

# Macroeconomic Buffer Effects of Mega-FTA Formation: A CGE Analysis for Korea

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## Abstract

**Purpose** – As global trade disputes intensify and global trade uncertainty increases due to the prevailing trade protectionism all over the world, mega-FTAs such as the RCEP and CPTPP are suggested as strategic trade policy options for export-driven small open economies, such as Korea. This paper aims to provide a comprehensive analysis of Korea's mega-FTA participation and the induced implications for the Korean economy.

**Design/methodology** – We use a multi-region, multi-sector global CGE model, and investigate the different effects of both the US-China and US-EU trade wars on the relative changes in GDP, welfare, and trade under different trade policy regimes; (i) Korea does not participate in any mega-FTA, (ii) Korea participates in the RCEP, and (iii) Korea participates in the CPTPP.

**Findings** – We show, among others, that though industrial effects might be largely varied, the overall enlarging of free trade zones through multilateral mega-FTA participation may contribute significantly to the macroeconomic soundness and stability of Korea, even when global trade protectionism prevails. Under RCEP and CPTPP trade regimes, Korea's GDP may increase even when the global trade environment deteriorates as trade wars occur and intensify between the US and China, or between the US and EU. It is also estimated that RCEP participation increases Korea's GDP, welfare (measured in equivalent variation), and total trade by 1.12%, \$1.09 billion, and 2.54%, respectively, while CPTPP participation increases them by 0.19%, \$0.92 billion, and 0.13%, respectively.

**Originality/value** – Existing studies usually focus on the direct impacts of mega-FTA participation on macroeconomic variables such as GDP, welfare, and trade, and do not consider the possible buffer effects of a mega-FTA when the global trade environment worsens. In this paper, we analyze and quantify not only the direct impacts of RCEP and CPTPP on the main macroeconomic variables but also the possible buffer effects of the RCEP and CPTPP in the cases of the US-China and US-EU trade wars.

**Keywords:** Global Trade War, Korean Trade Policy, Macroeconomic Buffer Effect, Mega-FTA

**JEL Classifications:** F15, F62

## 1. Introduction

As the US-China trade war intensifies, there is growing concern that the conflict may spread all over the world and become a long-term structural phenomenon. Continuing US protectionism is now perceived as a major threat not only by China but also by the US's traditional allies, including the EU, Japan, Korea, and so on. If the global trade disputes continue and intensify, export-driven economies such as Korea could be largely affected in many ways. In response to the spread of global protectionism, Korea need to consider not only its own response strategies but also multilateral measures through regional economic integration that can be more effective than single actions.

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There is now extensive literature on the effects of regional economic integration on integrating countries; see Baldwin and Venables (1995) for a theoretical and empirical survey. Though many important channels through which Regional Trade Agreements (RTAs) affect member and/or non-member countries have been studied and revealed, recent globalization processes are much more complex and differ from the old methods in that today they are occurring at a much finer level of disaggregation with even sophisticated global value chains all over the world (see Baldwin, 2006; Grossman and Rossi-Hansberg, 2008). It is therefore very likely that recent mega-FTA negotiations affect largely the global trading and supply chain systems.<sup>1</sup>

Since the very beginning of mega-FTA negotiations, there have been many studies assessing possible impacts. For example, for ASEAN, several studies suggested that both trade and financial liberalization played an important role in ASEAN's economic development, and more generally it was shown that multilateral and/or large trade agreements rather than bilateral and/or small ones generate greater economic gains (see Selvarajan and Ab-Rahim, 2017; Ji et al., 2018). Some researchers, therefore, argue that a new trade regionalism should be constructed in the Asia-Pacific region to form a more cohesive and multilateral trading structure such as those in other regions like Europe and the Americas (see Solis and Wilson, 2017).

Currently, two important mega-FTAs are on the way in the Asia-Pacific region: the Regional Comprehensive Economic Partnership (RCEP) and the Comprehensive & Progressive Agreement for Trans-Pacific Partnership (CPTPP; also known as TPP-11). Wilson (2015) and Aggarwal (2016) discussed the context and characteristics of these two mega-FTAs and the strategic trade policy decisions to be made by the concerned countries in this region. Despite the high importance of these agreements for Korea, the CPTPP has already entered into force since December 2018 without the participation of Korea, and the Korean government has not yet provided a roadmap for how to join it. Furthermore, due to the continuing US-China trade war, the negotiation of the RCEP in which Korea participated has almost stalled, with no further progress. Given the great significance for the regional economy, the RCEP and CPTPP are likely to bring about profound impacts on the trade and industry structure, as well as the macroeconomic stability of Korea. It is therefore very important for Korea to make strategic choices about how to use the RCEP and CPTPP in response to continuing global trade disputes.

Some previous studies provide possible implications for the Korean economy following mega-FTA participation. For example, Petri et al. (2017) estimated that if the RCEP reduces tariffs by 85% within the region, Korea's real income and exports will increase by 1.1% and 5.7%, respectively, by 2030. Kawasaki (2017) also estimated that if the RCEP eliminates tariffs within the region, the average GDP of member countries would increase by 1.89%, with Korea seeing an increase of 5.95%. On the other hand, Li et al. (2017) analyzed the effects of the RCEP on FDI and suggested that the RCEP would generate a significant FDI creation effect for member countries, particularly for China with an FDI inflow increase by up to \$5.86 billion. More recently, Jung Jae-Won (2018) analyzed the effects of RCEP participation on Korea, and estimated that Korea's total production would increase by 1.6% due to significant and positive changes in production and trade structures within the region.<sup>2</sup>

<sup>1</sup> Recent firm heterogeneity literature in international trade also highlights an aggregate productivity growth effect of economic integration through self-selection of heterogeneous firms and/or workers; see Melitz (2003) for a symmetric-county setting, and Jung Jae-Won (2017) for a North-South setting.

<sup>2</sup> According to La Mee-Ryung (2017), international vertical integration is important for Korea's manufacturing sector, and the share of RCEP participating countries in total foreign value added for the exported products of Korea show a comparative advantage growing by up to 40-50%.

Though most works predict some positive gains for mega-FTA participating member countries, they usually focus on the direct impacts of mega-FTA participation on macroeconomic variables such as GDP, welfare, and trade, and do not consider the possible buffer effects of a mega-FTA when the global trade environment worsens. The latter effects might be much more important, particularly for an export-driven, small, and open economy such as Korea. One exception was found in Jung Jae-Won (2018), who analyzed the effects of the RCEP and argued that RCEP participation may also contribute significantly to the macroeconomic stability of Korea in the case of a US-China trade war.

This study aims to provide a comprehensive analysis of Korea's mega-FTA participation and the induced implications for the Korean economy. We assess the potential effects of RCEP and CPTPP participation on the Korean economy using a global CGE model. We analyze and quantify not only the direct impacts of RCEP and CPTPP on the main macroeconomic variables but also the possible buffer effects of the RCEP and CPTPP in the cases of the US-China and US-EU trade wars.<sup>3</sup> In particular, we investigate the different effects of both the US-China and US-EU trade wars on the relative changes in GDP, welfare, and trade under different trade policy regimes; (i) Korea does not participate in any mega-FTA (*BASE*), (ii) Korea participates in the RCEP (*RCEP*), and (iii) Korea participates in the CPTPP (*CPTPP*). We show, among others, that though the industrial effects might be largely varied depending on the scenarios, an overall enlarging of free trade zones through multilateral mega-FTA participation may contribute significantly to the macroeconomic soundness and stability of Korea, even when global trade protectionism prevails. Under the RCEP and CPTPP trade regimes, Korea's GDP may increase even when the global trade environment deteriorates as trade wars occur and intensify between the US and China or between the US and EU, with RCEP participation inducing a greater GDP increasing effect due to its larger market size and the importance of the Chinese market for Korea.

The rest of the paper is organized as follows. Section II describes the research method, a CGE model analysis. In Section III, we present the macroeconomic effects of the RCEP and CPTPP on Korea. In Section IV, we study the buffer effects of RCEP and CPTPP in the cases of the US-China and US-EU trade wars. Section V concludes with some remarks.

## 2. Research Method

We use a computable general equilibrium (CGE) approach. Computable general equilibrium, also referred to as applied general equilibrium, has become an indispensable tool for modern quantitative policy analysis to better understand real-world economic issues. A CGE model is a system of equations that describes an economy as a whole, along with interactions among all agents and markets. Typically, a general-equilibrium model requires agent optimization, market clearing, and income balance conditions, and all of the equations in the model are solved simultaneously to find equilibrium prices and quantities. A CGE model is calibrated to a base-year database so that all solutions exactly replicate the initial equilibrium as in the benchmark database, and then the calibrated model is used to analyze the economy-wide effects of any policy changes. While a single-country models describe one country, analyzing the effects of trade policy changes requires comprehensive multi-country models to account for international interrelationships among countries.

In this paper, to assess the potential economic effects of the RCEP and CPTPP on Korea, a

<sup>3</sup> Though currently the US is focusing on the trade war with China, it is widely stated that the EU may be the next target of the US given the large trade deficit with the EU. Recently, US-EU trade disputes are showing over Boeing and Airbus subsidies.

multi-region, multi-sector global CGE model is constructed. Specifically, we adapt Jung Jae-Won (2019) for the case of homogeneous technology and perfect competition for comparability with conventional CGE models.<sup>4</sup> The CGE model was calibrated using a global Social Accounting Matrix (SAM) dataset extracted from the GTAP 9 Database (base year 2011).

The database was aggregated to 11 countries/regions and 10 sectors (see Table A in the Appendix). The 11 countries/regions include Korea, China, Japan, India, USA, EU, Rest of World (RoW), and 4 country-groups according to participation in the RCEP and/or CPTPP. The 10 sectors include 2 primary sectors (livestock and dairy, other primary), 6 manufacturing sectors (petroleum and chemicals, steel & metal, motor and other transport, electronics, machinery, other manufactures), and 2 service sectors (private services, public services). All simulation results were computed assuming a transition period of 15 years to approach new steady states.

To provide a comprehensive analysis of Korea's mega-FTA participation and the induced implications for the Korean economy, our simulations are two-fold. First, we analyze the direct impacts of RCEP and CPTPP participation on the main macroeconomic variables: GDP, welfare, and trade. Welfare effects are measured in equivalent variation (EV). For trade effects, we investigate trade volume change by industry, and trade share change by country/region.

Secondly, and more importantly, we analyze the possible macroeconomic buffer effects of RCEP and CPTPP participation. To this end, we consider three different trade policy regimes; (i) Korea does not participate in any mega-FTA (*BASE*), (ii) Korea participates in the RCEP (*RCEP*), and (iii) Korea participates in the CPTPP (*CPTPP*), and two possible trade wars: the US-China and US-EU trade wars, for which we assume three scenarios. (i) The US and China/EU impose reciprocal additional tariffs of 10%, (ii) the US and China/EU impose reciprocal additional tariffs of 25%, and (iii) the US and China/EU impose reciprocal additional tariffs of 50%.<sup>5</sup> We then investigate how the Korean economy reacts in the cases of the US-China and US-EU trade wars, and under different regimes. For the comparability of relative changes, initial variable values of each economy under different regimes are normalized to one.

### 3. Macroeconomic Effects of the RCEP and CPTPP

#### 3.1. GDP Effect

Table 1 shows the effects of RCEP and CPTPP participation on GDP. The impact of the RCEP on each country and region is expected to show an increase in the GDPs of member countries, except for India, and a decrease in GDP in the rest of the world. Specifically, Australia and New Zealand are estimated to have a GDP increase of about 7.02% because they enjoy the greatest effect of trade creation due to the RCEP. GDP growth effects of 4.76%, 4.73%, and 4.20% are expected for China, Japan, and six ASEAN countries, respectively. In the case of China, the RCEP will reduce transaction costs of intra-regional intermediate

<sup>4</sup> Jung Jae-Won (2019) developed a global CGE model incorporating heterogeneous workers and firm-technologies, and analyzed the technology-upgrading mechanism of trade liberalization. For the conventional structure of CGE models, see also Shoven and Whalley (1992), Francois and Reinert (1996), Ginsburgh and Keyzer (2002), and so on.

<sup>5</sup> Though scenario (iii) seems to not be very feasible, we include it to see any (non-)monotonicity of changes.

goods, which will lead to an increase in the export of final goods to the US. The increase in demand for intermediate goods from China is expected to have a positive impact on industrial production in Korea; intermediate goods account for about 75-80% of Korean exports to China. Though discussions on a Korea-China-Japan FTA are stalled, Japan may also expect a trade creation effect with Korea and China through the RCEP. The four ASEAN countries participating in both the RCEP and CPTPP and Korea are also expected to see an increase of GDP by 1.45% and 1.12%, respectively.

On the other hand, India is estimated to have a GDP reduction effect of 0.76% when the RCEP takes effect. India has relatively high tariffs on manufactured goods, so if 100% tariff elimination is implemented through RCEP, increasing imports will replace domestic industrial production. The service industry, in which India has a comparative advantage, is instead expected to expand the market through the RCEP. The RCEP is expected to have a negative impact on the GDP of outside countries, including the US, EU, and the American countries. As centripetal force toward the internal market due to the RCEP becomes larger than the centrifugal force, this will have a negative impact on the outside market.

If Korea joins the CPTPP in response to global trade disputes, it is expected to have a different ripple effect. As the CPTPP entered into force in December 2018, additional GDP growth effects for the 11 incumbent countries might be relatively insignificant. Under the current agreement of the CPTPP without participation of the USA, GDP is expected to decline in all member countries, though slightly with less than 0.45%, except for American countries. It is estimated that the GDP of the US and EU may also decrease by 0.07% and 0.06%, respectively. On the other hand, Korean GDP is expected to increase the most by 0.19%, though it is much less than the GDP increase effect through the RCEP. In the case of China, a small but positive impact of 0.06% is expected. With the expansion of the CPTPP market in the region, China will have more opportunity for export growth, but expansion of intra-regional trade may weaken Chinese trade with other foreign countries at the same time.

**Table 1.** GDP Effect of the RCEP and CPTPP by Country and Region

	(% Changes)										
	Korea	China	USA	Japan	India	ASE4	ASE6	Ocea2	Amer4	EU	RoW
RCEP	1.116	4.763	-0.533	4.732	-0.761	1.451	4.202	7.018	-0.126	-0.459	-0.117
CPTPP	0.191	0.060	-0.065	-0.275	-0.060	-0.442	-0.217	-0.147	0.022	-0.062	0.016

**Notes:** 1. ASE4: Vietnam, Malaysia, Singapore, Brunei (RCEP & CPTPP participation).

2. ASE6: Thailand, Indonesia, Philippines, Myanmar, Cambodia, Laos, India (RCEP participation).

3. Ocea2: Australia, New Zealand (RCEP & CPTPP participation).

4. Amer4: Canada, Mexico, Peru, Chile (CPTPP participation).

### 3.2. Welfare Effect

Table 2 shows the effects of RCEP and CPTPP participation on welfare. Welfare is measured in equivalent variation (EV). When the RCEP enters into force, the welfare levels of the countries in the region, excluding India, are expected to improve. China and Japan are expected to have the greatest positive impacts at \$29.4 billion and \$26.5 billion, respectively. Korea is also expected to see a welfare increase of \$1.1 billion. The effect of the RCEP should thus be to increase the consumption efficiency of consumers, and to improve income levels in the region. As in the case of a GDP effect, it is estimated that the welfare of the US and EU would decrease by \$14.4 billion and \$16.9 billion, respectively.

**Table 2.** Welfare Effect of the RCEP and CPTPP (measured in EV) by Country and Region

	(US \$ Billion)										
	Korea	China	USA	Japan	India	ASE4	ASE6	Ocea2	Amer4	EU	RoW
RCEP	1.087	29.436	-14.389	26.548	-2.377	1.339	10.584	11.500	-0.878	-16.944	-8.573
CPTPP	0.918	0.612	-0.561	-0.957	-0.059	-0.451	-0.339	0.049	0.444	-0.699	1.242

On the other hand, the welfare effect of the CPTPP shows opposite patterns. Consumer welfare may decrease in Japan and four ASEAN countries, while it may increase in four American countries, Australia, and New Zealand. As in the case of the RCEP, Korea and China are expected to have welfare gains of about \$900 million and \$600 million, respectively.

Korea is expected to increase consumer welfare through both the RCEP and CPTPP since it may enjoy trade expansion and positive competition effects given its highly outward-oriented characteristics. Overall, the RCEP seems to have a larger impact than the CPTPP due to the high influence of the Chinese and Indian economies in the region.

### 3.3. Trade Effect

Table 3 and 4 show the effects of RCEP and CPTPP participation on trade. The trade effect of Korea can be analyzed through the effects of the RCEP and CPTPP on both trade size and changes in the share of trade with trading partners. If the RCEP comes into effect, it is estimated that Korea's total exports will increase by 3.78%, and imports will increase by 1.06% (see Table 3). By industry, exports are expected to increase in all industries in orders of machinery (7.00%), livestock and dairy (5.56%), and other manufactured goods (5.41%).<sup>6</sup> Concerning imports, the increase and decrease will cross depending on the industry. In the motor and other transport, machinery, and private service industries, an import reduction effect will be generated, while the remainder of industries will increase imports. In the machinery industry, imports will fall while exports rise. On the other hand, the livestock and dairy industries are expected to show a simultaneous increase in exports and imports. In the motor and other transport industry, it is shown that the import reduction effect is relatively larger than the export increase effect. On the other hand, in the livestock and dairy, petrochemical, steel and metal, electronics industries, and so on, it is expected that the increase of exports largely outweighs the increase of imports.

Looking at the trade effects in the case of Korea's CPTPP joining, we can estimate that total exports will decrease by 0.31% while the total imports will increase by 0.53%. The impact of such a ripple effect is relatively smaller than that of the RCEP. Specifically, the effect of the reduction of exports would be caused by differences in trade structure and characteristics of regional markets. On one hand, it can be deduced that the trade effect of the RCEP appears to be more significant because of the high dependence of Korea on the Chinese economy, as well as the close trade relationships between Korea, China, and Japan. On the other hand, the absolute market size of the CPTPP has decreased significantly due to the withdrawal of the US, which yields a relatively small market size effect compared to the RCEP. However, even

<sup>6</sup> At first glance, it might be rather surprising that the RCEP yields a large export-increasing effect for the Korean livestock and dairy industry. Korea is, however, a large importing country for this industry: in the base year, Korea imported \$73.48 billion worth of livestock and dairy products, while it exported only \$0.16 billion. Consequently, though the RCEP may create a relatively high increase in exports for these products, the increase of imports largely outweighs the increase of exports, which leads to an overall additional yearly trade deficit of \$83 million in this industry.

if total exports may decrease slightly, it should be noted that not joining the CPTPP while other member countries enjoy a market expansion effect may lead to much a larger decrease in exports. Also, if the cumulative rules of origin effects not considered in standard CGE models come into force, the opportunity cost of not joining CPTPP might aggravate the trade balance even further.

On the other hand, looking at trade effects by industry, most industries are expected to experience a slight decline in exports, except for the primary and other manufacturing industries, while imports are expected to increase in all industries, notably in the livestock and dairy sector.

**Table 3.** Trade Volume Effect of the RCEP and CPTPP by Industry

		(% Changes)										
		Livestock Dairy	Other Primary	Petrol. Chem.	Steel Metal	Motor Transp.	Electro.	Mach.	Other Manuf.	Private Services	Public Services	Total
R C E P	Export	5.560	1.994	3.954	3.362	0.728	2.653	7.003	5.406	1.292	0.394	3.784
	Import	1.617	2.375	1.157	1.618	-1.024	0.179	-0.224	0.088	-0.058	1.259	1.057
	Total	1.775	2.371	3.021	2.526	0.489	1.873	4.926	2.771	0.481	0.957	2.544
C P T P P	Export	0.000	0.043	-0.118	-0.334	-0.144	-0.644	-0.399	0.098	-0.497	-0.503	-0.305
	Import	2.357	0.040	0.343	0.328	1.017	0.469	1.183	1.071	0.686	0.464	0.530
	Total	2.295	0.040	0.059	0.011	0.045	-0.231	0.263	0.683	0.264	0.127	0.126

A comparison of the changes in the share of trade shows a considerable difference between the RCEP and CPTPP (see Table 4).<sup>7</sup> While the influence of the CPTPP seems to be relatively small compared to the baseline, the influence of the RCEP seems to be very large. In the case of the RCEP, the share of Korean trade to China, Japan, Australia, and New Zealand will increase significantly, and the share of trade to the US and EU will decline sharply. In particular, the portion of exports to China is expected to double from 23.9% to 51.0%, and the portion of exports to the US is expected to decline to 3.7%. Looking at the share of imports, the share of the US, India, and the EU increases, and imports from China, Japan, and ASEAN are relatively reduced.

So far, our analyses have excluded the aspect of global trade conflicts such as the US-China trade war and the US-EU trade war. If global trade conflicts become prolonged and intensified, it is natural that Korea's trade and industrial structures should change significantly. Therefore, in order to ensure certain macroeconomic soundness and stability, it is necessary to discuss the use of the RCEP and CPTPP to cope with global trade conflicts. In the following section, we analyze possible macroeconomic buffer effects of the RCEP and CPTPP in the cases of the US-China and US-EU trade wars.

<sup>7</sup> The most recent GTAP 9 database used in this study uses 2011 as the base year, and thus has the limitation that it does not fully reflect the effects of the Korea-US FTA, the Korea-China FTA, and so on that took effect thereafter. It should, however, be understood that CGE models are not to predict, but to assess the potential economic effects of policy changes at given parameter values. As usual, only the relative values of concerned variables are meaningful, and not the absolute values.

**Table 4.** Trade Share Effect of the RCEP and CPTPP by Country and Region

		(%)										
		China	USA	Japan	India	ASE4	ASE6	Ocea2	Amer4	EU	RoW	Total
B	Export	23.850	12.142	7.631	2.281	5.320	5.344	1.657	3.463	12.376	25.936	100.000
A	Import	15.808	11.040	12.040	1.380	4.356	4.511	4.582	2.965	11.569	31.750	100.000
E	Total	19.815	11.589	9.843	1.829	4.836	4.926	3.125	3.213	11.971	28.853	100.000
R	Export	50.991	3.702	14.158	0.753	3.956	7.966	5.616	1.167	3.624	8.066	100.000
C	Import	7.947	15.221	5.536	6.889	4.139	1.719	0.755	3.841	14.944	39.009	100.000
E	Total	34.535	8.106	10.861	3.099	4.026	5.578	3.757	2.189	7.952	19.896	100.000
C	Export	24.137	11.807	7.325	2.230	5.272	4.975	2.015	4.029	12.052	26.159	100.000
P	Import	14.757	10.721	14.472	1.333	5.177	4.505	5.528	3.060	11.396	29.051	100.000
P	Total	19.189	11.234	11.095	1.757	5.222	4.727	3.868	3.518	11.706	27.685	100.000

## 4. Macroeconomic Buffer Effects of the RCEP and CPTPP

The Korean economy, which relies heavily on trade and investment with China and the US, is sensitive to the volatility of the Chinese and US economies. Korea has pursued an export-driven growth strategy based on its domestic and overseas production structures that utilize global value chains. Accordingly, a US-China trade war will not only cause changes in the trade volume and trade structure of Korea but also increase the uncertainty and risk of trade. This is because Korea has an open economy with a small influence on the world market compared to its high dependence on foreign trade. Therefore, as the volatility and uncertainty of the US-China trade war widens, the Korean economy needs to strengthen its responsiveness to foreign environmental changes that are difficult to control internally.

As analyzed in Section III, the Korean economy may enjoy positive GDP growth, welfare, and trade effects through RCEP and CPTPP participation, but those ripple effects did not consider global trade disputes. If global trade disputes intensify, what impact will the RCEP and CPTPP have on the Korean economy? Since the US-China trade war and the US-EU trade war would be important external environmental factors for the Korean economy, in this section we attempt to analyze whether RCEP and CPTPP participation could be buffering countermeasures.

### 4.1. Buffer Effects Against the US-China Trade War

In this subsection, we analyze GDP, welfare, and trade effects in the case of the US-China trade war under RCEP and CPTPP regimes. We assume three scenarios: (i) the US and China impose reciprocal additional tariffs of 10%, (ii) the US and China impose reciprocal additional tariffs of 25%, and (iii) the US and China impose reciprocal additional tariffs of 50%.

#### 4.1.1. GDP Effect

At the baseline, Korea's GDP is unchanged if the US and China impose reciprocal additional tariffs of 10%. However, if the two countries impose additional tariffs of 25% on all traded goods, Korea's GDP is expected to suffer a 1.6% reduction. On the other hand, if the

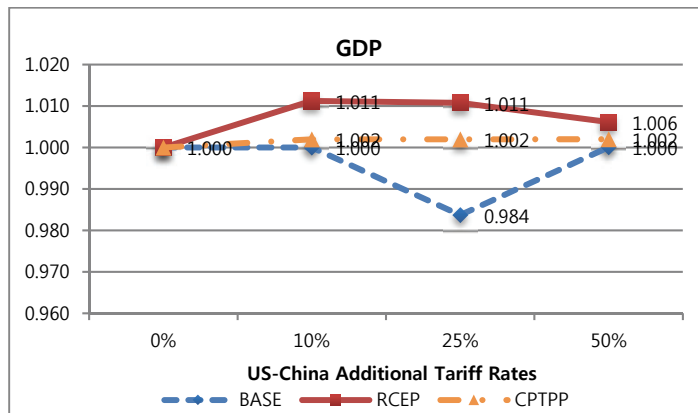


RCEP takes effect, Korea's GDP is expected to increase by 1.1%. Likewise, if Korea joins the CPTPP, a 0.2% GDP increase is expected compared to the baseline. If the US and China impose reciprocal additional tariffs of 50% on each other, China's exports to the US would sharply decrease. Consequently, Korean products may be substituted for Chinese products in the US market. However, since Korea's exports of intermediate goods to China would also sharply decline, the final GDP effect is shown to be decreased slightly compared to the case of additional tariffs of 25% (from 1.011 to 1.006, see Fig. 1).

The analysis of these tariffs and scenarios shows a different result than the usual expectation that the US-China trade war will have only negative impacts on Korea's economic growth. If we look at the base case, Korea's GDP may be affected strongly and negatively when the US and China impose reciprocal additional tariffs of 25%. On the other hand, it is shown that the influence of the US-China trade war would be quite limited in the cases of additional tariffs of 10% or 50%. Korea's response should therefore be noteworthy in the case of additional tariffs of 25%.

While the US-China trade war may be a significantly negative factor for Korea's economic growth, it may also turn out to be a positive factor through the RCEP and CPTPP. As shown in Fig. 1, it is estimated that there could be a 2.7% point gap in GDP changes between the RCEP and BASE in the case of additional tariffs of 25%.

Fig. 1. GDP Effects of the US-China Trade War for Alternative Trade Policy Regimes



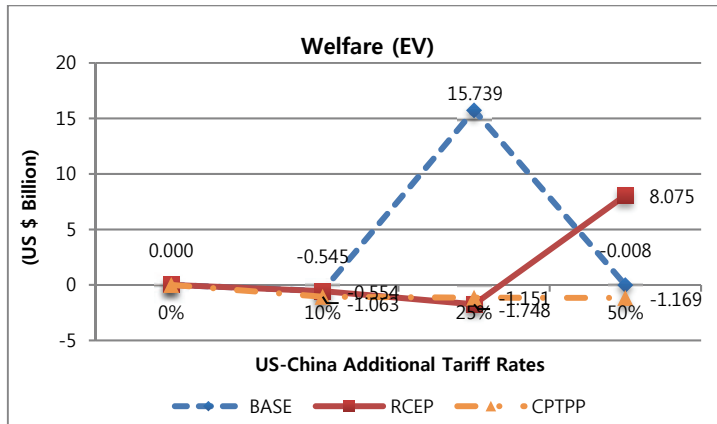
#### 4.1.2. Welfare Effect

At the baseline, if the US and China impose reciprocal additional tariffs of 25%, Korea is estimated to see an additional gain in EV of \$15.7 billion. This is in contrast to when the two countries impose additional tariffs of 10% or 50%. Consumer prices for traded products between the US and China may rise sharply, but Korean consumers are likely to have an opportunity to enjoy relatively low import prices. If Chinese products lose price competitiveness in the large US market, Korea may import them at relatively low prices. It is shown in Fig. 3 that Korea's export reduction effect and import increase effect are caused when additional tariffs of 25% are imposed.

On the other hand, it is estimated that if the US and China impose reciprocal additional tariffs of 25%, welfare decreases slightly by \$1.7 billion and \$1.2 billion under RCEP and

CPTPP regimes, respectively. However, if the US and China impose additional tariffs of 50%, Korea may use the RCEP to increase social welfare.

**Fig. 2.** Welfare Effects of the US-China Trade War for Alternative Trade Policy Regimes



#### 4.1.3. Trade Effect

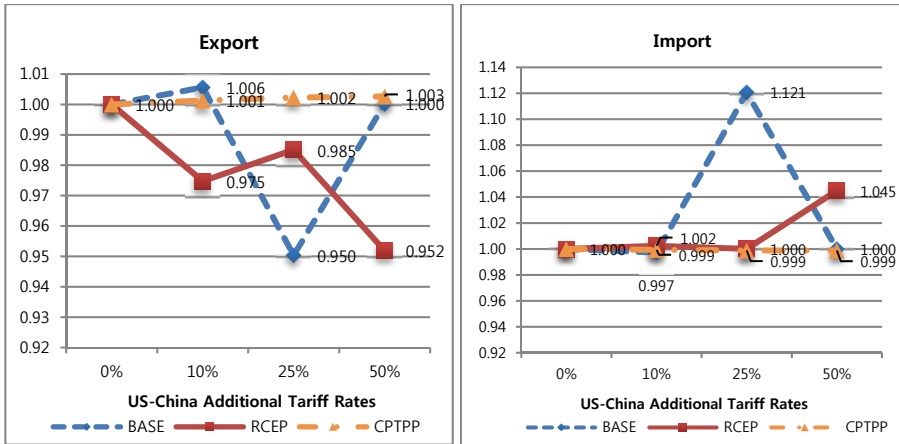
In the baseline, if the US and China impose reciprocal additional tariffs of 25%, Korea's exports would be reduced by 5.0%, while imports would increase by 12.1%. Korea's current account deficit will be seriously impacted. This is compared to the cases of additional 10% or 50% tariffs, in which the impacts would be limited. As the buffer effects through the CPTPP and RCEP appear to be outstanding, trade soundness will recover significantly. When 25% additional tariffs are imposed, Korea's import changes are shown to be stable, and exports under the CPTPP increase by 0.2%. The total exports under the RCEP are shown to decrease, but it can be considered improved by 3.5% points if compared to the baseline. The buffer effect of a mega-FTA against the US-China trade war seems to be effective in the case of additional 25% tariffs. The imposition of tariffs of 10% or 50% may, however, result in a counter effect by which the current account deficit is worsened compared to a case without mega-FTA (see Fig. 3).

By industry, Korea's electronics and machinery exports are expected to decline by 5.7% with the imposition of additional 25% tariffs between the US and China. Exports of the livestock and dairy industry and petrochemical industry are estimated to decline by 2.3% and 3.9%, respectively. In the face of declining exports, it is estimated that the industries where the buffering effects of the RCEP and CPTPP can be most significant would be the motor and other transport, other primary (agriculture, fishery and mining), electronics, and machinery industries. Specifically, despite the imposition of additional 25% tariffs, the motor and other transport industry shows a distinct difference from other industries with an increase in exports of 3.1% under the RCEP (see Fig. A. in the Appendix).

In terms of the increase in imports by industry, it is estimated that, when additional tariffs of 25% are imposed, the motor and other transport industry would face the most significant increase in imports at 31.0%. In machinery, public service, private service, and the livestock and dairy industries, import growth is also expected to be significant. Thus, the buffer effect of the RCEP and CPTPP on those industries will be most meaningful.

In the end, if additional tariffs of 25% are imposed between the US and China, Korea's major export industries, such as the motor and other transport, machinery, and electronics industries, will have relatively large buffer effects from mega-FTAs. The RCEP and CPTPP seem to have relatively similar buffer effects against import increases in most industries. On the other hand, concerning buffer effects against export decreases, the RCEP seems to have greater influence on motors and other transport, livestock and dairy, and services, while the CPTPP seems to have greater influence on the petrochemical, steel and metal, electronics, and machinery sectors.

**Fig. 3.** Trade Effects of the US-China Trade War for Alternative Trade Policy Regimes



## 4.2. Buffer Effects Against the US-EU Trade War

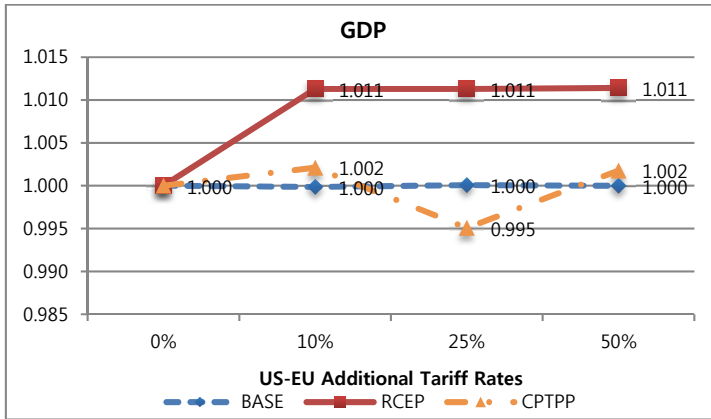
We examine the ripple effects of US protectionism on the Korean economy when it spreads to the EU. As in the case of the US-China trade war, we assume three scenarios with reciprocal additional tariff impositions of 10%, 25%, and 50% between the US and EU. As before, we then analyze GDP, welfare, and trade effects under alternative trade regimes.

### 4.2.1. GDP Effect

Even if the US and the EU impose reciprocal additional tariffs on each other, it does not seem to cause significant ripple effects on Korea's GDP growth at the baseline. On the other hand, if the RCEP takes effect, Korea's GDP is expected to increase by 1.1%. If Korea joins the CPTPP and the US and the EU impose reciprocal additional 10% or 50% tariffs, Korea's GDP is estimated to increase by 0.2%, while a 25% tariff imposition would result in a GDP reduction of 0.5%.

These results show that the Korean economy can complement the contraction of trade between the US and the EU through the revitalization of intra-trade within the RCEP region. However, as the CPTPP excludes China, India, Indonesia, and Thailand, it is expected that the substitution effect of the US-EU trade dispute will be relatively small, and the 25% tariff imposition will have a negative impact on Korea's GDP.

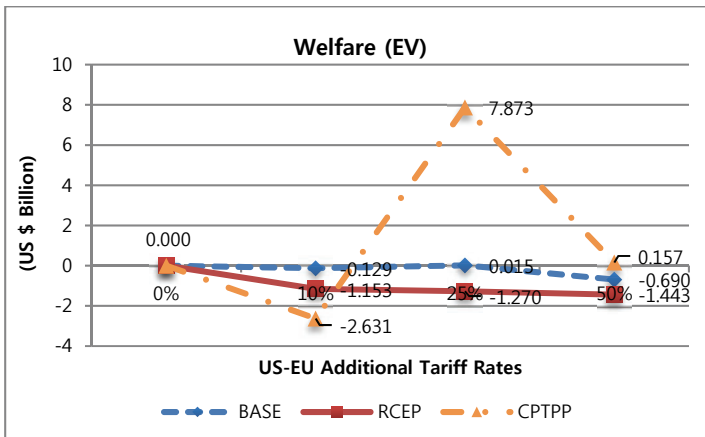
Fig. 4. GDP Effects of the US-EU Trade War for Alternative Trade Policy Regimes



#### 4.2.2. Welfare Effect

At the baseline, even if there is a trade dispute between the US and EU, the social welfare effect on the Korean economy is inferred to be insignificant. Even when the two regions impose reciprocal additional tariffs of 50%, social welfare would be reduced only by \$690 million. If 10% additional tariffs are imposed under the RCEP or CPTPP, it is expected that the decrease in social welfare will be larger compared to the baseline, and the buffering effects are not expected. On the other hand, in the case of a 25% tariff imposition, social welfare under the CPTPP is shown to increase by \$7.9 billion (see Fig. 5).

Fig. 5. Welfare Effects of the US-EU Trade War for Alternative Trade Policy Regimes



#### 4.2.3. Trade Effect

At the baseline, the impact of trade disputes between the US and EU on Korean trade is estimated to be minimal, similar to GDP growth and the social welfare effects. In the case of

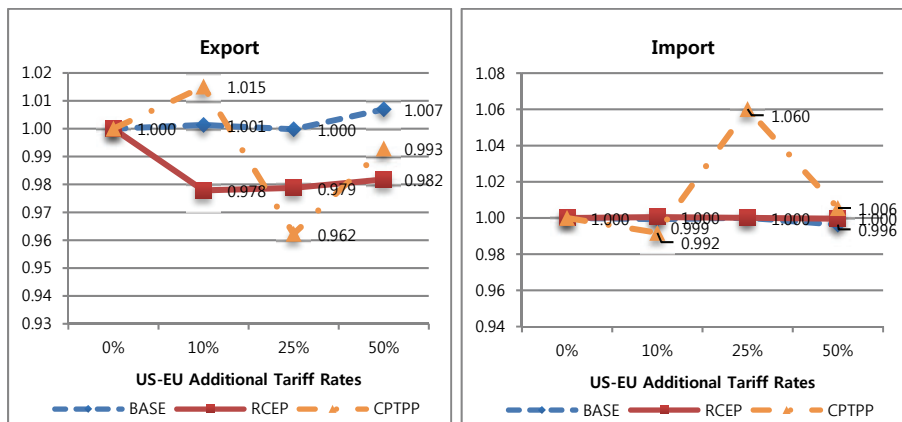
a 50% tariff imposition, Korea's exports are estimated to increase by 0.7%, while imports are estimated to decrease by 0.4%. If the US and the EU impose reciprocal additional tariffs of 25%, this is expected to have a negative impact on exports under both the RCEP and CPTPP. It is shown that imports under the CPTPP increase by 6.0%, which would exacerbate the current account. If the US and the EU impose reciprocal 10% additional tariffs, CPTPP participation would yield buffering effects with an increase of Korean exports by 1.5%, and a decrease of imports by 0.8%. RCEP participation is estimated to reduce Korea's exports by 2.2% in this case (see Fig. 6).

In terms of trade effects by industry, there are very few industry-specific differences. It is estimated that if 10% additional tariffs are applied, the CPTPP induces an export-increasing effect for all industries in Korea, while the RCEP induces an export-reduction effect for all industries, except the motor and other transport industry. In this case, the CPTPP shows a buffer effect to improve the current account by also inducing a decrease in imports. The RCEP is expected to have fewer buffering effects.

If 25% additional tariffs are imposed, it is estimated that the CPTPP will cause a reduction in exports in all Korean industries, which is in stark contrast to the case of 10% additional tariffs. It is expected that the effect of the RCEP will be to reduce exports in industries except the motor and other transport industry, as in the case of additional 10% tariffs. Concerning imports, it is estimated that the effect of the RCEP will be to reduce imports in the other primary (agriculture, fishery and mining), petrochemical, steel and metal, and public service industries (see Fig. B. in the Appendix).

As a result, it is estimated that, in the case of additional 10% tariff imposition, the CPTPP shows buffering effects to improve the current account in all industries. On the other hand, the buffering effects of the RCEP are limited to the public service industry in the case of additional 25% tariffs.<sup>8</sup>

**Fig. 6.** Trade Effects of the US-EU Trade War for Alternative Trade Policy Regimes



One notable feature we observe from the results is that in many cases the effects on GDP, welfare, trade, and so on. are non-monotonic with additional tariff rates between US and China/EU. Obviously, all the elasticities, as well as the close interdependence between all

<sup>8</sup> Even though the RCEP may induce an import decreasing effect in the other primary, petrochemical, and steel and metal industries, it should be offset by the export decrease effect.

sectors and countries, would play an essential role for such results. In a two-country setting, the classical optimal tariff theory shows that the response of macroeconomic variables to additional tariff rates may be non-monotonic depending on elasticities. A large country may gain by raising tariffs until a point as long as the improvement in the terms of trade dominates the decline in the volume of trade, and the magnitude of such an optimum tariff depends essentially on the elasticity of the foreign offer curve. In a multi-country setting with close interdependence among countries as well as wide asymmetries in all aspects, things become much more complicated, and a priori it is not possible to predict the potential outcomes of how global trade wars between large countries would affect the surrounding countries under different trade policy regimes, not only quantitatively but also qualitatively. Country-level outcomes would highly depend on various income and substitution effects at the global level. Using a multi-region, multi-sector global CGE model, this paper tries to provide some counterfactual predictions that can be used to design appropriate optimal trade policies for Korea.

## 5. Conclusion

As the US-China trade war continues and intensifies, the growing global trade uncertainty comes as a major threat to the world economy. Among others, mega-FTAs are considered potentially effective countermeasures to promote and revive international trade and investment. On the other hand, due to their own comprehensive and large-scale characteristics, mega-FTAs are expected to largely affect global value chains by restructuring industrial and trade structures of not only member countries but also the rest of world.

In this paper, we investigated the potential effects of the currently ongoing two mega-FTAs (RCEP and CPTPP) on the Korean economy using a multi-region, multi-sector global CGE model adapted from Jung Jae-Won (2019). The simulation results show overall positive macroeconomic effects for Korea. It is estimated that RCEP participation increases Korea's GDP, welfare (measured in equivalent variation), and total trade by 1.12%, \$1.09 billion, and 2.54%, respectively, while CPTPP participation increases them by 0.19%, \$0.92 billion, and 0.13%, respectively.

As expected, the simulation results also reveal that the RCEP and CPTPP may considerably change Korea's trade patterns by region and industry. Given the potentially important industry and trade restructuring effects of the RCEP and CPTPP, we analyzed and quantified not only their direct impacts on the main macroeconomic variables but also possible buffer effects on Korea in the cases of the US-China and US-EU trade war.

Assuming US-China and US-EU trade wars under three different trade regimes for Korea (*BASE*, *RCEP*, and *CPTPP*), it was shown that though industrial effects might be largely varied depending on the scenarios, overall RCEP and CPTPP participation might also significantly contribute to the macroeconomic soundness and stability of Korea. In particular, it was shown that under RCEP and CPTPP trade regimes, Korea's GDP might rather increase more following the US-China and US-EU trade wars. One exception of slight decrease in GDP was found in the case where the US and EU impose reciprocal additional tariffs of 25% under the CPTPP regime. Even in such a case, the policy recommendation should be to enlarge free trade zones through multilateral measures, and not to exclude the CPTPP from consideration.

It is widely believed that the proliferation of trade protectionism around the world would negatively affect in particular export-driven small open economies such as Korea. This paper highlighted possible macroeconomic buffer effects through mega-FTA participation. Needless to say, examining other trade conflicts under other trade regimes and/or circumstances might also lead to different results with different policy implications. We leave these to future research.

## References

- Aggarwal, V. K. (2016), *Mega-FTAs and the Trade-Security Nexus: The Trans-Pacific Partnership (TPP) and Regional Comprehensive Economic Partnership (RCEP)* (Asia Pacific Issue Paper, No. 123), Honolulu, HI: East-West Center, 1-8.
- Baldwin, R. E. (2006), *Globalisation: The Great Unbundling(s)* (Research Paper, No. 2006-09), Helsinki: Economic Council of Finland, 5-47.
- Baldwin, R. E. and A. J. Venables (1995), "Regional Economic Integration". In G. M. Grossman and K. Rogoff (Eds.), *Handbook of International Economics*, Amsterdam: North-Holland, 1597-1644.
- Francois, J. F. and K. A. Reinert (1998), *Applied Methods for Trade Policy Analysis: A Handbook*, Cambridge, MA: Cambridge University Press.
- Ginsburgh, V. and M. Keyzer (2002), *The Structure of Applied General Equilibrium Models*, Cambridge, MA: MIT Press.
- Grossman, G. M. and E. Rossi-Hansberg (2008), "Trading Tasks: A Simple Theory of Offshoring", *American Economic Review*, 98, 1978-1997.
- Global Trade Analysis Project (GTAP), *Data Base*. Available from <https://www.gtap.agecon.purdue.edu/> (accessed March 21, 2019)
- Ji, X., P. B. Rana, W. M. Chia and C. Li (2018), "Post-TPP Trade Policy Options for ASEAN and its Dialogue Partners: Preference Ordering Using CGE Analysis", *East Asian Economic Review*, 22(2), 177-215.
- Jung, Jae-Won (2017), "Openness, Productivity and Welfare with Heterogeneous Firms", *Journal of Korea Trade*, 21(4), 349-365.
- Jung, Jae-Won (2018), *The Effects of RCEP on the Korean Economy*, Seoul: KERI.
- Jung, Jae-Won (2019), "Introducing Roy-like Worker Assignment into Computable General Equilibrium Models", *Applied Economics Letters*, 1-8, DOI: 10.1080/13504851.2019.1637510
- Kawasaki, K. (2017), *Emergent Uncertainty in Regional Integration: Economic Impacts of Alternative RTA Scenarios* (GRIPS Discussion Paper, No.16-28), Tokyo: National Graduate Institute for Policy Studies, 1-21.
- La, Mee-Ryung (2017), *An Analysis of RCEP Value Chains and Policy Implications*, Sejong, Korea: KIEP.
- Li, Q., R. Scollay and J. Gilbert (2017), "Analyzing the Effects of the Regional Comprehensive Economic Partnership on FDI in a CGE Framework with Firm Heterogeneity", *Economic Modelling*, 67, 409-420.
- Melitz, M. J. (2003), "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", *Econometrica*, 71(6), 1695-1725.
- Petri, P. A., M. G. Plummer, S. Urata and F. Zhai (2017), *Going It Alone in the Asia-Pacific: Regional Trade Agreements without the United States* (PIIE Working Paper, No. 17-10), Washington, DC: Peterson Institute for International Economics, 1-17.
- Selvarajan, S. K. and R. Ab-Rahim (2017), "Economic Liberalization and Its Link to Convergence: Empirical Evidence from RCEP and TPPA Countries", *International Journal of Business and Society*, 18(3), 439-460.
- Shoven, J. B. and J. Whalley (1992), *Applying General Equilibrium*, Cambridge, MA: Cambridge University Press.
- Solis, M. and J. D. Wilson (2017), "From APEC to Mega-Regionals: The Evolution of the Asia-Pacific Trade Architecture", *The Pacific Review*, 30(6), 923-937.
- Wilson, J. D. (2015), "Mega-Regional Trade Deals in the Asia-Pacific: Choosing Between the TPP and RCEP?", *Journal of Contemporary Asia*, 45(2), 345-353.

## Appendix

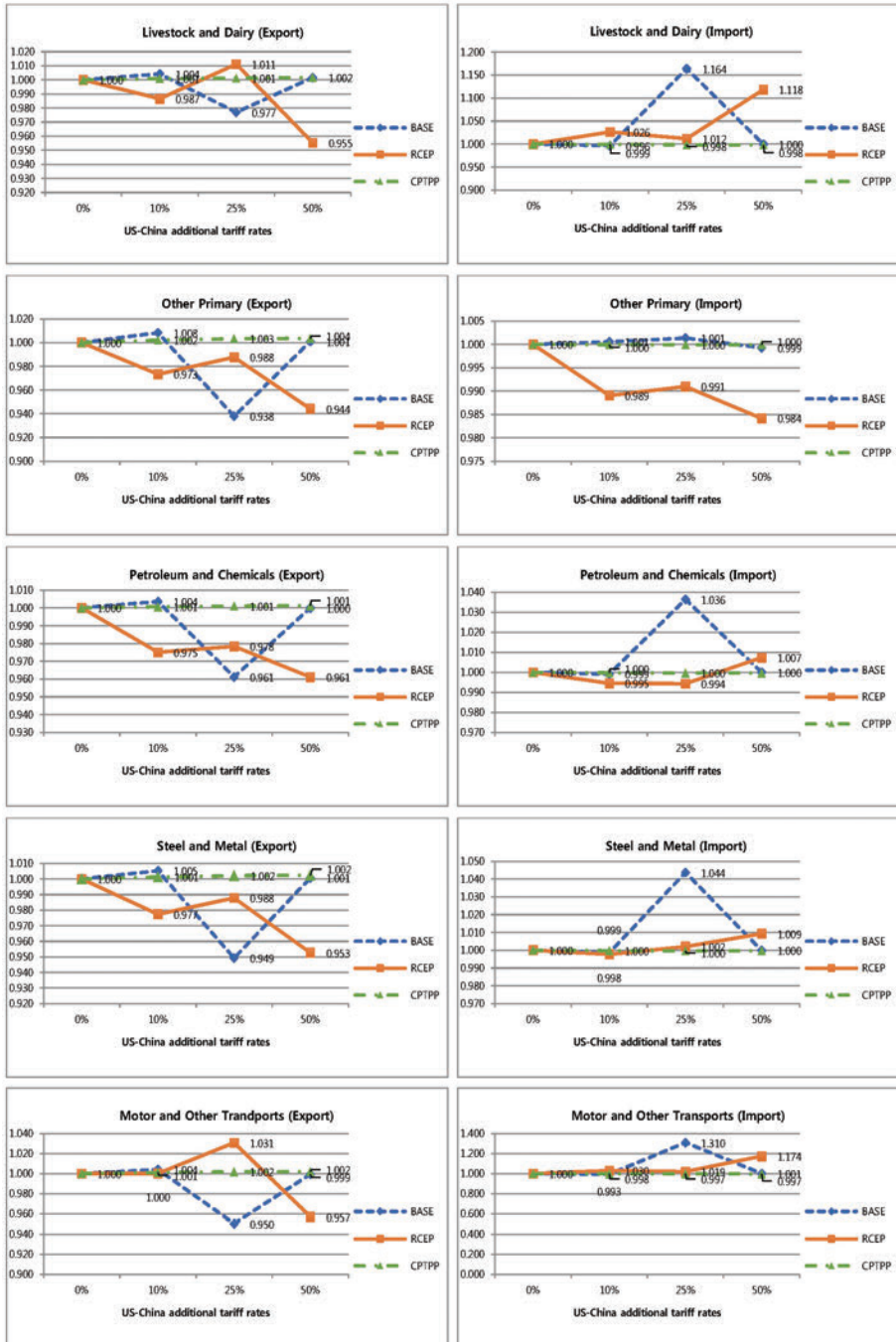
**Table A.** Classification of Countries/Regions and Industries

Country / Region		Industry
Korea	Primary	Livestock & Dairy
China		Other Primary
Japan	Manufacturing	Petroleum & Chemicals
India		Steel & Metal
ASEAN 4		Motor and Other Transports
ASEAN 6		Electronics
Oceania 2		Machinery
USA		Other Manufactures
America 4	Service	Private Services
EU		Public Services
Rest of World		

- Notes:**
1. ASEAN 4: Vietnam, Malaysia, Singapore, Brunei (RCEP & CPTPP participation).
  2. ASEAN 6: Thailand, Indonesia, Philippines, Myanmar, Cambodia, Laos, India (RCEP participation).
  3. Oceania 2: Australia, New Zealand (RCEP & CPTPP participation).
  4. America 4: Canada, Mexico, Peru, Chile (CPTPP participation).



Fig. A. Industrial Trade Effects (US-China Trade War)



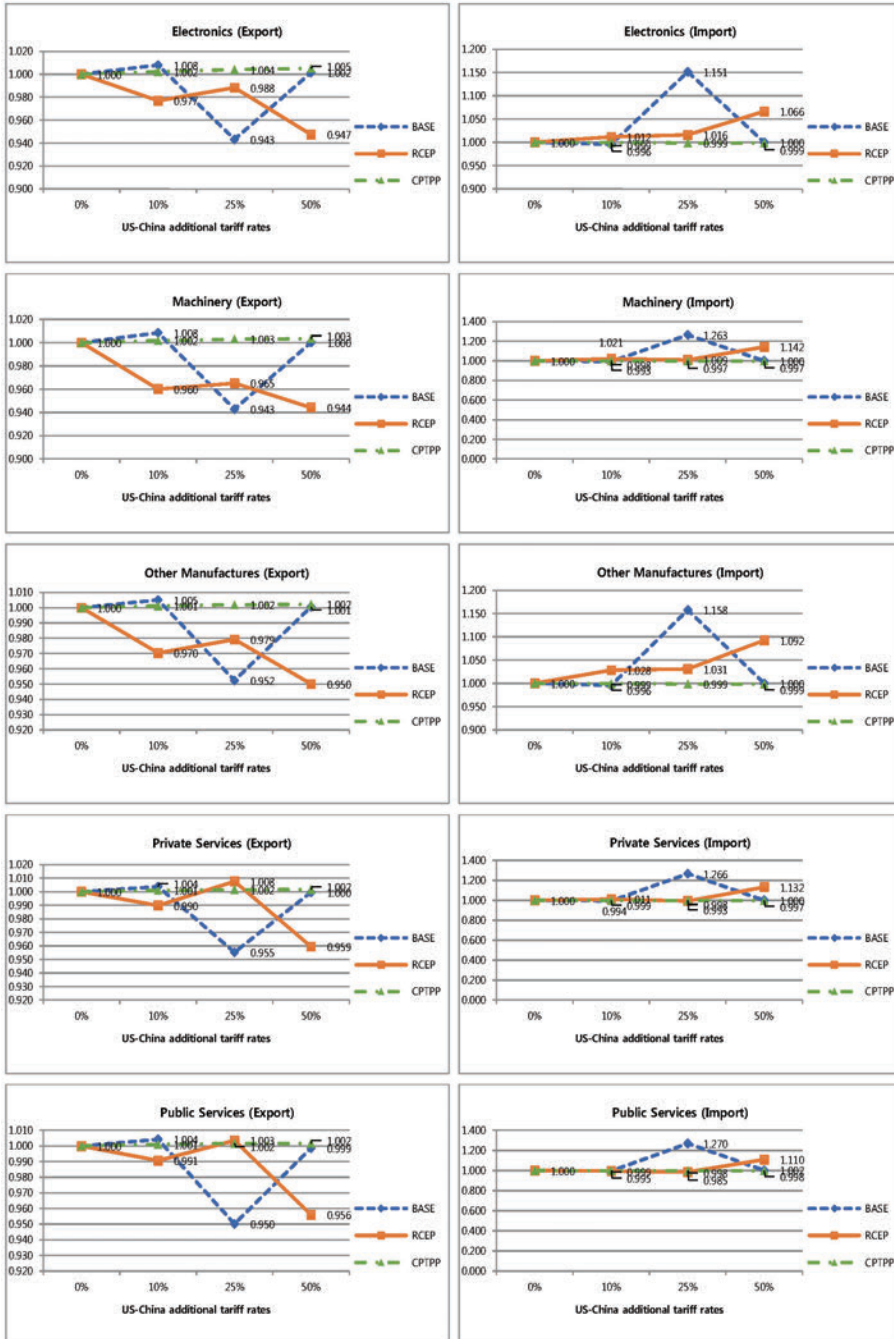


Fig. B. Industrial Trade Effects (US-EU Trade War)

