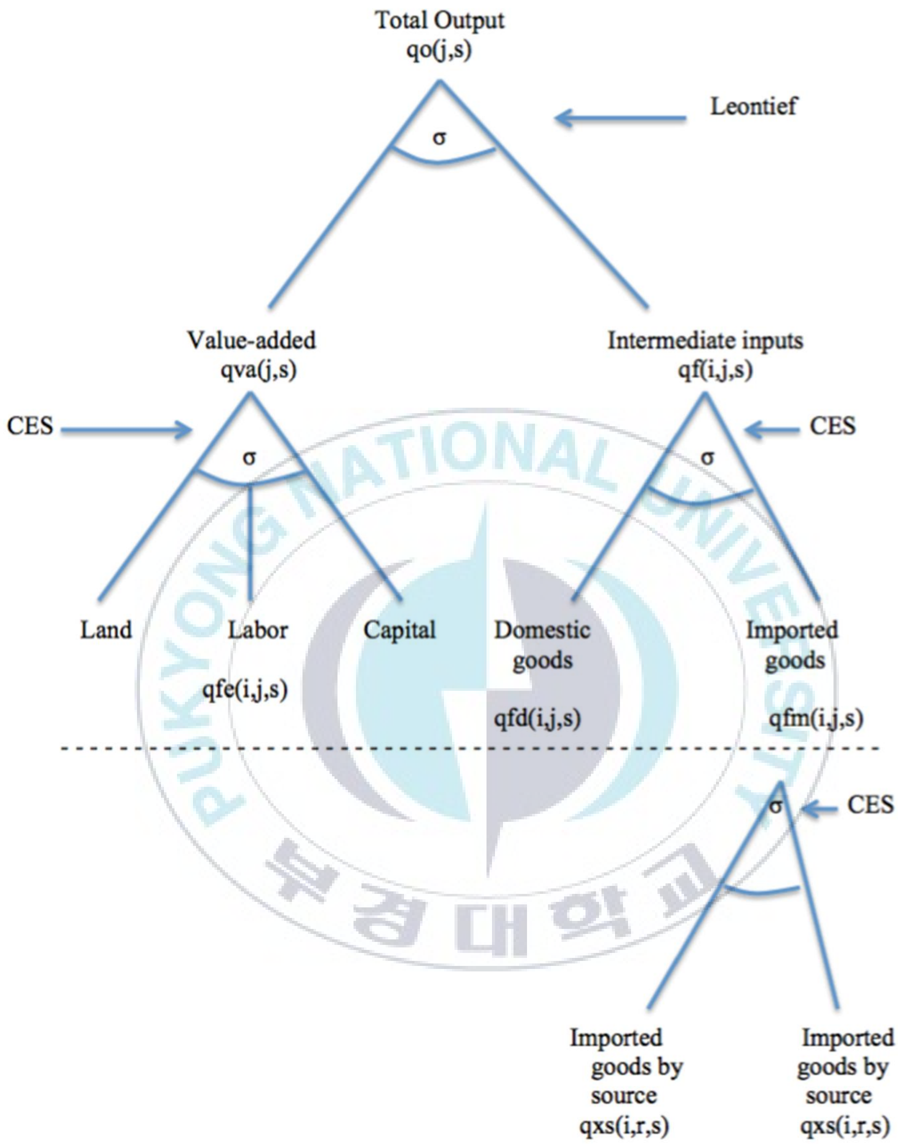
(3.14)

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

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

(3.15)

Figure 17 the structure of producer behavior in GTAP



Source: Based on Hertel and Tsigas (1997)

The consumer's behavior (Figure 18) is directed by the Stone-Geary utility function. This function is derived from the Extended Linear Expenditure System

(ELES) that was introduced by Howe (1975). He started with Stone-Geary utility function where the restrictions of the substance budget share for the saving is zero. In addition, in the GTAP model a special case of Stone-Geary utility function where all the substance shares are equal to zero (Hertel and Tsigas, 1997).

The behaviors of the consumer determine the total expenditure for the government, the private household and the savings. In addition, Cobb-Douglas function drives the government's demands for the products by the CES for the domestic and imported goods. The Constant Difference of Elasticity expenditure function (CDE) drives the private household's expenditure, where its demand is for domestic and imported goods is driven by the CES function (Hertel and Tsigas, 1997).

The CDE expenditure function for the private household is as the following equation:

$$\sum_{TRAD} B(i,r) \cdot UP(r)^{\beta(i,r)\Upsilon(i,r)} \cdot [\frac{PP(i,r)}{E\big(PP(r),UP(r)\big)}]^{\beta(i,r)} \equiv 1 \tag{3.16}$$

where *E(.)* is the minimum expenditure required to attain the level of the private household utility, *UP(r)*, and the vector of household price is *PP(r).* To normalize the individual's price, the minimum expenditure is applied. These scaled prices are powered by $\beta(i,r)$ and merged in additive form. Υ is used to replicate the chosen income elasticity of demand. $B(i,r)$ is the shift term which is a scale factor embodied in the budget share (Hertel and Tsigas). Equation (3.27) is the demand of the per capita private household for the tradable commodities:

$$qp(i,r) = \sum_{TRAD} EP(i,k,r) \cdot pp(k,r) + EY(i,r) \cdot [yp(r) - pop(r)] + pop(r) \tag{3.17}$$

the next equation is the private household's purchases of the domestic goods:

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

(3.18)

the following equation is the private household's purchases of the imported goods:

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

(3.19)

and the last equation for the private household for its imported purchases by destination, as follows:

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

(3.20)

The government expenditure is presented in Cobb-Douglas utility function in the following five equations, where its assumption of constant budget shares is applied:

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

(3.21)

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

(3.22)

where $pgove(r)$ in Equation (3.17) is the price index for all the purchases of the government, and $qg(i,r)$ in Equation (3.18) is the conditional demand for the composite tradable goods. The next equation is the government's purchases of the domestic goods:

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

(3.23)

the next equation is the government's purchases of the imported goods:

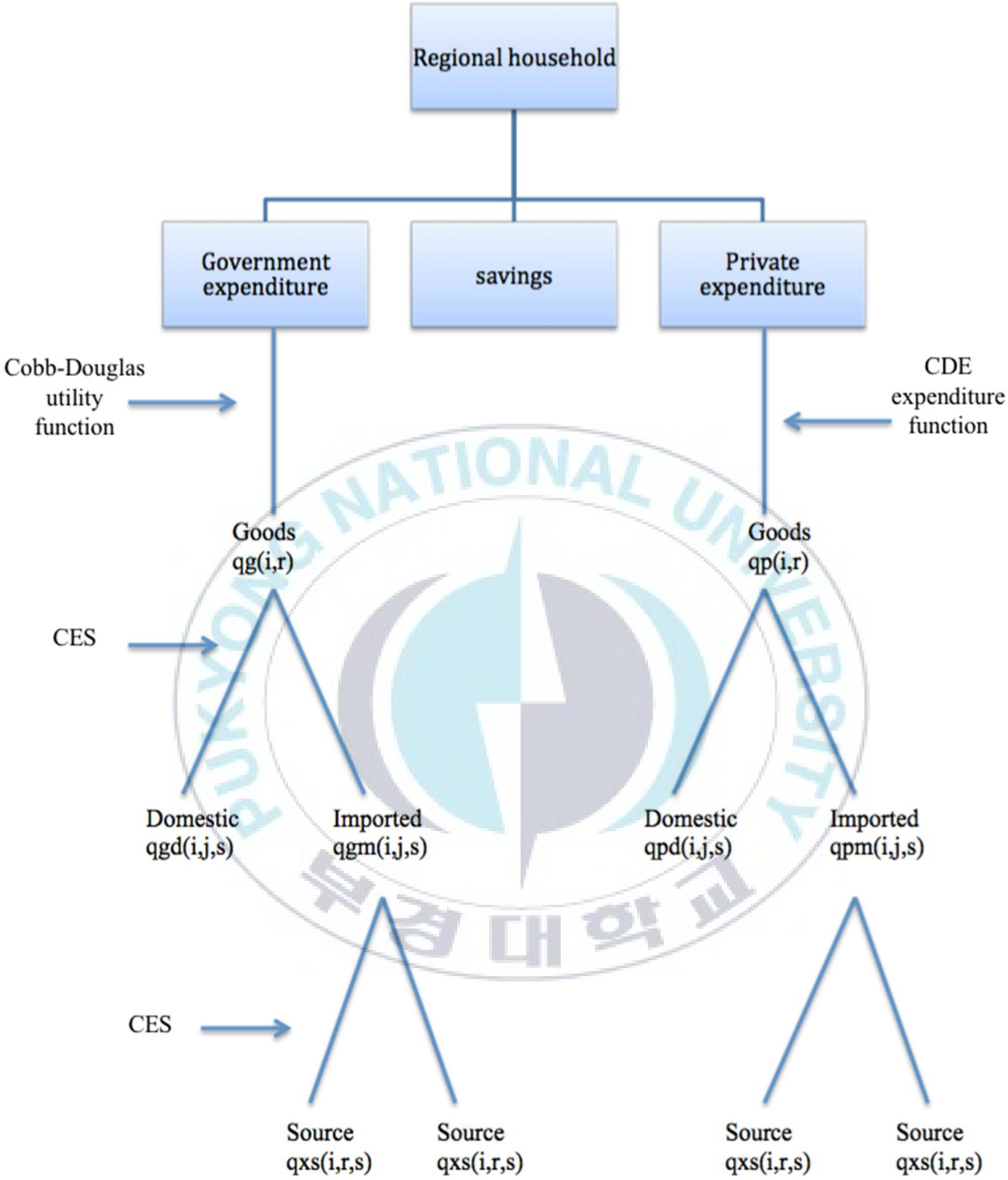
$$qgm(i,s) = qg(i,s) + \sigma_D(i) \cdot [pg(i,s) - pgm(i,s)]$$

(3.24)

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

$$qxs(i,r,s) = qim(i,s) + \sigma_M(i) \cdot [pms(i,s) - pim(i,s)] \tag{3.25}$$

Figure 18 The structure of the consumer's behavior



Source: Based on Hertel and Tsigas (1997)

3.3.2 Data

The GTAP 9 database for estimating the trade policies contains a total of 57 sectors and 140 regions. In this study, 19 regions and 21 sectors were aggregated for the purpose of the study (see Table 3-4 and Table 3-5). The included regions are chosen according to their necessity to the study, which included the GCC members, OPEC members, the top oil exporting countries, and the largest economic size countries. The 19 regions in the model (see Table 3-4) are Korea, Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, Oman, the USA, China, the EU28, Japan, the other OPEC members (Ecuador, Iran, Nigeria and Venezuela), Russia, Canada, Brazil, Mexico, Norway, Kazakhstan and the rest of the world (ROW).

The 19 sectors that were selected in the model are chosen according to their importance to the study and the analysis of the Korea-GCC FTA. The selected sectors are agriculture, oil, gas, petroleum and other mining, processed food, textiles and wearing apparels, petrochemicals and coal products, other chemicals, metal products, automobiles, other transportation equipment, electronics, machinery, other manufactures, utilities, construction, trade, transport, communication, financial, and other services (see table 3-5). Moreover, the parameters used in the study are standard in the GTAP database. In addition, the factors classification includes primary the factors of production land, labor, and capital. The labor in the standard GTAP model consists of skilled labor and unskilled labor (see Table 3-6).

Table 3-4 Regional classification (19 regions)

No.	Region code	Region description
1	KOR	Korea
2	KWT	Kuwait (GCC Member)
3	SAU	Saudi Arabia (GCC Member)
4	BHR	Bahrain (GCC Member)
5	QAT	Qatar (GCC Member)
6	ARE	United Arab Emirates (GCC Member)
7	OMN	Oman (GCC Member)
8	USA	United States of America
9	CHN	China
10	EU28	European Union 28
11	JPN	Japan
12	OthOPEC	Other OPEC members[8]: Ecuador, Iran, Nigeria and Venezuela
13	RUS	Russia
14	CAN	Canada
15	BRA	Brazil
16	MEX	Mexico
17	NOR	Norway
18	KAZ	Kazakhstan
19	ROW	Rest of the World

Source: Author's classification

[8] OPEC includes seven members that are not included in the GTAP's regions database: Algeria, Angola, Equatorial Guinea, Gabon, Iraq and Libya.

Table 3-5 Sectoral classifications (21 sectors)

No.	Code	Name	Description
1	OIL	OIL	Oil: extraction of crude petroleum, service activities incidental to oil extraction excluding surveying (part)
2	Gas	Gas	Gas: extraction of c natural gas, service activities incidental to gas extraction excluding surveying (part)
3	PetroCoalPrd	Petroleum, coal products	Petroleum & Coke: coke oven products, refined petroleum products, processing of nuclear fuel
4	OthChem	Chemical, rubber, plastic products	Chemical Rubber Products: basic chemicals, other chemical products, rubber and plastics products
5	MetalPrd	Metal products	Fabricated Metal Products: Sheet metal products, but not machinery and equipment
6	Automobile	Motor vehicles and parts	Motor vehicles and parts: cars, lorries, trailers and semi-trailers
7	Electronics	Electronic equipment	Electronic Equipment: office, accounting and computing machinery, radio, television and communication equipment and apparatus
8	Machinery	Machinery and equipment nec	Other Machinery & Equipment: electrical machinery and apparatus n.e.c., medical, precision and optical instruments, watches and clocks
9	OthMnf	Manufactures nec	Other Manufacturing: includes recycling
10	Construction	Construction	Construction: building houses factories offices and roads
11	Trade	Trade	Trade: all retail sales; wholesale trade and commission trade; hotels and restaurants; repairs of motor vehicles and personal and household goods; retail sale of automotive fuel
12	Financial	Financial services nec	Other Financial Intermediation: includes auxiliary activities but not insurance and pension funding
13	OthMining	Other Mining	Other Mining: mining of metal ores, uranium, gems. Other mining and quarrying

14	PrcFood	Processed food	Processed food
15	TextWapp	Textiles and Wearing Apparel	Textiles: textiles and man-made fibers Wearing Apparel: Clothing, dressing and dyeing of fur
16	OthTrnsEq	Other Transport Equipment	Other Transport Equipment: Manufacture of other transport equipmentc
17	Utilities	Utilities	Utilities
18	Transport	Transport	Transport: air transport, water transport and other, and transport equipment
19	Communic	Communications	Communications: post and telecommunications
20	OthServ	Other Services	Other Services (Government): public administration and defense; compulsory social security, education, health and social work, sewage and refuse disposal, sanitation and similar activities, activities of membership organizations n.e.c., extra-territorial organizations and bodies
21	Agriculture	Agriculture	Agriculture

Source: Author's classification

Table 3-6 Factors classifications (5 factors)

No.	Factor code	Factor description
1	Land	Land
2	UnSKLab	Un-Skilled Labor
3	SKLab	Skilled Labor
4	Capital	Capital
5	NatRes	Natural resources

Source: Author's classification

3.4 Scenarios

Simulating the right scenario is crucial to the CGE model to predict the estimated effects that may affect the economy. Therefore, before introducing the scenarios that are presented in the study, a review of the calculated ad valorem tariff rates between the GCC countries and Korea to the different imports sectors. Table 3-7 shows the importing tariff rates of Korea from the GCC countries. The table shows that there are differences in the tariffs according to the sector. In addition, the Table 3-8 shows the importing tariffs of the GCC countries from Korea. The table shows differences as well as similarities in tariff rates between the countries and the sectors. In general, according to the tables, the GCC countries have higher tariff rates than Korea, and Korea has higher tariffs in some sectors as well.

Table 3-7 Korea's ad valorem tariff rates on its imports from the GCC countries by sector (%)

rTMS	KWT	SAU	BHR	QAT	ARE	OMN
1 Agriculture	0.00	129.00	0.00	0.47	19.30	0.00
2 OIL	3.00	3.00	0.00	3.00	3.00	3.00
3 GAS	0.00	0.00	0.00	3.00	3.00	3.00
4 OthMining	0.00	0.11	0.00	3.00	3.80	0.30
5 PrcFood	0.00	14.50	18.30	0.00	19.30	9.97
6 TextWapp	11.20	8.52	10.30	11.50	9.14	10.60
7 PetroCoalPrd	3.24	3.26	3.32	3.22	3.25	3.33
8 OthChem	3.06	2.52	1.13	3.38	4.95	2.71
9 MetalPrd	0.10	0.30	2.33	1.39	0.93	1.02
10 Automobiles	7.91	8.53	7.97	7.96	8.44	7.58
11 OthTrnsEq	0.00	0.10	0.00	0.00	0.03	0.00
12 Electronics	1.11	1.71	1.78	1.40	2.59	2.14
13 Machinery	2.87	6.93	5.91	5.29	5.16	6.87
14 OthMnf	0.14	3.13	1.93	4.53	2.19	2.56
15 Utilities	0.00	0.00	0.00	0.00	0.00	0.00
16 Construction	0.00	0.00	0.00	0.00	0.00	0.00
17 Trade	0.00	0.00	0.00	0.00	0.00	0.00
18 Transport	0.00	0.00	0.00	0.00	0.00	0.00
19 Communic	0.00	0.00	0.00	0.00	0.00	0.00
20 Financial	0.00	0.00	0.00	0.00	0.00	0.00
21 OthServ	0.00	0.00	0.00	0.00	0.00	0.00

Source: Aguiar, Narayanan and McDougall (2016)

Table 3-8 the GCC countries' ad valorem tariff rates on its imports from Korea by sector (%)

rTMS	KWT	SAU	BHR	QAT	ARE	OMN
1 Agriculture	1.24	1.96	1.53	3.23	1.97	0.01
2 OIL	0.00	0.00	0.00	0.00	0.00	0.00
3 GAS	0.00	0.00	0.00	0.00	0.00	0.00
4 OthMining	5.00	5.00	5.00	5.00	5.00	5.00
5 PrcFood	4.80	3.86	9.01	4.54	88.10	7.28
6 TextWapp	5.00	5.00	5.00	5.00	5.00	5.00
7 PetroCoalPrd	5.00	5.00	5.00	5.00	5.00	5.00
8 OthChem	4.45	3.98	4.92	4.81	4.53	3.19
9 MetalPrd	5.00	5.00	5.00	5.00	5.00	5.00
10 Automobiles	5.00	5.00	5.00	5.00	5.00	5.00
11 OthTrnsEq	0.00	0.21	4.85	4.99	0.13	0.12
12 Electronics	0.56	0.95	0.83	0.71	1.09	0.29
13 Machinery	3.91	4.22	4.80	4.66	4.24	4.61
14 OthMnf	5.00	4.99	5.33	4.98	4.98	5.00
15 Utilities	0.00	0.00	0.00	0.00	0.00	0.00
16 Construction	0.00	0.00	0.00	0.00	0.00	0.00
17 Trade	0.00	0.00	0.00	0.00	0.00	0.00
18 Transport	0.00	0.00	0.00	0.00	0.00	0.00
19 Communic	0.00	0.00	0.00	0.00	0.00	0.00
20 Financial	0.00	0.00	0.00	0.00	0.00	0.00
21 OthServ	0.00	0.00	0.00	0.00	0.00	0.00

Source: Aguiar, Narayanan and McDougall (2016)

To simulate the effects of the Korea-GCC FTA using the GTAP model, three different scenarios were applied:

- **The first scenario:** 50 percent cut in tariffs for all the imports from the GCC countries to Korea and all the imports from Korea to the GCC countries to reach half of the trade liberalization between the two parties.
- **The second scenario:** 75 percent cut in tariffs for all the imports from the GCC countries to Korea and all the imports from Korea to the GCC countries to reach a partial trade liberalization between the two parties.
- **The third scenario:** 100 percent cut in tariffs for all the imports from the GCC countries to Korea and all the imports from Korea to the GCC countries to reach the full trade liberation between the two parties.
- **The fourth scenario:** 50 percent cut in tariffs for all the imports from the GCC countries to Korea and all the imports from Korea to the GCC countries to reach half of the trade liberalization and an increase in TFP as a result of the Korea-GCC FTA.
- **The fifth scenario:** 75 percent cut in tariffs for all the imports from the GCC countries to Korea and all the imports from Korea to the GCC countries to reach a partial trade liberalization and an increase in TFP as a result of the Korea-GCC FTA.
- **The sixth scenario:** 100 percent cut in tariffs for all the imports from the GCC countries to Korea and all the imports from Korea to the GCC countries to reach the full trade liberation and an increase in TFP as a result of the Korea-GCC FTA.

In the Scenarios 4, 5 and 6 the Total Factor of Productivity (TFP) is added to the to the shocks to seek a long-term effect of the economy for the selected countries. Therefore, it is assumed that if the Trade Openness (TO) increases by 1%, TFP increases by 0.15%. The TO is calculated by the following equations

(Hwang and Wang, 2004; Abizadeh and Pandey, 2009; Majeed and Ahmed, 2014):

TO before the shock (base data):

$$TO = \frac{Exports + Imports}{GDP}$$

(3.26)

TO' after the shock (updated data):

$$TO' = \frac{Exports' + Imports'}{GDP'}$$

(3.27)

therefore the *TO* percentage change is:

$$\frac{TO' - TO}{TO} \cdot 100$$

(3.28)

by multiplying the result by the TFP

$$aoreg = TO \cdot 0.15$$

(3.29)

In sum, the shock on the on the tariff reduction is represented in the following equation in the variable (*tms*):

$$pms(i,r,s) = tm(i,s) + tms(i,r,s) + pcif(i,r,s)$$

(3.30)

where *pms* market price of the tradable commodity, *tm* is taxes on imports (add-valorem tariffs on imports), *tms* is taxes on imports by source (add-valorem tariffs on imports by source), *pcif* is the border price or border intervention. In addition, the shock on the TFP is presented in the following two equations on the variable (*ao*), where both equations are applied to the total output nest in Figure 17:

$$qva(j,r) + ava\,(j,r) = qo(j,r) - ao(j,r)$$

(3.31)

$$qf(i,j,r) + af(i,j,r) = qo(j,r) - ao(j,r)$$

(3.32)

$$ao(j,r\,) = aosec(j) + aoreg(r) + aoall(j,r)$$

(3.33)

where aosec(j) is the output's technological changes in sector j, aoreg(r) is the output technological output changes in region (r), and aoall(j,r) is the augmenting technological changes in sector j of region r.

3.5 Simulation Results

This section will discuss the simulation results of the two scenarios of the empirical analysis. The simulations were conducted using a quantitative analysis by the GTAP model. The results will reveal the potential effect of the simulated FTAs that were discussed earlier. The results will be presented in two parts, first the macroeconomic effects, and second the microeconomic effects.

3.5.1 Macroeconomic Effects

Table 3-9 shows the FTA's effect on the selected regions regarding welfare and GDP. The simulation results show that Korea gains the most (more than the GCC countries and the rest of the regions) in the welfare, which is projected in the Equivalent Variation (EV), in the six scenarios. In addition, the simulations show that Korea gain 1246, 589 and 281 million in Scenario 3, 2 and 1, respectively, and 4945, 3056, 1926 million in Scenario 6, 5 and 4, respectively. The results show the highest gain, in the GDP, in the sixth scenario (0.37%), then the fifth scenario (0.24%), the fourth scenario (0.15%), the third scenario (0.09%), the second scenario (0.05%) and the first scenario (0.03%). In addition, the technological change (TFP) has strong effects on the welfare and the GDP that is showing in Scenario 4, 5, and 6.

The simulation results show that Kuwait would gain in the welfare in all of the scenarios. In addition, the simulations show that Kuwait would gain USD 244, 183 and 122 million in Scenario 3, 2 and 1, respectively. The results showed limited gains, in the GDP, in the first, second and the third scenarios. In scenarios, 4, 5 and 6 the gains for Kuwait in the GDP are more evident after adding the TFP shock. The simulation results showed that the highest increase in the GDP is in Scenario 6, where it was 0.08%, then Scenario 5 by 0.07% and Scenario 4 by 0.03%. Also, Kuwait would gain in the welfare the most in Scenario 6 by USD 397 million, followed by Scenario 5 by USD 307 million and Scenario 4 by USD 182 million.

The simulation results show that Saudi Arabia would gain in the welfare in all of the scenarios. In addition, the simulations show that Saudi Arabia would gain USD 602, 458 and 307 million in Scenario 3, 2 and 1, respectively. %. In addition, it would gain in the welfare the most in Scenario 6 by USD 1,092 million, then Scenario 5 by USD 829 million and Scenario 4 by USD 556 million. Moreover, the results show limited gains, in the GDP, in the first, second and the third scenarios. In scenarios, 4, 5 and 6 the gains for Saudi Arabia in the GDP are more evident after adding the TFP shock. The simulation results show that the highest increase in the GDP is in Scenario 6, where it was 0.07%, then Scenario 5 by 0.05% and Scenario 4 by 0.04%.

The simulation results show that Bahrain would gains in the welfare in all of the scenarios, except for Scenario 4. Additionally, the simulations show that Bahrain would gain in its welfare by USD 8, 6 and 4 million in Scenario 3, 2 and 1, respectively. In addition, Bahrain would gain in the welfare the most in

Scenario 6 by USD 13 million, then Scenario 5 by USD 12, however it would lose USD 23 million in Scenario 4 due to the decrease of the technological shock in that scenario. The results showed limited gains, in the GDP, in the first, second and the third scenarios. Yet, in scenarios, 4, 5 and 6 the gains for Bahrain in the GDP are more evident after adding the TFP shock. The simulation results show that the highest increase in the GDP is in Scenario 6, where it was 0.02%, and Scenario 5 by 0.02%, however in Scenario 4 the GDP decreased by 0.09%.

The simulation results show that Qatar would gain in the welfare in all of the scenarios. Also, the simulations show that Qatar would gain USD 168, 122 and 79 million in Scenario 3, 2 and 1, respectively. In addition, it would gain in the welfare the most in Scenario 6 by USD 364 million, then Scenario 5 by USD 280 million and Scenario 4 by USD 198 million. In addition, the results show limited gains, in the GDP, in the first, second and the third scenarios. In scenarios, 4, 5 and 6 the gains for Qatar in the GDP are more evident after adding the TFP shock. The simulation results show that the highest increase in the GDP is in Scenario 6, where it was 0.09%, and Scenario 5 by 0.08% and Scenario 4 by 0.06%.

The simulation results show that the UAE would gain in the welfare in all of the scenarios. Also, the simulations show that the UAE would gain 798, 651 and 408 million in Scenario 3, 2 and 1, respectively. In addition, it would gain in the welfare the most in Scenario 6 by USD 1,028 million, then Scenario 5 by USD 761 million and Scenario 4 by USD 460 million. Moreover, The results show that the UAE gain the most in the GDP out of the rest of the regions in the first three scenarios, and the second after Korea in the last three scenarios with the effect of the TFP. Its gain in the GDP is in the third scenario (0.16%), the second scenario (0.12%), and the first (0.07%). Yet, in scenarios, 4, 5 and 6 the gains for the UAE in the GDP are more evident after adding the TFP shock. The simulation results showed that the highest increase in the GDP is in Scenario 6, where it was 0.24%, and Scenario 5 by 0.16% and Scenario 4 by 0.09%.

The simulation results show that Oman would gain in the welfare in all of the scenarios. Additionally, the simulations show that Oman would gain 89, 66 and 44 million in Scenario 3, 2 and 1, respectively. Also, it would gain in the welfare the most in Scenario 6 by USD 140 million, followed by Scenario 5 by USD 104 million and Scenario 4 by USD 70 million. In addition, the results showed limited gains, in the GDP, in the first, second and the third scenarios. In scenarios, 4, 5 and 6 the gains for Oman in the GDP are more evident after adding the TFP shock. The simulation results showed that the highest increase in the GDP is in Scenario 6, where it was 0.07%, and Scenario 5 by 0.05% and Scenario 4 by 0.04%.

In summary, the results show that Scenario 6 is the best scenario in term of welfare for Korea and the GCC countries. In addition, Korea will gain the most followed by the UAE, Saudi Arabia, Kuwait, Qatar, Oman, and Bahrain, respectively. However, it is not the same case for the GDP where the first three scenarios showed a limited impact on Saudi Arabia, Bahrain, Qatar, Oman, and Kuwait. The fourth scenario is the best for Korea and the six GCC countries. Also, Korea's GDP will gain the most followed the UAE, Qatar, Kuwait, Saudi Arabia, Oman, and Bahrain, respectively in Scenario 6. On the other hand, the welfare for the other regions shows, mostly, negative effects upon applying the Korea-GCC FTA. Moreover, the other regions' GDPs are not strongly affected by the potential FTA. These results implicate that the non-members will not benefit from the free trade agreement. These negative effects support the argument that the non-members will be affected by the trade diversion effect.

Table 3-9 The effects of the Korea-GCC FTA on welfare (in $ US millions) and the GDP (% change)

Scenario	SC1		SC2		SC3		SC4		SC5		SC6	
Region	EV	GDP	EV	GDP	EV	GDP	EV	GDP	EV	GDP	EV	GDP
KOR	281	0.03	589	0.05	1,246	0.09	1,926	0.15	3,056	0.24	4,945	0.37
KWT	122	0.00	183	0.00	244	0.00	182	0.03	307	0.07	397	0.08
SAU	307	0.00	458	0.00	602	0.00	556	0.04	829	0.05	1,092	0.07
BHR	4	0.00	6	0.00	8	0.00	-23	-0.09	12	0.02	13	0.02
QAT	79	0.00	122	0.00	168	0.00	198	0.06	280	0.08	364	0.09
ARE	408	0.07	651	0.12	798	0.16	460	0.09	761	0.16	1,028	0.24
OMN	44	0.00	66	0.00	89	0.00	70	0.04	104	0.05	140	0.07
USA	-93	0.00	-143	0.00	-188	0.00	-92	0.00	-140	0.00	-186	0.00
CHN	37	0.00	47	0.00	48	0.00	1	0.00	-8	0.00	-23	0.00
EU28	-66	0.00	-116	0.00	-173	0.00	-38	0.00	-71	0.00	-108	0.00
JPN	-251	0.00	-379	0.00	-503	0.00	-234	0.00	-351	0.00	-463	0.00
OthOPEC	-57	0.00	-80	0.00	-97	0.00	-91	0.00	-134	0.00	-174	0.00
RUS	-132	0.00	-190	0.00	-248	0.00	-182	0.00	-267	0.00	-357	-0.01
CAN	8	0.00	13	0.00	18	0.00	-4	0.00	-6	0.00	-9	0.00
BRA	-24	0.00	-55	0.00	-114	0.00	-39	0.00	-77	0.00	-146	0.00
MEX	0	0.00	-1	0.00	-4	0.00	-9	0.00	-14	0.00	-23	0.00
NOR	0	0.00	1	0.00	2	0.00	-10	0.00	-14	0.00	-19	0.00
KAZ	2	0.00	4	0.00	4	0.00	-3	0.00	-5	0.00	-8	0.00
ROW	-422	0.00	-687	0.00	-1,021	0.00	-476	0.00	-763	0.00	-1,130	0.00

Source: Author's simulations

Tables 3-10, Table 3-11 and Table 3-12 show the welfare decomposition that is originated from the allocation effect, the term of trade, and the investment trade for Scenario 1, Scenario 2 and Scenario 3, respectively. In the three scenarios, Korea and the GCC countries have a positive effect in total EV. However, some countries have negative effects on the disaggregated welfare. For instance, in Scenario 3 the resource allocation effect (efficiency) has a negative effect on the welfare for Kuwait, Saudi Arabia, Bahrain and Oman, and positive effect on the welfare of Korea, Qatar, and the UAE. However, in Scenario 2 only Saudi Arabia showed negative sign on the resource allocation and the Scenario 1 all the GCC members and Korea have a positive sign.

Tables 3-13, Table 3-14 and Table 3-15 show the welfare decomposition that is originated from the technological changes along with the resources allocation effect, the term of trade, and the investment trade for Scenario 4, Scenario 5 and Scenario 6, respectively. In the three scenarios, Korea and the GCC countries have a positive effect in total EV. However, some countries have negative effects on the disaggregated welfare. For instance, in Scenario 6 the resource allocation effect (efficiency) has a negative effect on the welfare for Saudi Arabia, Bahrain and Oman, and positive effect on the welfare of Korea, Kuwait, Qatar and the UAE. However, in Scenario 5 all the FTA members showed positive sign on the resource allocation, technological changes and terms of trade, and Scenario 4 all the GCC members and Korea have a positive sign except for Bahrain, which has a negative effect the technological changes and the total welfare.

The changes in the terms of trade showed positive signs for all the GCC countries in the six scenarios. Yet, it is positive for Korea in Scenario 1 and Scenario 2, and negative in Scenario 3. The saving and investment flows show a negative effect on Korea, Kuwait, Qatar, UAE and Oman in the three scenarios, and positive effect for Saudi Arabia and Bahrain for Scenario 1, Scenario 2 and Scenario 3. The highest contribution for the welfare of Korea and the UAE is the resource allocation effects by USD 1082 million and USD 564 million, respectively in Scenario 3. On the other hand, the highest contribution for the welfare (without the TFP shock) for Kuwait, Saudi Arabia, Bahrain, Qatar and Oman is the terms of trade by USD 295, USD 578, USD 8.04, USD 221 and USD 93.9 millions, respectively, in Scenario 3 as well without any regards to the technological changes shock.

The changes in terms of trade showed positive signs for all the GCC countries and Korea in scenarios 4, 5 and 6 as well. The technological change is expected to have the most increases in Scenario 6, where the highest beneficial country by the technological changes is Korea by USD 3,003 million followed by Saudi Arabia USD 481 million, the UAE 269 million, Qatar by USD 158 million, Kuwait by USD 133 million, Oman USD 50 million and Bahrain USD 6 million, respectively.

The investment trade flows showed a negative effect on Korea, Kuwait and UAE in the three scenarios, and positive effect for Saudi Arabia, Bahrain, Qatar and Oman for Scenario 4, Scenario 5 and Scenario 6. The highest contribution for the welfare of Korea and the UAE is in the resource allocation effects by USD 1,502 and USD 567 million, respectively in Scenario 6. On the other hand, the highest contribution for the welfare for Korea, Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE and Oman is the terms of trade by USD 505, USD 265, USD 505, USD 7, USD 203, USD 231 and USD 84 millions, respectively, in Scenario 6 as well.

Table 3-10 The welfare decomposition effect of the Korea-GCC FTA for Scenario 1 (in $ US millions)

Region	Allocation effect	Endow. effect	Tech. change	Pop. growth	Terms of trade	Investment-trade	Preference change	Total
KOR	330	0	0	0	-25	-23	0	281
KWT	2	0	0	0	147	-27	0	122
SAU	5	0	0	0	288	13	0	307
BHR	0	0	0	0	4	0	0	4
QAT	2	0	0	0	105	-28	0	79
ARE	251	0	0	0	161	-4	0	408
OMN	1	0	0	0	46	-3	0	44
USA	-11	0	0	0	-61	-21	0	-93
CHN	-31	0	0	0	37	31	0	37
EU28	-12	0	0	0	-59	5	0	-66
JPN	-102	0	0	0	-149	1	0	-251
OthOPEC	-11	0	0	0	-60	14	0	-57
RUS	-45	0	0	0	-109	22	0	-132
CAN	-1	0	0	0	7	2	0	8
BRA	-9	0	0	0	-17	2	0	-24
MEX	-2	0	0	0	0	2	0	0
NOR	0	0	0	0	-1	1	0	0
KAZ	0	0	0	0	2	0	0	2
ROW	-119	0	0	0	-314	11	0	-422
Total	247	0	0	0	0	0	0	247

Source: Author’s simulations

Table 3-11 The welfare decomposition effect of the Korea-GCC FTA for Scenario 2 (in USD millions)

Region	Allocation effect	Endow. effect	Tech. change	Pop. growth	Terms of trade	Invest. trade	Preference change	Total
KOR	595	0	0	0	32	-37	0	589
KWT	1	0	0	0	221	-39	0	183
SAU	-2	0	0	0	435	25	0	458
BHR	0	0	0	0	6	0	0	6
QAT	2	0	0	0	162	-42	0	122
ARE	432	0	0	0	229	-10	0	651
OMN	0	0	0	0	69	-3	0	66
USA	-18	0	0	0	-95	-30	0	-143
CHN	-53	0	0	0	52	47	0	47
EU28	-19	0	0	0	-104	7	0	-116
JPN	-155	0	0	0	-225	1	0	-379
OthOPEC	-16	0	0	0	-85	21	0	-80
RUS	-63	0	0	0	-160	33	0	-190
CAN	-1	0	0	0	10	4	0	13
BRA	-18	0	0	0	-41	3	0	-55
MEX	-3	0	0	0	-1	3	0	-1
NOR	-0	0	0	0	-0	2	0	1
KAZ	-1	0	0	0	4	1	0	4
ROW	-189	0	0	0	-513	16	0	-687
Total	492	0	0	0	-3	0	0	489

Source: Author’s simulations

Table 3-12 The welfare decomposition effect of the Korea-GCC FTA for Scenario 3 (in $ US millions)

Region	Allocation effect	Endow. effect	Tech. change	Pop. growth	Terms of trade	Investment-trade	Preference change	Total
KOR	1,082	0	0	0	221	-57	0	1,246
KWT	-0	0	0	0	295	-51	0	244
SAU	-18	0	0	0	578	41	0	601
BHR	-1	0	0	0	8	1	0	8
QAT	2	0	0	0	221	-56	0	167
ARE	564	0	0	0	259	-25	0	798
OMN	-2	0	0	0	94	-3	0	89
USA	-25	0	0	0	-127	-36	0	-188
CHN	-83	0	0	0	68	63	0	48
EU28	-23	0	0	0	-160	9	0	-173
JPN	-209	0	0	0	-297	2	0	-503
OthOPEC	-18	0	0	0	-109	30	0	-98
RUS	-79	0	0	0	-213	44	0	-248
CAN	-2	0	0	0	14	5	0	18
BRA	-34	0	0	0	-89	5	0	-117
MEX	-6	0	0	0	-2	3	0	-4
NOR	-0	0	0	0	0	2	0	2
KAZ	-1	0	0	0	4	1	0	4
ROW	-271	0	0	0	-770	21	0	-1,021
Total	877	0	0	0	-4	0	0	873

Source: Author's simulations

Table 3-13 The welfare decomposition effect of the Korea-GCC FTA for Scenario 4 (in $ US millions)

Region	Allocation effect	Endow. effect	Tech. change	Pop. growth	Terms of trade	Investment-trade	Preference change	Total
KOR	517	0	1,334	0	102	-27	0	1,925
KWT	2	0	53	0	134	-7	0	182
SAU	7	0	241	0	256	52	0	556
BHR	0	0	-24	0	3	-1	0	-23
QAT	2	0	95	0	96	5	0	198
ARE	252	0	67	0	149	-8	0	460
OMN	1	0	25	0	41	2	0	70
USA	-10	0	0	0	-65	-17	0	-92
CHN	-44	0	0	0	60	-15	0	1
EU28	5	0	0	0	-36	-6	0	-38
JPN	-101	0	0	0	-131	-1	0	-234
OthOPEC	-16	0	0	0	-88	13	0	-91
RUS	-60	0	0	0	-145	23	0	-182
CAN	-2	0	0	0	-1	-1	0	-4
BRA	-15	0	0	0	-25	0	0	-39
MEX	-4	0	0	0	-4	-1	0	-9
NOR	-1	0	0	0	-9	-1	0	-10
KAZ	-1	0	0	0	-3	1	0	-3
ROW	-131	0	0	0	-334	-11	0	-476
Total	403	0	1,790	0	-0	0	0	2,193

Source: Author’s simulations

Table 3-14 The welfare decomposition effect of the Korea-GCC FTA for Scenario 5 (in $ US millions)

Region	Allocation effect	Endow. effect	Tech. change	Pop. growth	Terms of trade	Investment-trade	Preference change	Total
KOR	875	0	2,002	0	223	-44	0	3,056
KWT	2	0	106	0	200	-0	0	307
SAU	1	0	361	0	384	83	0	829
BHR	0	0	6	0	5	1	0	12
QAT	2	0	127	0	149	2	0	280
ARE	433	0	135	0	210	-17	0	761
OMN	1	0	37	0	63	4	0	104
USA	-16	0	0	0	-100	-24	0	-140
CHN	-71	0	0	0	88	-25	0	-8
EU28	7	0	0	0	-68	-10	0	-71
JPN	-153	0	0	0	-196	-2	0	-351
OthOPEC	-23	0	0	0	-130	20	0	-134
RUS	-85	0	0	0	-216	34	0	-267
CAN	-3	0	0	0	-1	-1	0	-6
BRA	-26	0	0	0	-51	1	0	-77
MEX	-7	0	0	0	-6	-1	0	-14
NOR	-1	0	0	0	-12	-1	0	-14
KAZ	-1	0	0	0	-5	1	0	-5
ROW	-206	0	0	0	-539	-18	0	-763
Total	729	0	2,773	0	-4	0	0	3,499

Source: Author’s simulations

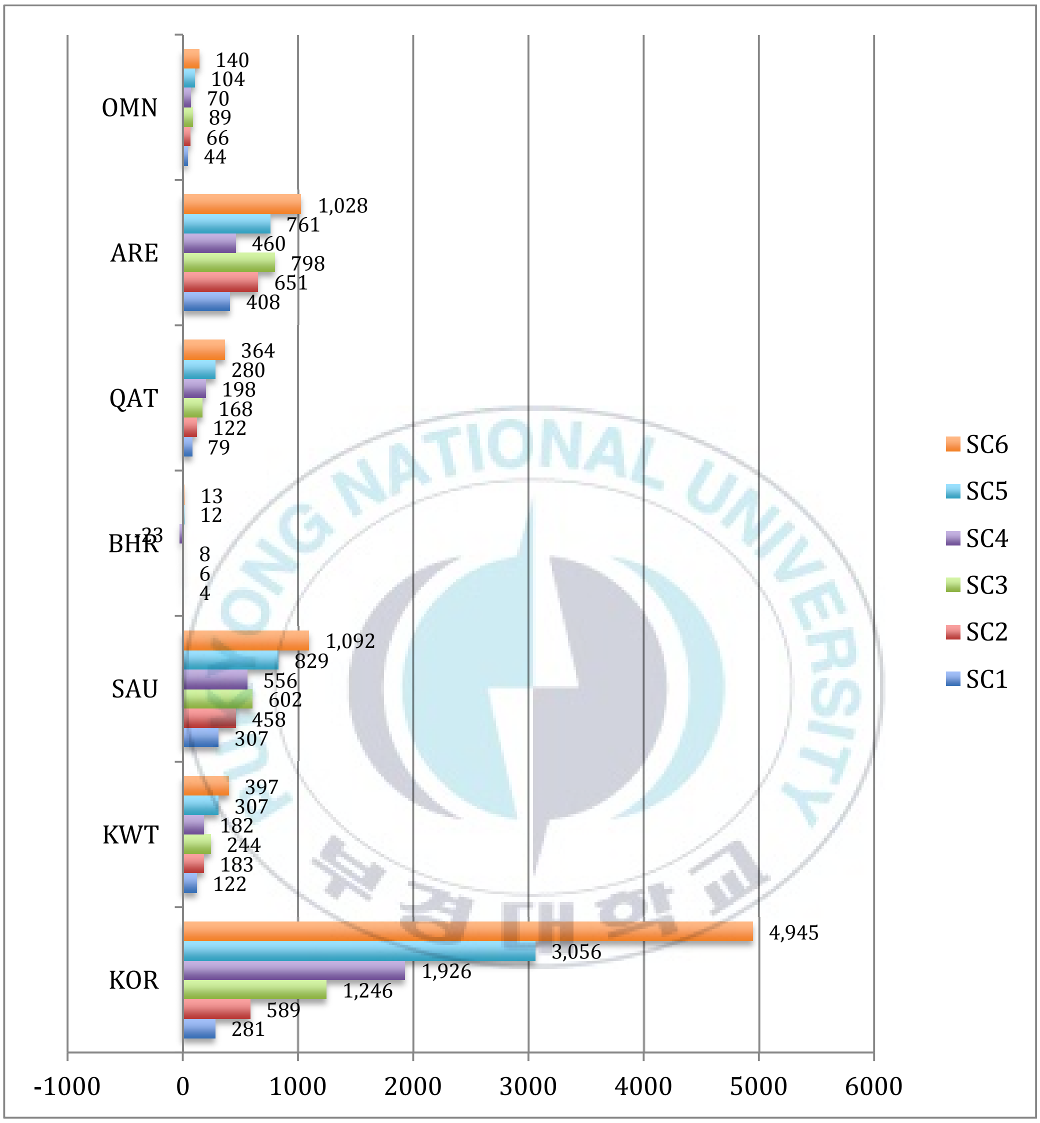
Table 3-15 The welfare decomposition effect of the Korea-GCC FTA for Scenario 6 (in $ US millions)

Region	Allocation effect	Endow. effect	Tech. change	Pop. growth	Terms of trade	Investment-trade	Preference change	Total
KOR	1,502	0	3,003	0	505	-64	0	4,945
KWT	1	0	133	0	265	-1	0	397
SAU	-14	0	481	0	505	119	0	1,091
BHR	-1	0	6	0	7	1	0	13
QAT	2	0	158	0	203	1	0	364
ARE	567	0	269	0	231	-39	0	1,028
OMN	-2	0	50	0	84	7	0	139
USA	-23	0	0	0	-135	-27	0	-186
CHN	-111	0	0	0	120	-32	0	-23
EU28	16	0	0	0	-111	-12	0	-108
JPN	-205	0	0	0	-256	-2	0	-463
OthOPEC	-29	0	0	0	-175	29	0	-175
RUS	-109	0	0	0	-294	46	0	-357
CAN	-5	0	0	0	-3	-1	0	-9
BRA	-46	0	0	0	-105	2	0	-149
MEX	-11	0	0	0	-10	-2	0	-23
NOR	-1	0	0	0	-16	-2	0	-19
KAZ	-1	0	0	0	-9	2	0	-8
ROW	-297	0	0	0	-810	-23	0	-1,130
Total	1,232	0	4,100	0	-5	0	0	5,327

Source: Author's simulations

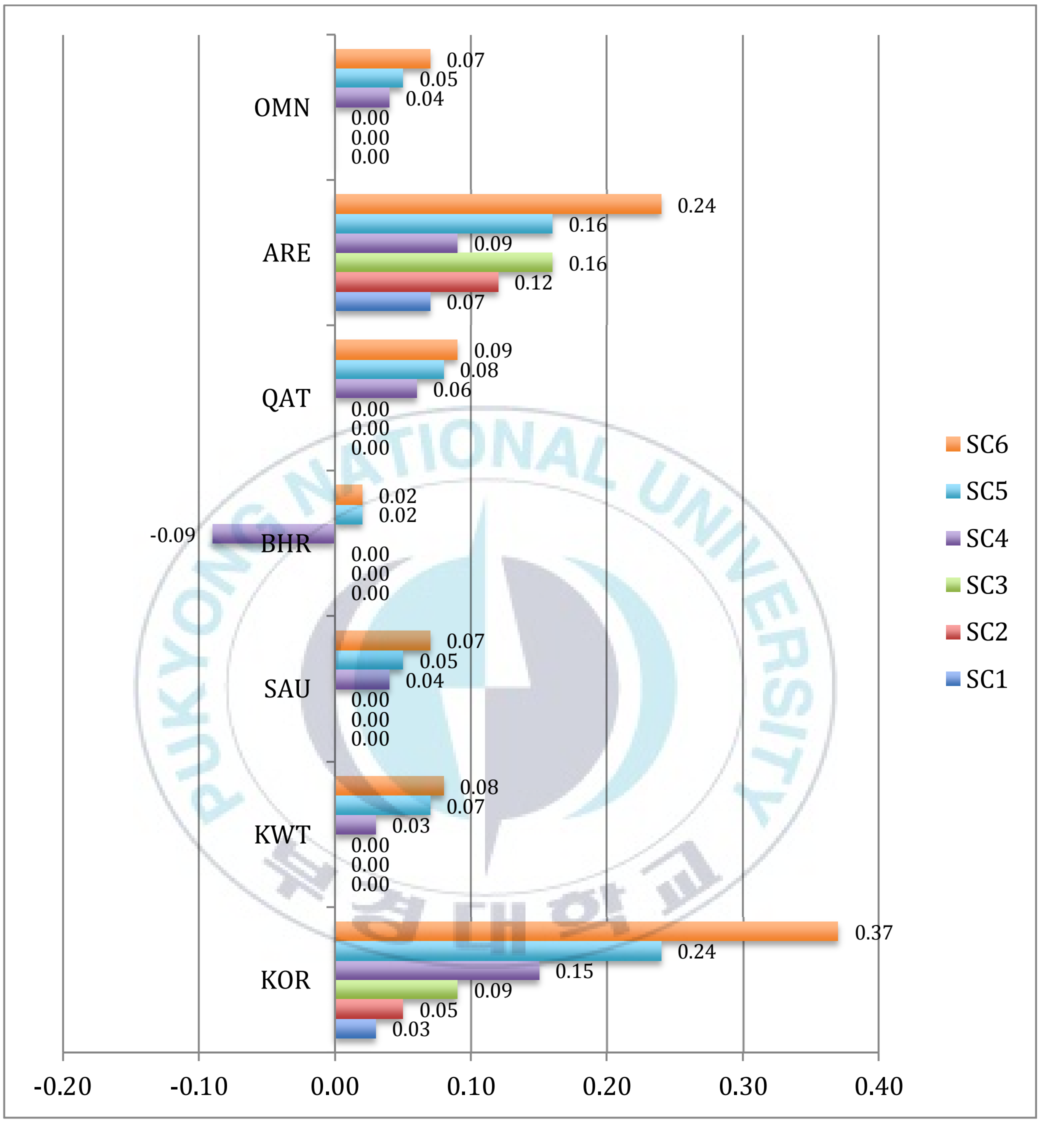
The simulated scenarios show the findings of the potential FTA between the GCC countries and Korea. The analysis of the simulated scenarios shows some excellent positive and severe adverse effects on their economies. The results of the GCC members and Korea showed a positive effect in term of welfare in the six scenarios, except for Bahrain in Scenario 4, which have a negative effect on its welfare (see Figure 19). Likewise, the GDP showed gains on those of Korea, Kuwait, Saudi Arabia, Bahrain, the UAE and Oman in the six scenarios. However, Bahrain's GDP expect to gain in the five scenarios and decrease in the fourth scenario (see Figure 20).

Figure 19 The effect of the Korea-GCC FTA on welfare in the six scenarios (in millions USD)



Source: Author's simulations

Figure 20 The effect of the Korea-GCC FTA on GDP growth in the six scenarios (% change)



Source: Author’s simulations

The Tables 3-16, 3-17, 3-18, 3-19, 3-20 and 3-21 show the effect of the FTA on the total bilateral exports (DTOT) between the selected regions in the six scenarios. According to the simulation results, the GCC countries and Korea have the highest positive effect on the bilateral exports is in Scenario 3, also, the GCC countries have a higher effect on exports to Korea than Korean exports to the GCC countries. The simulation results show that Korea's exports to the GCC countries would increase in Scenario 3 by USD 270, 2164, 61, 160, 4775 and 270 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. In Scenario 2, Korea's exports to the GCC countries would increase by USD 196, 1573, 44, 116, 2650 and 196 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. In addition, Korea's exports to the GCC countries would increase in Scenario 1 by USD 126, 1013, 28, 74, 1472 and 126 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. Korea's exports to the GCC countries would increase in Scenario 6 by USD 207, 2146, 60, 158, 4759 and 268 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. Moreover, Korea's exports to the GCC countries would increase in Scenario 5 by USD 195, 1562, 44, 115, 2638 and 195 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. Finally, Korea's exports to the GCC countries would increase in Scenario 4 by USD 125, 1006, 28, 74, 1419 and 125 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively.

On the other hand, the GCC's exports to Korea would increase in Scenario 3 by USD 1683, 4035, 97, 3278, 1992 and 798 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. In Scenario 2, the GCC's exports to Korea would increase by USD 1216, 2983, 71, 2412, 1488 and 612 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. Also, the GCC's exports to Korea would increase in Scenario 1 by

USD 838, 1970, 46, 1581, 989 and 416 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. In Scenario 6, the GCC's exports to Korea would increase by USD 1684, 4032, 96, 3280, 1996 and 707 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. In Scenario 5, the GCC's exports to Korea would increase by USD 1262, 2981, 70, 2423, 1490 and 611 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. In Scenario 4, the GCC's exports to Korea would increase by USD 838, 1970, 45, 1582, 989 and 415 million for Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE, and Oman, respectively. The simulation results show that the FTA would affect the GCC countries exports to Korea more that Korea's exports to the GCC countries in the total bilateral exports.

Table 3-16 The effect of the Korea-GCC FTA on the total exports from r to s in Scenario 1 (in USD millions)

DTOT	KOR	KWT	SAU	BHR	QAT	ARE	OMN	USA	CHN	EU28	JPN	OthOPEC	RUS	CAN	BRA	MEX	NOR	KAZ	ROW	Total
KOR	0	126	1,013	28	74	1,427	126	-308	-190	-360	34	-48	-59	-33	-16	-58	-17	-6	-309	1,426
KWT	838	0	-4	0	0	0	-1	-119	-131	-84	-68	-1	0	-1	-2	0	0	0	-437	-10
SAU	1,970	-7	0	-3	-4	-51	-3	-457	-219	-446	-37	-2	-1	-13	-18	-1	0	-1	-578	131
BHR	46	0	-12	0	0	-4	-1	-1	-2	-5	-5	0	0	0	0	0	0	0	-15	0
QAT	1,581	-9	-7	0	0	-22	-1	-39	-43	-531	-310	-1	-1	-15	-8	-19	0	0	-546	28
ARE	989	-1	-4	0	-1	0	-9	-17	-52	-29	-364	-7	-1	-1	-1	0	0	-1	-431	69
OMN	416	-2	-6	0	0	-6	0	-16	-91	-17	-161	-1	0	0	0	0	0	0	-110	5
USA	108	-11	-116	-3	-1	-99	-9	0	19	18	-3	-2	-2	22	-9	32	2	0	38	-16
CHN	58	-8	-93	-2	-1	-140	-5	8	5	-26	-10	1	-9	-1	-3	7	0	0	35	-182
EU28	107	-15	-190	-5	-3	-291	-15	36	81	149	-4	1	-16	6	-2	8	10	2	107	-36
JPN	19	-9	-60	-3	-3	-61	-28	63	132	40	0	2	5	5	3	7	1	1	108	222
OthOPEC	-817	0	0	0	0	-10	0	241	45	83	120	1	1	2	13	5	0	0	316	-1
RUS	-571	0	-3	0	0	-3	0	49	47	371	63	3	0	1	1	1	1	2	101	63
CAN	17	0	-8	0	0	-7	0	-1	-1	-3	-1	-1	0	0	-1	1	0	0	-1	-7
BRA	16	0	0	0	0	-81	0	12	9	13	3	1	1	1	0	2	0	0	36	14
MEX	3	0	-3	0	0	-3	0	10	1	-6	0	-1	0	0	0	0	0	0	4	5
NOR	-16	0	0	0	0	-2	0	4	0	9	0	0	0	1	0	0	0	0	1	-3
KAZ	0	0	0	0	0	0	0	0	-3	-22	0	0	0	0	0	0	0	0	27	2
ROW	-2,185	-3	-147	-4	-1	-371	-14	287	259	427	494	1	2	21	4	18	3	7	755	-444
Total	2,579	61	361	7	61	276	39	-246	-133	-419	-247	-53	-81	-4	-39	2	-1	5	-899	1,268

Source: Author’s simulations

Table 3-17 The effect of the Korea-GCC FTA on the total exports from r to s in Scenario 2 (in USD millions)

DTOT	KOR	KWT	SAU	BHR	QAT	ARE	OMN	USA	CHN	EU28	JPN	OthOPEC	RUS	CAN	BRA	MEX	NOR	KAZ	ROW	Total
KOR	0	196	1573	44	116	2650	196	-520	-388	-601	21	-80	-98	-54	-32	-95	-28	-10	-586	2305
KWT	1261	0	-6	0	0	0	-1	-178	-196	-126	-103	-1	-1	-1	-4	0	0	0	-656	-14
SAU	2983	-11	0	-5	-6	-92	-4	-686	-328	-668	-57	-3	-1	-19	-27	-2	-1	-1	-867	205
BHR	71	-1	-18	0	0	-9	-2	-1	-2	-7	-7	0	0	0	0	0	0	0	-23	0
QAT	2421	-13	-10	0	0	-34	-2	-60	-66	-815	-477	-2	-1	-23	-13	-29	0	0	-831	44
ARE	1488	0	0	1	-1	0	-11	-23	-77	-39	-547	1	-1	-1	-2	0	0	-1	-626	160
OMN	612	-3	-9	0	0	-12	0	-23	-137	-24	-232	-1	0	0	-1	0	0	0	-161	7
USA	205	-17	-182	-5	-1	-181	-15	0	31	20	-1	-4	-3	34	-17	51	4	1	53	-29
CHN	105	-13	-146	-3	-1	-229	-8	10	9	-52	-12	2	-14	-2	-9	12	1	0	49	-300
EU28	180	-24	-297	-8	-6	-541	-25	70	141	260	0	2	-17	11	-9	13	16	4	185	-44
JPN	31	-14	-93	-5	-4	-97	-43	95	208	57	0	2	8	7	3	11	1	1	160	327
OthOPEC	-1219	0	0	0	0	-18	0	359	66	124	180	2	1	2	19	8	0	0	473	-3
RUS	-850	0	-6	0	0	-6	0	72	70	554	94	4	0	2	1	1	2	2	149	90
CAN	31	0	-12	0	0	-14	0	-1	-2	-6	-1	-2	-1	0	-1	2	0	0	-4	-11
BRA	31	0	0	1	0	-183	0	27	22	32	7	3	2	3	0	4	1	0	75	26
MEX	5	0	-4	0	0	-5	0	17	1	-9	0	-1	0	0	0	0	0	0	5	8
NOR	-23	0	-1	0	0	-4	0	7	0	13	0	0	0	2	0	0	0	0	2	-5
KAZ	0	0	0	0	0	0	0	0	-4	-34	0	0	0	0	0	0	0	0	41	3
ROW	-3245	-4	-230	-7	-2	-765	-23	464	437	682	762	1	8	35	3	30	5	11	1183	-656
Total	4086	95	560	11	95	461	60	-372	-214	-641	-371	-77	-117	-4	-88	4	-1	7	-1382	2112

Source: Author's simulations by the GTAP

Table 3-18 The effect of the Korea-GCC FTA on the total exports from r to s in Scenario 3 (in USD millions)

DTOT	KOR	KWT	SAU	BHR	QAT	ARE	OMN	USA	CHN	EU28	JPN	OthOPEC	RUS	CAN	BRA	MEX	NOR	KAZ	ROW	Total
KOR	0	270	2,164	61	160	4,775	270	-826	-760	-942	-45	-127	-153	-84	-59	-146	-43	-16	-1,073	3,425
KWT	1,683	0	-9	-1	0	0	-2	-237	-261	-168	-138	-2	-1	-1	-5	0	0	-1	-876	-18
SAU	4,035	-16	0	-8	-9	-157	-6	-914	-436	-887	-79	-4	-1	-25	-36	-2	-1	-1	-1,155	296
BHR	97	-1	-25	0	0	-16	-3	-1	-3	-9	-9	0	0	0	0	0	0	0	-30	-1
QAT	3,278	-18	-14	-1	0	-47	-3	-80	-88	-1105	-648	-2	-2	-31	-17	-39	0	0	-1,119	61
ARE	1,992	3	16	3	3	0	-5	-21	-96	-31	-725	37	1	0	-2	0	0	-1	-763	410
OMN	798	-4	-12	0	0	-21	0	-31	-183	-31	-295	-1	0	0	-1	0	0	0	-210	8
USA	374	-24	-252	-7	-2	-310	-21	0	46	11	4	-9	-4	46	-31	72	5	1	57	-46
CHN	181	-18	-203	-4	-2	-351	-11	11	15	-99	-8	0	-20	-3	-22	18	1	0	56	-458
EU28	284	-34	-414	-12	-10	-944	-37	126	229	419	12	1	-10	18	-25	22	25	7	290	-52
JPN	42	-19	-128	-7	-6	-144	-59	124	296	67	0	3	11	9	2	15	1	1	207	413
OthOPEC	-1,616	0	0	0	0	-32	0	479	87	166	241	2	1	3	24	10	0	0	628	-6
RUS	-1,123	0	-8	0	0	-11	1	96	93	734	125	6	0	2	1	1	3	3	195	117
CAN	57	-1	-16	0	0	-25	-1	-1	-3	-10	-1	-3	-1	0	-3	3	-1	0	-8	-14
BRA	58	1	0	1	0	-370	-1	55	48	70	15	8	5	6	0	8	2	0	144	51
MEX	7	0	-6	0	0	-8	0	26	2	-13	0	-2	0	1	-1	0	0	0	7	12
NOR	-28	0	-1	0	0	-7	0	9	1	17	0	0	0	2	-1	0	0	0	2	-7
KAZ	0	0	0	0	0	0	0	0	-6	-45	1	0	0	0	0	0	0	0	54	4
ROW	-4,233	-7	-317	-10	-4	-1,460	-36	688	685	990	1,053	-5	20	54	-3	45	8	16	1,673	-843
Total	5,886	130	775	14	131	870	83	-498	-334	-868	-498	-98	-155	-3	-179	6	-1	9	-1,920	3,350

Source: Author’s simulations by the GTAP

Table 3-19 The effect of the Korea-GCC FTA on the total exports from r to s in Scenario 4 (in USD millions)

DTOT	KOR	KWT	SAU	BHR	QAT	ARE	OMN	USA	CHN	EU28	JPN	OthOPEC	RUS	CAN	BRA	MEX	NOR	KAZ	ROW	Total
KOR	0	125	1,006	28	73	1,419	125	-406	-317	-470	1	-61	-74	-41	-26	-70	-22	-8	-464	820
KWT	838	0	-4	-0	-0	-0	-1	-117	-129	-81	-67	-1	-0	-1	-2	-0	-0	-0	-427	7
SAU	1,970	-7	0	-8	-5	-52	-3	-448	-217	-440	-37	-2	-1	-12	-18	-1	-0	-1	-575	143
BHR	45	-0	-9	0	-0	-4	-1	1	-1	-3	-6	0	-0	0	0	0	0	0	-16	5
QAT	1,582	-9	-6	-0	0	-21	-1	-38	-42	-524	-305	-1	-1	-15	-8	-19	-0	-0	-535	58
ARE	989	-0	-2	-1	-1	0	-8	-17	-52	-28	-362	-7	-1	-1	-1	-0	-0	-1	-427	79
OMN	415	-2	-5	-0	-0	-6	0	-15	-90	-16	-162	-0	-0	-0	-0	-0	-0	-0	-107	11
USA	166	-9	-102	-5	-0	-97	-9	0	29	31	4	-4	-4	23	-11	37	3	0	57	110
CHN	104	-7	-86	-3	-0	-137	-5	1	8	-35	-7	-2	-15	-2	-6	8	0	-1	40	-143
EU28	177	-12	-161	-9	-2	-284	-13	40	100	159	1	-3	-33	5	-6	8	9	1	130	107
JPN	45	-9	-56	-4	-2	-60	-27	60	148	38	0	1	4	4	2	7	0	1	110	263
OthOPEC	-818	0	0	-0	0	-9	0	247	44	89	119	1	1	2	13	5	0	0	316	12
RUS	-571	-0	-2	-0	0	-3	0	53	49	385	63	4	0	1	2	1	2	2	113	98
CAN	22	-0	-6	-0	0	-7	-0	5	0	-0	-0	-1	-1	0	-1	2	-0	0	1	13
BRA	18	0	2	-3	0	-80	0	16	13	20	4	1	1	2	0	3	1	0	48	46
MEX	4	0	-2	-0	-0	-3	-0	19	1	-5	0	-1	-0	0	0	0	-0	0	5	19
NOR	-12	0	-0	-0	0	-2	0	5	1	10	0	-0	-0	1	-0	0	0	0	2	5
KAZ	-0	0	0	-0	0	-0	0	0	-3	-21	0	-0	0	0	-0	0	0	0	28	5
ROW	-2,153	-0	-130	-7	-1	-363	-12	298	291	439	496	-4	-2	21	2	19	3	6	767	-330
Total	2,822	71	434	-12	62	291	47	-295	-166	-454	-257	-80	-125	-12	-60	-0	-5	0	-934	1,328

Source: Author’s simulations by the GTAP

Table 3-20 The effect of the Korea-GCC FTA on the total exports from r to s in Scenario 5 (in USD millions)

DTOT	KOR	KWT	SAU	BHR	QAT	ARE	OMN	USA	CHN	EU28	JPN	OthOPEC	RUS	CAN	BRA	MEX	NOR	KAZ	ROW	Total
KOR	0	195	1,562	44	115	2,638	195	-665	-577	-765	-28	-100	-120	-67	-46	-114	-35	-13	-818	1,400
KWT	1,262	0	-6	-0	-0	-0	-1	-176	-193	-122	-100	-1	-1	-1	-3	-0	-0	-0	-638	19
SAU	2,981	-10	0	-5	-7	-93	-4	-674	-326	-660	-59	-3	-1	-19	-27	-2	-1	-1	-865	225
BHR	70	-1	-17	0	-0	-9	-2	-2	-3	-7	-7	-0	-0	-0	-0	-0	-0	-0	-23	-0
QAT	2,423	-13	-10	-0	0	-33	-2	-58	-64	-805	-472	-2	-1	-22	-12	-29	-0	-0	-816	83
ARE	1,490	1	2	1	-1	0	-10	-23	-77	-39	-542	0	-1	-1	-2	-0	-0	-1	-619	178
OMN	611	-3	-7	-0	-0	-11	0	-22	-135	-23	-232	-1	-0	-0	-1	-0	-0	-0	-157	16
USA	291	-13	-160	-5	-0	-176	-14	0	47	41	9	-7	-6	36	-20	58	4	0	82	167
CHN	175	-11	-135	-2	-1	-222	-7	-1	14	-66	-7	-3	-22	-4	-13	13	0	-1	57	-236
EU28	285	-17	-254	-7	-5	-527	-22	76	171	274	7	-4	-43	10	-15	14	15	3	219	179
JPN	71	-13	-87	-5	-4	-95	-41	89	232	53	0	1	6	6	2	11	1	1	164	392
OthOPEC	-1,220	0	1	0	0	-17	0	369	65	133	179	2	1	3	19	8	0	0	472	17
RUS	-851	-0	-4	0	0	-5	1	78	72	575	94	6	0	2	2	1	2	3	167	145
CAN	39	-0	-10	-0	0	-13	-0	7	0	-1	-0	-2	-1	0	-1	2	-0	0	0	21
BRA	34	1	3	1	0	-182	0	33	27	41	8	4	2	4	0	5	1	0	91	75
MEX	6	0	-4	-0	-0	-5	-0	31	2	-8	1	-1	-0	1	0	0	-0	0	8	29
NOR	-17	0	-0	0	0	-4	0	7	1	15	0	-0	-0	2	-0	0	0	0	3	7
KAZ	-1	0	0	0	0	-0	0	0	-4	-31	1	-0	0	0	-0	0	-0	0	41	8
ROW	-3,198	1	-204	-6	-2	-749	-21	479	484	699	764	-7	1	35	-1	31	5	10	1,198	-482
Total	4,451	116	669	14	96	495	72	-450	-263	-695	-385	-118	-185	-16	-119	0	-7	-0	-1,433	2,242

Source: Author's simulations by the GTAP

Table 3-21 The effect of the Korea-GCC FTA on the total exports from r to s in Scenario 6 (in USD millions)

DTOT	KOR	KWT	SAU	BHR	QAT	ARE	OMN	USA	CHN	EU28	JPN	OthOPEC	RUS	CAN	BRA	MEX	NOR	KAZ	ROW	Total
KOR	0	267	2,146	60	158	4,759	268	-1,042	-1,041	-1,186	-117	-156	-187	-103	-81	-174	-53	-21	-1,417	2,078
KWT	1,684	0	-8	-1	-0	-0	-2	-234	-258	-162	-135	-2	-1	-1	-4	-0	-0	-1	-852	24
SAU	4,032	-15	0	-8	-10	-157	-6	-896	-434	-875	-83	-4	-1	-25	-36	-2	-1	-1	-1,151	325
BHR	96	-1	-24	0	-0	-16	-3	-2	-3	-9	-9	-0	-0	-0	-0	-0	-0	0	-30	-1
QAT	3,280	-18	-13	-0	0	-47	-3	-78	-86	-1,092	-643	-2	-2	-30	-17	-39	-0	-0	-1,099	111
ARE	1,996	3	18	3	3	0	-3	-21	-95	-31	-714	36	1	-0	-2	-0	-0	-1	-751	440
OMN	797	-4	-10	-0	-0	-20	0	-29	-181	-30	-296	-1	-0	-0	-1	-0	-0	-0	-204	20
USA	504	-19	-224	-7	-1	-301	-20	0	71	42	19	-14	-8	49	-36	84	6	0	102	247
CHN	286	-16	-189	-3	-2	-337	-11	-6	22	-120	-2	-7	-32	-6	-29	20	0	-2	69	-363
EU28	442	-25	-357	-11	-8	-918	-33	135	274	443	22	-7	-48	17	-34	23	24	4	344	286
JPN	101	-18	-120	-7	-6	-139	-56	116	332	61	0	1	8	8	1	15	1	1	213	512
OthOPEC	-1,617	0	1	0	0	-29	-0	493	85	180	238	3	2	4	25	11	0	0	627	24
RUS	-1,124	-0	-5	0	1	-10	1	104	96	765	125	8	0	3	2	1	3	4	222	197
CAN	69	-0	-14	-0	0	-25	-0	11	0	-3	0	-3	-1	0	-3	4	-0	0	-2	33
BRA	62	1	4	1	1	-368	-0	65	56	83	17	9	5	7	0	10	3	0	169	124
MEX	8	0	-5	-0	-0	-8	-0	47	3	-11	1	-2	-0	1	-1	0	-0	0	10	43
NOR	-19	0	-0	-0	0	-7	0	10	2	19	0	-1	0	2	-1	0	0	0	4	9
KAZ	-1	0	0	0	0	-0	0	1	-5	-41	1	-0	0	0	-0	0	-0	0	55	10
ROW	-4,161	-1	-284	-10	-3	-1,430	-33	710	756	1,014	1,055	-16	10	54	-9	47	8	14	1,696	-582
Total	6,435	155	917	17	132	947	98	-616	-406	-952	-520	-159	-254	-21	-226	-0	-10	-2	-1,996	3,538

Source: Author's simulations by the GTAP

Table 3-22 shows the term of trade (tot index) represented by the percentage change. The tot index is the ratio of the price of exported by the imported commodities and it shows the purchasing power of a country. According to the simulation results, the GCC countries and Korea have a positive effect in the tot index, but the GCC countries lead the adverse of the terms of trade for Korea, except for Bahrain in Scenario 4, Scenario 5 and Scenario 6. The results show that: first, there is a 0.04% change of the value in Scenario 3, a 0.00% in Scenario 2, -0.01% in Scenario 1, 0.08% in Scenario 6, 0.04% in Scenario 5 and 0.02% in Scenario 4 for Korea. Second, there is a 0.25% change of the value in Scenario 3, a 0.19% in Scenario 2 and a 0.12% in Scenario 1, 0.22% in Scenario 6, 0.17% in Scenario 5 and 0.11% in Scenario 4 for Kuwait. Third, there is a 0.148% change of the value in Scenario 3, a 0.111% in Scenario 2 and a 0.073% in Scenario 1, 0.13% in Scenario 6, 0.1% in Scenario 5 and 0.06% in Scenario 4 for Saudi Arabia. Fourth, there is a 0.041% change of the value in Scenario 3, a 0.030% in Scenario 2 and a 0.020% in Scenario 1, 0.03% in Scenario 6, 0.03% in Scenario 5 and 0.01% in Scenario 4 for Bahrain. Fifth, there is a 0.22% change of the value in Scenario 3, a 0.16% in Scenario 2 and a 0.11% in Scenario 1, 0.2% in Scenario 6, 0.15% in Scenario 5 and 0.09% in Scenario 4 for Qatar. Sixth, there is a 0.15% change of the value in Scenario 3, a 0.13% in Scenario 2 and a 0.09% in Scenario 1, 0.14% in Scenario 6, 0.12% in Scenario 5 and 0.09% in Scenario 4 for the UAE. Seventh, there is a 0.22% change of the value in Scenario 3, a 0.16% in Scenario 2 and a 0.10% in Scenario 1, 0.2% in Scenario 6, 0.14% in Scenario 5 and 0.09% in Scenario 4 for Oman.

Table 3-22 The effect of the Korea-GCC FTA on the terms of trade (% change)

tot	Sc1	Sc2	Sc3	Sc4	Sc5	Sc6
KOR	-0.01	0.00	0.04	0.02	0.04	0.08
KWT	0.12	0.19	0.25	0.11	0.17	0.22
SAU	0.07	0.11	0.15	0.06	0.10	0.13
BHR	0.02	0.03	0.04	0.01	0.03	0.03
QAT	0.11	0.16	0.22	0.09	0.15	0.20
ARE	0.09	0.13	0.15	0.09	0.12	0.14
OMN	0.10	0.16	0.22	0.09	0.14	0.20
USA	0.00	-0.01	-0.01	0.00	0.00	-0.01
CHN	0.00	0.00	0.00	0.00	0.00	0.01
EU28	0.00	0.00	0.00	0.00	0.00	0.00
JPN	-0.02	-0.02	-0.03	-0.01	-0.02	-0.03
OthOPEC	-0.02	-0.02	-0.03	-0.02	-0.03	-0.05
RUS	-0.02	-0.03	-0.04	-0.03	-0.04	-0.05
CAN	0.00	0.00	0.00	0.00	0.00	0.00
BRA	-0.01	-0.02	-0.03	-0.01	-0.02	-0.04
MEX	0.00	0.00	0.00	0.00	0.00	0.00
NOR	0.00	0.00	0.00	0.00	-0.01	-0.01
KAZ	0.00	0.01	0.01	0.00	-0.01	-0.01
ROW	-0.01	-0.01	-0.02	-0.01	-0.01	-0.02

Source: Author's simulations

Table 3-23 shows the trade balance (DTBAL) represented by the change in USD million. The index is represented by the difference between the total exported and the total imported commodities. According to the simulation results, Korea, the UAE, and Bahrain have negative trade balance, while Kuwait, Saudi Arabia, Qatar, and Oman have a positive effect on the trade balance in the first three scenarios. The results show that there is a deficit USD 1,667 million in the balance of the value in Scenario 3, a deficit USD 1,271 million in Scenario 2 and a deficit USD 844 million in Scenario 1 for Korea. Kuwait's balance has a surplus USD 135 million in the value in Scenario 3, USD 104 million in Scenario 2 and USD 70 million in Scenario 1. Saudi Arabia's balance has a surplus USD 58 million increase of the value in Scenario 3, USD 52 million in Scenario 2 and USD 41 million in Scenario 1. Bahrain's trade balance has a deficit USD 7 million of the value in Scenario 3, a deficit USD 5 million in Scenario 2 and a deficit USD 1 million in Scenario 3. Qatar's trade balance has a surplus USD 142 million in Scenario 3, USD 105 million in Scenario 2 and USD 69 million in Scenario 1. The UAE's have a deficit USD 149 million Scenario 3, a deficit USD 75 million in Scenario 2 and a deficit USD 39 million in Scenario 1. Oman's trade balance has a surplus USD 14 million in Scenario 3, USD 13 million in Scenario 2 and USD 10 million in Scenario 1. The highest beneficial country among the FTA members in the first three scenarios is Qatar by USD 142 million, followed by Kuwait, Saudi Arabia, Oman, Bahrain, the UAE and Oman by USD 135, 58, 14, -7, -149 and -1667 million, respectively in Scenario 3 (see Figure 21).

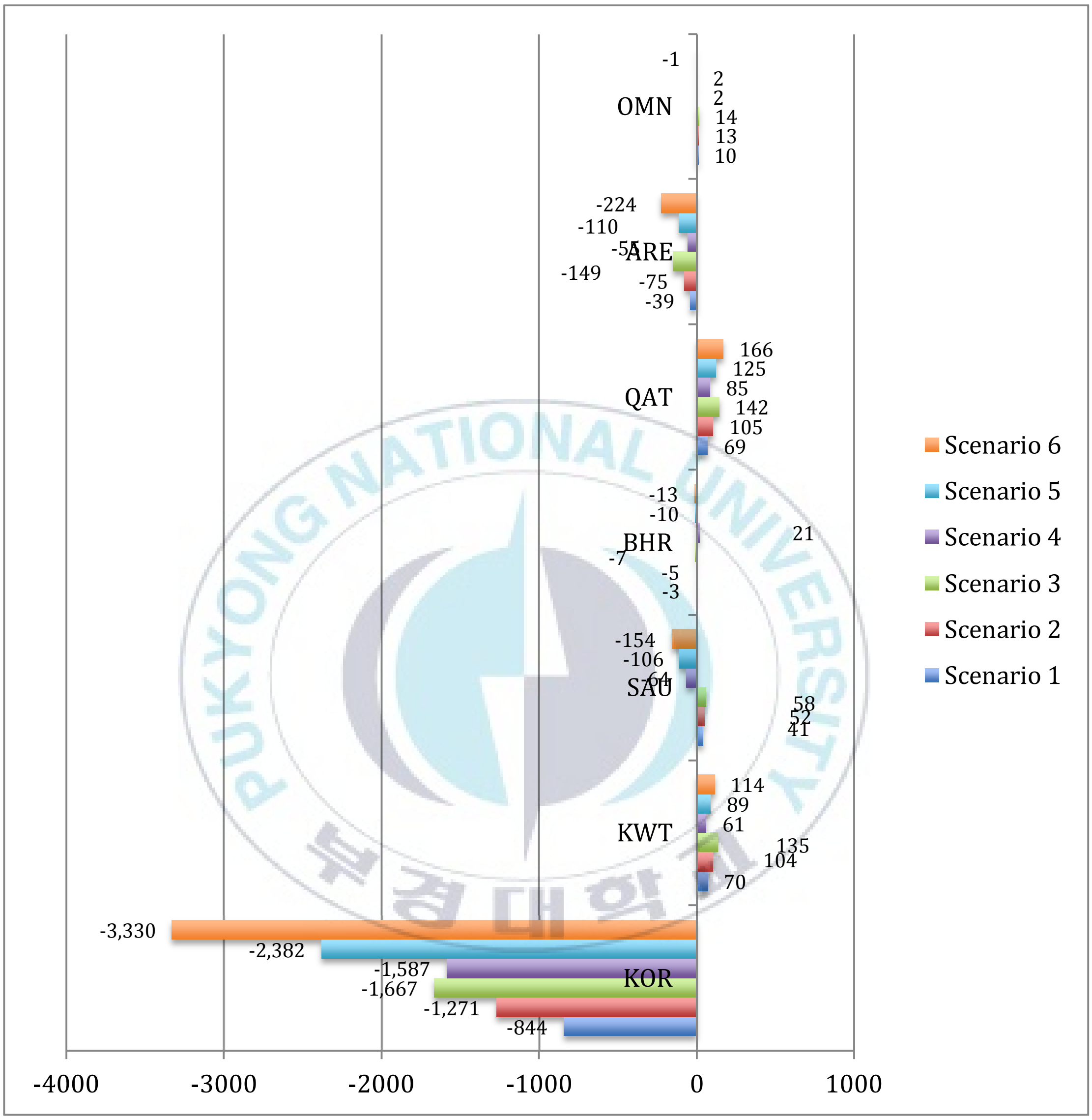
In Scenario 4, 5 and 6, Korea, Saudi Arabia, Bahrain, the UAE, and Oman have a negative trade balance, yet Kuwait and Qatar have a positive effect on the trade balance in those scenarios. The results show that there is a deficit USD 3.330 million in the balance of the trade in Scenario 6, a deficit USD 2,382 million in Scenario 5 and a deficit USD 1,587 million in Scenario 4 for Korea. Kuwait's trade balance has a surplus USD 114 million in Scenario 6, USD 89 million in Scenario 5 and USD 61 million in Scenario 4. Saudi Arabia's trade balance has a deficit USD 154 million decreases of the value in Scenario 6, a deficit USD 106 million in Scenario 5 and a deficit USD 64 million in Scenario 4. Bahrain's trade balance has a deficit of USD 13 million in Scenario 6, and a deficit USD 10 million in Scenario 5, however a surplus by USD 21 million in Scenario 4. Qatar's trade balance has surplus USD 166 million in Scenario 6, USD 152 million in Scenario 5 and USD 85 million in Scenario 4. The UAE's trade balance has a deficit USD 224 million change of the value in Scenario 6, a deficit USD 110 million in Scenario 5 and a deficit USD 55 million in Scenario 4. Oman's trade balance has a deficit of USD 1 million of the value in Scenario 6, and a surplus of USD 2 million in Scenario 4 and Scenario 5. The highest beneficial country among the FTA members is Qatar by USD 166 million, followed by Kuwait USD 114 in the sixth scenario (see Figure 21).

Table 3-23 The effect of the Korea-GCC FTA on the trade balance (in USD millions)

DTBAL	Sc1	Sc2	Sc3	Sc4	Sc5	Sc6
KOR	-844	-1,271	-1,667	-1,587	-2,382	-3,330
KWT	70	104	135	61	89	114
SAU	41	52	58	-64	-106	-154
BHR	-3	-5	-7	21	-10	-13
QAT	69	105	142	85	125	166
ARE	-39	-75	-149	-55	-110	-224
OMN	10	13	14	2	2	-1
USA	176	265	348	386	594	839
CHN	-41	-70	-114	39	56	75
EU28	103	164	230	323	510	748
JPN	264	394	512	336	506	681
OthOPEC	-6	-9	-15	1	1	1
RUS	5	8	11	34	53	79
CAN	4	5	4	25	37	53
BRA	41	84	157	88	156	264
MEX	3	3	3	14	21	30
NOR	0	-0	0	2	3	4
KAZ	0	-0	0	1	1	1
ROW	148	234	338	289	455	667

Source: Author’s simulations

Figure 21 The effect of the Korea-GCC FTA on the trade balance (in USD millions)



Source: Author's simulations by the GTAP

3.5.2 Microeconomic Effects

The microeconomic effect of the Korea-GCC FTA on the value added in production (see Table 3-24, Table 3-25, Table 3-26, Table 3-27, Table 3-28, and Table 3-29 and Figures from 22 to Figure 33) has a positive effect on sectors in Korea more than the GCC countries because of the diversity of Korea's economy and exports. Korea's gains are in the agriculture, other mining, processed food, textiles and wearing appeal, petroleum and coal products, other chemicals, metal product, automobiles, utilities, construction, trade and transport sectors in the different degrees of the trade liberalizations in the six scenarios. The highest gains are in Scenario 6 for the processed food and the petroleum and coal products by 3.37 and 2.25 percent, respectively. These increasing results are gained as a result of the growth in the production over the short-term period that caused by the instant trade liberalization.

Kuwait gain from the sectors of the oil, gas, other mining, other chemical, other transport equipment, utilities, construction, trade, financial and the other service sectors in the six scenarios. The highest increases are in the other chemical and the construction sectors by 0.25 and 0.1 percent, respectively. Saudi Arabia gains from the agriculture, oil, other mining, other chemicals, utilities, construction, trade, communications, financial and other services sectors in the six scenarios. The highest increases are in Scenario 6 for the agriculture and the construction sectors by 0.45 and 0.15 percent, respectively. Bahrain gains from the oil, gas, petroleum and coal products, metal products, utilities, construction, trade and other services sectors the six scenarios, the other transport equipment sector in Scenario 3, and the processed food sector in Scenario 1, Scenario 5 and Scenario 4. Qatar benefits from the oil, gas, petroleum and coal products, other chemicals and construction in the six scenarios. The highest increases for Qatar are in Scenario 3 for the petroleum and coal products, gas and oil sectors by 0.29, 0.02 and 0.08 percent, respectively. The UAE gains from the agriculture, oil, gas, petroleum and coal products, utilities, construction, trade, transport, communications, financial and other services sectors in the six scenarios. The UAE benefits most in Scenario 3 from the agriculture and the trade sectors by 0.4 and 0.34 percent, respectively. Oman profits from the oil, gas, automobile, construction, trade, communication, financial and other services sectors in the six scenarios. Oman benefits the most from the gas, automobile, and construction by 0.46, 0.15 and 0.15 percent, respectively in Scenario 3.

As expected, the GCC countries gain from the oil, gas, petrochemical, construction and services sectors. On the other hand, Korea gains from the manufacturing, agriculture and services sectors. Among the GCC countries, the UAE gain from more sectors than the rest of the GCC countries because it has the most diverse economy. However, Qatar has the least gains in its sectors due to its high dependence on gas exports and its small population.

Table 3-24 The effect of the Korea-GCC FTA on value added in case of Scenario 1 (% change)

qva	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.04	-0.04	0.03	0.00	-0.04	0.06	-0.04
OIL	-0.39	0.03	0.04	0.03	0.04	0.08	0.01
GAS	-0.28	0.00	-0.01	0.00	0.04	0.02	0.23
OthMining	0.12	0.00	0.02	-0.02	-0.03	-0.05	-0.07
PrcFood	0.56	-0.02	-0.04	0.11	-0.04	-0.52	-0.23
TextWapp	0.20	-0.30	-0.26	-0.05	-0.15	-0.16	-0.21
PetroCoalPrd	1.09	-0.18	-0.03	0.01	0.15	0.05	-0.20
OthChem	0.43	0.04	0.01	-0.07	0.02	-0.10	-0.57
MetalPrd	0.12	-0.36	-0.34	0.02	-0.14	-0.27	-0.23
Automobiles	0.20	-0.20	-0.22	-0.19	-0.11	-0.21	0.06
OthTrnsEq	-0.71	-0.03	-0.02	-0.02	-0.12	-0.12	-0.15
Electronics	-0.48	-0.15	-0.03	-0.03	-0.05	-0.14	-0.12
Machinery	-0.17	-0.20	-0.45	-0.37	-0.08	-0.23	-1.58
OthMnf	-0.10	-0.14	-0.03	-0.03	-0.07	-0.10	-0.18
Utilities	0.12	0.01	0.01	0.01	-0.03	0.04	-0.13
Construction	0.20	0.12	0.05	0.05	0.02	0.08	0.06
Trade	0.01	0.03	0.02	0.01	0.00	0.12	0.04
Transport	0.09	-0.03	-0.04	-0.05	-0.07	0.02	-0.02
Communic	-0.03	-0.16	0.03	-0.01	-0.01	0.06	0.03
Financial	-0.05	0.00	0.02	-0.01	-0.05	0.04	0.04
OthServ	-0.03	0.01	0.01	0.00	-0.02	0.03	0.03
CGDS	0.26	0.13	0.05	0.06	0.02	0.09	0.06

Source: Author’s simulation

Note: CGDS is the capital good sector, or the change in capital good production

Table 3-25 The effect of the Korea-GCC FTA on value added in case of Scenario 2 (% change)

qva	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.14	-0.06	0.11	-0.02	-0.06	0.16	-0.07
OIL	-0.60	0.05	0.06	0.05	0.06	0.13	0.01
GAS	-0.46	0.00	-0.01	0.00	0.06	0.03	0.35
OthMining	0.17	0.01	0.03	-0.02	-0.04	-0.07	-0.11
PrcFood	1.39	-0.04	-0.15	-0.02	-0.08	-1.19	-0.51
TextWapp	0.29	-0.46	-0.40	-0.06	-0.22	-0.21	-0.32
PetroCoalPrd	1.66	-0.27	-0.04	0.02	0.22	0.07	-0.31
OthChem	0.62	0.06	0.02	-0.11	0.04	-0.15	-0.86
MetalPrd	0.16	-0.56	-0.53	0.04	-0.22	-0.41	-0.35
Automobiles	0.28	-0.30	-0.34	-0.29	-0.17	-0.32	0.10
OthTrnsEq	-1.16	-0.02	-0.01	-0.02	-0.19	-0.18	-0.22
Electronics	-0.79	-0.22	-0.04	-0.04	-0.08	-0.19	-0.18
Machinery	-0.31	-0.30	-0.69	-0.56	-0.12	-0.34	-2.38
OthMnf	-0.17	-0.22	-0.04	-0.05	-0.11	-0.15	-0.27
Utilities	0.19	0.02	0.01	0.02	-0.05	0.06	-0.19
Construction	0.30	0.18	0.08	0.08	0.03	0.14	0.10
Trade	0.03	0.04	0.04	0.02	0.00	0.21	0.06
Transport	0.13	-0.05	-0.06	-0.08	-0.10	0.04	-0.04
Communic	-0.04	-0.25	0.04	-0.01	-0.01	0.09	0.05
Financial	-0.08	0.00	0.02	-0.02	-0.08	0.05	0.06
OthServ	-0.04	0.01	0.01	0.00	-0.03	0.04	0.04
CGDS	0.40	0.19	0.08	0.09	0.04	0.15	0.10

Source: Author’s simulations

Note: CGDS is the capital good sector, or the change in capital good production

Table 3-26 The effect of the Korea-GCC FTA on value added in case of Scenario 3 (% change)

qva	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.37	-0.07	0.42	-0.06	-0.08	0.40	-0.12
OIL	-0.83	0.06	0.08	0.07	0.08	0.18	0.01
GAS	-0.66	0.01	-0.02	0.01	0.08	0.05	0.46
OthMining	0.18	0.01	0.04	-0.02	-0.05	-0.07	-0.14
PrcFood	3.30	-0.08	-0.41	-0.48	-0.16	-2.57	-1.08
TextWapp	0.35	-0.63	-0.54	-0.03	-0.29	-0.16	-0.44
PetroCoalPrd	2.24	-0.37	-0.06	0.02	0.29	0.10	-0.41
OthChem	0.77	0.10	0.03	-0.14	0.05	-0.19	-1.13
MetalPrd	0.11	-0.77	-0.72	0.07	-0.31	-0.48	-0.46
Automobiles	0.30	-0.41	-0.45	-0.39	-0.23	-0.46	0.15
OthTrnsEq	-1.75	0.01	0.00	0.00	-0.25	-0.15	-0.29
Electronics	-1.22	-0.29	-0.05	-0.04	-0.10	-0.13	-0.24
Machinery	-0.57	-0.40	-0.94	-0.74	-0.17	-0.37	-3.15
OthMnf	-0.26	-0.30	-0.05	-0.05	-0.15	-0.16	-0.36
Utilities	0.26	0.03	0.02	0.03	-0.06	0.06	-0.26
Construction	0.42	0.25	0.11	0.12	0.04	0.21	0.15
Trade	0.06	0.06	0.05	0.02	0.00	0.34	0.10
Transport	0.16	-0.06	-0.08	-0.10	-0.13	0.04	-0.04
Communic	-0.03	-0.33	0.06	-0.01	-0.02	0.09	0.08
Financial	-0.09	0.00	0.03	-0.02	-0.10	0.01	0.07
OthServ	-0.04	0.01	0.01	0.00	-0.04	0.02	0.06
CGDS	0.56	0.27	0.11	0.13	0.05	0.23	0.15

Source: Author's simulations
Note: CGDS is the capital good sector, or the change in capital good production

Table 3-27 The effect of the Korea-GCC FTA on value added in case of Scenario 4 (% change)

qva	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.02	-0.04	0.01	0.02	-0.03	0.05	-0.04
OIL	-0.43	0.02	0.03	0.04	0.04	0.08	-0.01
GAS	-0.32	0.00	-0.02	0.01	0.04	0.01	0.22
OthMining	0.07	0.02	0.04	0.05	-0.04	-0.06	-0.07
PrcFood	0.59	0.03	-0.04	0.10	-0.01	-0.51	-0.18
TextWapp	0.14	-0.32	-0.30	0.17	-0.16	-0.16	-0.21
PetroCoalPrd	1.09	-0.17	-0.02	-0.04	0.12	0.03	-0.17
OthChem	0.39	0.06	0.03	-0.12	0.02	-0.10	-0.51
MetalPrd	0.04	-0.34	-0.34	0.16	-0.15	-0.27	-0.24
Automobiles	0.15	-0.18	-0.22	-0.20	-0.09	-0.20	0.10
OthTrnsEq	-0.89	-0.02	-0.09	0.14	-0.10	-0.12	-0.14
Electronics	-0.61	-0.13	-0.02	-0.01	-0.03	-0.13	-0.06
Machinery	-0.32	-0.18	-0.50	-0.21	-0.10	-0.23	-1.50
OthMnf	-0.21	-0.13	-0.02	0.04	-0.06	-0.09	-0.14
Utilities	0.09	0.04	0.03	-0.02	-0.02	0.04	-0.10
Construction	0.40	0.20	0.14	-0.28	0.04	0.09	0.12
Trade	0.03	0.05	0.05	-0.08	0.01	0.12	0.06
Transport	0.03	-0.02	0.01	-0.11	-0.05	0.03	0.01
Communic	-0.02	-0.17	0.05	0.01	0.01	0.07	0.05
Financial	-0.06	0.00	0.01	0.02	-0.05	0.04	0.04
OthServ	0.02	0.01	0.00	-0.02	-0.01	0.03	0.03
CGDS	0.54	0.24	0.17	-0.38	0.08	0.11	0.15

Source: Author's simulations

Note: CGDS is the capital good sector, or the change in capital good production

Table 3-28 The effect of the Korea-GCC FTA on value added in case of Scenario 5 (% change)

qva	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.10	-0.06	0.08	-0.02	-0.06	0.15	-0.07
OIL	-0.67	0.03	0.04	0.04	0.06	0.12	-0.01
GAS	-0.51	0.00	-0.03	0.00	0.06	0.02	0.34
OthMining	0.09	0.03	0.06	-0.03	-0.06	-0.09	-0.10
PrcFood	1.44	0.05	-0.15	0.01	-0.04	-1.17	-0.44
TextWapp	0.20	-0.51	-0.46	-0.10	-0.23	-0.22	-0.31
PetroCoalPrd	1.66	-0.25	-0.04	0.02	0.17	0.04	-0.26
OthChem	0.56	0.10	0.05	-0.09	0.04	-0.15	-0.76
MetalPrd	0.03	-0.53	-0.52	0.02	-0.22	-0.42	-0.35
Automobiles	0.21	-0.27	-0.34	-0.28	-0.14	-0.31	0.16
OthTrnsEq	-1.42	-0.02	-0.11	-0.04	-0.15	-0.19	-0.20
Electronics	-0.99	-0.19	-0.03	-0.04	-0.05	-0.19	-0.08
Machinery	-0.54	-0.26	-0.76	-0.58	-0.15	-0.35	-2.25
OthMnf	-0.33	-0.20	-0.02	-0.05	-0.09	-0.13	-0.20
Utilities	0.14	0.08	0.05	0.03	-0.03	0.07	-0.15
Construction	0.61	0.34	0.21	0.15	0.05	0.16	0.18
Trade	0.05	0.09	0.07	0.04	0.02	0.23	0.10
Transport	0.03	-0.03	0.01	-0.06	-0.08	0.05	0.02
Communic	-0.03	-0.27	0.07	-0.02	0.01	0.10	0.07
Financial	-0.08	-0.01	0.01	-0.02	-0.07	0.05	0.06
OthServ	0.03	0.02	0.01	0.01	-0.02	0.04	0.04
CGDS	0.83	0.42	0.25	0.18	0.11	0.19	0.23

Source: Author’s simulations
Note: CGDS is the capital good sector, or the change in capital good production

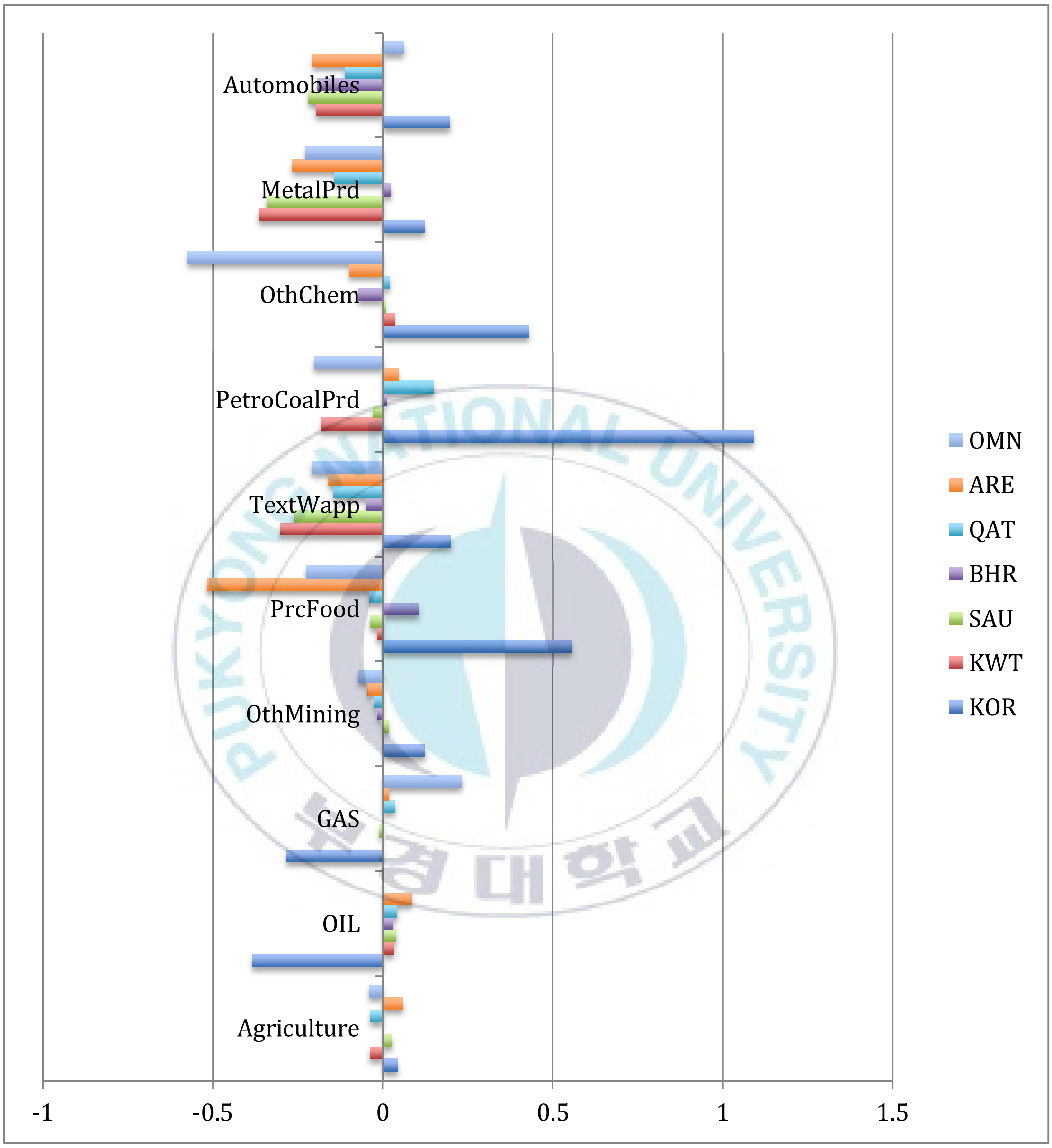
Table 3-29 The effect of the Korea-GCC FTA on value added in case of Scenario 6 (% change)

qva	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.32	-0.07	0.39	-0.06	-0.08	0.37	-0.12
OIL	-0.94	0.04	0.05	0.05	0.08	0.16	-0.01
GAS	-0.74	0.00	-0.03	0.01	0.08	0.03	0.45
OthMining	0.06	0.05	0.08	-0.03	-0.08	-0.11	-0.13
PrcFood	3.37	0.03	-0.41	-0.45	-0.11	-2.53	-0.97
TextWapp	0.20	-0.69	-0.62	-0.08	-0.30	-0.19	-0.42
PetroCoalPrd	2.25	-0.33	-0.05	0.02	0.21	0.07	-0.35
OthChem	0.67	0.15	0.07	-0.12	0.06	-0.19	-1.00
MetalPrd	-0.08	-0.72	-0.71	0.06	-0.31	-0.52	-0.47
Automobiles	0.20	-0.37	-0.46	-0.38	-0.19	-0.43	0.22
OthTrnsEq	-2.14	0.03	-0.13	-0.01	-0.20	-0.19	-0.25
Electronics	-1.52	-0.24	-0.03	-0.04	-0.06	-0.15	-0.11
Machinery	-0.92	-0.34	-1.02	-0.75	-0.20	-0.40	-2.98
OthMnf	-0.51	-0.27	-0.02	-0.05	-0.12	-0.13	-0.27
Utilities	0.18	0.10	0.06	0.04	-0.05	0.08	-0.20
Construction	0.88	0.45	0.27	0.18	0.07	0.26	0.26
Trade	0.10	0.12	0.1	0.04	0.02	0.37	0.14
Transport	0.02	-0.05	0.02	-0.08	-0.10	0.05	0.03
Communic	-0.01	-0.35	0.1	-0.01	0.01	0.11	0.10
Financial	-0.10	-0.01	0.01	-0.03	-0.09	0.02	0.07
OthServ	0.07	0.02	0.01	0.01	-0.03	0.02	0.05
CGDS	1.20	0.54	0.33	0.22	0.14	0.33	0.31

Source: Author’s simulations

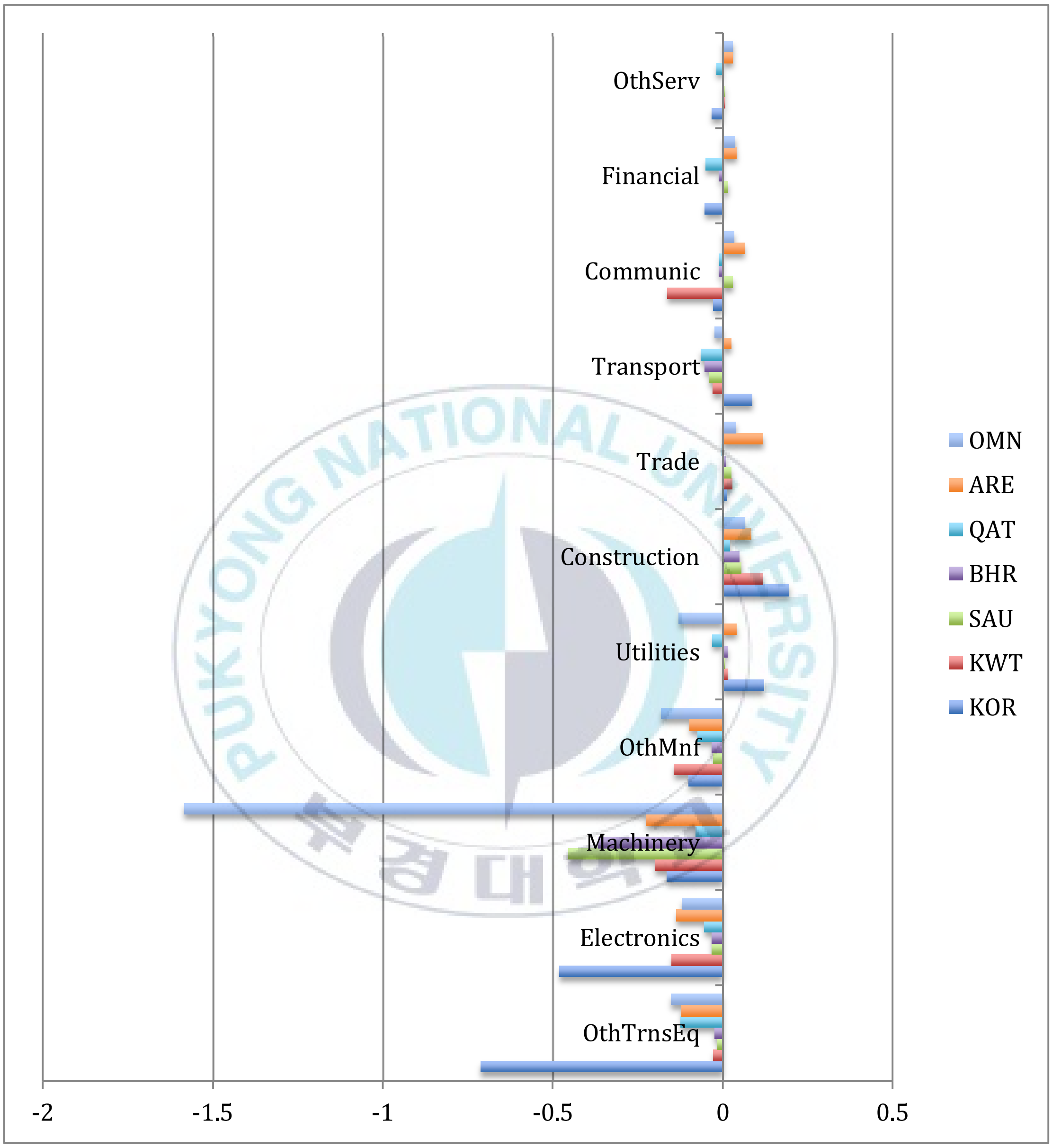
Note: CGDS is the capital good sector, or the change in capital good production

Figure 22 The effect of the Korea-GCC FTA on the value added in Scenario 1 (% change, 1/2)



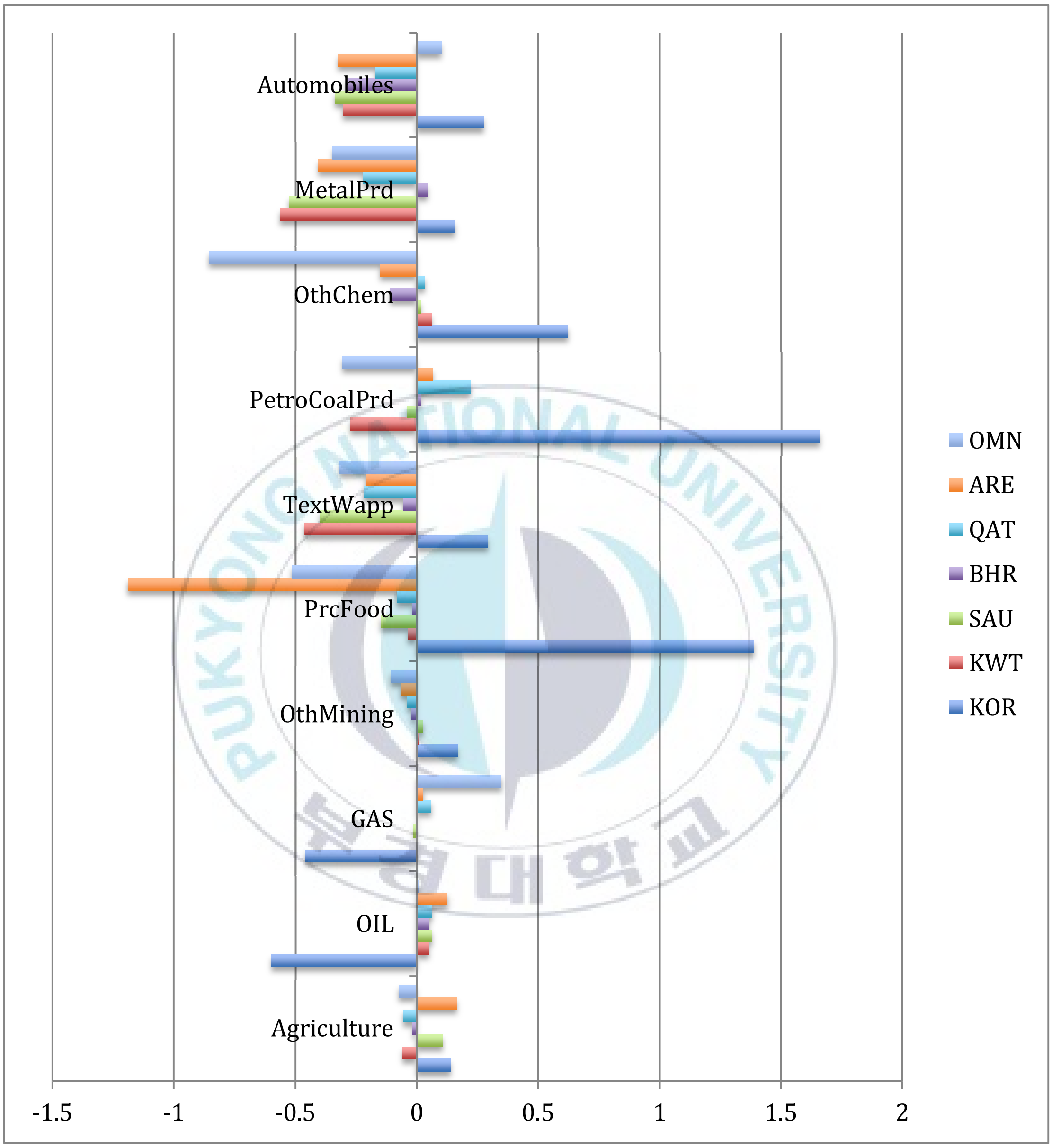
Source: Author's simulations

Figure 23 The effect of the Korea-GCC FTA on the value added in Scenario 1 (% change, 2/2)



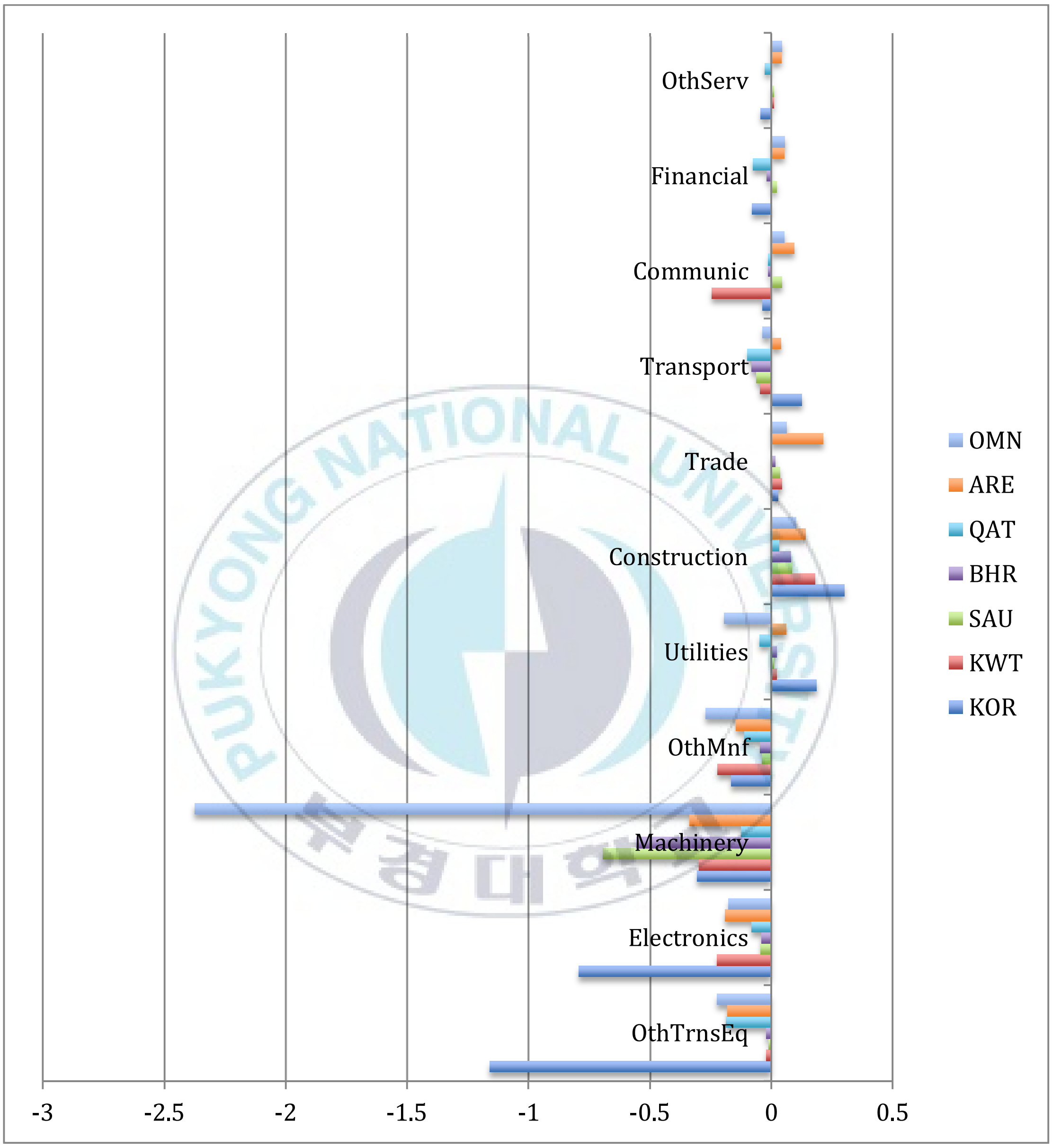
Source: Author's simulations

Figure 24 The effect of the Korea-GCC FTA on the value added in Scenario 2 (% change, 1/2)



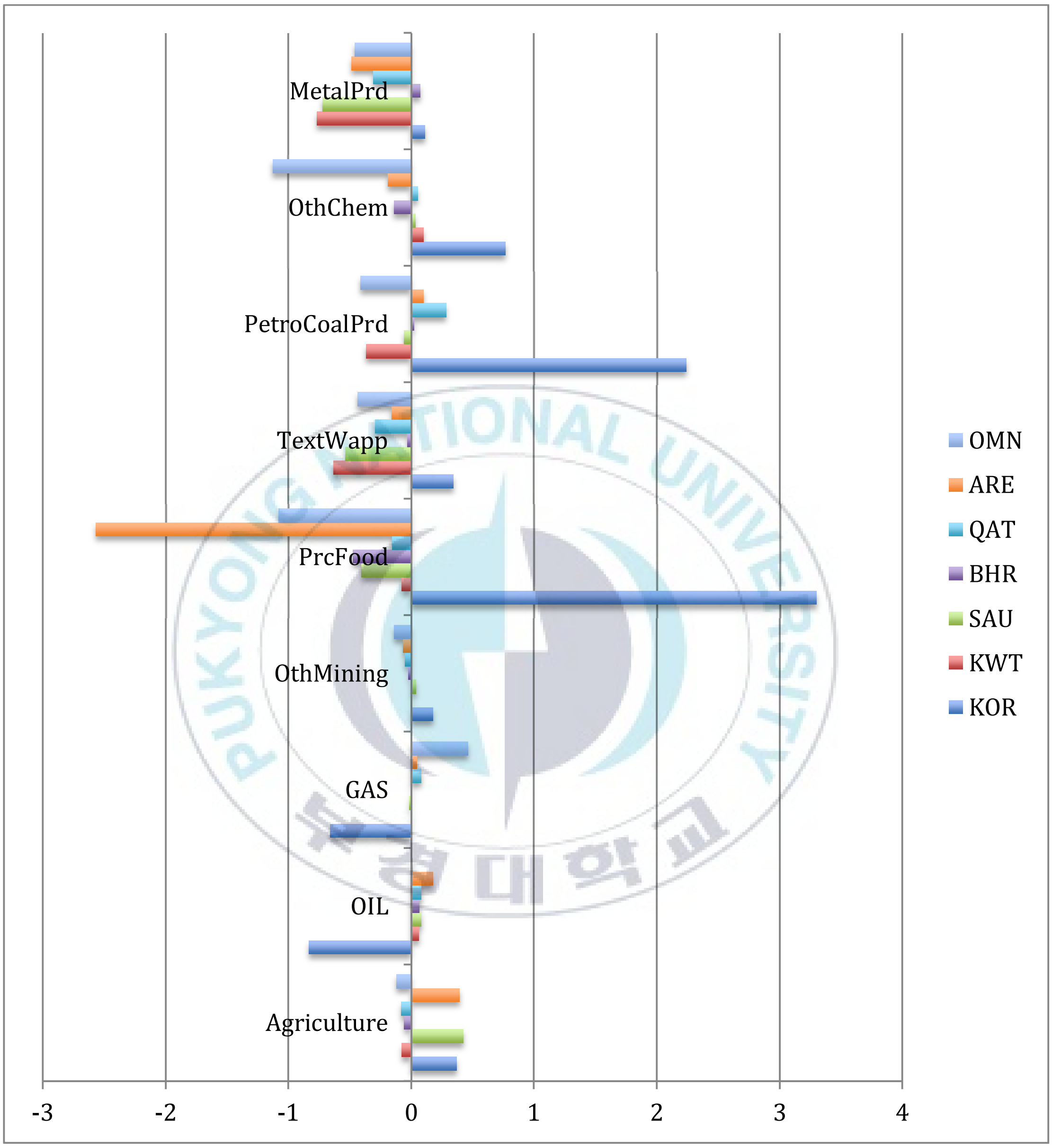
Source: Author's simulations

Figure 25 The effect of the Korea-GCC FTA on the value added in Scenario 2 (% change, 2/2)



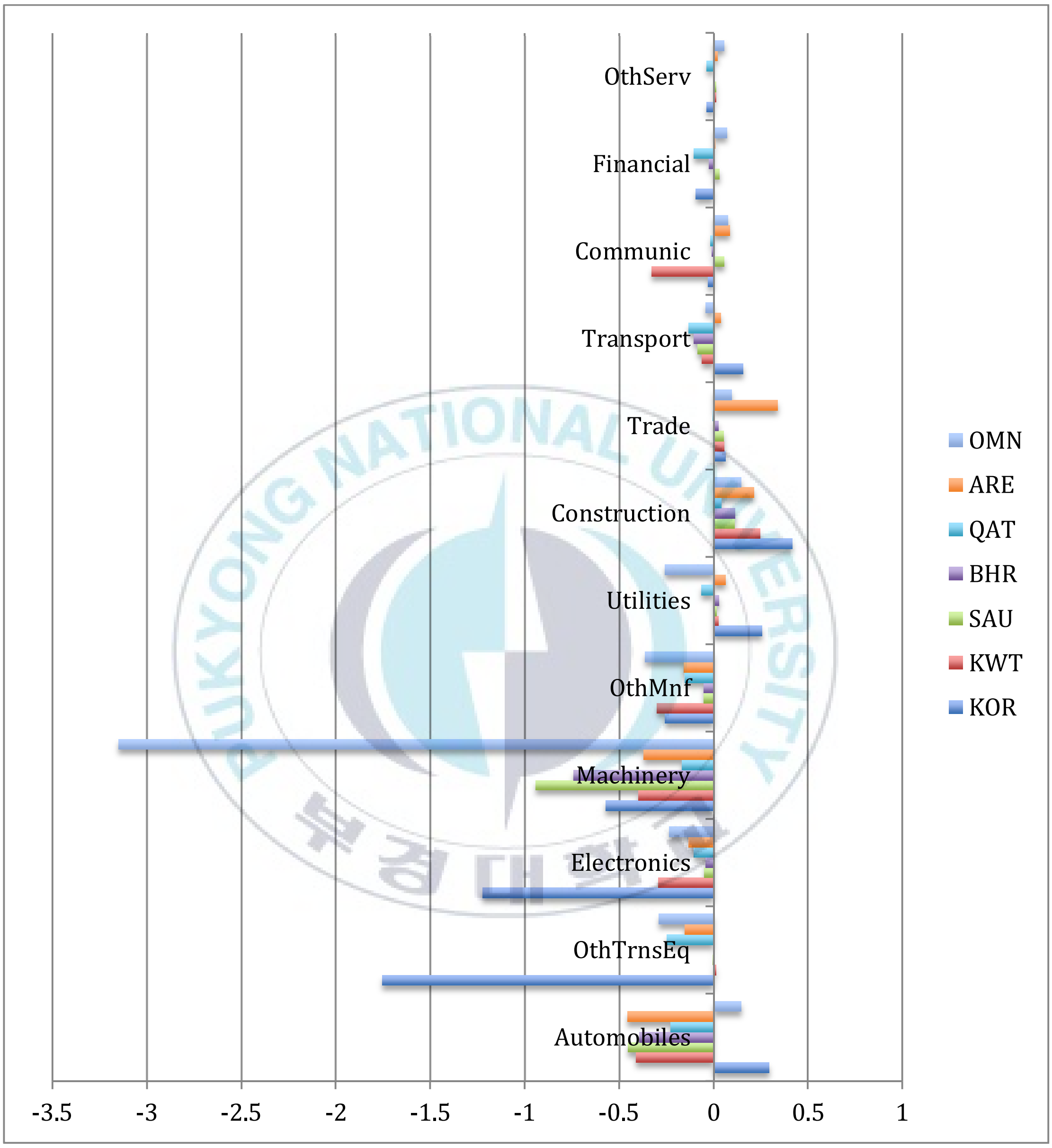
Source: Author's simulations

Figure 26 The effect of the Korea-GCC FTA on the value added in Scenario 3 (% change, 1/2)



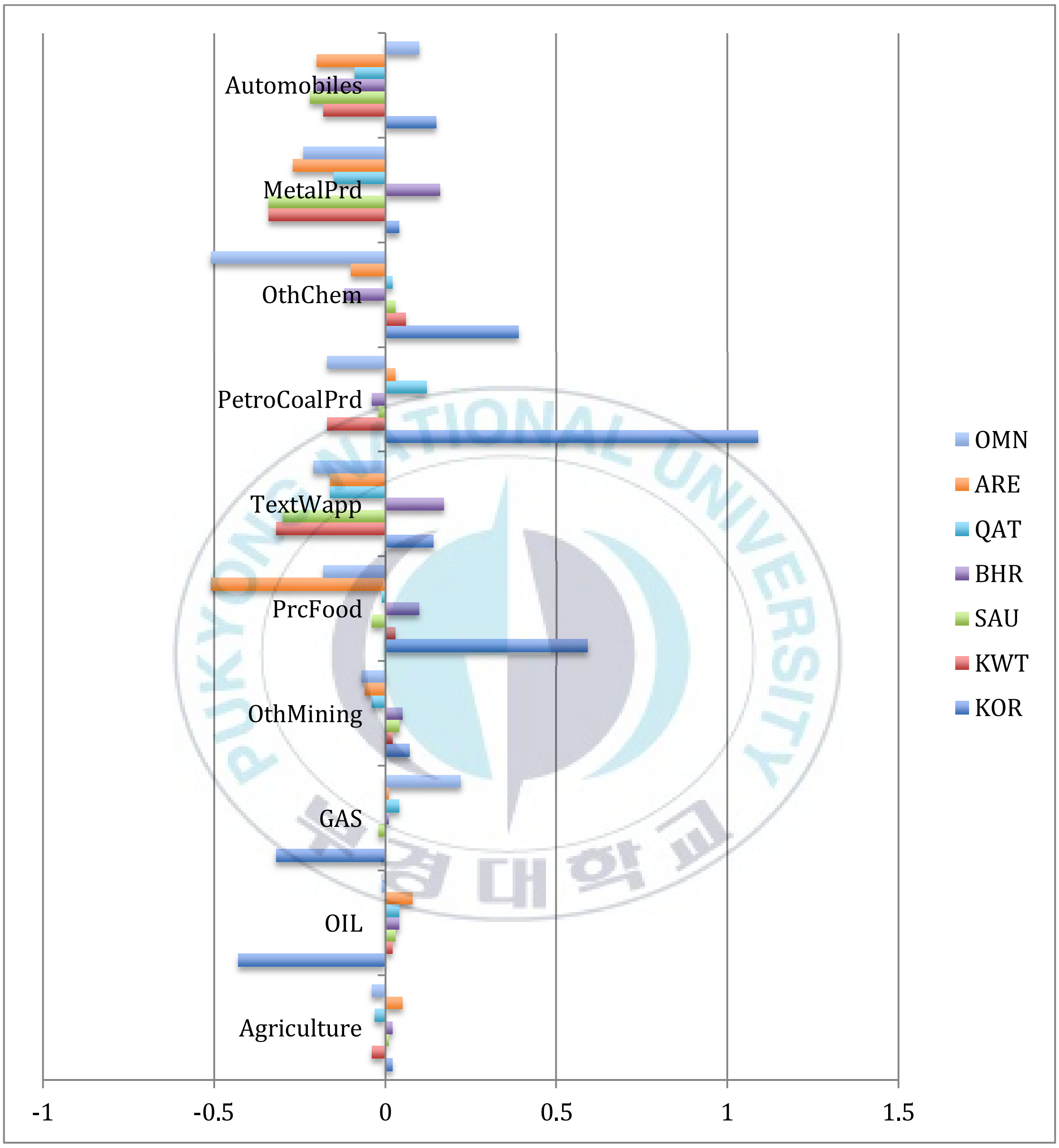
Source: Author's simulations

Figure 27 The effect of the Korea-GCC FTA on the value added in Scenario 3 (% change, 2/2)



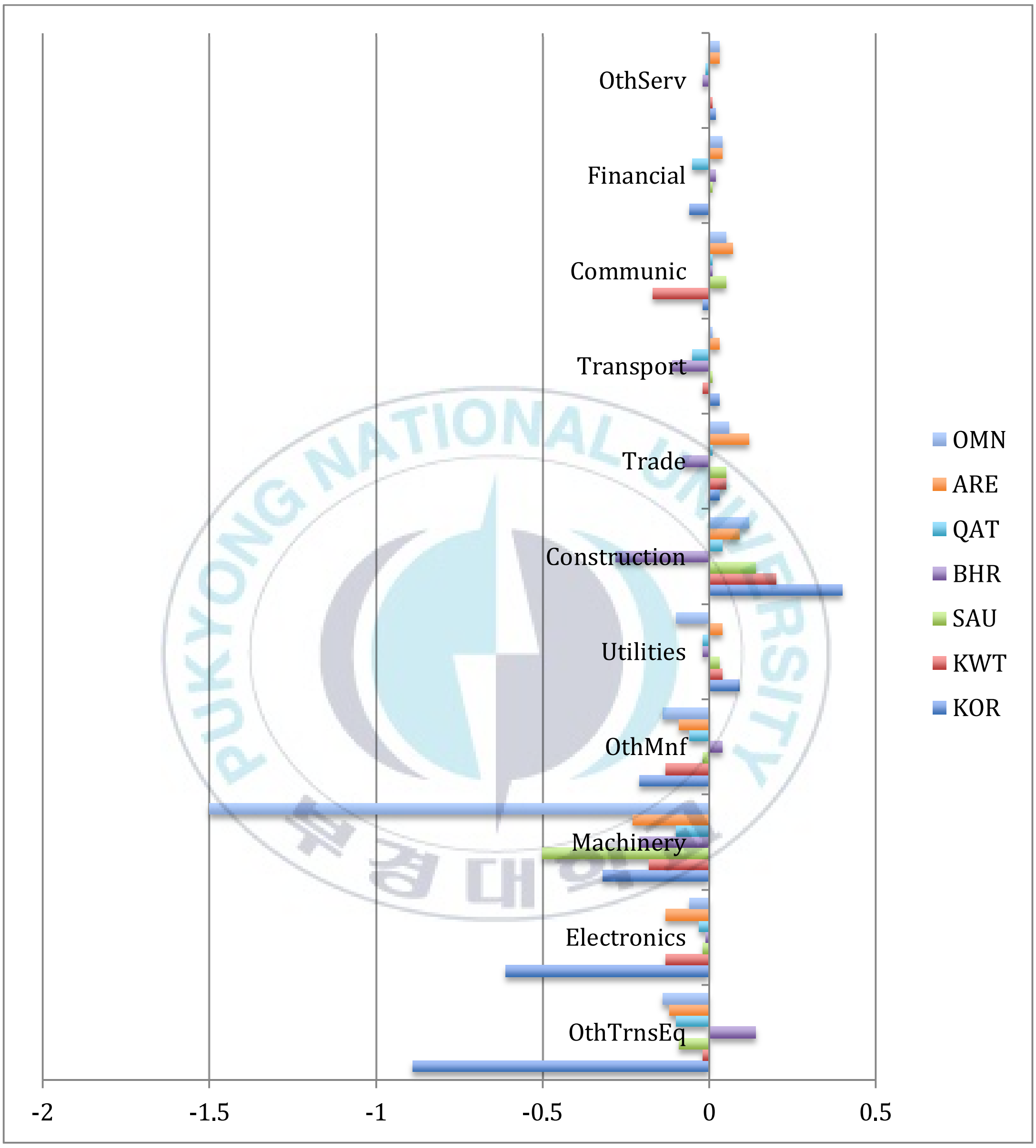
Source: Author's simulations

Figure 28 The effect of the Korea-GCC FTA on the value added in Scenario 4 (% change, 1/2)



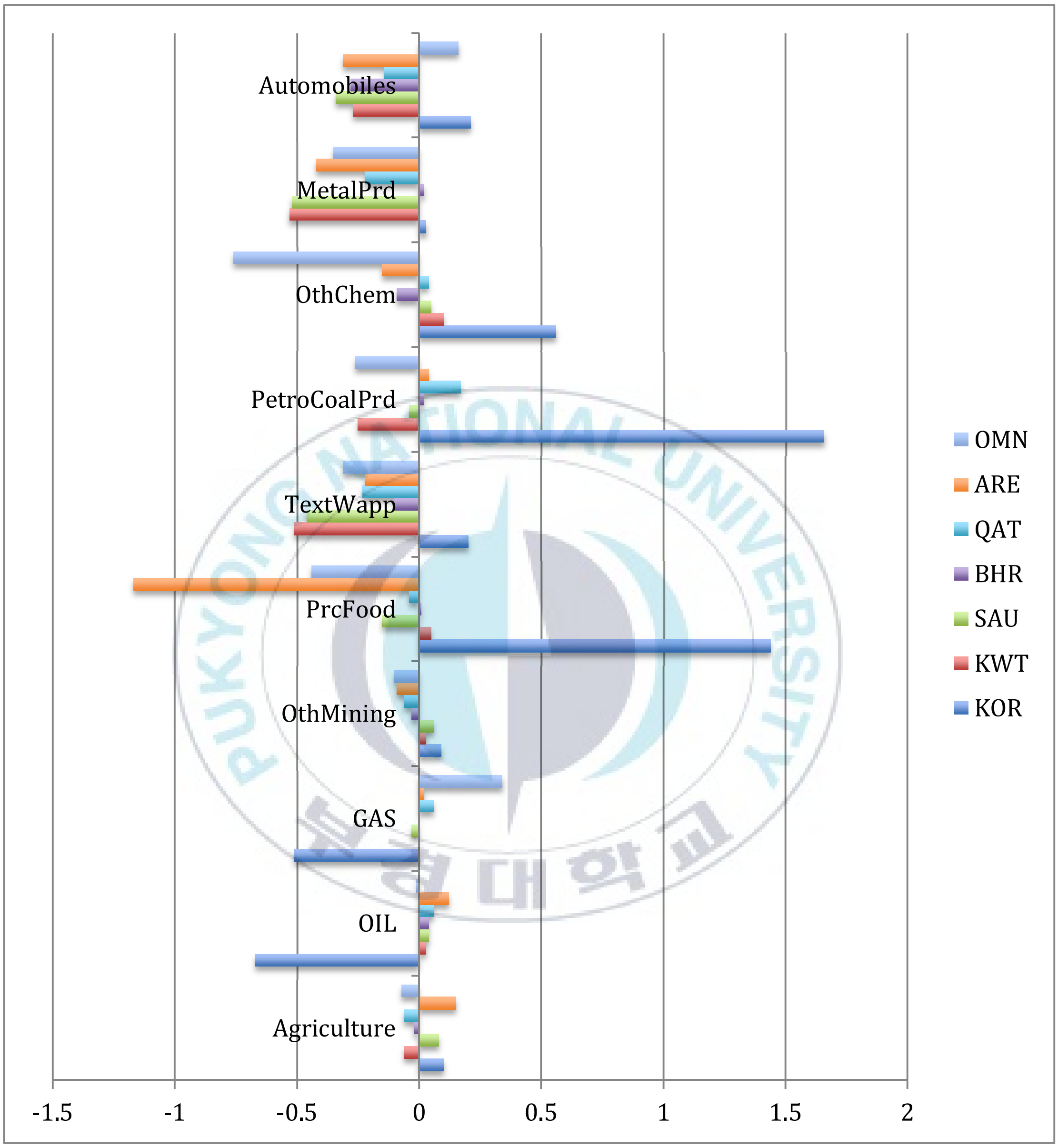
Source: Author's simulations

Figure 29 The effect of the Korea-GCC FTA on the value added in Scenario 4 (% change, 2/2)



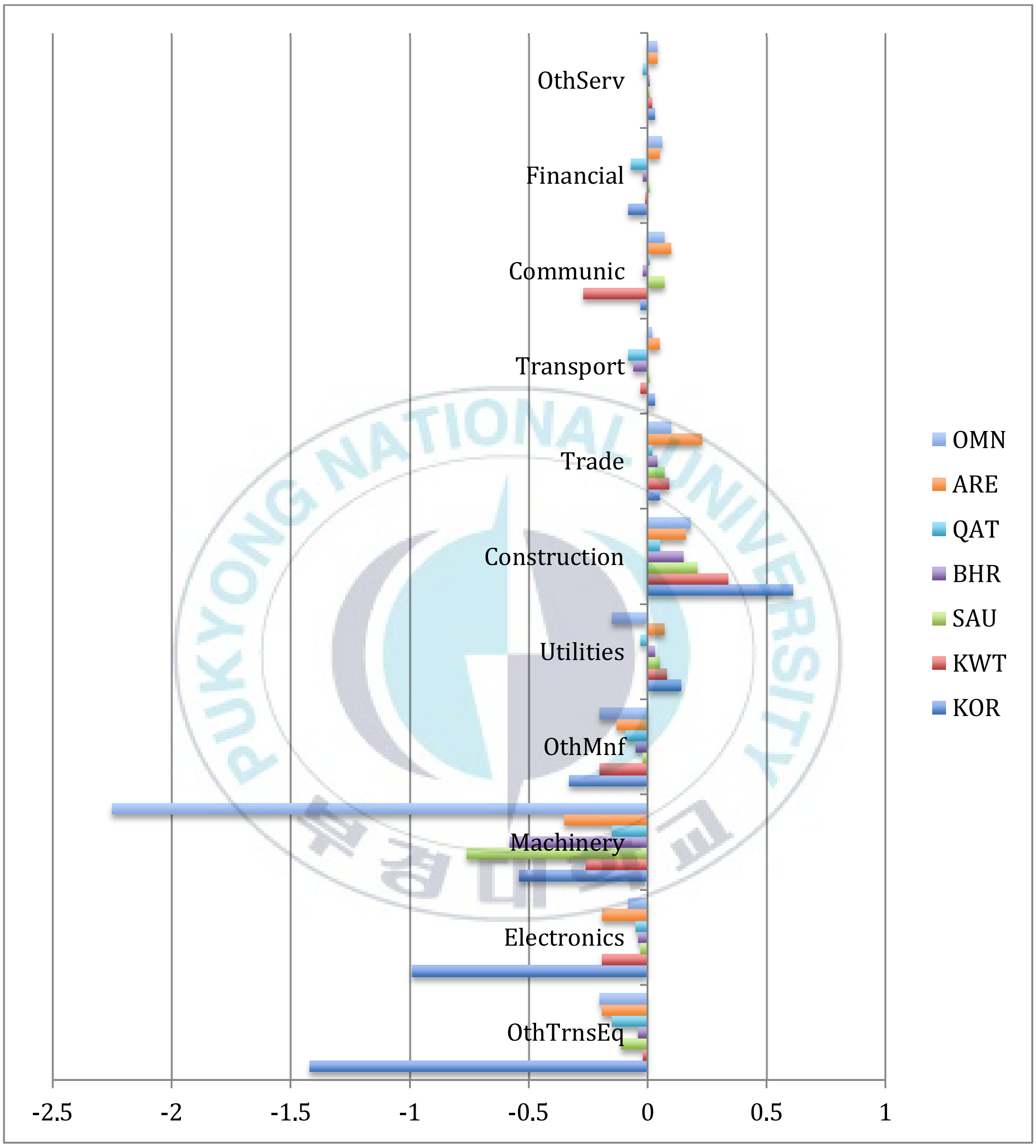
Source: Author's simulations

Figure 30 The effect of the Korea-GCC FTA on the value added in Scenario 5 (% change, 1/2)



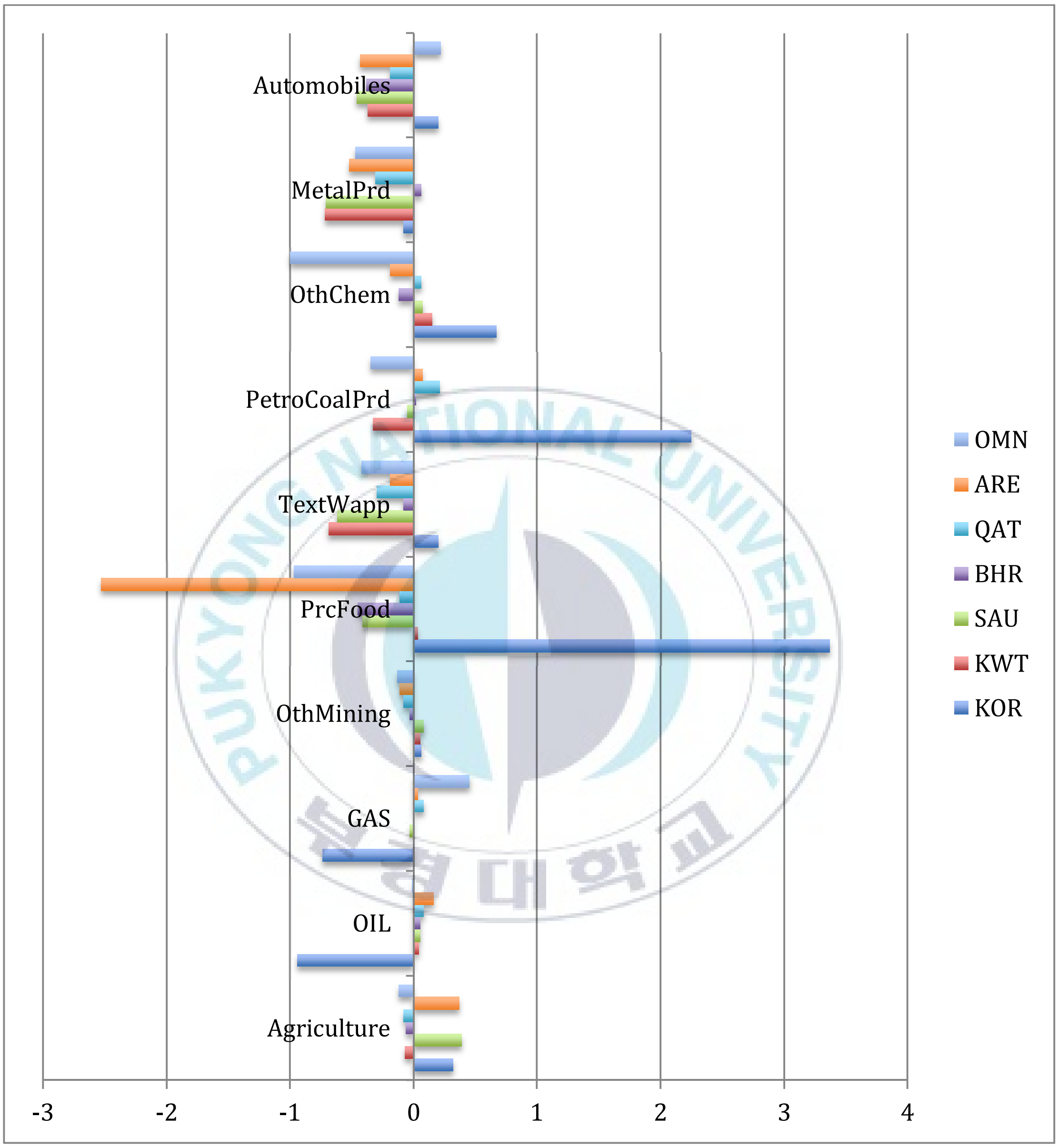
Source: Author's simulations

Figure 31 The effect of the Korea-GCC FTA on the value added in Scenario 5 (% change, 2/2)



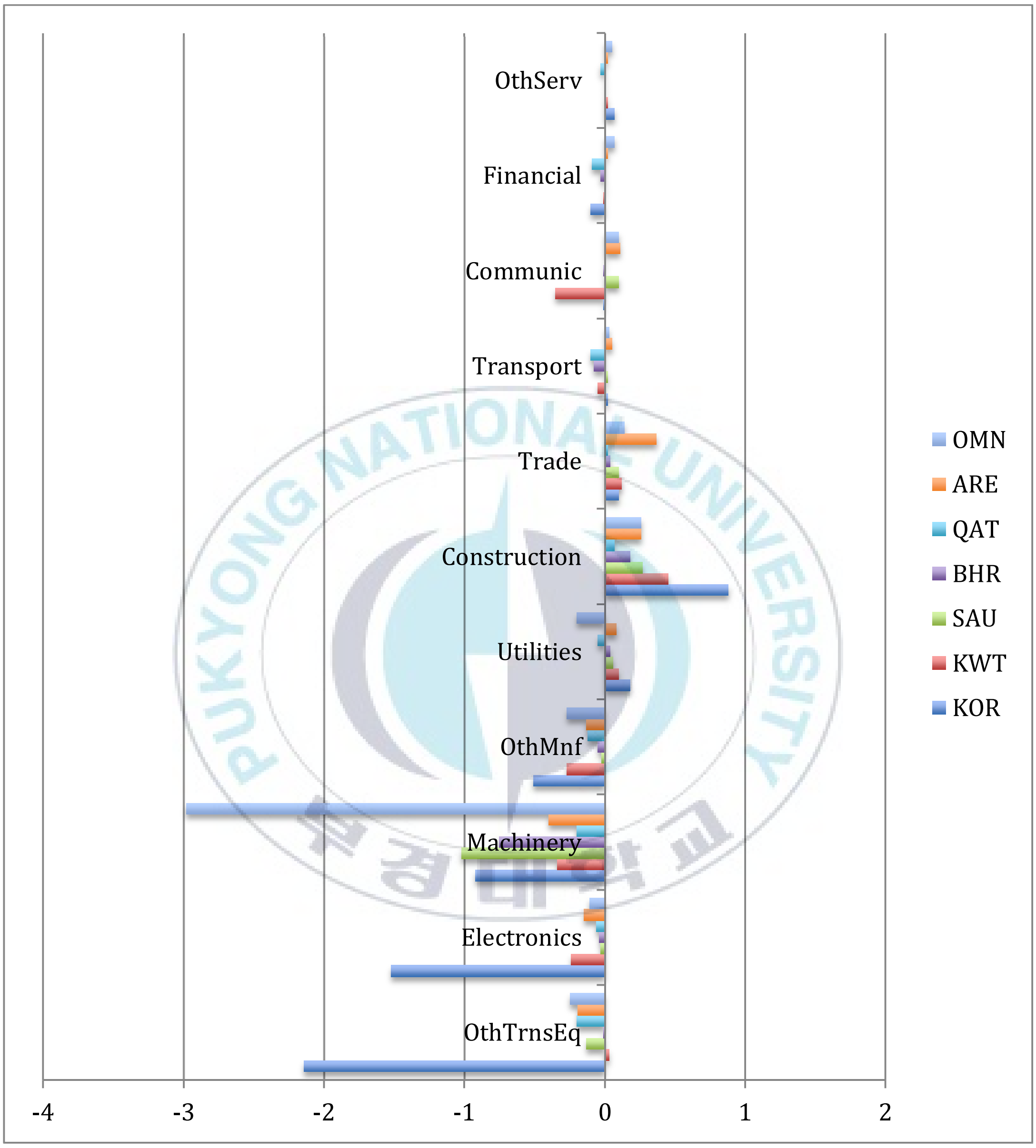
Source: Author's simulations

Figure 32 The effect of the Korea-GCC FTA on the value added in Scenario 6 (% change, 1/2)



Source: Author's simulations

Figure 33 The effect of the Korea-GCC FTA on the value added in Scenario 6 (% change, 2/2)



Source: Author's simulations

The trade balance (Table 3-30, Table 3-31 Table 3-32, Table, 3-33, Table 3-34 and Table 3-35, and Figure 34 to 45) of Korea and the GCC countries show that Korea has surpluses in more sectors than the GCC countries because of its diverse economy. Korea has a surplus in the six sectors of processed food, textiles and wearing apparel, petroleum and coal products and automobiles in the six scenarios, and the transport sector in Scenario 1. Kuwait has a surplus in the three sectors of oil, gas and other chemicals in the six scenarios. Saudi Arabia has a surplus in the three sectors of agriculture, oil and petroleum and coal products sectors in the six scenarios. Bahrain has a surplus in the sectors of petroleum and coal products, automobile and the construction sectors in the six scenarios, the agriculture sector in Scenario 3, and the processed food sector in Scenario 1. Qatar has a surplus in the four sectors of oil, gas, petroleum and coal products, and the other chemicals in the six scenarios. The UAE has a surplus in the sectors of the agriculture, oil, petroleum and coal products, and the trade sectors for the six scenarios, the utilities and construction sectors in Scenario 3, and the processed food sector in Scenario 2, Scenario 1, Scenario 4 and Scenario 5. Oman has a surplus in the sectors of oil, gas and the construction in the six scenarios, and the agriculture sector for Scenario 2 and Scenario 3.

The GCC countries share the surplus in the agriculture sector except for Kuwait and Qatar. Moreover, the GCC countries share the surplus in the oil sector except for Bahrain, the petroleum and coal products except for Kuwait and Oman. Only Kuwait and Qatar have a surplus in the other chemical sector. Bahrain is the only country that has a surplus in the metal sector. The UAE is the only member that has a surplus in the utilities sector. Bahrain, the UAE, and Oman have a surplus in the construction sector. Finally, the UAE is the only GCC member that has a surplus in the trade sector, while the rest of members do not. The overall results show that the effect of the TFP on the Korea-GCC FTA on the trade balance is almost the same between the first three scenarios and the rest three scenarios (with different levels of increase and decrease).

Table 3-30 The effect of the Korea-GCC FTA on trade balance by sector in case of Scenario 1 (in million USD)

DTBALi	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	-95	-1	2	-0	-0	9	-0
OIL	-1,199	177	408	-1	40	226	33
GAS	-38	1	-0	-0	60	-0	46
OthMining	-112	-0	-2	-0	-1	-3	-0
PrcFood	381	-2	-11	0	-1	122	-2
TextWapp	59	-3	-14	-0	-1	-25	-1
PetroCoalPrd	737	-34	5	7	41	19	-2
OthChem	580	1	-11	-2	5	-78	-28
MetalPrd	300	-14	-108	1	-15	-77	-7
Automobiles	200	-12	-86	-2	-12	-47	-8
OthTrnsEq	-370	-1	-3	-0	-2	-10	-1
Electronics	-602	-1	-8	-0	-1	-28	-1
Machinery	-219	-8	-86	-3	-21	-77	-9
OthMnf	-67	-3	-7	-0	-3	-38	-2
Utilities	0	-0	-0	-0	-3	-1	-2
Construction	-41	-0	-2	0	-1	-0	0
Trade	-65	-2	-3	-0	-2	0	-1
Transport	1	-3	-9	-1	-4	-8	-1
Communic	-10	-10	-1	-0	-1	-1	-0
Financial	-43	-1	-5	-1	-3	-6	-0
OthServ	-241	-13	-17	-0	-7	-15	-3

Source: Author’s simulations

Table 3-31 The effect of the Korea-GCC FTA on trade balance by sector in case of Scenario 2 (in million USD)

DTBALi	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	-230	-1	10	-0	-0	25	0
OIL	-1,844	267	620	-2	61	341	49
GAS	-71	1	-0	-0	96	-1	69
OthMining	-162	-0	-3	-1	-1	-5	-0
PrcFood	971	-4	-28	-0	-2	156	-4
TextWapp	85	-4	-23	-0	-2	-38	-1
PetroCoalPrd	1,126	-52	8	11	61	28	-3
OthChem	854	2	-14	-3	8	-120	-42
MetalPrd	460	-22	-170	2	-24	-121	-11
Automobiles	284	-19	-134	-4	-19	-72	-13
OthTrnsEq	-601	-2	-5	-0	-3	-15	-1
Electronics	-983	-2	-12	-0	-2	-40	-1
Machinery	-394	-12	-134	-4	-33	-118	-14
OthMnf	-113	-5	-10	-0	-4	-55	-3
Utilities	1	-1	-0	-0	-4	-1	-3
Construction	-68	-0	-3	0	-1	-0	0
Trade	-108	-3	-5	-0	-3	4	-1
Transport	-7	-4	-13	-1	-6	-11	-2
Communic	-16	-15	-2	-0	-1	-2	-0
Financial	-69	-2	-7	-1	-4	-9	-1
OthServ	-388	-19	-24	-0	-11	-22	-4

Source: Author's simulations

Table 3-32 The effect of the Korea-GCC FTA on trade balance by sector in case of Scenario 3 (in million USD)

DTBALi	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	-543	-1	41	0	-0	58	0
OIL	-2,508	356	832	-3	81	460	66
GAS	-116	1	-0	-0	134	-1	91
OthMining	-190	-1	-4	-1	-2	-6	-0
PrcFood	2,335	-5	-64	-3	-3	-7	-7
TextWapp	98	-6	-32	-0	-2	-42	-1
PetroCoalPrd	1,529	-70	9	14	79	42	-4
OthChem	1,083	4	-15	-4	11	-148	-56
MetalPrd	613	-30	-237	3	-33	-152	-15
Automobiles	320	-26	-185	-5	-26	-89	-19
OthTrnsEq	-904	-2	-6	-0	-4	-12	-1
Electronics	-1,492	-3	-15	-0	-3	-34	-2
Machinery	-708	-17	-187	-5	-46	-147	-20
OthMnf	-179	-6	-13	-0	-6	-50	-4
Utilities	0	-1	-1	-0	-5	0	-3
Construction	-104	-0	-3	0	-1	0	0
Trade	-167	-4	-6	-0	-3	17	-2
Transport	-33	-5	-18	-1	-8	-8	-3
Communic	-24	-21	-2	-0	-2	-1	-0
Financial	-103	-2	-9	-1	-5	-9	-1
OthServ	-577	-26	-30	-0	-15	-21	-6

Source: Author’s simulations

Table 3-33 The effect of the Korea-GCC FTA on trade balance by sector in case of Scenario 4 (in million USD)

DTBALi	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	-101	-1	1	0	-0	9	-0
OIL	-1,188	174	387	2	45	219	30
GAS	-38	1	-1	0	71	1	45
OthMining	-84	-0	-4	4	-1	-3	-1
PrcFood	370	-3	-15	2	-1	122	-2
TextWapp	39	-3	-17	1	-1	-26	-1
PetroCoalPrd	796	-31	3	0	37	15	-1
OthChem	610	0	-23	1	6	-80	-26
MetalPrd	343	-15	-120	6	-14	-78	-8
Automobiles	144	-13	-93	-1	-12	-48	-10
OthTrnsEq	-462	-2	-9	1	-2	-11	-1
Electronics	-749	-2	-11	0	-1	-29	-1
Machinery	-505	-9	-87	1	-20	-75	-11
OthMnf	-108	-3	-11	1	-3	-40	-2
Utilities	-0	-0	-0	-0	-2	-1	-2
Construction	-57	-0	-8	0	-0	-0	0
Trade	-105	-2	-5	0	-2	-0	-1
Transport	-33	-3	-8	-1	-3	-8	-1
Communic	-14	-10	-2	0	-1	-1	-0
Financial	-65	-1	-9	2	-3	-6	-1
OthServ	-379	-15	-31	2	-8	-15	-4

Source: Author's simulations

Table 3-34 The effect of the Korea-GCC FTA on trade balance by sector in case of Scenario 5 (in million USD)

DTBALi	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	-239	-2	9	-0	-0	24	-0
OIL	-1,826	264	585	-2	66	333	45
GAS	-71	1	-1	-0	110	2	67
OthMining	-120	-1	-6	-1	-1	-5	-1
PrcFood	955	-5	-34	-0	-2	156	-4
TextWapp	56	-5	-26	-1	-2	-40	-1
PetroCoalPrd	1,213	-43	3	9	54	23	-2
OthChem	899	-0	-31	-3	10	-126	-40
MetalPrd	526	-24	-188	1	-22	-123	-12
Automobiles	200	-21	-144	-4	-19	-74	-15
OthTrnsEq	-739	-3	-12	-0	-4	-17	-1
Electronics	-1,204	-3	-16	-0	-2	-44	-2
Machinery	-823	-15	-137	-5	-31	-116	-16
OthMnf	-174	-6	-16	-1	-4	-60	-3
Utilities	-0	-1	-0	-0	-4	-1	-3
Construction	-91	-0	-12	0	-0	-	0
Trade	-167	-3	-7	-0	-3	3	-2
Transport	-59	-4	-12	-1	-4	-11	-2
Communic	-23	-16	-3	-0	-1	-2	-0
Financial	-102	-2	-13	-1	-4	-10	-1
OthServ	-594	-24	-45	-1	-11	-24	-6

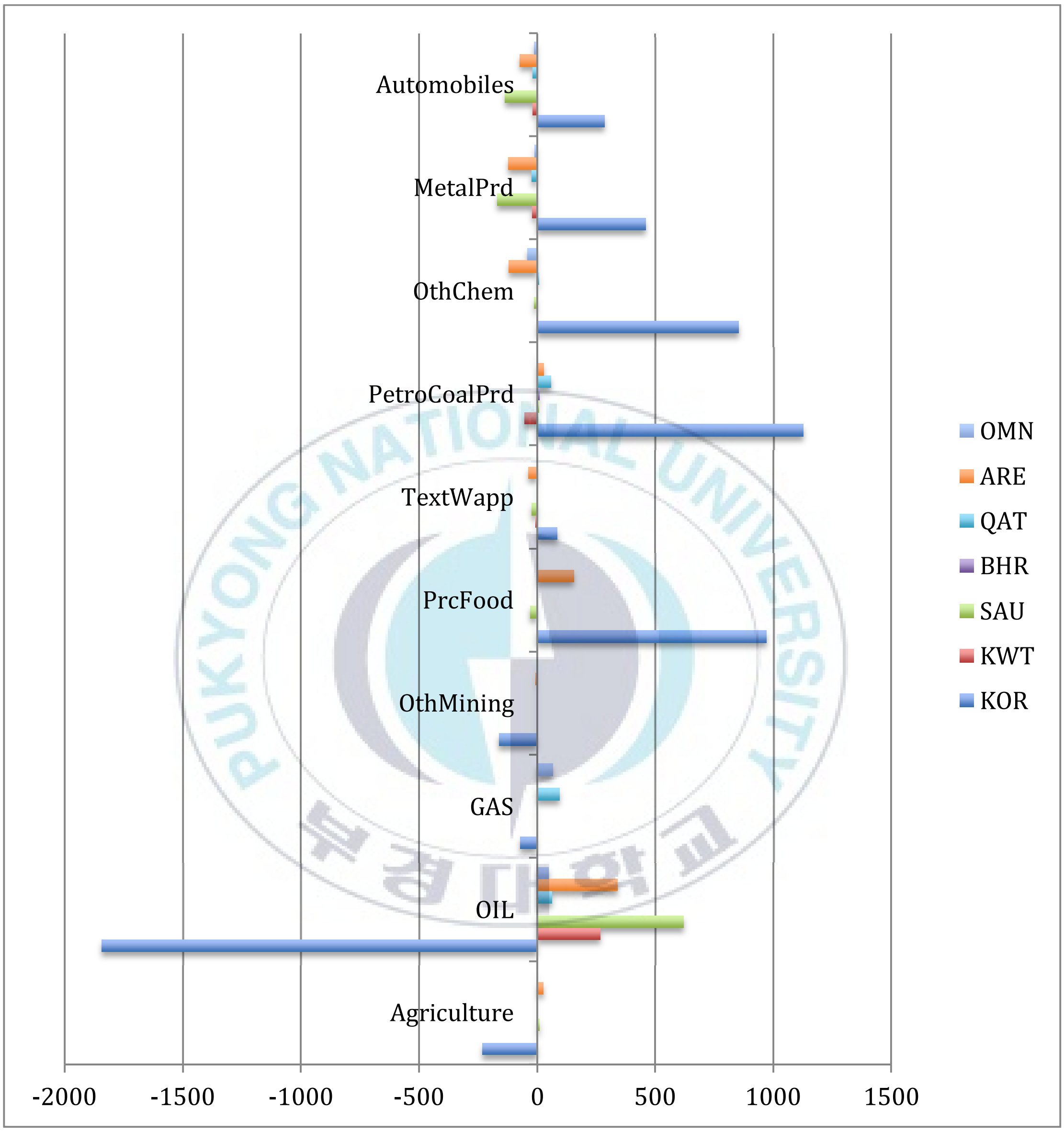
Source: Author’s simulations

Table 3-35 The effect of the Korea-GCC FTA on trade balance by sector in case of Scenario 6 (in million USD)

DTBALi	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	-556	-2	39	0	-0	57	0
OIL	-2,484	350	778	-2	86	456	59
GAS	-115	1	-1	-0	152	5	89
OthMining	-128	-1	-8	-1	-2	-8	-1
PrcFood	2,311	-7	-72	-3	-3	-8	-7
TextWapp	54	-6	-36	-1	-2	-48	-1
PetroCoalPrd	1,661	-61	1	12	68	36	-3
OthChem	1,150	2	-36	-4	15	-163	-52
MetalPrd	712	-33	-260	2	-31	-157	-17
Automobiles	194	-28	-198	-5	-26	-95	-22
OthTrnsEq	-1,110	-3	-15	-0	-5	-16	-1
Electronics	-1,822	-3	-20	-0	-3	-43	-2
Machinery	-1,350	-20	-189	-6	-43	-147	-22
OthMnf	-271	-8	-20	-1	-6	-63	-4
Utilities	-1	-1	-0	-0	-5	0	-3
Construction	-140	-1	-15	0	-1	0	0
Trade	-256	-4	-9	-0	-3	15	-2
Transport	-110	-5	-15	-1	-6	-8	-2
Communic	-34	-21	-4	-0	-1	-2	-0
Financial	-152	-3	-18	-1	-5	-11	-1
OthServ	-886	-31	-57	-1	-15	-26	-8

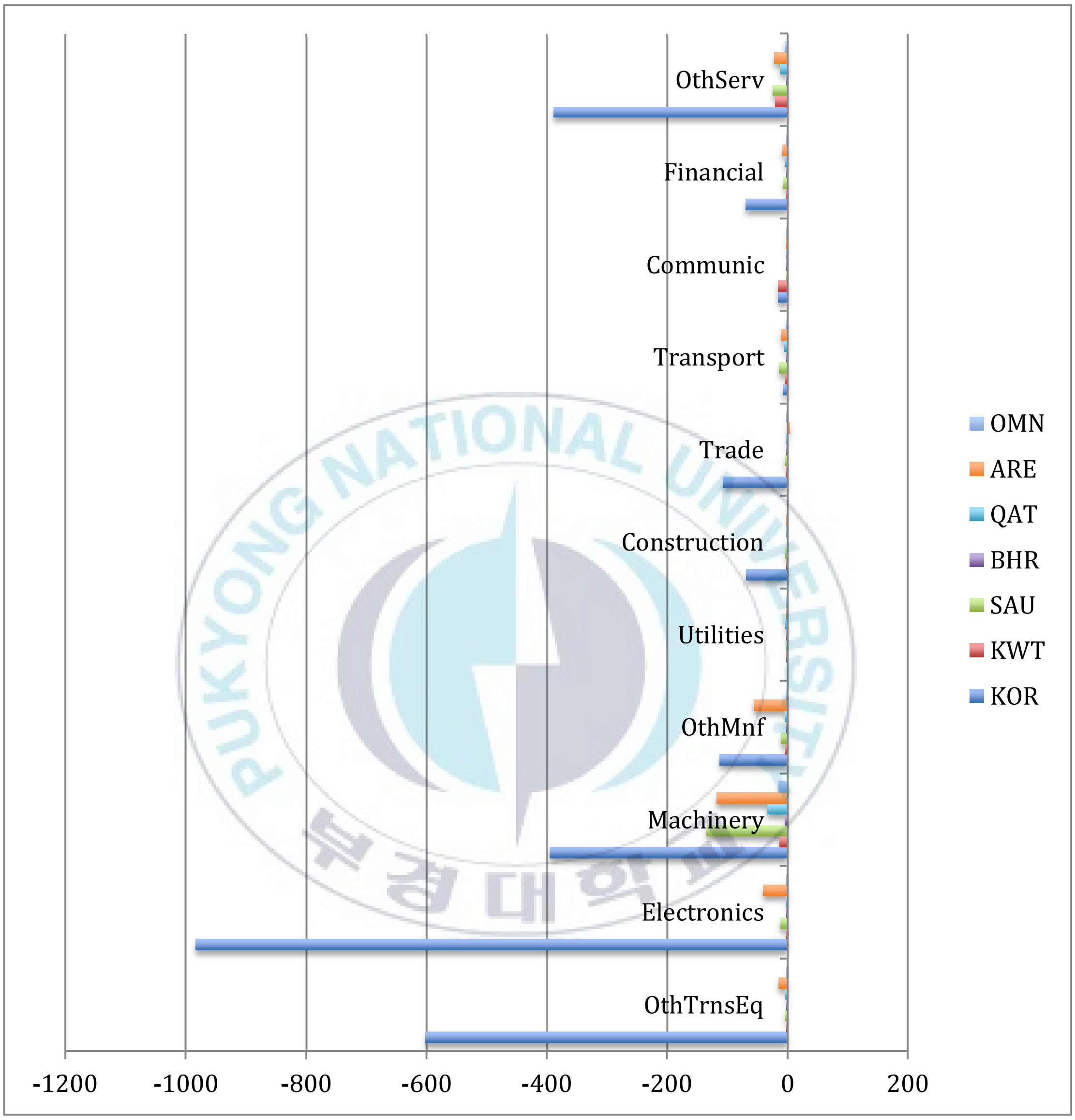
Source: Author’s simulations

Figure 34 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 1 (in million USD, 1/2)



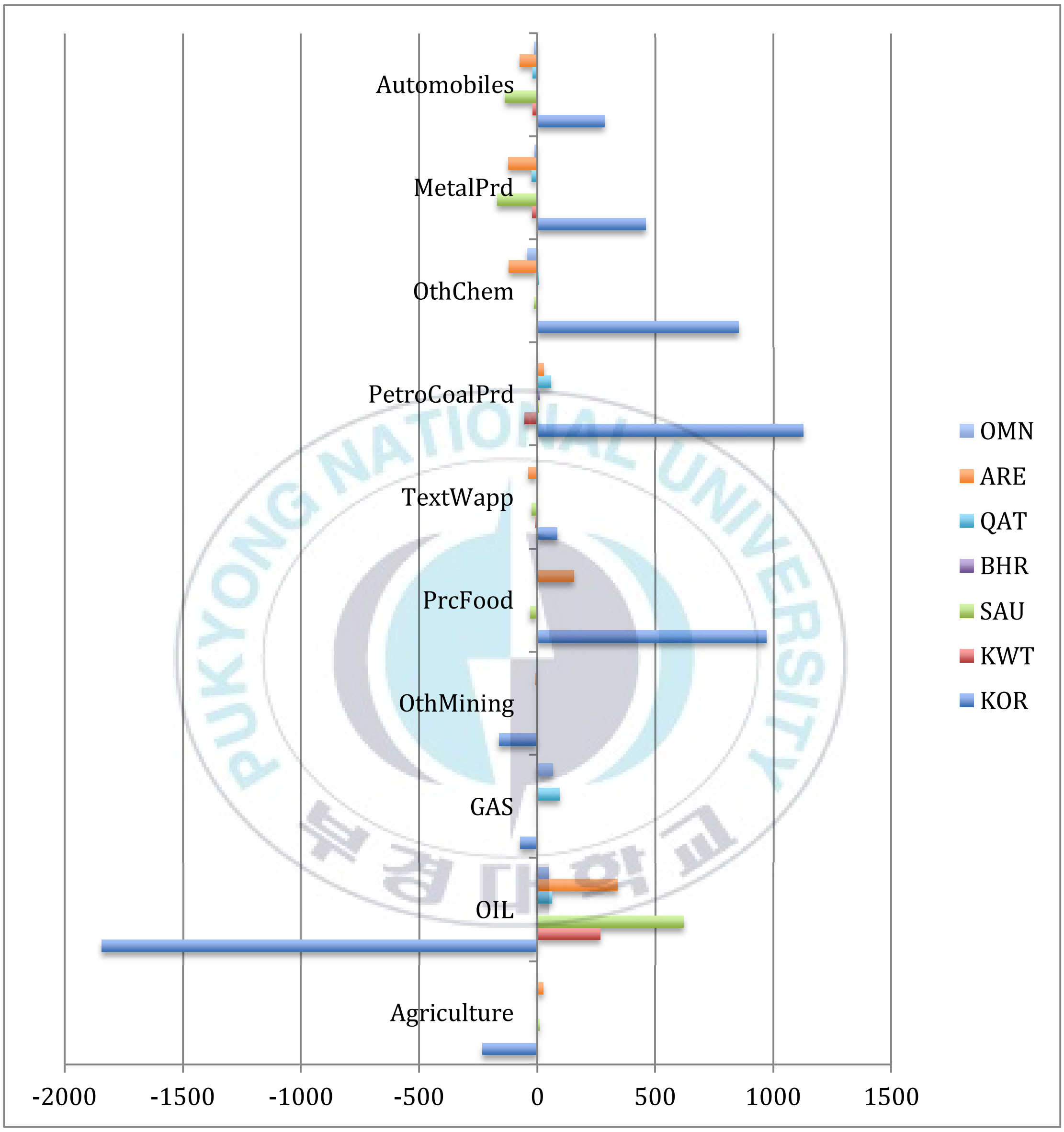
Source: Author's simulations

Figure 35 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 1 (in million USD, 2/2)



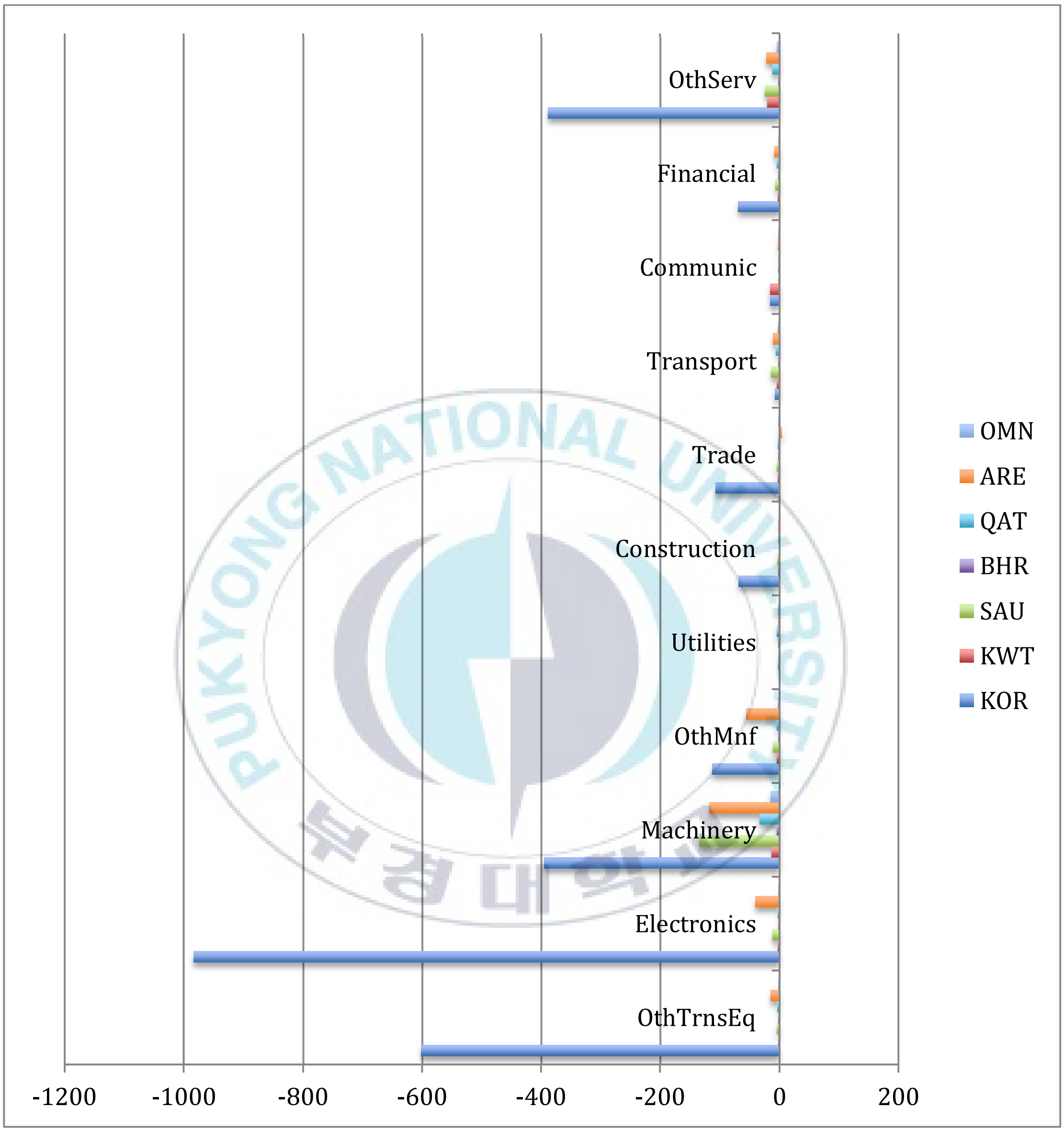
Source: Author's simulations

Figure 36 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 2 (in million USD, 1/2)



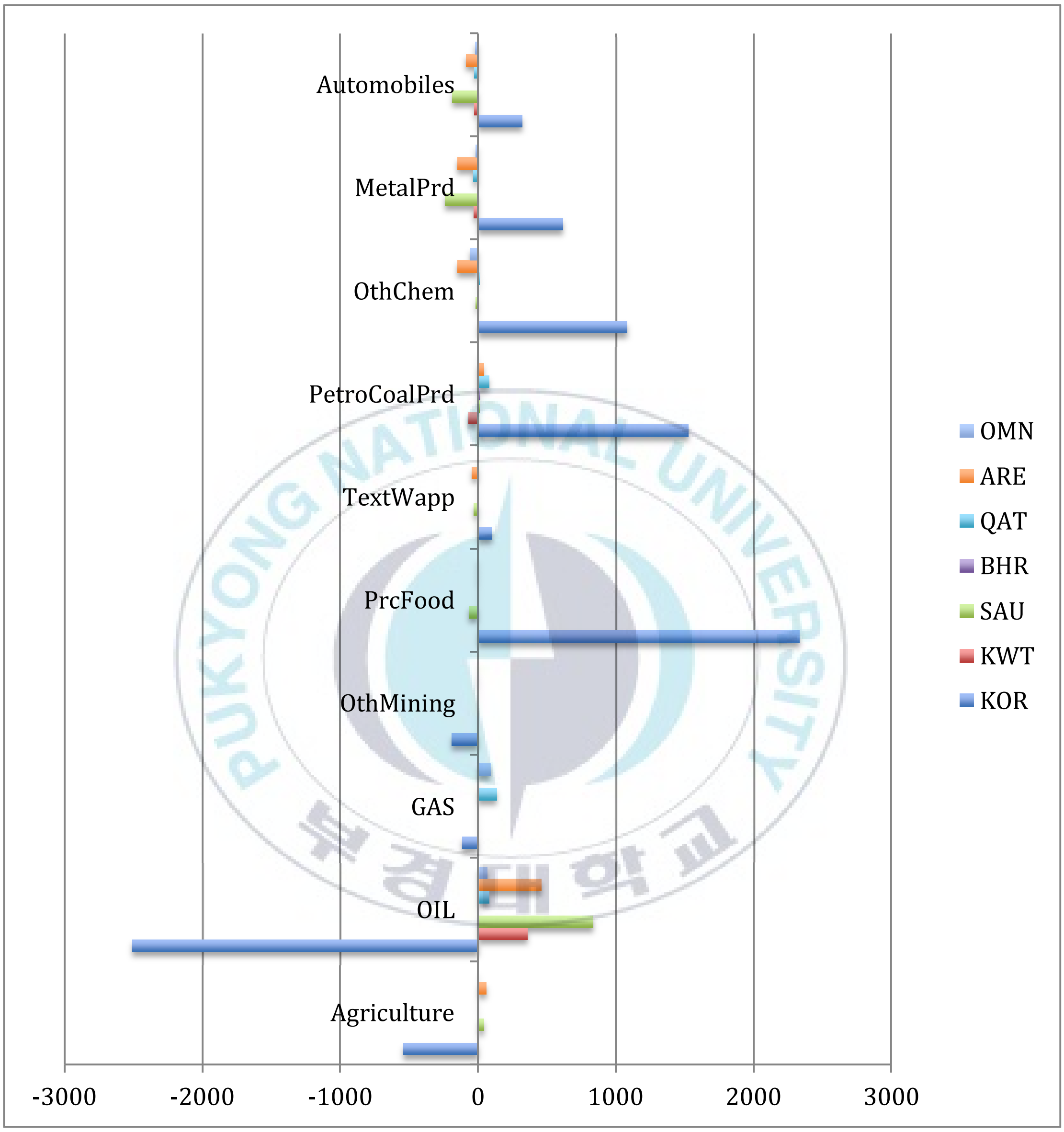
Source: Author's simulations

Figure 37 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 2 (in million USD, 2/2)



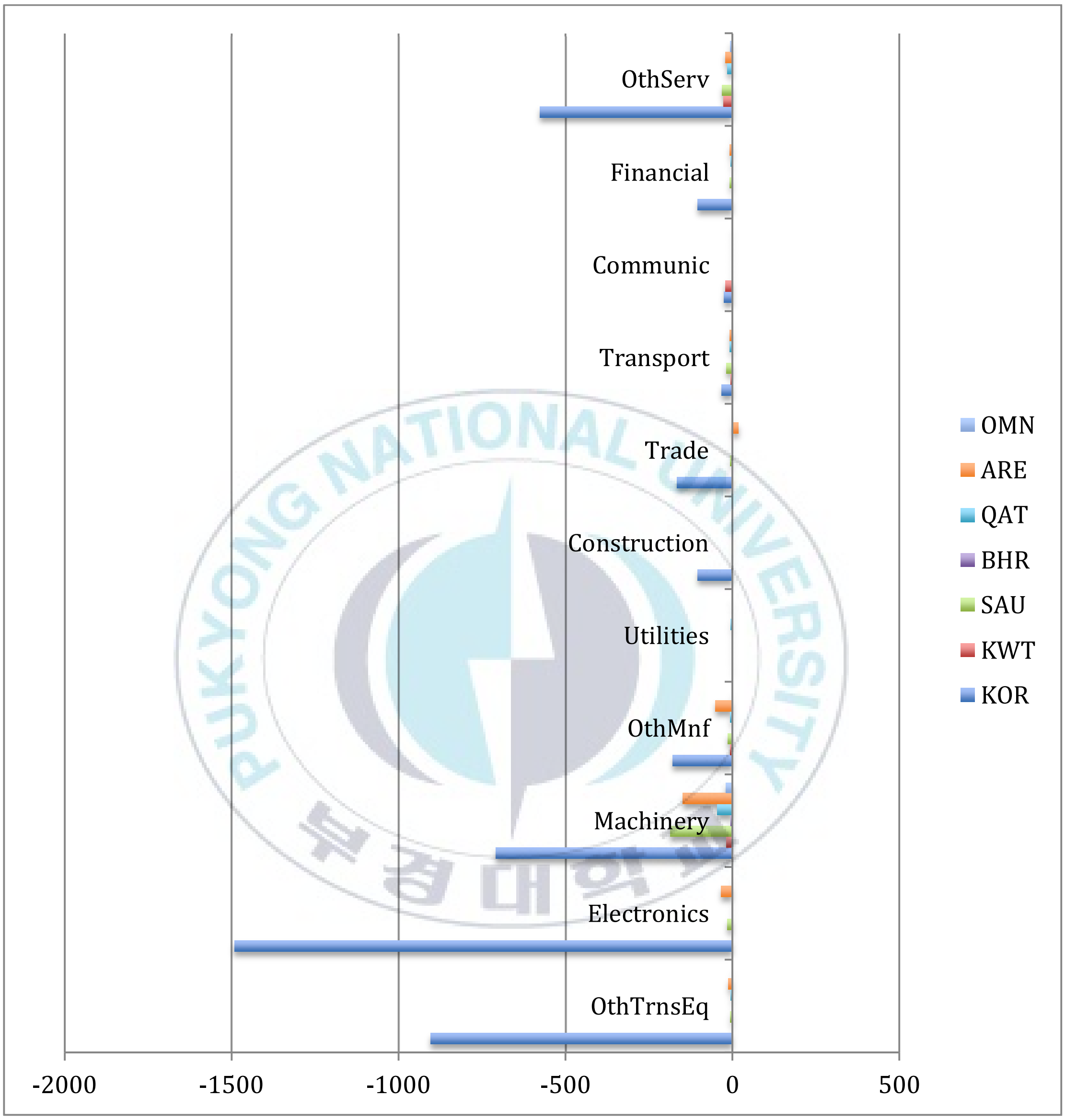
Source: Author’s simulations

Figure 38 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 3 (in million USD, 1/2)



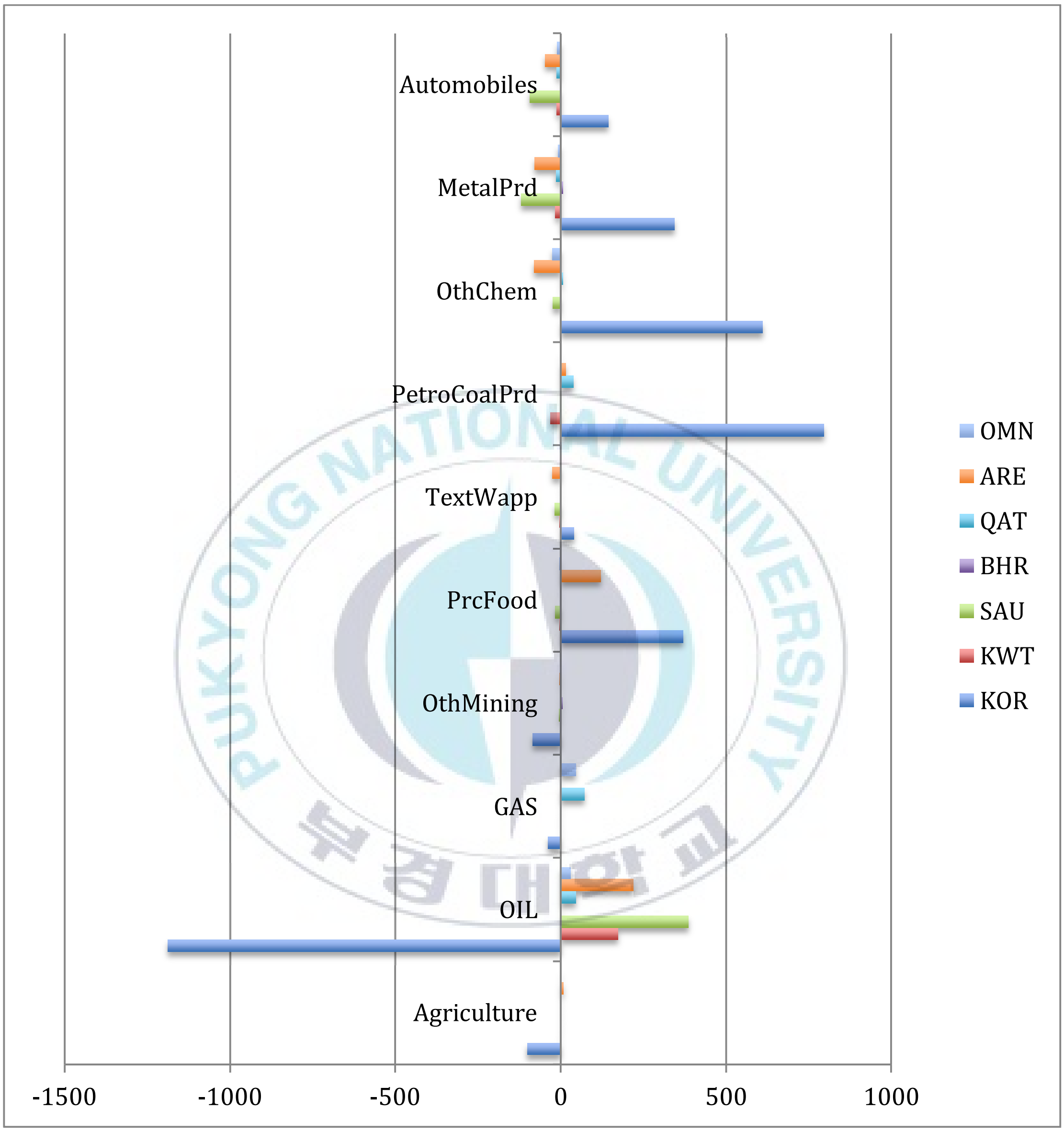
Source: Author's simulations

Figure 39 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 3 (in million USD, 2/2)



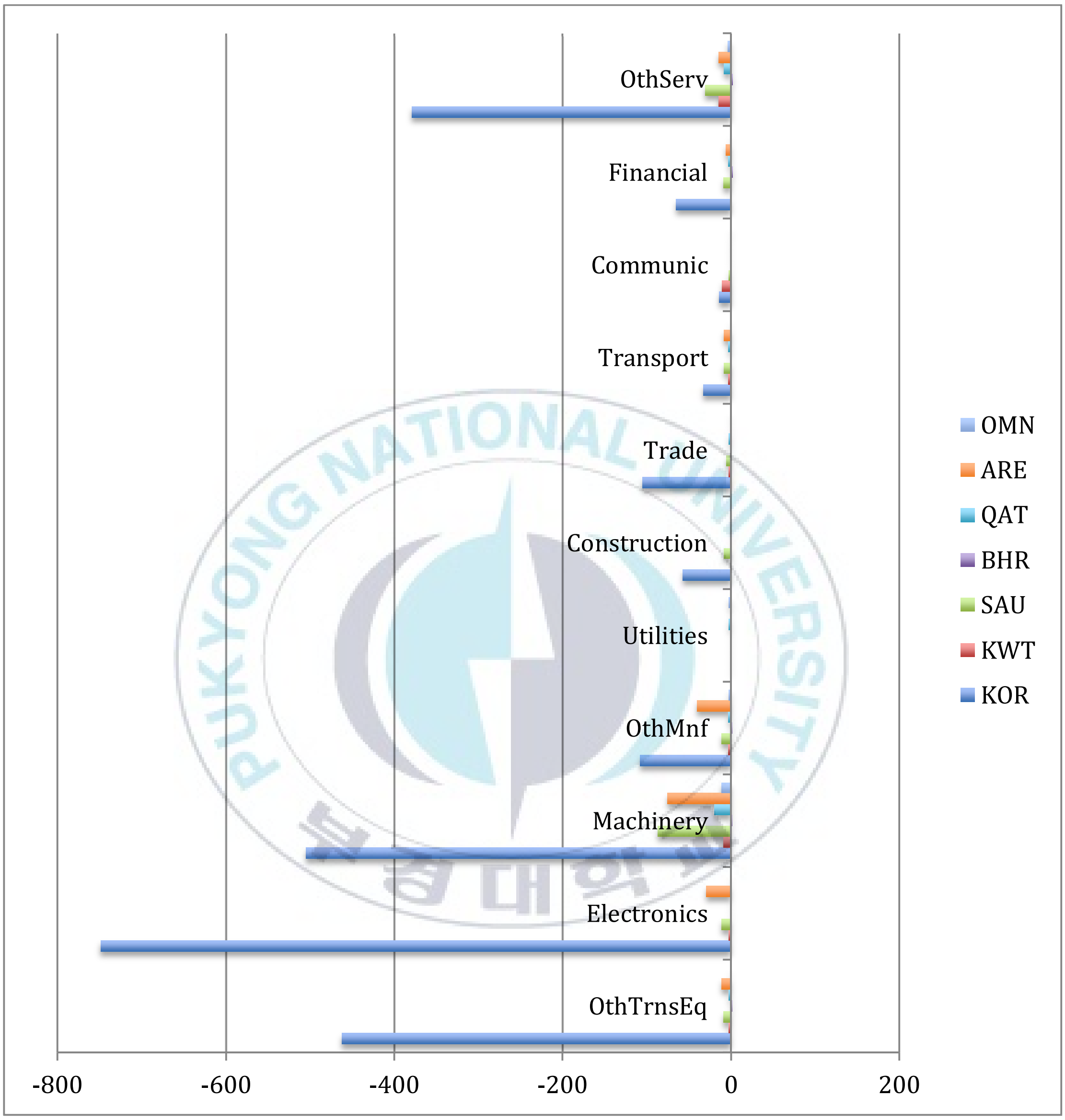
Source: Author’s simulations

Figure 40 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 4 (in million USD, 1/2)



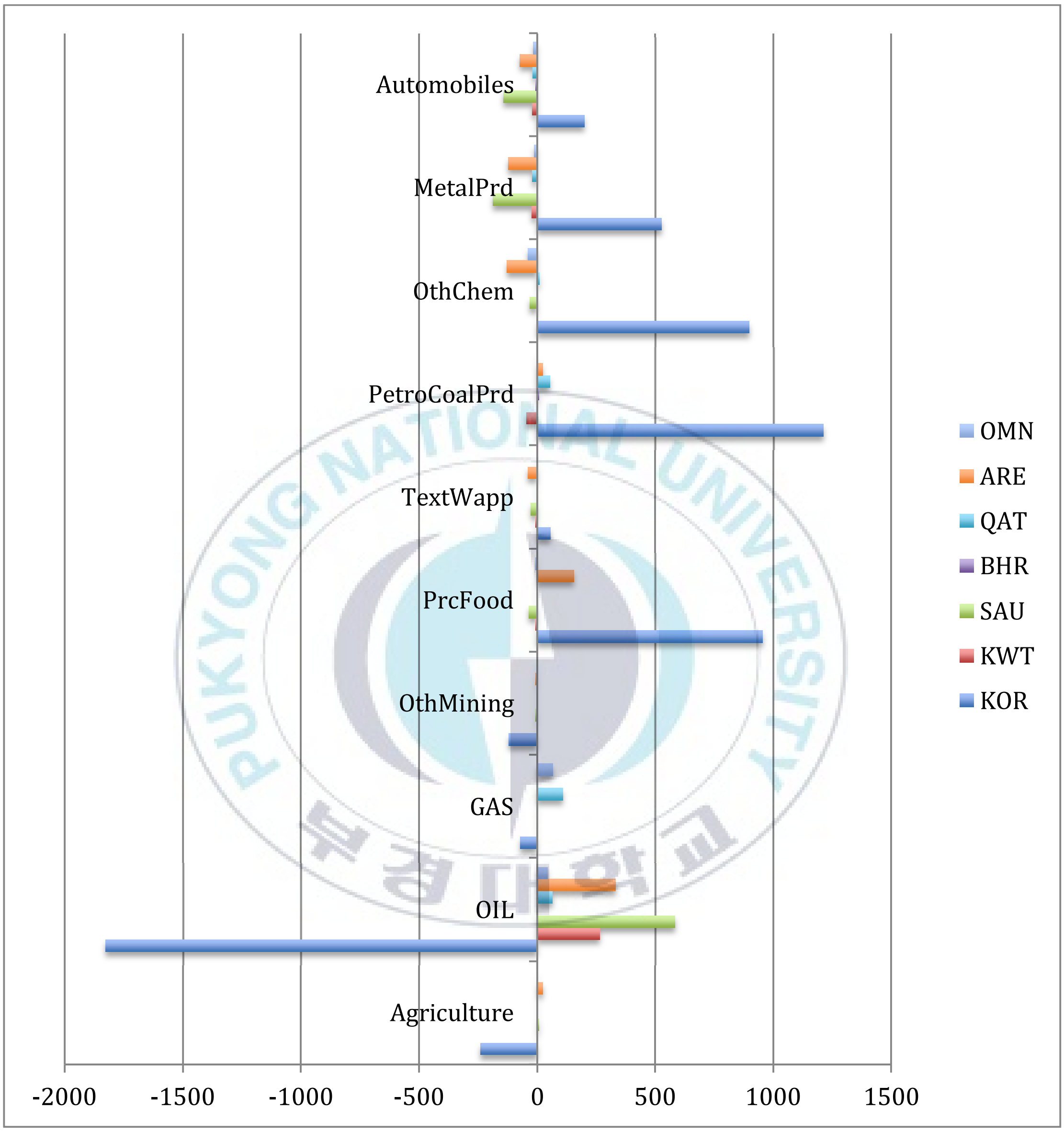
Source: Author’s simulations

Figure 41 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 4 (in million USD, 2/2)



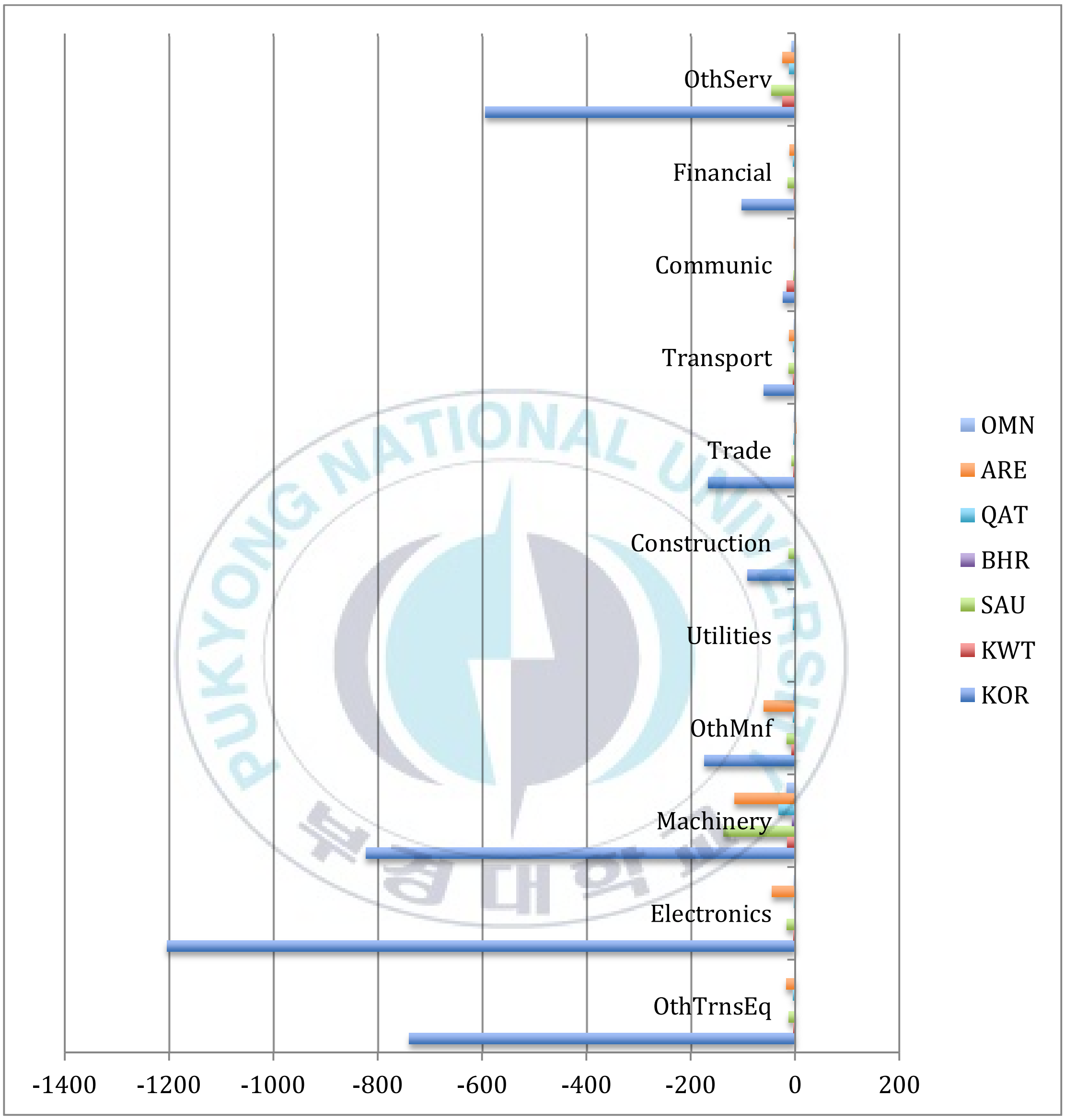
Source: Author’s simulations

Figure 42 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 5 (in million USD, 1/2)



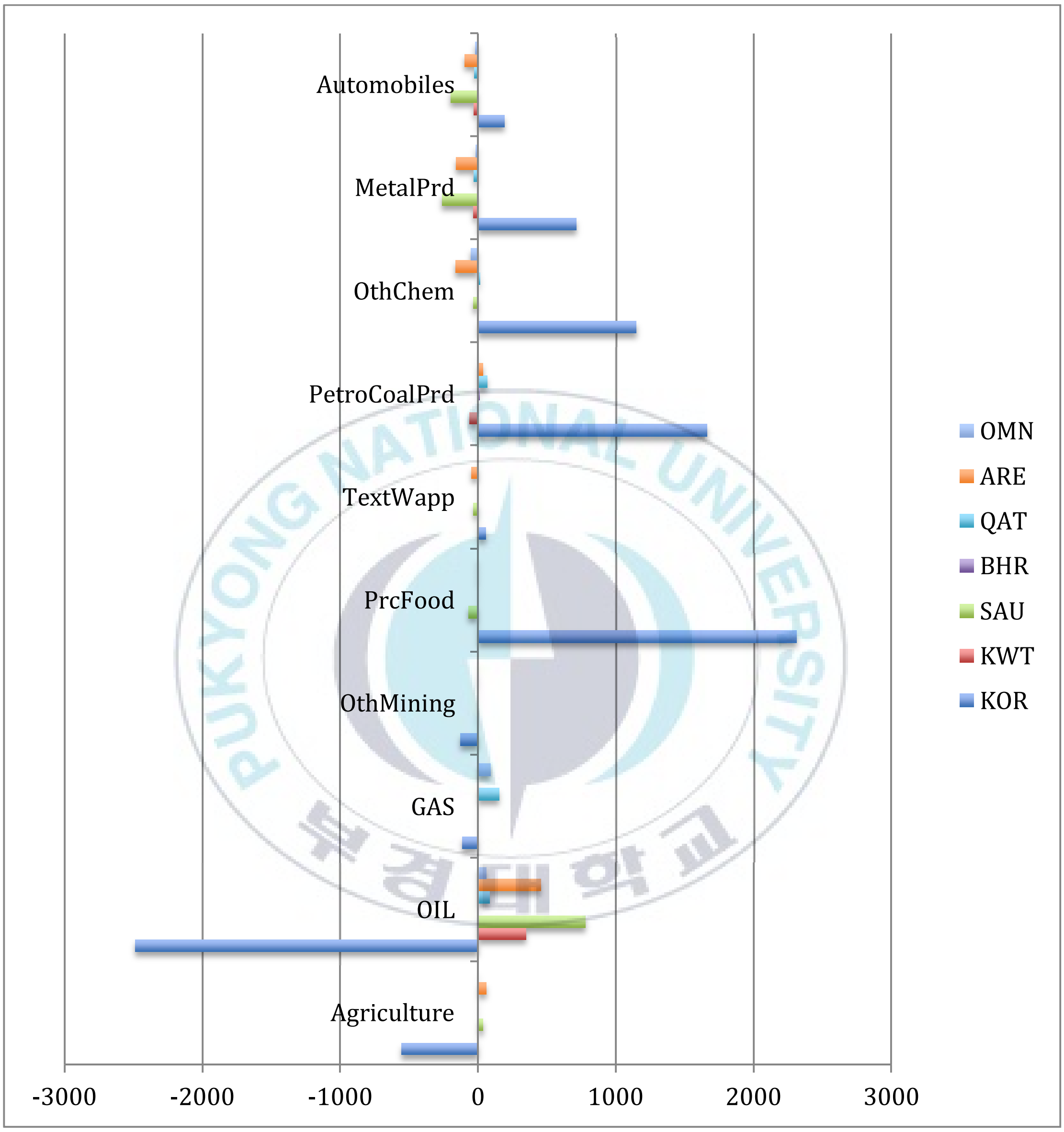
Source: Author's simulations

Figure 43 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 5 (in million USD, 2/2)



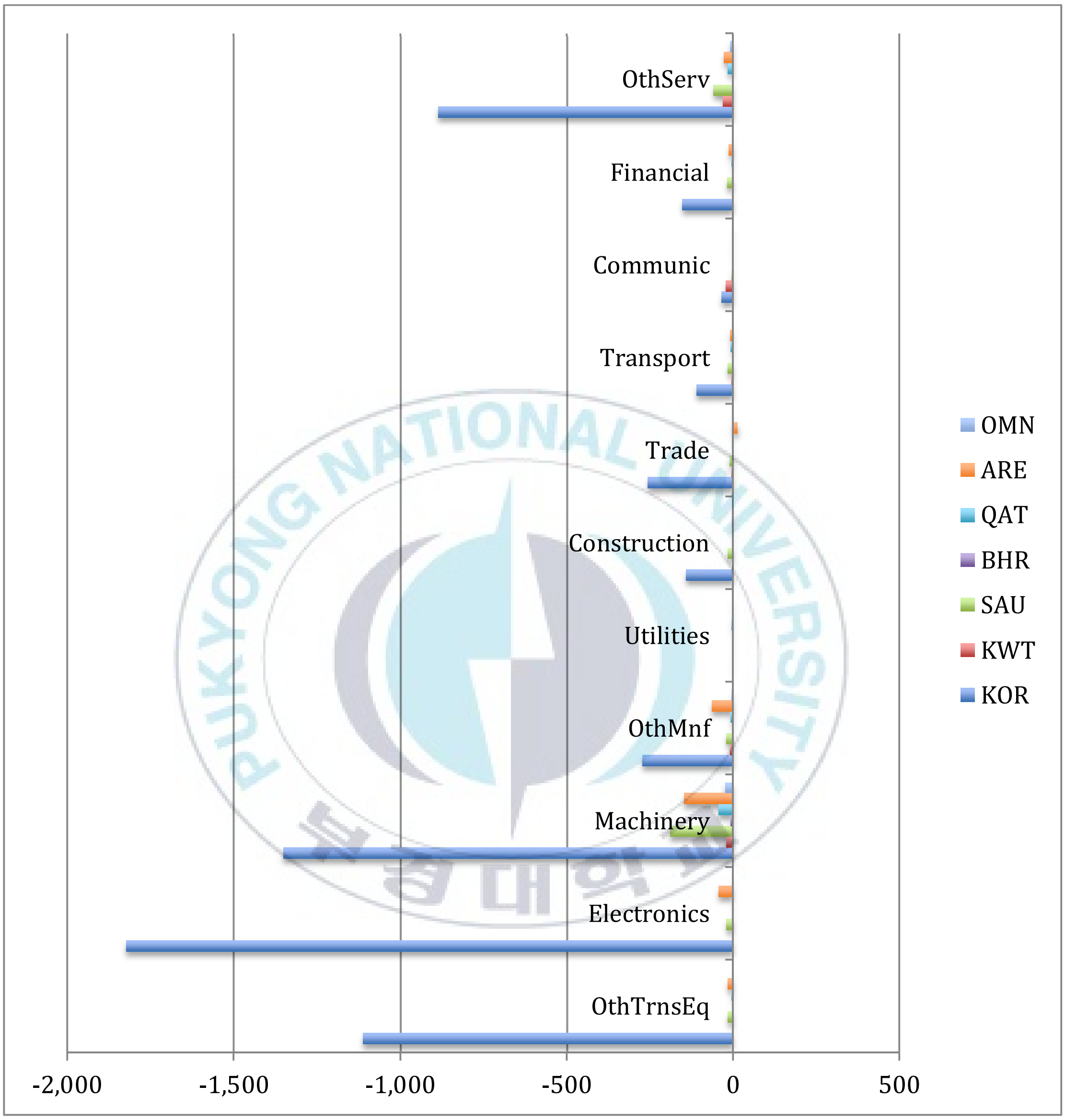
Source: Author's simulations

Figure 44 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 6 (in million USD, 1/2)



Source: Author's simulations

Figure 45 The effect of the Korea-GCC FTA on the trade balance by sector in Scenario 6 (in million USD, 2/2)



Source: Author's simulations

Table 3-36, Table 3-38 and Table 2-40 show the percentage changes for Korea's exports to the GCC countries for sectors by destination for Scenario 1, Scenario 2 and Scenario 3, respectively. According to the simulations, Korea's exports to the GCC countries have positively increased in most of the sectors, except for seven sectors for some of the GCC countries: the agriculture sector only for Oman in the three scenarios. Korea's exports of the other transport equipment sector for Kuwait, the UAE, and Oman in the three scenarios, Saudi Arabia in Scenario 3. Korea's exports of the construction sector for the six GCC members in the three scenarios, except for Bahrain in Scenario 3. The trade, communication, financial and other service sectors for the six GCC countries in the three scenarios. From Korea's perspective, a more openness leads to a higher definite increase in their exports to the GCC countries in most of the sector.

Table 3-42, Table 3-44 and Table 2-46 show the percentage changes for Korea's exports to the GCC countries by sector after adding the technological change for Scenario 4, Scenario 5 and Scenario 6, respectively. According to the simulations, Korea's exports to the GCC countries have positively increased in most of the sectors, except for seven sectors for some of the GCC countries: the agriculture sector only for Oman in the three scenarios. Korea's exports of the other transport equipment sector for Kuwait, the UAE and Oman in the three scenarios, and Saudi Arabia in Scenario 5, and Scenario 6. Korea's exports of the transport sector for Bahrain in the three scenarios, Qatar in Scenario 5 and Scenario 6, Kuwait, Saudi Arabia and the UAE in Scenario 5. The trade, communication, financial and other service and construction sectors for the six GCC countries in the three scenarios. From Korea's perspective, a more openness leads to a higher positive increase in their exports to the GCC countries in most of the sector.

Table 3-37, Table 3-39 and Table 3-41 show the percentage changes for the GCC's exports to Korea by sector for Scenario 1, Scenario 2 and Scenario 3, respectively. The results show positive effects for the GCC's exports to Korea in most of the sectors, except for four sectors: the gas sector for Saudi Arabia's only in Scenario 2. Kuwait's exports to Korea in the other transport equipment sector for in Scenario 3, and Qatar and Oman's exports to Korea in Scenario 1. The six GCC countries exports to Korea in the utilities sector in the three scenarios have a negative effect. The transport sector from Saudi Arabia and Qatar in the three scenarios, and Kuwait, Bahrain, the UAE and Oman in Scenario 1 and Scenario 2 have a negative effect as well.

Table 3-43, Table 3-45 and Table 3-47 show the percentage changes for the GCC's exports to Korea by sector for Scenario 4, Scenario 5 and Scenario 6, respectively. The results show positive effect for the GCC's exports to Korea in most of the sectors, except for four sectors: the gas sector for Saudi Arabia's only in Scenario 5. Kuwait's exports to Korea in the other transport equipment sector for Scenario 3. The Kuwait, Qatar, the UAE and Oman's exports to Korea in the utilities sector in the three scenarios have a negative effect and Saudi Arabia in Scenario 4. The transport sector for Bahrain in Scenario 4 has affected negatively as well.

From the GCC countries' perspective, a more openness leads to a higher positive increase in their exports to Korea, especially with the sectors that have high tariff rates (see Table 3-7 and Table 3-8). For example, the tariff rates on Saudi Arabia's agriculture exports are 129 percent, and after the full trade liberation, Saudi Arabia's exports will increase to 4,397 percent in Scenario 3. The reason for this high increasing percentage is that Korea has a protective policy to its agriculture sector, therefore, it applies high tariff rats to the agriculture imports. Therefore eliminating the tariff barrier for Saudi Arabia would open a new market for its agriculture exports, hence, trade creation effect.

Table 3-36 The change in Korea's exports to the GCC at world prices in sector by destination in case of Scenario 1 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	2.21	3.97	2.94	7.09	3.84	-0.89
OIL	0.00	0.00	0.00	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00	0.00	0.00
OthMining	7.14	6.97	6.94	6.95	6.99	6.80
PrcFood	12.07	9.55	23.37	11.32	263.66	18.39
TextWapp	18.65	18.15	18.68	18.95	18.39	18.89
PetroCoalPrd	13.61	13.10	13.45	13.45	13.32	12.9
OthChem	15.72	13.79	17.16	17.07	15.75	11.16
MetalPrd	17.91	17.55	18.81	18.46	17.56	18.04
Automobiles	12.94	12.61	12.83	13.29	12.67	12.63
OthTrnsEq	-0.21	0.15	21.36	22.14	-0.12	-0.20
Electronics	1.80	3.36	2.92	2.55	4.00	0.75
Machinery	14.87	15.77	19.23	18.86	16.17	17.76
OthMnf	17.48	17.54	18.90	17.65	17.51	17.66
Utilities	0.77	0.60	0.56	0.66	0.47	0.64
Construction	-0.20	-0.29	-0.32	-0.26	-0.29	-0.32
Trade	-0.35	-0.42	-0.46	-0.38	-0.42	-0.40
Transport	0.15	0.16	0.12	0.12	0.19	0.18
Communic	-0.46	-0.46	-0.50	-0.42	-0.40	-0.43
Financial	-0.50	-0.55	-0.58	-0.54	-0.48	-0.54
OthServ	-0.42	-0.52	-0.54	-0.49	-0.47	-0.46

Source: Author's simulations

Table 3-37 The change in the GCC's exports to Korea at world prices in sector by destination in case of Scenario 1 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.47	403.49	0.58	1.65	52.17	0.60
OIL	5.76	6.33	0.00	5.89	5.51	6.57
GAS	0.00	0.00	0.00	31.94	35.74	16.19
OthMining	0.08	0.35	0.26	4.52	5.67	0.60
PrcFood	0.18	39.69	50.98	0.15	55.62	26.84
TextWapp	47.04	35.10	43.28	48.16	37.87	44.24
PetroCoalPrd	3.82	4.07	4.16	3.93	3.97	4.17
OthChem	9.56	8.00	3.42	10.76	16.39	8.00
MetalPrd	0.32	1.26	8.88	5.00	3.54	3.66
Automobiles	23.87	25.81	24.28	23.70	25.62	23.40
OthTrnsEq	-0.15	0.66	0.25	-0.01	0.22	-0.01
Electronics	4.48	7.64	7.96	5.92	11.66	9.22
Machinery	11.96	30.82	26.00	22.72	22.36	28.75
OthMnf	0.46	11.48	7.11	16.60	7.97	9.12
Utilities	-0.64	-0.31	-0.22	-0.41	-0.41	-1.44
Construction	0.10	0.17	0.16	0.03	0.17	0.18
Trade	0.16	0.27	0.29	0.19	0.42	0.2
Transport	-0.10	-0.09	-0.05	-0.09	-0.03	-0.08
Communic	0.07	0.22	0.23	0.12	0.17	0.15
Financial	0.13	0.30	0.32	0.19	0.22	0.22
OthServ	0.15	0.27	0.31	0.20	0.22	0.24

Source: Author's simulations

Table 3-38 The change in Korea's exports to the GCC at world prices in sector by destination in case of Scenario 2 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	2.62	5.31	3.76	10.09	4.97	-2.11
OIL	0.00	0.00	0.00	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00	0.00	0.00
OthMining	10.96	10.69	10.64	10.66	10.73	10.42
PrcFood	18.48	14.46	37.08	17.23	650.44	28.56
TextWapp	29.31	28.46	29.37	29.83	28.87	29.70
PetroCoalPrd	21.25	20.43	21.00	21.01	20.78	20.18
OthChem	24.56	21.42	26.92	26.78	24.60	17.20
MetalPrd	28.06	27.46	29.60	28.99	27.48	28.28
Automobiles	20.05	19.51	19.86	20.62	19.59	19.55
OthTrnsEq	-0.36	0.11	33.77	35.09	-0.29	-0.41
Electronics	2.62	4.99	4.30	3.75	5.96	1.03
Machinery	23.07	24.51	30.23	29.62	25.17	27.78
OthMnf	27.38	27.49	29.72	27.68	27.43	27.68
Utilities	1.17	0.90	0.82	0.99	0.61	0.94
Construction	-0.35	-0.49	-0.53	-0.45	-0.48	-0.53
Trade	-0.60	-0.72	-0.78	-0.64	-0.77	-0.68
Transport	0.20	0.20	0.15	0.15	0.24	0.24
Communic	-0.75	-0.75	-0.81	-0.68	-0.67	-0.71
Financial	-0.81	-0.90	-0.94	-0.88	-0.79	-0.87
OthServ	-0.69	-0.85	-0.88	-0.80	-0.78	-0.75

Source: Author’s simulations

Table 3-39 The change in the GCC's exports to Korea at world prices in sector by destination in case of Scenario 2 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	1.26	1,255.79	1.45	3.04	92.05	1.52
OIL	8.66	9.54	0.00	8.86	8.27	9.91
GAS	0.00	-50.00	0.00	49.13	55.89	23.52
OthMining	0.17	0.52	0.35	6.78	8.64	0.89
PrcFood	0.53	66.97	88.52	0.48	99.60	43.94
TextWapp	79.74	57.82	72.72	81.85	62.88	74.50
PetroCoalPrd	5.76	6.15	6.29	5.94	5.99	6.30
OthChem	14.72	12.27	5.17	16.63	25.75	12.28
MetalPrd	0.48	1.90	13.65	7.59	5.37	5.56
Automobiles	38.33	41.67	39.04	38.03	41.35	37.53
OthTrnsEq	-0.21	1.04	0.43	0.01	0.37	0.03
Electronics	6.80	11.72	12.21	9.02	18.06	14.19
Machinery	18.56	50.17	41.83	36.24	35.65	46.60
OthMnf	0.72	17.83	10.93	26.11	12.27	14.08
Utilities	-0.93	-0.44	-0.29	-0.60	-0.59	-2.13
Construction	0.18	0.29	0.28	0.08	0.29	0.31
Trade	0.28	0.46	0.50	0.33	0.82	0.39
Transport	-0.14	-0.11	-0.06	-0.12	-0.02	-0.09
Communic	0.14	0.37	0.39	0.21	0.31	0.27
Financial	0.23	0.50	0.53	0.33	0.37	0.37
OthServ	0.26	0.45	0.52	0.33	0.37	0.40

Source: Author's simulations

Table 3-40 The change in Korea's exports to the GCC at world prices in sector by destination in case of Scenario 3 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	1.53	4.81	3.57	11.62	4.63	-5.77
OIL	0.00	0.00	0.00	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00	0.00	0.00
OthMining	14.12	14.29	13.95	15.00	14.36	15.38
PrcFood	24.73	18.97	50.85	22.73	1525.67	38.91
TextWapp	40.93	39.63	41.16	42.11	40.26	41.28
PetroCoalPrd	29.32	28.67	28.8	29.39	29.11	28.57
OthChem	34.10	29.48	37.55	37.54	34.13	23.36
MetalPrd	39.32	38.13	41.61	39.47	38.10	39.13
Automobiles	27.48	26.73	26.84	28.74	26.75	26.81
OthTrnsEq	-0.57	-0.43	46.85	50.00	-0.70	-1.28
Electronics	3.24	6.50	5.64	4.78	7.70	1.15
Machinery	31.69	33.72	42.18	40.71	34.62	38.26
OthMnf	38.08	38.01	41.18	38.48	38.05	38.36
Utilities	1.49	1.10	0.00	1.37	0.33	3.57
Construction	-0.62	-0.80	0.00	-0.64	-0.82	-0.83
Trade	-1.02	-1.23	-1.24	-1.36	-1.33	-0.93
Transport	0.00	0.17	0.20	0.00	0.16	0.16
Communic	-1.15	-0.76	-1.18	-1.08	-0.88	-1.16
Financial	-1.21	-1.27	-1.74	-1.04	-1.27	-1.11
OthServ	-1.10	-1.28	-1.33	-1.23	-0.75	-1.23

Source: Author’s simulations

Table 3-41 The change in the GCC's exports to Korea at world prices in sector by destination in case of Scenario 3 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.00	4,396.73	3.45	4.62	148.54	2.56
OIL	11.54	12.75	0.00	11.83	11.01	13.23
GAS	0.00	0.00	0.00	66.71	77.12	30.22
OthMining	0.00	0.00	0.00	100.00	12.50	1.63
PrcFood	0.00	101.80	139.10	1.08	165.94	64.83
TextWapp	121.67	84.86	109.70	124.71	93.65	112.00
PetroCoalPrd	7.71	8.26	8.35	7.95	8.04	8.40
OthChem	20.29	16.72	6.47	22.83	36.67	16.24
MetalPrd	0.83	2.49	18.48	10.19	7.05	7.78
Automobiles	55.05	60.05	55.81	54.14	59.66	53.72
OthTrnsEq	0.00	0.85	0.00	0.00	0.74	0.00
Electronics	9.30	15.84	15.97	12.32	25.15	19.89
Machinery	25.50	73.33	60.11	51.25	51.43	67.29
OthMnf	1.01	24.62	15.09	36.69	17.29	19.25
Utilities	-1.07	-0.62	-0.39	-0.81	-1.09	-2.98
Construction	0.33	0.34	0.51	0.18	0.88	0.48
Trade	0.40	0.69	0.54	0.93	1.53	0.00
Transport	0.00	-0.11	0.00	-0.25	0.12	0.00
Communic	0.31	0.71	0.65	0.36	0.84	0.60
Financial	0.38	0.94	0.93	0.50	0.75	0.00
OthServ	0.29	0.67	1.40	0.52	0.00	0.58

Source: Author's simulations

Table 3-42 The change in Korea's exports to the GCC at world prices in sector by destination in case of Scenario 4 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	2.17	3.91	2.82	7.03	3.77	-0.94
OIL	0.00	0.00	0.00	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00	0.00	0.00
OthMining	7.14	6.97	6.56	6.86	6.92	6.74
PrcFood	12.11	9.59	23.25	11.34	263.70	18.42
TextWapp	18.57	18.08	18.41	18.85	18.29	18.81
PetroCoalPrd	13.73	13.24	13.55	13.58	13.44	13.05
OthChem	15.78	13.86	16.98	17.09	15.77	11.20
MetalPrd	17.95	17.61	18.72	18.45	17.56	18.07
Automobiles	12.90	12.59	12.60	13.24	12.61	12.60
OthTrnsEq	-0.25	0.03	21.03	21.98	-0.26	-0.33
Electronics	1.69	3.27	2.56	2.41	3.86	0.63
Machinery	14.72	15.58	18.86	18.64	15.98	17.61
OthMnf	17.22	17.29	18.42	17.36	17.20	17.38
Utilities	0.69	0.54	0.43	0.62	0.40	0.58
Construction	-0.26	-0.33	-0.77	-0.41	-0.42	-0.41
Trade	-0.54	-0.59	-0.83	-0.56	-0.61	-0.57
Transport	0.05	0.06	-0.06	0.01	0.08	0.09
Communic	-0.65	-0.62	-0.85	-0.60	-0.60	-0.61
Financial	-0.75	-0.79	-0.98	-0.80	-0.75	-0.79
OthServ	-0.69	-0.78	-1.01	-0.77	-0.76	-0.71

Source: Author’s simulations

Table 3-43 The change in the GCC's exports to Korea at world prices in sector by destination in case of Scenario 4 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.49	403.60	0.71	1.71	52.23	0.64
OIL	5.76	6.32	0.00	5.91	5.50	6.56
GAS	0.00	0.00	0.00	31.97	35.83	16.15
OthMining	0.00	0.26	0.26	4.45	5.60	0.52
PrcFood	0.29	39.76	51.07	0.28	55.75	26.99
TextWapp	47.02	35.05	43.71	48.24	37.91	44.29
PetroCoalPrd	3.74	3.98	3.98	3.83	3.86	4.11
OthChem	9.53	7.96	3.44	10.75	16.34	8.03
MetalPrd	0.24	1.13	8.91	4.97	3.46	3.57
Automobiles	24.01	25.88	24.50	23.87	25.76	23.57
OthTrnsEq	0.01	0.77	0.71	0.25	0.44	0.22
Electronics	4.52	7.63	8.26	6.01	11.70	9.35
Machinery	12.14	30.94	26.45	22.96	22.54	29.06
OthMnf	0.58	11.60	7.39	16.81	8.12	9.32
Utilities	-0.32	-0.02	0.03	-0.17	-0.19	-1.20
Construction	0.24	0.29	0.25	0.22	0.30	0.33
Trade	0.38	0.48	0.59	0.44	0.64	0.43
Transport	0.00	0.06	-0.03	0.04	0.05	0.06
Communic	0.20	0.33	0.46	0.29	0.31	0.27
Financial	0.32	0.47	0.68	0.40	0.42	0.40
OthServ	0.35	0.44	0.68	0.42	0.43	0.41

Source: Author's simulations

Table 3-44 The change in Korea's exports to the GCC at world prices in sector by destination in case of Scenario 5 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	1.64	5.28	3.18	11.59	4.35	-4.80
OIL	0.00	0.00	0.00	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00	0.00	0.00
OthMining	14.97	14.53	14.33	14.29	14.48	14.06
PrcFood	24.95	19.20	51.93	22.93	1527.82	38.83
TextWapp	40.67	39.41	40.69	41.36	39.93	41.13
PetroCoalPrd	29.84	28.67	29.49	29.52	29.11	28.24
OthChem	34.25	29.68	37.53	37.31	34.14	23.59
MetalPrd	39.17	38.28	41.38	40.37	38.17	39.45
Automobiles	27.43	26.67	27.11	28.22	26.67	26.71
OthTrnsEq	-0.67	-0.37	46.96	48.85	-0.98	-1.10
Electronics	3.06	6.25	5.22	4.48	7.44	0.84
Machinery	31.35	33.29	41.62	40.65	34.22	38.08
OthMnf	37.36	37.51	40.68	37.69	37.23	37.72
Utilities	1.33	1.02	0.88	1.16	0.35	1.01
Construction	-0.69	-0.88	-1.07	-1.04	-1.03	-1.04
Trade	-1.39	-1.52	-1.66	-1.44	-1.83	-1.48
Transport	-0.07	-0.06	-0.15	-0.14	-0.07	0.00
Communic	-1.56	-1.52	-1.65	-1.47	-1.53	-1.49
Financial	-1.78	-1.86	-2.01	-1.90	-1.82	-1.88
OthServ	-1.65	-1.86	-1.96	-1.85	-1.83	-1.72

Source: Author’s simulations

Table 3-45 The change in the GCC's exports to Korea at world prices in sector by destination in case of Scenario 5 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	1.28	1256.17	1.49	3.14	92.17	1.58
OIL	8.65	9.52	0.00	8.89	8.26	9.89
GAS	0.00	-50.00	0.00	49.18	56.09	23.46
OthMining	0.00	0.37	0.26	6.71	8.52	0.77
PrcFood	0.72	67.08	88.69	0.67	99.86	44.19
TextWapp	79.62	57.73	72.70	81.99	62.93	74.60
PetroCoalPrd	5.66	6.01	6.13	5.77	5.82	6.21
OthChem	14.68	12.21	5.10	16.61	25.66	12.33
MetalPrd	0.36	1.71	13.48	7.55	5.24	5.41
Automobiles	38.56	41.79	39.23	38.32	41.58	37.82
OthTrnsEq	-0.01	1.21	0.71	0.41	0.67	0.37
Electronics	6.84	11.69	12.21	9.16	18.12	14.39
Machinery	18.82	50.38	42.08	36.62	35.95	47.12
OthMnf	0.90	18.02	11.10	26.45	12.50	14.40
Utilities	-0.41	0.00	0.01	-0.24	-0.27	-1.77
Construction	0.41	0.48	0.46	0.35	0.50	0.54
Trade	0.62	0.77	0.81	0.70	1.16	0.72
Transport	0.03	0.11	0.08	0.07	0.11	0.11
Communic	0.33	0.54	0.56	0.46	0.51	0.45
Financial	0.50	0.76	0.82	0.65	0.67	0.64
OthServ	0.54	0.71	0.82	0.67	0.69	0.66

Source: Author's simulations

Table 3-46 The change in Korea's exports to the GCC at world prices in sector by destination in case of Scenario 6 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	2.58	5.17	3.68	9.99	4.86	-2.18
OIL	0.00	0.00	0.00	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00	0.00	0.00
OthMining	11.01	10.69	10.56	10.52	10.63	10.36
PrcFood	18.58	14.52	37.13	17.25	650.59	28.61
TextWapp	29.20	28.35	29.22	29.66	28.72	29.56
PetroCoalPrd	21.45	20.65	21.21	21.22	20.97	20.34
OthChem	24.71	21.54	26.97	26.80	24.65	17.27
MetalPrd	28.17	27.57	29.64	28.97	27.50	28.36
Automobiles	19.99	19.47	19.77	20.54	19.51	19.49
OthTrnsEq	-0.39	-0.06	33.56	34.82	-0.49	-0.60
Electronics	2.48	4.85	4.11	3.54	5.76	0.85
Machinery	22.86	24.22	29.94	29.26	24.87	27.54
OthMnf	26.99	27.08	29.26	27.20	26.93	27.24
Utilities	1.04	0.80	0.73	0.92	0.51	0.85
Construction	-0.40	-0.55	-0.67	-0.67	-0.67	-0.66
Trade	-0.87	-0.97	-1.06	-0.91	-1.05	-0.94
Transport	0.04	0.05	-0.01	-0.02	0.08	0.09
Communic	-1.03	-1.00	-1.09	-0.96	-0.96	-0.98
Financial	-1.17	-1.25	-1.34	-1.27	-1.19	-1.25
OthServ	-1.08	-1.23	-1.29	-1.23	-1.20	-1.13

Source: Author’s simulations

Table 3-47 The change in the GCC's exports to Korea at world prices in sector by destination in case of Scenario 6 (% change)

vxwd	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	3.12	4383.55	3.48	5.66	149.51	3.68
OIL	11.54	12.73	0.00	11.86	11.03	13.23
GAS	0.00	-50.00	0.00	66.81	77.56	30.18
OthMining	-0.08	0.42	0.26	8.97	11.51	0.95
PrcFood	1.64	102.06	139.41	1.58	166.19	65.33
TextWapp	120.88	84.91	109.34	124.83	93.70	112.49
PetroCoalPrd	7.55	8.03	8.19	7.69	7.81	8.30
OthChem	20.09	16.64	6.86	22.81	35.89	16.81
MetalPrd	0.45	2.27	18.41	10.15	7.11	7.27
Automobiles	55.26	60.23	56.31	54.89	60.03	54.14
OthTrnsEq	0.12	1.77	1.12	0.67	1.12	0.65
Electronics	9.26	15.96	16.71	12.42	25.11	19.73
Machinery	26.05	73.24	60.45	52.11	51.17	68.25
OthMnf	1.33	25.01	15.27	37.14	17.29	19.87
Utilities	-0.42	0.14	0.17	-0.19	-0.16	-2.21
Construction	0.65	0.76	0.74	0.57	0.83	0.84
Trade	1.01	1.20	1.28	1.11	2.14	1.17
Transport	0.11	0.23	0.18	0.15	0.30	0.23
Communic	0.57	0.86	0.90	0.74	0.88	0.73
Financial	0.84	1.18	1.28	1.04	1.09	1.02
OthServ	0.86	1.10	1.25	1.04	1.10	1.03

Source: Author's simulations

The Korea-GCC FTA agreement has an effect on Korea and the GCC countries in many of their production sectors (see Table 3-48, Table 3-49, Table 3-50, Table 3-51, Table 3-52 and Table 3-53). The FTA agreement has a positive effect for the production of Korea in the sectors of agriculture, other mining, processed food, textile and wearing appeal, petroleum and coal products, other chemical, metal products, automobiles, utilities, construction trade and transport in the six scenarios. Korea's highest productions increase in the sectors of the processed food (3.47%), the petroleum and coal products (2.34%) and the construction (0.97%) in Scenario 6.

The agreement has a positive effect on the production of Kuwait in the sectors of oil, gas, other mining, other chemicals, utilities, construction, trade, the financial and other services in the three scenarios, and the other transport equipment only in Scenario 3, 4, 5 and 6. Kuwait's highest productions increase in the sectors of the construction (0.5%), the other chemicals (0.21%) and the oil (0.09%) in Scenario 6. The agreement has a positive effect on the production of Saudi Arabia in the sectors of agriculture, oil, other mining, other chemicals, utilities, construction, trade, communication, financial, and other services in the six scenarios. Saudi Arabia's highest productions increase in the sectors of the agriculture (0.43%), construction (0.31%), and the oil (0.09%) in Scenario 6. In addition, the agreement has a positive effect on the production of Bahrain in the sectors of oil, gas, petroleum and coal products, metal products, utilities, construction, trade and other services in the six scenarios, the other transport equipment in Scenario 3, and the processed food sector in Scenario 1, 4 and 5. Bahrain's highest productions increase in the sectors of the construction (0.19%) in Scenario 6, the processed food (0.1%) in Scenario 1, and the metal products (0.07%) in Scenario 3 and Scenario 6. Also, the agreement has a positive effect on the production of Qatar in the sectors of oil, gas, petroleum and coal products, other chemicals and the construction in the six scenarios. Qatar's highest productions increase in the sectors of the petroleum and coal products (0.3%) in Scenario 3, and the gas (0.13%), and the oil (0.13%) sectors in Scenario 6. The agreement has a positive effect on the production of the UAE in the sectors of agriculture, oil, gas, petroleum and coal products, utilities, construction, trade, transport, communication, the financial and other services in the six scenarios. The UAE's highest productions increases are in the sectors of the agriculture (0.41%), trade (0.14%), and the construction (0.3%) in Scenario 6. Finally, The agreement has a positive effect on the production of Oman in the sectors of oil, gas, automobiles, construction, trade, communication, the financial and other services in the six scenarios. Oman's highest productions increases are in the sectors of the gas (0.49%), automobiles (0.26%), and the construction (0.3%) in Scenario 6. The TFP has a distinct effect on the total production positively, especially with the full trade liberation in Scenario 6.

Table 3-48 The impact of the Korea-GCC FTA on the production by sector in case of Scenario 1 (% change)

qo	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.04	-0.04	0.03	0.00	-0.04	0.06	-0.04
OIL	-0.39	0.03	0.04	0.03	0.04	0.08	0.01
GAS	-0.28	0.00	-0.01	0.00	0.04	0.02	0.23
OthMining	0.12	0.00	0.02	-0.02	-0.03	-0.05	-0.07
PrcFood	0.56	-0.02	-0.04	0.11	-0.04	-0.52	-0.23
TextWapp	0.20	-0.30	-0.26	-0.05	-0.15	-0.16	-0.21
PetroCoalPrd	1.09	-0.18	-0.03	0.01	0.15	0.05	-0.20
OthChem	0.43	0.04	0.01	-0.07	0.02	-0.10	-0.57
MetalPrd	0.12	-0.36	-0.34	0.02	-0.14	-0.27	-0.23
Automobiles	0.20	-0.20	-0.22	-0.19	-0.11	-0.21	0.06
OthTrnsEq	-0.71	-0.03	-0.02	-0.02	-0.12	-0.12	-0.15
Electronics	-0.48	-0.15	-0.03	-0.03	-0.05	-0.14	-0.12
Machinery	-0.17	-0.20	-0.45	-0.37	-0.08	-0.23	-1.58
OthMnf	-0.10	-0.14	-0.03	-0.03	-0.07	-0.10	-0.18
Utilities	0.12	0.01	0.01	0.01	-0.03	0.04	-0.13
Construction	0.20	0.12	0.05	0.05	0.02	0.08	0.06
Trade	0.01	0.03	0.02	0.01	0.00	0.12	0.04
Transport	0.09	-0.03	-0.04	-0.05	-0.07	0.02	-0.02
Communic	-0.03	-0.16	0.03	-0.01	-0.01	0.06	0.03
Financial	-0.05	0.00	0.02	-0.01	-0.05	0.04	0.04
OthServ	-0.03	0.01	0.01	0.00	-0.02	0.03	0.03
CGDS	0.26	0.13	0.05	0.06	0.02	0.09	0.06

Source: Author’s simulations

Note: CGDS is the capital good sector, or the change in capital good production

Table 3-49 The impact of the Korea-GCC FTA on the production by sector in case of Scenario 2 (% change)

qo	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.14	-0.06	0.11	-0.02	-0.06	0.16	-0.07
OIL	-0.60	0.05	0.06	0.05	0.06	0.13	0.01
GAS	-0.46	0.00	-0.01	0.00	0.06	0.03	0.35
OthMining	0.17	0.01	0.03	-0.02	-0.04	-0.07	-0.11
PrcFood	1.39	-0.04	-0.15	-0.02	-0.08	-1.19	-0.51
TextWapp	0.29	-0.46	-0.40	-0.06	-0.22	-0.21	-0.32
PetroCoalPrd	1.66	-0.27	-0.04	0.02	0.22	0.07	-0.31
OthChem	0.62	0.06	0.02	-0.11	0.04	-0.15	-0.86
MetalPrd	0.16	-0.56	-0.53	0.04	-0.22	-0.41	-0.35
Automobiles	0.28	-0.30	-0.34	-0.29	-0.17	-0.32	0.10
OthTrnsEq	-1.16	-0.02	-0.01	-0.02	-0.19	-0.18	-0.22
Electronics	-0.79	-0.22	-0.04	-0.04	-0.08	-0.19	-0.18
Machinery	-0.31	-0.30	-0.69	-0.56	-0.12	-0.34	-2.38
OthMnf	-0.17	-0.22	-0.04	-0.05	-0.11	-0.15	-0.27
Utilities	0.19	0.02	0.01	0.02	-0.05	0.06	-0.19
Construction	0.30	0.18	0.08	0.08	0.03	0.14	0.10
Trade	0.03	0.04	0.04	0.02	0.00	0.21	0.06
Transport	0.13	-0.05	-0.06	-0.08	-0.10	0.04	-0.04
Communic	-0.04	-0.25	0.04	-0.01	-0.01	0.09	0.05
Financial	-0.08	0.00	0.02	-0.02	-0.08	0.05	0.06
OthServ	-0.04	0.01	0.01	0.00	-0.03	0.04	0.04
CGDS	0.40	0.19	0.08	0.09	0.04	0.15	0.10

Source: Author's simulations

Note: CGDS is the capital good sector, or the change in capital good production

Table 3-50 The impact of the Korea-GCC FTA on the production by sector in case of Scenario 3 (% change)

qo	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.37	-0.07	0.42	-0.06	-0.08	0.40	-0.12
OIL	-0.83	0.06	0.08	0.07	0.08	0.18	0.01
GAS	-0.66	0.01	-0.02	0.01	0.08	0.05	0.46
OthMining	0.18	0.01	0.04	-0.02	-0.05	-0.07	-0.14
PrcFood	3.30	-0.08	-0.41	-0.48	-0.16	-2.57	-1.08
TextWapp	0.35	-0.63	-0.54	-0.03	-0.29	-0.16	-0.44
PetroCoalPrd	2.24	-0.37	-0.06	0.02	0.29	0.10	-0.41
OthChem	0.77	0.10	0.03	-0.14	0.05	-0.19	-1.13
MetalPrd	0.11	-0.77	-0.72	0.07	-0.31	-0.48	-0.46
Automobiles	0.30	-0.41	-0.45	-0.39	-0.23	-0.46	0.15
OthTrnsEq	-1.75	0.01	0.00	0.00	-0.25	-0.15	-0.29
Electronics	-1.22	-0.29	-0.05	-0.04	-0.10	-0.13	-0.24
Machinery	-0.57	-0.40	-0.94	-0.74	-0.17	-0.37	-3.15
OthMnf	-0.26	-0.30	-0.05	-0.05	-0.15	-0.16	-0.36
Utilities	0.26	0.03	0.02	0.03	-0.06	0.06	-0.26
Construction	0.42	0.25	0.11	0.12	0.04	0.21	0.15
Trade	0.06	0.06	0.05	0.02	0.00	0.34	0.10
Transport	0.16	-0.06	-0.08	-0.10	-0.13	0.04	-0.04
Communic	-0.03	-0.33	0.06	-0.01	-0.02	0.09	0.08
Financial	-0.09	0.00	0.03	-0.02	-0.10	0.01	0.07
OthServ	-0.04	0.01	0.01	0.00	-0.04	0.02	0.06
CGDS	0.56	0.27	0.11	0.13	0.05	0.23	0.15

Source: Author’s simulations
Note: CGDS is the capital good sector, or the change in capital good production

Table 3-51 The impact of the Korea-GCC FTA on the production by sector in case of Scenario 4 (% change)

qo	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.06	-0.02	0.03	-0.02	0.00	0.06	-0.02
OIL	-0.39	0.04	0.05	0.00	0.07	0.09	0.01
GAS	-0.28	0.02	0.00	-0.03	0.07	0.02	0.24
OthMining	0.11	0.04	0.06	0.01	-0.01	-0.05	-0.05
PrcFood	0.63	0.05	-0.02	0.06	0.02	-0.5	-0.16
TextWapp	0.18	-0.3	-0.28	0.13	-0.13	-0.15	-0.19
PetroCoalPrd	1.13	-0.15	0.00	-0.08	0.15	0.04	-0.15
OthChem	0.43	0.08	0.05	-0.16	0.05	-0.09	-0.49
MetalPrd	0.08	-0.32	-0.32	0.12	-0.12	-0.26	-0.22
Automobiles	0.19	-0.16	-0.2	-0.24	-0.06	-0.19	0.12
OthTrnsEq	-0.85	0.00	-0.07	0.1	-0.07	-0.11	-0.12
Electronics	-0.57	-0.11	0.00	-0.05	0.00	-0.12	-0.04
Machinery	-0.28	-0.16	-0.48	-0.25	-0.07	-0.22	-1.48
OthMnf	-0.17	-0.11	0.00	0.00	-0.03	-0.08	-0.12
Utilities	0.13	0.06	0.05	-0.06	0.01	0.05	-0.08
Construction	0.44	0.22	0.16	-0.32	0.07	0.1	0.14
Trade	0.07	0.07	0.07	-0.12	0.04	0.13	0.08
Transport	0.07	0.00	0.03	-0.15	-0.02	0.04	0.03
Communic	0.02	-0.15	0.07	-0.03	0.04	0.08	0.07
Financial	-0.02	0.02	0.03	-0.02	-0.02	0.05	0.06
OthServ	0.06	0.03	0.02	-0.06	0.02	0.04	0.05
CGDS	0.58	0.26	0.19	-0.42	0.11	0.12	0.17

Source: Author’s simulations
Note: CGDS is the capital good sector, or the change in capital good production

Table 3-52 The impact of the Korea-GCC FTA on the production by sector in case of Scenario 5 (% change)

qo	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.16	-0.02	0.11	-0.01	-0.02	0.17	-0.04
OIL	-0.61	0.07	0.07	0.05	0.10	0.14	0.02
GAS	-0.45	0.04	0.00	0.01	0.10	0.04	0.37
OthMining	0.15	0.07	0.09	-0.02	-0.02	-0.07	-0.07
PrcFood	1.50	0.09	-0.12	0.02	0.00	-1.15	-0.41
TextWapp	0.26	-0.47	-0.43	-0.09	-0.19	-0.2	-0.28
PetroCoalPrd	1.72	-0.21	-0.01	0.03	0.21	0.06	-0.23
OthChem	0.62	0.14	0.08	-0.08	0.08	-0.13	-0.73
MetalPrd	0.09	-0.49	-0.49	0.03	-0.18	-0.4	-0.32
Automobiles	0.27	-0.23	-0.31	-0.27	-0.1	-0.29	0.19
OthTrnsEq	-1.36	0.02	-0.08	-0.03	-0.11	-0.17	-0.17
Electronics	-0.93	-0.15	0.00	-0.03	-0.01	-0.17	-0.05
Machinery	-0.48	-0.22	-0.73	-0.57	-0.11	-0.33	-2.22
OthMnf	-0.27	-0.16	0.01	-0.04	-0.05	-0.11	-0.17
Utilities	0.20	0.12	0.08	0.04	0.01	0.09	-0.12
Construction	0.67	0.38	0.24	0.16	0.09	0.18	0.21
Trade	0.11	0.13	0.1	0.05	0.06	0.25	0.13
Transport	0.09	0.01	0.04	-0.05	-0.04	0.07	0.05
Communic	0.03	-0.23	0.1	-0.01	0.05	0.12	0.1
Financial	-0.02	0.03	0.04	-0.01	-0.03	0.07	0.09
OthServ	0.09	0.06	0.04	0.02	0.02	0.06	0.07
CGDS	0.89	0.46	0.28	0.19	0.15	0.21	0.26

Source: Author's simulations

Note: CGDS is the capital good sector, or the change in capital good production

Table 3-53 The impact of the Korea-GCC FTA on the production by sector in case of Scenario 6 (% change)

qo	KOR	KWT	SAU	BHR	QAT	ARE	OMN
Agriculture	0.41	-0.02	0.43	-0.05	-0.03	0.41	-0.08
OIL	-0.86	0.09	0.09	0.06	0.13	0.20	0.03
GAS	-0.65	0.05	0.01	0.02	0.13	0.07	0.49
OthMining	0.15	0.10	0.12	-0.02	-0.03	-0.07	-0.09
PrcFood	3.47	0.08	-0.37	-0.44	-0.06	-2.49	-0.93
TextWapp	0.29	-0.64	-0.58	-0.07	-0.25	-0.15	-0.38
PetroCoalPrd	2.34	-0.28	-0.01	0.03	0.26	0.11	-0.31
OthChem	0.76	0.21	0.11	-0.11	0.11	-0.15	-0.96
MetalPrd	0.01	-0.67	-0.67	0.07	-0.26	-0.48	-0.43
Automobiles	0.29	-0.32	-0.42	-0.37	-0.14	-0.39	0.26
OthTrnsEq	-2.05	0.08	-0.09	0.00	-0.15	-0.15	-0.21
Electronics	-1.43	-0.19	0.01	-0.03	-0.01	-0.11	-0.07
Machinery	-0.83	-0.29	-0.98	-0.74	-0.15	-0.36	-2.94
OthMnf	-0.42	-0.22	0.02	-0.04	-0.07	-0.09	-0.23
Utilities	0.27	0.15	0.10	0.05	0.00	0.12	-0.16
Construction	0.97	0.50	0.31	0.19	0.12	0.30	0.30
Trade	0.19	0.17	0.14	0.05	0.07	0.41	0.18
Transport	0.11	0.00	0.06	-0.07	-0.05	0.09	0.07
Communic	0.08	-0.30	0.14	0.00	0.06	0.15	0.14
Financial	-0.01	0.04	0.05	-0.02	-0.04	0.06	0.11
OthServ	0.16	0.07	0.05	0.02	0.02	0.06	0.09
CGDS	1.29	0.59	0.37	0.23	0.19	0.37	0.35

Source: Author's simulations
Note: CGDS is the capital good sector, or the change in capital good production

3.6 Conclusion

This chapter aims to assess the potential effects of the Korea-GCC FTA using the GTAP model. To simulate the model, 19 regions and 21 sectors that are relevant to the study were aggregated in the model. The analysis in the study focuses on the macroeconomic effects (including the welfare, the GDP, the total exports, the terms of trade and the trade balance), and the microeconomic effects (the 19 sectors that are included in the study). The study focuses on six scenarios with different levels of trade liberation: 50 percent cuts in tariffs, 75 percent cuts in tariffs, 100 percent cuts in tariffs to obtain full trade liberation where zero tariffs applied, and three more scenarios with the same tariff cuts in addition to the technological changes (TFP) as a result to the FTA. According to the results, many findings can be extracted from the different simulated scenarios.

Although the GDP and the exports expected to be affected positively, the GDP effect was not for Kuwait, Saudi Arabia, Bahrain and Oman in Scenario 1, Scenario 2 and Scenario 3. Additionally, the FTA's although the impact on the GDP is limited, the exports increase and have significant effect in the six scenarios. In precisely, only the GDP for Korea and the UAE is affected in the six scenarios, on the other hand, the GDP for Kuwait, Saudi Arabia, Bahrain, Qatar, and Oman affected in Scenario 4, Scenario 5, and Scenario 6. Moreover, Korea and the GCC countries expect to witness a trade creation in some sectors, especially the agriculture sector for Saudi Arabia and the UAE. The trade creation may expect sizeable effects while the trade diversion is limited to fewer other sectors.

The FTA is supposed to do some changes in the economic structure of the GCC countries more than Korea. Even though most of the bilateral exports sectors for the GCC countries expected to experience an increase in exports, some sectors expect to have decreased in exports for some countries (such as the utilities and the transports). On the other hand, Korea expects to increase in fewer sectors than the GCC countries, but still, most of its bilateral trading sectors expect to have positive effects (except for the construction, trade, communication, financial, the other services and the other transport equipment).

The FTA has different levels of effects for the GCC countries and Korea. Therefore, some members expect higher effects on their GDPs and welfare than the other. In term of the GDP, the highest beneficial country is Korea then the UAE, Qatar, Kuwait, Saudi Arabia, Oman, and Bahrain, respectively in Scenario 6. From the welfare's perspective, the highest beneficial country is Korea, Saudi Arabia, the UAE, Kuwait, Qatar, Oman, and Bahrain, respectively.

In this context, the Korea-GCC FTA, as suggested by the results, can affect the welfare of the people and the economic growth positively for both parties. The FTA can motivate the development of the production of many sectors for each country. Korea will witness growth in the sectors of agriculture, other mining, processed food, textile and wearing appeal, automobiles, utilities, construction trade and transport. Kuwait will witness growth in the sectors of oil, gas, other mining, other chemicals, utilities, construction, trade, the financial and other services. Saudi Arabia will witness growth in the sectors of agriculture, oil, other mining, other chemicals, utilities, construction, trade, communication, financial, and other services. Bahrain will witness growth in the sectors of oil, gas, petroleum and coal products, metal products, utilities, construction, trade and other services. Qatar will witness growth in the sectors of oil, gas, petroleum and coal products, other chemicals and the construction. The UAE will witness growth in the sectors of agriculture, oil, gas, petroleum and coal products, utilities, construction, trade, transport, communication, the financial and other services. Oman will witness growth in the sectors of oil, gas, automobiles, construction, trade, communication, financial and other services. At the same time, other sectors would experience deflation for the seven countries.

The Korea-GCC FTA will benefit all the member countries. The FTA will gather Korea and the GCC countries toward the economic integration, which will lead to mutual gains. Although there is some unfavorable negativity, the positive effects actually overflow the negativities. In addition, the FTA is beneficial to some countries that are not part of the FTA like China, Canada, Norway and Kazakhstan whether in the welfare or GDP. In terms of trade, Korea, and the GCC countries have a significantly positive effect. However, the FTA has a negative effect on the non-member countries except for China, Canada, Norway and Kazakhstan in the first three scenarios, Mexico in Scenario 1 and Scenario 2, and China in the Scenario 4.

Chapter 4 Conclusion and Implications

4.1 Conclusion

The primary objectives of the study are: first, to empirically quantify the determinants of the exports for the six members of the GCC countries and South Korea. To reach this objective and quantify the determinants of Korea and the GCC countries, an augmented gravity model of trade is used. The second objective of the study is to measure the effects of the potential FTA between Korea and the GCC countries. To reach the second objective, the CGE model is applied by using the GTAP 9 database to simulate six different scenarios. Consequently, the best scenario from the six is reached according to the simulation results.

First, by using an augmented gravity model of trade, the study investigates the factors that promote the exports for Korea and the GCC countries by applying the three regressions of the panel data: the pooled OLS model, the FE model, and the RE model. The Datasets is from 2000 to 2015, and it included three groups of countries: 55, 45 and 35 trading partners for the GCC countries, and 80, 60 and 40 trading partners for Korea. The trading partners are chosen for each country by their top exports volume and the data availability for comparative purposes. *Hausman* test is applied to all the datasets, and its results showed that the RE model is the best for Kuwait, Qatar, the UAE, Oman, and Korea, while the pooled OLS model is the best for Saudi Arabia and Bahrain. Therefore, the reported results are those that are mentioned in the first gravity model while the rest of the results for the Pooled OLS model, the FE model, and the RE model, and the second gravity model are presented as reference models.

The findings of the study reveal that the exporter's and the importer's GDPs have a positive and significant effect on Korea and five of the GCC countries, except for Qatar. The distance has a significant and negative effect on Korea and Oman. The exporter's GDP per capita has a significant and positive effect on those of Saudi Arabia, Bahrain, the UAE, and Oman. The exporter's population has a significantly positive effect on the six GCC countries. The importer's population has a significantly positive effect on those of Kuwait and Bahrain, and negative effect on Korea. The language has a significant and positive effect on those of Kuwait, Bahrain, and Oman. The FTA has a significantly positive effect on Saudi Arabia and Bahrain, and a significantly negative effect on those of Qatar and Oman. The economic block GCC has a significant and positive effect on those of Kuwait, Bahrain, and Qatar.

Second, to measure the potential effects of the Korea-GCC FTA, the Computable General Equilibrium model was applied by using the Global Trade Analysis Project to simulate six scenarios. In addition, the first scenario is 50 percent cuts in tariffs for the trade between Korea and the GCC countries. The second is 75 percent cuts in tariffs for the trade between Korea and the GCC countries. The third scenario is 100 percent cuts in tariffs for the trade between Korea and the GCC countries. The fourth is 50 percent cuts in tariffs for the trade between Korea and the GCC countries, and an increase in the TFP. The fifth is 75 percent cuts in tariffs for the trade between Korea and the GCC countries, and an increase in the TFP. The sixth is 100 percent cuts in tariffs for the trade between Korea and the GCC countries, and an increase in the TFP. The simulated model includes 19 regions and 21 sectors that are relevant to the study. The analysis in the study focuses on the macroeconomic effects (including the welfare, the GDP, the term of trade and trade balance), and the microeconomic effects (the sectors).

The results show that in term of the economic growth, Korea and the GCC countries witness different levels of positive effects in the six scenarios. Moreover, the welfare also has a definite increase for the six GCC countries and Korea, where Korea, the UAE, and Saudi Arabia are the most beneficial countries from signing the FTA in the welfare, respectively. Also, with more open trade, Korea expects to gain the most in the economic growth followed by the UAE, Qatar, Kuwait, Saudi Arabia Oman and Bahrain, respectively. Korea expects to gain the most in the welfare then Saudi Arabia, UAE, Kuwait, Qatar, Oman, and Bahrain, respectively. Finally, Kuwait expects to gain the most in the terms of trade followed by Qatar, Oman, the UAE, Saudi Arabia, Korea, and Bahrain, respectively.

Every economic methodology has its limitations, likewise the methodology in this study. However many of the limitations have a solution. The main problem of the gravity model is that it only explains the patterns of the exports and imports, yet it does not provide direct estimations for the welfare costs (Ivus & Strong, 2007). In addition, according to Kabir, Salim, & Al-Mawali (2017), there are other major issues in the empirical studies of the gravity model. These issues can be summarized by the specification error, omitted bias specifications, heteroskedasticity, heterogeneity, zero trade heteroskedasticity, autocorrelation, cross-sectional dependence and endogeneity problem. However, these practical problems have solutions (see the table in the Appendix A-1).

The CGE model has its difficulties as well. The main problem with the CGE model is that the structure of its equations is very complicated (Ariyasajjakorn, Gander, Ratanakomut, & Reynolds, 2009). Also, the nature of the structure of the GTAP is another weakness because it may weaken the long-horizon forecast that reflects in the results (Mukhopadhyay, Thomassin, & Chakraborty, 2012). Moreover, some regions or countries are not included in the GTAP database.

Finally, using the static GTAP model omits the time effect from the model, therefore, the long-run effects are not presented.

4.2 Policy Implications

The empirical results have eloquent explanations for the exports of Korea and the GCC countries that are reinforced by the gravity model. The results of this study suggest the following policy implications: first, Kuwait, Bahrain, and Qatar need to concentrate on intensifying their economic integration with the other GCC members, because the GCC has a significantly positive impact on their exports. Second, Bahrain and Saudi Arabia should focus on signing more FTAs to increase their exports because the FTA has a significantly positive effect on their exports. Third, the GCC members such as Kuwait, Bahrain, and Oman can focus on exporting to the countries that speak Arabic because the removal of the language obstacle has a significant and positive effect on their exports. Finally, as Korea's GDP, the GCC countries' GDP, and their trading partner's GDP have a significantly positive effect on their exports, the GCC countries and Korea should focus on maintaining their GDP growth because it is the fundamental motivating force for their exports. The results of this study are mostly coherent with the previous studies on Korea and the GCC countries.

In addition, the study suggests that signing an FTA between Korea and the GCC countries will have noticeable positive effects on their economy. Therefore signing the FTA is beneficial for both parties. Although the potential FTA has a limited effect on the GDP of four countries (Kuwait, Saudi Arabia, Bahrain and Oman only in the first three scenarios), however, it is noticeable in the last three scenarios and adds to the other benefits that are gained by those countries. Moreover, Korea and the GCC countries can improve the welfare of their populations on different levels as result of signing the FTA. Although the FTA has negative effects on some sectors, its positive effects on the other sectors cover the losses and ads benefits in general for both parties. Therefore, signing the Korea-GCC FTA recommended due to its many benefits to the economy of both parties.

4.3 Recommendations for Future Studies

This study traces the determinants of the exports of Korea and the GCC countries and the potential effect of the economic agreement Korea-GCC FTA by applying the CGE model. First, to improve the evaluation of the existing exports policy, applying the gravity model of trade to the exports by sector can give detailed information regarding what effect each sector. Second, the simulation of the potential Korea-GCC FTA can be improved by adding the NTBs and other shocks, to the scenarios to have a different kind of impacts on the economies of the participant parties. Finally, applying the dynamic model rather than the static model to the potential FTA would have more realistic results that track the changes in the economy through the time.

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Appendix

A-1: The econometric issues that are accompanied with the empirical gravity model

Problem	Solutions
Specification error	Conducting three-way specifications where the first one is the time dimension, the second and the third are time-invariant variables that are related to the exporter and the importer
Omitted bias specifications (Dropping major variable)	Including fixed exporter, importer and time effect
Heteroskedasticity	Applying the Poisson pseudo maximum- likelihood (PSML), or panel data
Heterogeneity (Differences across the units being studied)	Applying the Poisson pseudo maximum- likelihood (PSML), or panel data
Zero trade heteroskedasticity	Using FE panel PML estimator, or eliminating the individual with zero trade heteroskedasticity
Autocorrelation (Correlated error term observations)	The transformation of the error term, or applying panel data
Cross-sectional dependence	Applying the Auto Regressive model $AR(1)$, or panel data and applying unit root test
Endogeneity problem (appear when the endogenous variable is correlated with the error)	Applying the unit-root test or two-stage least squares (2-SLS)

Source: Baltagi, (2005), Kabir, Salim and Al-Mawali (2017)

A-2: Estimation results for Equation (2.3.1)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 22:40
Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.59985	4.588743	-3.835441	0.0001
LGDPI	0.533628	0.130674	4.083653	0.0000
LGDPJ	0.620362	0.130774	4.743772	0.0000
LDISTANCE	-0.443970	0.493191	-0.900200	0.3683
BORDER	0.053742	2.253720	0.023846	0.9810
LANGUAGE	1.427931	0.872769	1.636092	0.1022
FTA	0.268637	0.239214	1.122997	0.2617
GCC	1.057988	1.361451	0.777104	0.4373

Effects Specification		S.D.	Rho
Cross-section random		1.967003	0.6797
Idiosyncratic random		1.350324	0.3203

Weighted Statistics			
R-squared	0.181942	Mean dependent var	1.485284
Adjusted R-squared	0.175375	S.D. dependent var	1.486827
S.E. of regression	1.350171	Sum squared resid	1589.623
F-statistic	27.70550	Durbin-Watson stat	1.237049
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.231537	Mean dependent var	8.780924
Sum squared resid	4619.845	Durbin-Watson stat	0.502163

A-3: Estimation results for Equation (2.3.2)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 22:48
Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-40.12215	6.974765	-5.752474	0.0000
LGDPI	1.612363	0.283702	5.683306	0.0000
LGDPJ	0.453972	0.136000	3.338034	0.0009
LDISTANCE	-0.277023	0.494610	-0.560084	0.5756
GDPPCI	-4.77E-05	1.11E-05	-4.280647	0.0000
BORDER	0.417929	2.255201	0.185318	0.8530
LANGUAGE	1.198560	0.874092	1.371205	0.1707
FTA	0.225663	0.237175	0.951462	0.3416
GCC	1.381772	1.363378	1.013492	0.3111

Effects Specification

	S.D.	Rho
Cross-section random	1.967551	0.6840
Idiosyncratic random	1.337493	0.3160

Weighted Statistics

R-squared	0.198745	Mean dependent var	1.471171
Adjusted R-squared	0.191385	S.D. dependent var	1.485960
S.E. of regression	1.336220	Sum squared resid	1555.156
F-statistic	27.00557	Durbin-Watson stat	1.234526
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.243547	Mean dependent var	8.780924
Sum squared resid	4547.638	Durbin-Watson stat	0.495788

A-4: Estimation results for Equation (2.3.3)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 22:59
Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-25.23413	4.952564	-5.095166	0.0000
LGDPI	0.621431	0.129764	4.788935	0.0000
LGDPJ	1.013326	0.179811	5.635516	0.0000
LDISTANCE	-0.395706	0.455449	-0.868826	0.3852
LGDPPCJ	-0.605720	0.193301	-3.133563	0.0018
BORDER	-1.051426	2.107749	-0.498839	0.6180
LANGUAGE	1.774461	0.815063	2.177086	0.0297
FTA	0.186119	0.240431	0.774107	0.4391
GCC	2.334400	1.317421	1.771947	0.0768

Effects Specification

	S.D.	Rho
Cross-section random	1.806480	0.6417
Idiosyncratic random	1.349741	0.3583

Weighted Statistics

R-squared	0.191855	Mean dependent var	1.612317
Adjusted R-squared	0.184432	S.D. dependent var	1.494983
S.E. of regression	1.350101	Sum squared resid	1587.635
F-statistic	25.84709	Durbin-Watson stat	1.242099
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.313574	Mean dependent var	8.780924
Sum squared resid	4126.651	Durbin-Watson stat	0.565772

A-5: Estimation results for Equation (2.3.4)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 23:00
Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-28.34813	5.135951	-5.519548	0.0000
LGDPI	-0.049033	0.180826	-0.271159	0.7863
LGDPJ	0.436312	0.136213	3.203145	0.0014
LDISTANCE	-0.258218	0.494688	-0.521982	0.6018
LPOPI	1.941176	0.420895	4.612023	0.0000
BORDER	0.456893	2.255265	0.202589	0.8395
LANGUAGE	1.144154	0.874558	1.308265	0.1911
FTA	0.281770	0.236564	1.191092	0.2339
GCC	1.399372	1.363253	1.026495	0.3049

Effects Specification

	S.D.	Rho
Cross-section random	1.967652	0.6847
Idiosyncratic random	1.335101	0.3153

Weighted Statistics

R-squared	0.201379	Mean dependent var	1.468539
Adjusted R-squared	0.194044	S.D. dependent var	1.485799
S.E. of regression	1.333877	Sum squared resid	1549.707
F-statistic	27.45378	Durbin-Watson stat	1.238173
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.244304	Mean dependent var	8.780924
Sum squared resid	4543.090	Durbin-Watson stat	0.495826

A-6: Estimation results for Equation (2.3.5)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 23:02
Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-25.51669	4.972780	-5.131273	0.0000
LGDPI	0.622522	0.129634	4.802151	0.0000
LGDPJ	0.404626	0.139802	2.894268	0.0039
LDISTANCE	-0.383526	0.454247	-0.844312	0.3987
LPOPJ	0.618602	0.194822	3.175217	0.0015
BORDER	-1.074689	2.102252	-0.511208	0.6093
LANGUAGE	1.799551	0.813793	2.211312	0.0273
FTA	0.184201	0.240465	0.766022	0.4439
GCC	2.372160	1.315901	1.802689	0.0718

Effects Specification

	S.D.	Rho
Cross-section random	1.800954	0.6403
Idiosyncratic random	1.349805	0.3597

Weighted Statistics

R-squared	0.192128	Mean dependent var	1.617169
Adjusted R-squared	0.184707	S.D. dependent var	1.495307
S.E. of regression	1.350165	Sum squared resid	1587.787
F-statistic	25.89256	Durbin-Watson stat	1.242091
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.316010	Mean dependent var	8.780924
Sum squared resid	4112.006	Durbin-Watson stat	0.567709

A-7: Estimation results for Equation (2.3.6)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 23:06
Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-36.16120	5.472014	-6.608390	0.0000
LGDPI	1.961721	0.317995	6.169022	0.0000
LGDPJ	0.240176	0.143835	1.669808	0.0953
LDISTANCE	-0.216699	0.455571	-0.475664	0.6344
LGDPPCI	-1.932935	0.419197	-4.611046	0.0000
LPOPJ	0.615256	0.194574	3.162067	0.0016
BORDER	-0.705812	2.103646	-0.335518	0.7373
LANGUAGE	1.541997	0.815398	1.891097	0.0589
FTA	0.196859	0.238026	0.827047	0.4084
GCC	2.672136	1.317097	2.028808	0.0428

Effects Specification

	S.D.	Rho
Cross-section random	1.801613	0.6453
Idiosyncratic random	1.335668	0.3547

Weighted Statistics

R-squared	0.211179	Mean dependent var	1.600232
Adjusted R-squared	0.203019	S.D. dependent var	1.494180
S.E. of regression	1.333912	Sum squared resid	1548.008
F-statistic	25.87907	Durbin-Watson stat	1.242802
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.332501	Mean dependent var	8.780924
Sum squared resid	4012.869	Durbin-Watson stat	0.563862

A-8: Estimation results for Equation (2.3.7)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 23:09
Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-27.07490	5.228650	-5.178182	0.0000
LGDPI	0.622199	0.129265	4.813341	0.0000
LGDPJ	-4.448172	5.404552	-0.823042	0.4107
LDISTANCE	-0.293016	0.460328	-0.636536	0.5246
LGDPPCJ	4.849725	5.401968	0.897770	0.3696
LPOPJ	5.516501	5.458729	1.010583	0.3125
BORDER	-1.164215	2.083385	-0.558809	0.5764
LANGUAGE	1.969993	0.828736	2.377105	0.0177
FTA	0.176052	0.240697	0.731427	0.4647
GCC	2.554765	1.317793	1.938669	0.0529

Effects Specification

	S.D.	Rho
Cross-section random	1.781714	0.6351
Idiosyncratic random	1.350405	0.3649

Weighted Statistics

R-squared	0.193165	Mean dependent var	1.634733
Adjusted R-squared	0.184818	S.D. dependent var	1.496486
S.E. of regression	1.351139	Sum squared resid	1588.252
F-statistic	23.14299	Durbin-Watson stat	1.242385
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.329399	Mean dependent var	8.780924
Sum squared resid	4031.514	Durbin-Watson stat	0.577922

A-9: Estimation results for Equation (2.3.8)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 23:12
Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-36.16120	5.472014	-6.608390	0.0000
LGDPI	0.028786	0.181809	0.158329	0.8742
LGDPJ	0.240176	0.143835	1.669808	0.0953
LDISTANCE	-0.216699	0.455571	-0.475664	0.6344
LPOPI	1.932935	0.419197	4.611046	0.0000
LPOPJ	0.615256	0.194574	3.162067	0.0016
BORDER	-0.705812	2.103646	-0.335518	0.7373
LANGUAGE	1.541997	0.815398	1.891097	0.0589
FTA	0.196859	0.238026	0.827047	0.4084
GCC	2.672136	1.317097	2.028808	0.0428

Effects Specification

	S.D.	Rho
Cross-section random	1.801613	0.6453
Idiosyncratic random	1.335668	0.3547

Weighted Statistics

R-squared	0.211179	Mean dependent var	1.600232
Adjusted R-squared	0.203019	S.D. dependent var	1.494180
S.E. of regression	1.333912	Sum squared resid	1548.008
F-statistic	25.87907	Durbin-Watson stat	1.242802
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.332501	Mean dependent var	8.780924
Sum squared resid	4012.869	Durbin-Watson stat	0.563862

A-10: Estimation results for Equation (2.3.9)

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 03/13/18 Time: 23:16

Sample: 2000 2015
Periods included: 16
Cross-sections included: 55
Total panel (balanced) observations: 880
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-37.19400	5.667255	-6.562965	0.0000
LGDPI	0.031950	0.181791	0.175751	0.8605
LGDPJ	-3.209238	5.391263	-0.595266	0.5518
LDISTANCE	-0.155009	0.461147	-0.336137	0.7368
LGDPPCJ	3.449784	5.390508	0.639974	0.5224
LPOPI	1.918488	0.419683	4.571275	0.0000
LPOPJ	4.099764	5.447090	0.752652	0.4519
BORDER	-0.776273	2.084944	-0.372323	0.7097
LANGUAGE	1.667642	0.830846	2.007160	0.0450
FTA	0.190920	0.238215	0.801463	0.4231
GCC	2.797933	1.318346	2.122305	0.0341

Effects Specification

	S.D.	Rho
Cross-section random	1.782394	0.6403
Idiosyncratic random	1.335975	0.3597

Weighted Statistics

R-squared	0.211824	Mean dependent var	1.617265
Adjusted R-squared	0.202754	S.D. dependent var	1.495313
S.E. of regression	1.335145	Sum squared resid	1549.089
F-statistic	23.35451	Durbin-Watson stat	1.242959
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.342537	Mean dependent var	8.780924
Sum squared resid	3952.531	Durbin-Watson stat	0.572244

A-11: Estimation results for equation (2.5) Kuwait's RE estimations for 35 countries

Dependent Variable: LEXPORT
Method: Panel EGLS (Cross-section random effects)
Date: 12/25/17 Time: 23:07
Sample: 2000 2015
Periods included: 16
Cross-sections included: 35
Total panel (balanced) observations: 560
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-41.62710	6.413969	-6.490069	0.0000
LGDPI_LGDPJ	-179.9952	100.4385	-1.792094	0.0737
LDISTANCE	0.140045	0.552058	0.253677	0.7998
LGDPPCI	180.2098	100.4375	1.794248	0.0733
LGDPPCJ	180.1593	100.4258	1.793954	0.0734
LPOPI	181.9051	100.4681	1.810575	0.0708
LPOPJ	180.9862	100.4373	1.801981	0.0721
BORDER	-0.991631	2.014349	-0.492284	0.6227
LANGUAGE	2.857429	1.202297	2.376640	0.0178
FTA	0.168025	0.231655	0.725324	0.4686
GCC	2.137585	1.454937	1.469193	0.1424
	Effects Specification			
			S.D.	Rho
Cross-section random			1.719517	0.7176
Idiosyncratic random			1.078577	0.2824
	Weighted Statistics			
R-squared	0.301672	Mean dependent var		1.483337
Adjusted R-squared	0.288952	S.D. dependent var		1.278513
S.E. of regression	1.078089	Sum squared resid		638.0899
F-statistic	23.71632	Durbin-Watson stat		1.315340
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	0.401534	Mean dependent var		9.574817
Sum squared resid	2005.314	Durbin-Watson stat		0.508736

A-12: The terminologies of the GTAP

$B(i,r)$	The shift term which is a scale factor embodied in the budget share
E(.)	The minimum expenditure required to attain the level of the private household utility, *UP(r)*, and the vector of household price is *PP(r)*.
GOVEXP	Government expenditures
MTAX	Imports Tax
NETINV	Net investment
PFE	Price of primary factor of production
$PM(i,r)$	The market price for commodity *i* in region *r*
PRIVEXP	Private household Expenditures
$qds(i,r)$	The percentage change in the domestic sales of commodity *i* in region *r*
$qds(i,r)$	The percentage change of the domestic sales of commodity *i* in region *r*
$QDS(i,r)$	The domestic sales of commodity *i* in region *r*
$qfd(i,j,r)$	The percentage change in the domestic purchases by firms
QFE	The quantities of primary factors of production (land, labor and capital)
$qfm(i,j,r)$	The percentage change of imports by firms of commodity *i* by firms from region *j* to region *r* at market price
$qgd(i,r)$	The percentage change in government's domestic purchases
$qgm(i,r)$	Percentage change
$qim(i,r)$	The percentage change of imports of commodity *i* in region *r*
$qo(i,r)$	The percentage change in the output quantities of commodity *i* in region *r*

QO(i,r)	The output quantities of commodity *i* in region *r*
$qpm(i,r)$	Percentage change of the imports by private households at market prices.
$qpm(i,r)$	The change in private household imports of commodity *i* for region *r*
$qst(i,r)$	The percentage change in exports quantities of commodity *i* for transportations from region *r*
$QST(i,r)$	The exports quantities of commodity *i* for transportations from region *r*
QVA	The value added quantities
$QXS(i,r,s)$	The exports quantities of commodity *i* from region *r* to region *s*
$qxs \cdot (i,r,s)$	The percentage change in the exports quantities of commodity *i* from region *r* to region *s*
ROW	Rest of the World
SVA	The share of endowment commodity *i* in the total cost of value-added in sector *j* of *r*
TMS	Import Tariffs by Source
VDFA	Value of Domestic Firm Purchases, evaluated at Agents' prices
$VDFM(i,j,r)$	The value of the domestic purchases by firms at market price
VDGA	Value of Domestic Government purchases, evaluated at Agents' prices
$VDGM(i,r)$	The value of domestic government's purchases at market price
VDM(i,r)	Represents the domestic sales of commodity *i* at market price in region *r*,
VDPA	Value of Domestic Private household purchases, evaluated at Agents' prices

VDPA	Value of Domestic Private household's purchases evaluated at Agents' price
VDPM	Value of Domestic Private household's purchases evaluated at Market price
$VDPM(i,r)$	The value of domestic private household's purchases at market price
VIFA	Value of Imported goods by Firms at Agents' prices
$VIFM(i,j,r)$	The total value of imported commodity *i* by firms from region *j* to region *r* at market price
VIGA	Value of Imported goods by Government at Agents' prices
$VIGM(i,r)$	The value of imports by the government at market prices
$VIM(i,r)$	The value of imports of commodity *i* to region *s* at market price
VIPA	Value of Imported goods by Private household at Agents' prices
$VIPM(i,r)$	The value of the imports by private households at market prices
VOA	Value of Output at Agent's prices
VOM	Value of Output evaluated at Market price
VOM(i,r)	Represents the output of commodity *i* at market price in region *r*
VOM(i,r)	Represents the output of commodity *i* at market price in region *r*
VST(i,r)	Represents the exports of commodity *i* for the transportation value at market price from region *r*
VST(i,r)	Represents the exports of commodity *i* for the transportation value at market price from region *r*
VSWD	Value of Exports of commodity from region to region, valued

at the world prices, by destination

VXMD	Value of Exports of commodity *i* from region *r* to region *s*, valued at the exporter's domestic market price by destination
VXMD(i,r,s)	Represents the exports of commodity *i* for the value at market prices from region *r* to region *s*
VXMD(i,r,s)	Represents the total exports of commodity *i* for the value at market prices from region *r* to region *s*
XTAX	Exports tax