A Computable General Equilibrium Analysis of the Potential Impacts of TPP/TPP-11 and RCEP on Agriculture in Vietnam

BUI, Canh-Thai
Graduate School of Economics, Nagoya University | Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics, Faculty of Agriculture, Kyushu University

KO, Jong-Hwan
Division of International and Area Studies, Pukyong National University, Busan

AMEKAWA, Yuichiro
Center for Promoting International Education and Research of Agriculture, Faculty of Agriculture, Kyushu University

ISODA, Hiroshi

他

A Computable General Equilibrium Analysis of the Potential Impacts of TPP/TPP–11 and RCEP on Agriculture in Vietnam

Canh–Thai BUI[1], Jong–Hwan KO[2], Yuichiro AMEKAWA[3], Hiroshi ISODA and Shoichi ITO*

Laboratory of Food and Agricultural Policies, Department of Agricultural and Resource Economics,
Faculty of Agriculture, *Kyushu University*, Fukuoka, 812–8581, Japan
(*Received October 31, 2017 and accepted November 20, 2017*)

As most of the member countries of the Trans–Pacific Partnership Agreement (TPP) are increasingly searching for economic liberalization and integration, the withdrawal of the United States from the TPP could not stop the efforts but has seeded the idea of a TPP–11 without the United States. On the other hand, the member states of the Regional Comprehensive Economic Partnership (RCEP) have since accelerated the process of negotiations as it is regarded as a more viable alternative. Being a member of the two mega free trade agreements (FTAs), the Vietnamese government may see its economy change structurally and substantially, thus, there is a need to anticipate the potential outcomes of the TPP–11 and the RCEP. In this study, we estimate the impacts of tariff elimination and non–tariff barriers (NTBs) reductions in ten scenarios considering singular and joint implementations of the TPP, the TPP–11, and the RCEP on Vietnam and, in particular, its agricultural sector using the Global Trade Analysis Project (GTAP) model. The focus of this study on the agricultural sector stems from the observation that it still plays an important role to reduce the country's trade deficit. Our simulation results suggest that Vietnam would be one of the best beneficiary countries in terms of changes in real GDP in all scenarios. Trade liberalization in the TPP, TPP–11, and the RCEP is expected to increase the level of trade deficit of Vietnam and decrease its trade surplus of agricultural goods. Accordingly, the three free trade agreements may end up encouraging Vietnam to focus more on manufacturing sector with a decreased output of agricultural products. The U.S. withdrawal from the TPP would reduce the potential damages to Vietnam's agriculture remarkably. In general, this study expects that while Vietnam would benefit from the pacts, its agricultural sectors may suffer sizeable losses.

Key words: Computable General Equilibrium Model, GTAP, Regional Comprehensive Economic Partnership, Trans–Pacific Partnership, TPP–11.

INTRODUCTION

Since Vietnam began to embrace the market economy through the launch of the unilateral politico–economic renovation called Đổi Mới in 1986, the government has been pushing for international economic integration. For instance, Vietnam became a member of major global and regional economic organizations such as the Asia–Pacific Economic Cooperation (APEC) in 1998, the World Trade Organization (WTO) in 2007, and the ASEAN Economic Community (AEC) in 2015. So far, Vietnam has participated in the negotiation processes of 16 different FTAs and successfully put 9 of them into effect. The depth and scope of the FTAs with which Vietnam is involved have been continuously expanding, ranging from the trade in goods and services to new and complex issues such as investment facilitation, intellectual property right, environmental protection, and so on.

The two recent notable examples are the negotiations of the TPP and the RCEP. These FTAs are considered the biggest and most ambitious trade agreements to date, which cover approximately 40 and 30 percent of the global GDP, respectively (Kawasaki, 2015). While the RCEP is still in the process of negotiation, the TPP was concluded and signed in February 2016. However, in January 2017, the United States decided to withdraw from the agreement, which led to a proposal of a TPP–11 without the U.S. participation. This idea was formally brought to the table of discussion for the first time in a summit meeting in Hanoi on 21 May 2017. The parties of the TPP–11 now expect a workable alternative to be drafted before the Asia–Pacific summit to be held in Vietnam in November 2017, in order to conclude the agreement.

Despite a lower level of investments than other sectors, the agricultural sector of Vietnam has achieved a great deal, to the extent that it has become an important driving force for Vietnam's high economic growth. In 2015, the sector embraced an estimated 26.4% of the nation's total labor force, contributing to 18.9% of its GDP, which is relatively high by international standards (Geck, 2017 and World Bank, 2016b). Being a net exporter of agricultural goods, Vietnam's trade surplus from its agricultural sector often has helped to reduce the total trade deficit of the country. International economic organizations such as the WTO have helped the structure of the Vietnamese economy shift towards an export–oriented one, with emphasis on exports of agricultural goods such as agricultural products, rice, coffee, rubber, cashew, and pepper. However, the agricultural growth of the country has been moderate compared to

---
[1] Graduate School of Economics, Nagoya University, Japan
[2] Division of International and Area Studies, Pukyong National University, Busan, South Korea
[3] Center for Promoting International Education and Research of Agriculture, Faculty of Agriculture, Kyushu University, Fukuoka, Japan
* Corresponding author (E–mail: s.ito.250@m.kyushu-u.ac.jp)

the overall economic growth and that of other more dynamic sectors, namely, industry, construction, and services.

Trans–Pacific Partnership

The TPP began as an expansion of the Trans–Pacific Strategic Economic Partnership Agreement (TPSEP or also known as P4) signed by Brunei, Chile, New Zealand, and Singapore in 2005. The twelve–member TPP negotiation started in 2013 when additional countries joined them, with the United States joining in February 2008, followed by Australia, Peru and Vietnam in November 2008, Malaysia in October 2010, Mexico and Canada in October 2012, and Japan in May 2013. While the final proposal was signed on 4 February 2016 in Auckland, New Zealand, the agreement could not be ratified due to the U.S. withdrawal on 23 January 2017. Since then, some member states such as Japan and Australia have emerged as vocal backers of an 11–member TPP agreement of which fate remains to be seen.

There are several empirical studies which tried to quantitatively estimate the impact of the TPP on its members. Burfisher et al. (2014) used the standard GTAP model and GTAP 8 database to analyze the impact of the TPP on agriculture. The result suggests a 6 percent increase in agricultural intra–trade among the TPP countries, with the US being the largest agricultural exporter and Japan the biggest importer. Notably, the output in almost all agricultural sub–sectors of Vietnam and Singapore will decline, while gains will be achieved most in Australia (meat), New Zealand (dairy) and Singapore (other agriculture).

In addition, Thanh et al. (2015) used the standard GTAP model and employ the GTAP database version 9 to assess the impacts of the TPP on the Vietnamese economy and its livestock sector which is considered the most vulnerable under the TPP regime. Vietnam is predicted to be the member that would achieve the largest real GDP gain in percentage terms. Eroding and less competitive industries such as meat, dairy, and forestry are assessed to have a hard time competing with strong foreign competitors. Consequently, the economy as a whole will shift to one that has a comparative advantage in labor–intensive industries such as textiles and apparel.

Regional Comprehensive Economic Partnership

On the other hand, Regional Comprehensive Economic Partnership is a free trade agreement between the ten member states of ASEAN and the six states with which ASEAN has existing free trade agreements including Australia, China, India, Japan, New Zealand, and South Korea. RCEP negotiations were formally launched in November 2012. The prospective RCEP members accounted for 48 percent of the world population, approximately 40 percent of the world trade, and 28 percent of the world GDP in 2011 (Zhu et al., 2015). While the RCEP approach includes simpler and more liberal rules of origin (ROO), the TPP, in contrast, tends to set 'developed country standards' that need to be met by those wanting to join it. For example, it requires almost

100% liberalization of trade in goods and comprehensive coverage, including services and investment, intellectual property rights, environmental and labor standards, and so forth.

Dordi et al. (2015) used a recursive dynamic GTAP model and GTAP 8.1 database to analyze the impacts of the RCEP on Vietnam's economy. Even though the RCEP would make a small, positive contribution, the study suggests that the Vietnamese economy will continue to expand even in the absence of the RCEP. In addition, the level of ambitions of the agreement could largely affect the outcome.

Recognizing the significance of the TPP and the RCEP for Vietnam, this study attempts to quantitatively assess the possible implications of their implementation for Vietnam's economy and its agricultural sector using a computable general equilibrium model. In this study, the U.S. withdrawal from the TPP is taken into account in analyzing a hypothetical TPP–11 agreement. Vietnam's agriculture is chosen as the main focus of the assessment as it is considered particularly vulnerable to trade liberalization.

MATERIALS AND METHODS

Global Trade Analysis Project Model

To analyze the effects of the RCEP and the TPP on Vietnam's agriculture, the standard Global Trade Analysis Project (GTAP) model is employed. The standard GTAP model is a comparative static, multi–regional, multi–sectoral CGE model with perfect competition and constant returns to scale (Hertel, 1997). The GTAP database version 7.1, which features Social Accounting Matrices (SAMs) of countries, trade linkages, behavioral parameters, and tariffs, is used in this study. Released in 2010, with the reference year of 2004, the database covers 112 regions and 57 sectors (Badri et al., 2008). Regional and commodity aggregation can be customized to suit the needs of the user.

Data Aggregation, and the Use of SplitCom

One hundred twelve regions and 57 sectors of the original database were aggregated to 22 regions and 14 sectors, respectively (22 regions: Vietnam, Malaysia, Singapore, Cambodia, Indonesia, Laos, Philippines, Thailand, RoSEA, Australia, New Zealand, Japan, Canada, USA, Mexico, Chile, Peru, China, India, Korea, EU_28, and ROW (Rest of World); 14 sectors: Rice, Coffee, Vegetable Nuts and Fruits, Other Grains, Other Crops, Other Agriculture Forestry and Fishery (Other AFF), Processed Foods, Extractive Manufacturing, Light Manufacturing, Heavy Manufacturing, Other Manufacturing, Utility & Construction, Transport & Communication, and Other Services). Due to the lack of the availability of data, Brunei and Myanmar are aggregated into RoSEA and it was not possible to take them into account in the analysis. In addition, while the Coffee sector is not distinguished in the original database, it was exclusively extracted using SplitCom technique (Horridge, 2008) because of its significance for the

economy.

As mentioned, SplitCom is a utility that allows users to split any sector into two or more new sectors. The weight of the split is decided by four factors: trade weight, row weight, column weight, and cross weight. Trade weight determines the import and export flows of the new sectors, while the row, column, and cross weights determine the activity of the new sectors within the national SAMs. The information used to conduct splitting such as trade and production data was retrieved from the database of the Food and Agriculture Organization (2016).

Baseline Scenario

Using the original GTAP database which reflects the global economy in 2004 to assess the impacts of the TPP and the RCEP would be an unrealistic approach because the economies would grow much larger by the time of their implementations and also because the tariffs between countries would be actively reduced. Since this analysis aims to address the marginal benefits that the TPP and the RCEP could theoretically bring, a baseline scenario which reflects the global economy in 2025 is built from a number of macroeconomic projections and historical data from the U.S. Department of Agriculture (Westcott and Hansen, 2016), the International Monetary Fund (2016) and French Centre d'Etudes Prospectives et d'Informations Internationales (Foure *et al.*, 2010) using the projection technique introduced by Chappuis and Walmsley (2011).

Maintaining the 2004 tariff regime would likely overestimate the benefits brought from tariff elimination. In particular, during the periods from 2004–2015, 155 Regional Trade Agreements (RTAs) were put into effect, which drastically reduced the tariff levels (WTO, 2016). Furthermore, 115 out of these 155 RTAs were joined by one of the 22 regions of the study, and 47 of the 115 RTAs were signed between the regions. This study assumes that the tariffs between partners covered by the RTAs, which were put into effect by 2015, would be fully abolished by 2025 regardless of the TPP or the RCEP.

Policy Scenarios

As this study focuses on the trade liberalization effects of the two mega FTAs, complete tariff removal and NTBs reductions are treated as policy shocks. Regarding the NTBs treatment, there are no data reported in the GTAP database. However, as shown in a study by Philippidis and Sanjuán (2007), the effects of NTBs reductions can be addressed in the GTAP model by treating the effective prices of commodity imported via a variable ams, which can be used to lower the effective price of imported products. The level of policy shocks are taken from the empirical study by Hayakawa and Kimura (2014), which estimates the NTBs reductions to be 5–7 percent of the prices of imported products.

In exception, rice as a commodity is treated according to the TPP tariffs of the International Trade Centre (2016). In particular, ad valorem tariffs on rice from the United States and Australia to Japan will be slashed by half, while maintaining the original tariffs on rice imported from other countries will be maintained. As for other routes of rice trade, tariffs will be eliminated. As the detailed concessions for the RCEP are not available, this study assumes the same treatment of rice in the RCEP as in the TPP, i.e. only Australia will receive a 50% cut for rice exported to Japan and the rice of other routes between the member states will be completely tariff–free.

Finally, on top of the baseline scenario, 10 scenarios are conducted as follows:

S1: Tariff removal among the TPP countries.
S2: Tariff removal plus 7% reduction of the NTBs among the TPP countries.
S3: Tariff removal among the TPP–11 countries.
S4: Tariff removal plus 7% reduction of the NTBs among the TPP–11 countries.
S5: Tariff removal among the RCEP countries.
S6: Tariff removal plus 7% reduction of the NTBs among the RCEP countries.
S7: Tariff removal in the TPP and the RCEP blocs.
S8: Tariff removal plus 7% reduction of the NTBs in the TPP and the RCEP blocs.
S9: Tariff removal in the TPP–11 and the RCEP blocs.
S10: Tariff removal plus 7% reduction of the NTBs in the TPP–11 and the RCEP blocs.

Systematic Sensitivity Analysis

It is important to note that the GTAP database 7.1 has the reference year of 2004. Efforts were made to project the database in order to see what the global economy would look like in 2025 with respect to various macroeconomic indicators. Given such a long span of time, however, it is reasonable to presume that behavioral parameters would change, especially in the case of the consumption of agricultural products where the demand for them might slow down as countries flourish economically. To take this possibility into account, a Systematic Sensitivity Analysis (Burfisher, 2011) is conducted to see how changes in income elasticities with respect to agricultural goods would change the outcomes of the simulations.

SIMULATION RESULTS

Macroeconomic Impacts

In Table 1, the estimated percentage changes in real GDP are reported. As a reminder, scenarios S1, S3, S5, S7, and S9 represent the treatment of only tariff removals while scenarios S2, S4, S6, S8 and S10 include reductions in non–tariff barriers in addition to tariff elimination. The results suggest that most of what the countries gain from the mega FTAs would primarily come from NTB reductions. The effect is illustrated most clearly in the case of a singular RCEP implementation (S5 and S6) in which the region has already homed an intensive network of FTAs.

In comparison of the FTAs, the joint implementation of the TPP–12 and RCEP is the most impactful, yet an unrealistic option at the moment. Interestingly, the dif-

Table 1. Estimated changes in real GDP[4]

Country	Percentage change									
	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Vietnam	0.29	1.47	0.09	0.89	0.01	2.87	0.31	3.61	0.29	3.03
Malaysia	0.13	1.81	0.00	1.20	0.01	3.17	0.14	3.80	0.02	3.23
Singapore	0.00	1.10	0.00	0.81	0.00	2.00	0.00	2.31	0.00	2.04
Cambodia	0.02	0.03	0.01	0.03	0.01	4.51	0.02	4.52	0.03	4.52
Indonesia	0.00	−0.01	0.00	0.00	0.00	0.63	0.00	0.63	0.00	0.63
Laos	0.01	0.01	0.00	0.00	0.00	2.99	0.01	2.98	0.01	2.99
Philippines	0.00	0.00	0.00	0.00	0.00	1.11	0.00	1.10	0.00	1.11
Thailand	−0.02	−0.02	−0.01	0.00	0.00	2.89	−0.02	2.87	0.01	2.89
RoSEA	0.00	−0.01	0.00	−0.01	0.00	0.94	0.01	0.94	0.00	0.94
Australia	0.00	0.43	0.00	0.29	0.02	0.78	0.02	0.93	0.02	0.80
NewZealand	0.08	0.98	0.06	0.80	0.03	1.18	0.08	1.43	0.08	1.25
Japan	0.10	0.35	0.03	0.17	0.02	0.51	0.11	0.75	0.04	0.57
Canada	0.05	1.23	0.03	0.18	0.00	−0.01	0.05	1.23	0.02	0.18
USA	0.00	0.27	0.00	0.00	0.00	−0.01	0.00	0.27	0.00	−0.01
Mexico	0.03	1.00	0.04	0.22	0.00	−0.03	0.03	0.98	0.03	0.19
Chile	0.00	0.29	0.00	0.16	0.00	−0.01	0.00	0.28	0.00	0.15
Peru	0.02	0.36	0.02	0.17	0.00	0.00	0.02	0.36	0.02	0.17
China	−0.01	0.00	0.00	0.00	0.00	0.11	−0.01	0.10	−0.01	0.11
India	0.00	−0.01	0.00	0.00	0.03	0.26	0.03	0.25	0.03	0.26
Korea	0.00	−0.01	0.00	0.00	0.18	1.21	0.18	1.20	0.18	1.21
EU_28	0.00	−0.01	0.00	0.00	0.00	−0.01	0.00	−0.02	0.00	−0.01
ROW	0.00	−0.01	0.00	0.00	0.00	−0.02	0.00	−0.02	0.00	−0.02

Source: Authors' simulation results

[4] Since the GTAP 7.1 data base has the base year of 2004, the real GDP equals to the nominal GDP in 2004.

ferences between scenario S6 (only the RCEP is implemented) and scenario S10 (both the RCEP and the TPP–11 are implemented) appear to be insignificant to most of the parties, except for the American members including Canada, Mexico, Chile, and Peru. In particular, while members of both the RCEP and the TPP–11 can gain more or less the same level of real GDP either with or without the TPP–11, Canada may lose 0.01% of its real GDP in scenario S6 as opposed to gaining 0.18% in scenario S10. Similarly, Mexico may lose 0.03% and gain 0.19% in scenario S10. For non–members of both FTAs, when the RCEP is implemented, the impacts are the same either with or without the TPP–11. Without the RCEP, they are unaffected either.

For Vietnam, its gains range from the largest levels of 3.61% in scenario S8 and 3.03% in scenario S10 to the least of 0.89% in scenario S4. In addition, Vietnam appears to be the second biggest earner after Malaysia in terms of changes in real GDP percentage. Yet, the gains from tariff removals are more for Vietnam than Malaysia. For instance, Vietnam may gain 0.09% in scenario S3 while Malaysia has no gains. Similarly, 0.29% for Vietnam and 0.02% for Malaysia in scenario S9.

Impacts on the Agricultural Sector in Vietnam

Table 2 shows the changes in agricultural imports to

Vietnam across different scenarios. In short, trade liberalization would boost the total imports of agricultural goods. The increase is estimated to be as high as 0.28% of its total agricultural imports or $2,149 million in scenario S8, yet ranging from 0.08% to 0.21% for the other scenarios. Out of the agricultural product groups, Other Agriculture, Forestry, Fishery (AFF) would undergo the largest changes owing to its current level of imports. For example, the increase is 18.26% or $217 million in scenario S6 and can be as high as 69.46% or $826 million in scenario S8. On the other hand, while Rice and Coffee are also expected to experience large percentage changes, their current level of imports is low, thus, making the actual impacts negligible. In addition, Processed Food and Vegetable, Nuts, Fruits may have a large increase in imports. In the event of the joint implementation of the TPP–11 and the RCEP (S10), the imports will rise by 12.93% ($577 mil.) and 11.62% ($71 mil.), respectively. Other Grians is the only group where imports may decrease, yet minimal in the absolute level.

Table 3 shows a gloomy picture of Vietnam's agricultural exports. The only two cases where Vietnam's agricultural sector is to gain are Coffee (scenario S5) with an additional increase in expect of $1.13 million and Other Grains (scenario S6) at $0.22 million. For the rest, the Rice sector may expect a loss of up to 17.45% or $43

Table 2. Changes in agricultural imports to Vietnam

Scenario	Rice		Coffee		Vegetables, Nuts, Fruits		Other Grains		Other Crops		Other AFF		Processed Food		Total Agriculture	
	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.
S1	5.85	1.39	12.69	0.10	9.05	54.91	−4.14	−16.32	6.41	66.92	25.66	305.20	7.11	317.16	0.09	729.35
S2	16.70	3.96	25.58	0.19	16.17	98.18	−3.02	−11.91	12.62	131.66	56.32	669.94	17.00	758.55	0.21	1,650.57
S3	1.75	0.41	3.91	0.03	1.89	11.47	−1.21	−4.75	1.96	20.40	5.99	71.19	1.91	85.18	0.02	183.92
S4	7.07	1.67	9.05	0.07	4.25	25.81	0.32	1.27	3.92	40.92	19.22	228.60	7.83	349.16	0.08	647.51
S5	−0.85	−0.20	0.00	0.00	−0.40	−2.45	−0.45	−1.79	0.28	2.94	−0.01	−0.14	−0.14	−6.14	0.00	−7.78
S6	32.06	7.60	20.79	0.15	8.52	51.71	1.46	5.75	4.27	44.58	18.26	217.21	9.70	432.70	0.10	759.70
S7	5.10	1.20	12.35	0.10	8.69	52.73	−4.47	−17.61	6.72	70.15	25.82	307.16	7.06	315.14	0.09	728.88
S8	48.52	11.49	48.13	0.37	24.07	146.09	−3.30	−13.01	16.43	171.40	69.46	826.23	22.58	1,007.24	0.28	2,149.81
S9	5.48	1.30	12.51	0.10	5.15	31.25	−3.77	−14.85	6.47	67.48	20.67	245.90	5.73	255.44	0.08	586.62
S10	35.92	8.51	28.12	0.22	11.62	70.54	−0.05	−0.19	7.35	76.65	29.11	346.30	12.93	576.57	0.14	1,078.61

Source: Authors' simulation results

Table 3. Changes in agricultural exports to Vietnam

Scenario	Rice		Coffee		Vegetables, Nuts, Fruits		Other Grains		Other Crops		Other AFF		Processed Food		Total	
	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.	%	$ Mil.
S1	−8.64	−269.11	−13.27	−44.98	−4.28	−65.43	−9.34	−3.52	−3.91	−56.70	−28.37	−131.10	−14.84	−701.57	−0.11	−1,272.43
S2	−17.20	−535.69	−21.73	−73.62	−8.42	−128.53	−13.33	−5.01	−6.73	−97.73	−40.09	−185.22	−16.08	−760.24	−0.15	−1,786.04
S3	−2.73	−84.97	−4.41	−14.94	−1.37	−20.89	−3.42	−1.29	−1.08	−15.72	−10.75	−49.67	−4.69	−221.54	−0.04	−409.01
S4	−6.50	−202.53	−9.84	−33.34	−3.46	−52.83	−2.22	−0.83	−3.00	−43.58	−16.04	−74.11	−3.11	−146.94	−0.05	−554.16
S5	−0.14	−4.26	0.33	1.13	−0.20	−3.10	−0.97	−0.36	−0.49	−7.05	−0.27	−1.27	−1.28	−60.63	−0.01	−75.53
S6	−2.47	−77.02	−8.60	−29.15	−2.56	−39.03	0.58	0.22	−2.56	−37.18	−6.54	−30.23	−0.98	−46.23	−0.02	−258.62
S7	−8.72	−271.41	−13.09	−44.36	−4.69	−71.59	−10.35	−3.89	−4.48	−65.10	−28.60	−132.14	−15.67	−740.70	−0.11	−1,329.18
S8	−17.45	−543.35	−26.00	−88.10	−9.89	−151.12	−16.89	−6.34	−8.29	−120.43	−43.99	−203.27	−19.75	−933.75	−0.18	−2,046.37
S9	−8.75	−272.38	−13.20	−44.71	−5.93	−90.62	−11.27	−4.25	−4.81	−69.83	−27.28	−126.06	−14.22	−672.19	−0.11	−1,280.04
S10	−6.46	−201.17	−14.25	−48.28	−4.54	−69.29	−5.30	−2.00	−4.30	−62.41	−20.79	−96.07	−7.02	−331.84	−0.07	−811.06

Source: Authors' simulation results

million (S8), and Other Crops 8.29% or $120 million (S8), as well as processed Food 19.75% or $934 million (S8). Overall, the total losses in agricultural exports are estimated to range from 0.01% ($76 million, scenario S5) to 0.18% ($2,046 million, scenario S8).

Results of Systematic Sensitivity Analysis

As explained earlier, there is a need to test the sensitivity of the outputs of agricultural goods in regard to income elasticity. In Figure 1, the simulation results in terms of changes in agricultural outputs are shown in the 95% confidence intervals. Four observations can be made from it. First, while the impacts of the two mega FTAs are mostly negative to agriculture, the impacts of the RCEP and the TPP–11 are less severe than those of the TPP. Second, the differences between the scenarios featuring the TPP and the TPP–11 indicate the significance of the U.S. to the agricultural market. Vietnam's agricultural sector would be better off with the TPP–11. Third, even though the NTBs reductions magnify the impacts of the FTAs, the ranges of the impacts are spread much wider. This means that the impacts are highly sensitive to income elasticities. In addition, the differences between tariffs and NTBs scenarios can be viewed in light of how the level of trade liberalization and standards may impact the outcomes differently. Fourth, there are several cases where the ranges are not significantly negative. We can be 95% confident that is in the case of S10, percenrage changes in output of coffee lie within 4.47 standard deviations of the mean, that is, between –3.54% and 2.53% and those of output OthAFF between –2.48% and 2.80%. This means that it is not wise to dismiss the possibility of a positive impact on the output of coffee and OthAFF of the implementation of both TPP–11 and RCEP.

FINDINGS AND DISCUSSION

From the simulation results, several interesting implications of the FTA implementations are drawn. First,
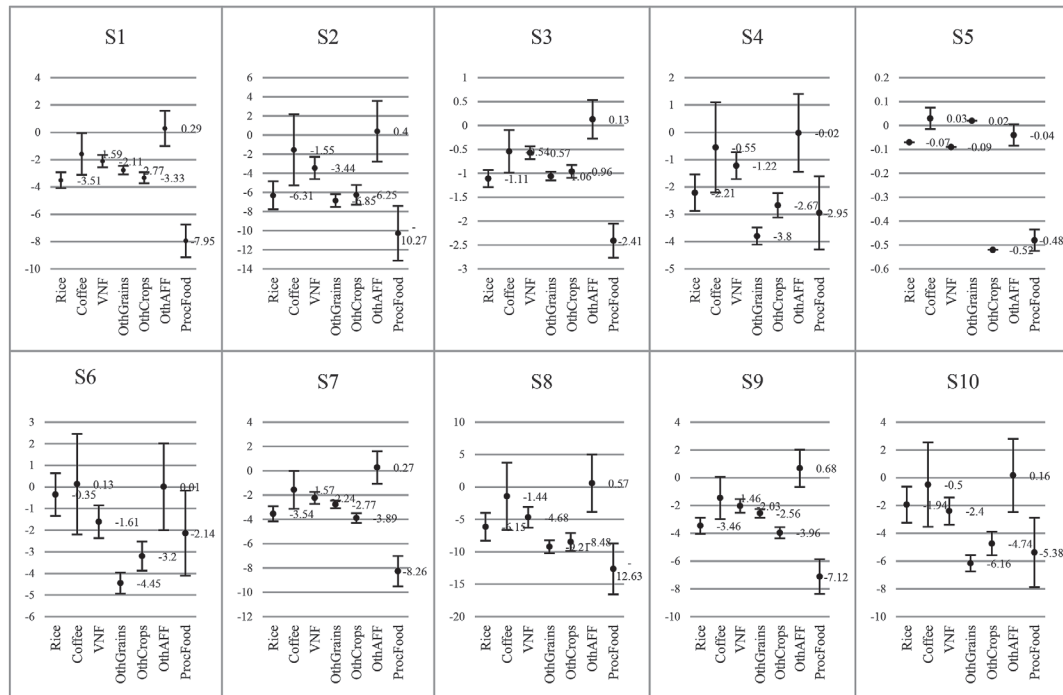
Fig. 1. Changes in agricultural outputs in Vietnam, in the 95% confidence interval (unit: percentage).
Source: Authors' simulation results

despite, the U.S. withdrawal from the TPP, the alternative TPP–11 is still beneficiary to the remaining countries, yet a much less promising option for the member states compared to both the original design and the RCEP. In the event when the RCEP is adopted first, the TPP–11 may appear even less desirable to the member states that have joined the two FTAs, given that the contribution of TPP–11 to their economies would seem trivial. Meanwhile, the adoption of the RCEP may push the American countries to the losing side. This result suggests that the countries still have incentives to support the development of the TPP–11.

Overall, Vietnam is expected to be one of the best beneficiary countries in terms of percentage gains in real GDP. One of the main drivers of the nation's economic growth would be domestic consumption. In addition, the FTAs would accelerate the pace of industrialization and shift the focus of production from the agricultural sector to the manufacturing and service sectors. Since the U.S. withdrew from the TPP, the most desirable remaining option for Vietnam would be to be the member of both the TPP–11 and the RCEP. However, the FTAs are likely to push uncompetitive, vulnerable, corroding and labor–intensive sectors to decline with heavy losses.

While Vietnamese agriculture has performed excellently despite the lack of investment, fundamental and structural changes in Vietnam seem to be indispensable as the country yearns for more economic integration. The trade liberalization is likely to minimize the sector's share in the economy, leading to the collapse of vulnerable sub–sectors and losses of investments. The overall negative impacts of the FTAs on agricultural outputs show clear indication of heavily declining exports and increasing imports. This suggests that domestic agricultural goods will be directed more toward meeting the growing domestic demand instead of exports. In particular, Processed Foods would be the most vulnerable to international competition while Other AFF may find opportunities to increase its output.

In the studied FTAs, the NTBs play an important role in how the FTAs may impact the economies. Not only are there clear differences between tariffs and NTBs scenarios, but the SSA test also indicates that the level of uncertainty is much greater in scenarios where NTBs are taken into account.

As regards policy directions to be taken by Vietnam, it is important for the government to carefully monitor the transition and take precautionary measures wherever possible, in order to achieve a competitive and healthy economy. To do so, the government must ensure that firms, cooperatives, and individuals acknowledge the important details of the agreements while creating incentives for them to lead to positive changes. Especially in the case of the RCEP, competitiveness would be the key element as members in the treaty share similar comparative advantages. In this context, Vietnam should focus on enhancing the competitiveness of its agricultural sector to prevent the declining levels of exports and domestic consumption. This should be done by addressing the series of existing issues: low investment, small–scale farming, poor output quality, ineffective export strategies and weak market chains from production to exports. Competition over the domestic marketing should also be encouraged by strengthening the existing vulnerable sub–sectors. Further, Vietnam should pro-

mote high–value commodity exports through diversification of exports in terms of both commodity types and export destinations. Last but not least, Vietnam should consider developing protection measures (NTBs) in accordance with the required commitments under the trade agreements.

AUTHOR CONTRIBUTIONS

Canh Thai BUI is the principal investigator of this study who has designed the study, performed the data analysis and interpretation, and wrote the draft of this manuscript. This research was conducted when he was a undergraduate student at the school of agriculture, Kyushu University.

Jong–Hwan KO provided technical training and reviewed the manuscript.

Yuichiro AMEKAWA supervised the study and reviewed the manuscript.

Hiroshi ISODA provided comments and supervised this research.

Shoichi ITO was the major supervisor of the first author along with reviewing the manuscript.

REFERENCES

Badri, N. G., & Walmsley, T. L. 2008 *Global trade, assistance, and production: the GTAP 7 data base*. Center for Global Trade Analysis, Purdue University

Burfisher, M. 2011 *Introduction to Computable General Equilibrium Models*. Cambridge University Press. doi: 10.1017/CBO9780511975004

Burfisher, M. E., Dyck, J., Meade, B., Mitchell, L., Wainio, J. T., Zahniser, S., Beckman, J. 2014 Agriculture in the Trans–Pacific Partnership. United States Department of Agriculture. *Economic Research Report No. 176*

Chappuis, T., & Walmsley, T. L. 2011 Projections for world CGE model baselines. *GTAP Research Memorandum No. 22*. Center for Global Trade Analysis, West Lafayette, USA

Dordi, C., Nguyen, D., Vanzetti, D., Trewin, R., Dinh, H., Vu, H., Le, S. 2015 *Assessing the Impacts of the Regional Comprehensive Economic Partnership on Vietnam's Economy*. EU–MUTRAP: ICB–8

Food and Agriculture Organization of the United Nations. 2016 FAOSTAT statistics database. Rome, Italy: FAO. http://www.fao.org/faostat/en/ (retrieved on 12, April 2017)

Fouré, J., Bénassy–Quéré, A., & Fontagné, L. 2010 *The world economy in 2050: a tentative picture*. CEPII, Paris, France

Geck, C. 2017 *The World Factbook*. The Charleston Advisor, **19**(1): 58–60

Hayakawa, K., & Kimura, F. 2014 How do free trade agreements reduce tariff rates and non–tariff barriers? No. 446. Institute of Developing Economies, Japan External Trade Organization (JETRO)

Hertel, T. W. 1997 *Global trade analysis: modeling and applications*. Center for Global Trade Analysis, West Lafayette, USA. Cambridge University Press

Horridge, M. 2008 *SplitCom: Programs to disaggregate a GTAP sector*. Centre of Policy Studies, Monash University, Melbourne, Australia

International Monetary Fund. 2011 *World Economic Outlook*. Washington, USA

International Trade Centre. 2016 Market Access Map: TPP Tariffs. http://www.macmap.org/countryanalysis/countrystatistics/GlobalAnalysis.aspx?s=1 (retrieved on 24, June 2017)

Kawasaki, K. 2015 The relative significance of EPAs in Asia–Pacific. *Journal of Asian Economics*, **39**: 19–30

Narayanan, B., Betina, D., & Robert, M. 2012 *GTAP 8 database documentation–chapter 2: Guide to the GTAP database*. Center for Global Trade Analysis, West Lafayette, USA

Philippidis, G., & Sanjuán, A. I. 2007 An analysis of Mercosur's regional trading arrangements. *The World Economy*, **30**(3): 504–531

Thanh, N. D., Hang, N. T. T., Itakura, K., Nga, N. T. L., & Tung, N. T. 2015 The Impacts of TPP and AEC on the Vietnamese Economy: Macroeconomic Aspects and the Livestock Sector. Vietnam Institute for Economic and Policy Research

Westcott, Paul. and Hansen, James. 2016 USDA Agricultural Projections to 2025. *USDA Agricultural Projections Report OCE–2016–1*. Interagency Agricultural Projections Committee, United States Department of Agriculture, USA

World Bank. 2016a World Integrated Trade Solution (WITS) Washington, DC. http://wits.worldbank.org/wits/ (retrieved on 12, April 2017)

World Bank. 2016b World Development Indicators 2016. Washington, DC. https://data.worldbank.org/data–catalog/world–development–indicators (retrieved on 12, April 2017)

World Trade Organization. 2016 Regional Trade Agreements Information System (RTA–IS). Retrieved from https://www.rtais.wto.org (retrieved on 12 April 2017)

Zhu, C., Feng, X., & He, M. 2015 Accelerating the RCEP Process through Strengthening Cooperation among the APT Countries. *East Asian Review*, **16**: 15–39