Free Trade Agreements versus Customs Unions: An Examination of East Asia*

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Abstract

Overlapping bilateral free trade agreements (FTAs) are proliferating in East Asia. Quite a few economists worry about the spaghetti bowl phenomenon expected from the proliferating East Asian regional trade agreements (RTAs).The complicated web of hub-and-spoke type of FTAs can result in high costs for verifying rules of origin (RoO). As an alternative policy option to avoid the negative effect of trade deflection, customs unions (CUs) should be examined. Most of the theoretical analyses on the formation of CUs highlight stronger positive welfare effects compared to FTAs. However, there is a lack of empirical evidence to support the second best theory of customs unions. This paper is an attempt to fill this gap by applying two methodologies, an ex-ante simulation approach and an ex-post econometric approach. In particular, we quantitatively estimate the trade effect of CUs and FTAs by adopting a Gravity regression analysis. In general, we find that a CU is a superior type of RTA to an FTA in terms of creating more intra-union trade. In addition to analyzing the trade effects of RTAs according to type, we quantitatively evaluate the welfare and output effects of CUs for East Asia (an ASEAN+3 CU and a China-Japan-Korea CU) compared to FTAs by applying a computable general equilibrium (CGE) model analysis. The East Asian CUs adopt a system of common external tariffs (CET) based on simple-averaged, import-weighted, consumption-weighted, and minimum rates. Overall, we find that the ASEAN+3 CU with the minimum CET is the most desirable type of RTA for both East Asian member countries and the world economy as a whole.

Keywords: free trade agreements, customs unions, rules of origin, common external tariffs, Gravity, CGE, East Asia, ASEAN+3

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I. INTRODUCTION

The second wave of regionalism[1] has been spreading over an increasingly global world economy. In particular, regional trade agreements (RTAs) have been proliferating in East Asia since the outbreak of the financial crisis in 1997. More specifically, overlapping bilateral free trade agreements (FTAs) have proliferated in the region.

Some economists worry about the "Noodle Bowl Syndrome" expected from the overlapping East Asian RTAs.[2] The complicated web of hub-and-spoke type of FTAs can result in high costs for verifying rules of origin (RoO). As an alternative policy option to avoid the negative effect of trade deflection, customs unions (CUs) should be examined. Based on the pioneering works on welfare-improving CUs by Viner (1950) and Kemp and Wan (1976), most of theoretical analyses on the formation of CUs highlight stronger positive welfare effects compared to FTAs.

However, there is a lack of empirical evidence to support the second best theory of customs unions. This paper is an attempt to fill this gap by applying both a partial equilibrium analysis and a general equilibrium analysis.[3] More specifically, we will quantitatively estimate and compare the trade effects of CUs and FTAs by adopting a Gravity regression analysis.

In addition to the analysis of trade effects of RTAs according to type, we will quantitatively evaluate the welfare and output effects of CUs for East Asia (an ASEAN+3 CU and a China-Japan-Korea CU) compared to FTAs involving the same countries using a global computable general equilibrium (CGE) model.[4] The quantitative analysis of East Asian CUs will adopt a system of common external tariffs (CET) based on simple-averaged, import-weighted, consumption-weighted, and minimum rates. We will additionally compare the real

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[1] See Bhagwati (1993).

[2] See Baldwin (2007) for the East Asian version of the spaghetti bowl phenomenon. For the spaghetti bowl phenomenon, see Bhagwati, Greenaway, and Panagariya (1998) and Panagariya (1999).

[3] Most of the quantitative analyses on the trade and welfare effects of RTAs are mainly based on two methodologies, an ex-ante simulation approach based on CGE models and an ex-post econometric approach based on Gravity equations. The econometric regression analysis is an excellent tool to estimate bilateral changes in the volume of trade but it has a limitation to measure the welfare and output effects in contrast to the CGE model analysis. See Burfisher, Robinson and Thierfelder (2004) and Greenaway and Milner (2002) for the methodological comparison and evaluation.

[4] Most of the CGE model analyses evaluate either the effects of FTAs or those of CUs separately.

GDP and welfare effects of different CET settings to find the most desirable determination of CET for a CU in the region.

The paper is organized as follows. Section II theoretically reviews the economic effects of CUs compared to FTAs and empirically tests the superiority of CUs over FTAs using Gravity equations. Section III descriptively demonstrates the superiority of CUs to FTAs for East Asian countries. Section IV introduces the CGE model, data, and ex-ante scenarios. This section quantitatively measures the effects of the proposed East Asian CUs with different CET systems in comparison to those of East Asian FTAs. Section V presents concluding remarks with policy implications.

II. FREE TRADE AGREEMENTS VERSUS CUSTOMS UNIONS

1. Theoretical Review and Empirical Evidence

RTAs have been revitalized since the successful evolution of the European and the North American integration in the late 1980s. Quite a few theoretical and empirical studies have evaluated the static welfare effects and the dynamic path of RTAs in general.[5] However, there is a lack of analysis of the trade and welfare effects produced by different types of RTAs. Krueger (1995) is a pioneering work on the comparison of different types of RTAs, especially, FTAs and CUs. She strongly argues that CUs are "always" better than FTAs by analyzing static net welfare gains and dynamic evolutionary paths. The negative opinion of FTAs is mainly based on the spaghetti bowl phenomenon expected from the hub-and-spoke type of overlapping FTAs. The welfare-reducing trade diversion effect and the high costs of verifying RoO may overwhelm the gains from freer trade with FTAs. This additional cost may cause larger negative welfare effects in addition to the traditional trade diversion effect and may not trigger the domino effect of regionalism[6] because of the difficulty in accommodating new entrants into the existing RoO regimes. Mirus and Rylska (2001) support Krueger's (1995) argument by carefully describing the costs and the benefits of FTAs and CUs, focusing on RoO and CET.

More rigorously, Panagariya and Findlay (1996) theoretically compare welfare

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[5] See Lee, Park and Shin (2008) for an informative literature survey of recent proliferation of RTAs and the evolutionary paths focusing on trade and welfare effects.
[6] See Baldwin (1993) for the domino effect of regionalism.

effects of FTAs and CUs by adopting a modified Meade model of endogenous external tariff protection. They argue that a CU is a less protective and welfare superior form of RTA than an FTA. However, similar to Richardson (1994), they identify a possible free-rider problem in lobbying for protection that makes a CU less effective than an FTA.

As we mentioned earlier, a significant volume of research has been carried out to measure the static net gains from forming RTAs and the dynamic evolution of RTAs toward global free trade. However, despite the above-mentioned theoretical analyses, there has been little empirical work done to prove the superiority of CUs over FTAs. Ghosh and Yamarik (2004) and Magee (2008) are exceptions. Both of those studies apply a Gravity regression analysis to measure intra-bloc and extra-bloc trade effects of different types of RTAs. They find that the trade effects are significantly different depending on the RTA type. In particular, Ghosh and Yamarik (2004) find that a CU in contrast to an FTA raises more intra-bloc trade but less extra-bloc trade when they estimate with including proposed RTAs. However, the pattern of trade effects are reversed with actual RTAs concerned. Magee (2008) finds that the net trade-creating effects of FTAs are greater than CUs but the result is reversed when he estimates the cumulative effects with lags because of the strong post-enactment intra-bloc trade-creating effect and weak anticipatory trade-diverting effect of CUs. Therefore, it remains an open question whether CUs are superior to FTAs in terms of creating more intra-bloc trade and diverting less extra-bloc trade. We attempt to find an answer in this section by adopting a Gravity regression analysis.

2. Gravity Regression Analysis: Bilateral Volume of Trade Effects

A. Model Specification

We quantitatively estimate the trade effects of CUs and FTAs by using an extended Gravity model of bilateral trade flows. We extend the typical Gravity model with a number of extra variables.[7] The extended Gravity model has similar specifications to that of Ghosh and

[7] Most conventional Gravity models do not distinguish between types of RTAs. In other words, they implicitly assume that all RTAs have the same trade effects. In particular, Aitken (1973) and Frankel (1993) introduce a dummy variable that takes the value of one if the two trading countries are both members of the same RTA and zero otherwise. On the other hand, Bayoumi and Eichengreen (1997), Frankel (1997), and Frankel and Wei (1998) add another dummy variable that takes the value of one for the bilateral trade between an RTA member and a nonmember country.

Yamarik (2004) and Magee (2008) in order to measure intra-bloc and extra-bloc trade effects of different types of RTAs.

In particular, we introduce a dummy variable for the Generalized System of Preferences (GSP) to control the indirect trade promoting effects. Rose (2004) finds that the GSP has a strong trade effect. Since the increased capabilities of developing countries to trade may increase indirectly their trade with other developing countries, we need to control for the factors affecting the trade of developing countries.

The extended Gravity equation is defined as:

$$\ln(Trade_{ijt}) = \alpha_0 + \alpha_1 \ln(GDP_{it}GDP_{jt}) + \alpha_2 \ln(Dist_{ij}) + \beta' X' + \gamma_0\, GSP_{ijt} + \gamma_1\, FTA_{ijt} + \gamma_2\, FTAOut_{ijt} + \gamma_3\, CU_{ijt} + \gamma_4\, CUOut_{ijt} + \varepsilon_{ijt}$$

where i and j denote particular countries, and t denotes time,

- $Trade_{ijt}$ denotes the average value of the bilateral trade between i and j at time t,
- *GDP* is a real GDP,
- $Dist_{ij}$ is the distance between i and j,
- *X* is a set of control variables including landlocked, border, common language, colony dummy, and area,
- *GSP* is the Generalized System of Preferences dummy,
- FTA_{ij} is a binary variable which is unity if *i* and *j* belong to a free trade agreement,
- $FTAOut_{ij}$ is a binary variable which is unity if *i* belongs to a customs union and *j* does not or *vice versa.*
- CU_{ij} is a binary variable which is unity if *i* and *j* belong to a customs union,
- $CUOut_{ij}$ is a binary variable which is unity if *i* belongs to a customs union and *j* does not or *vice versa,*

The error term ε_{ijt} is composed of an individual effect δ_{ij}, the time effect θ_t and a zero mean disturbance u_{ijt}, thus $\varepsilon_{ijt} = \delta_{ij} + \theta_t + u_{ijt}$,.

B. Estimation Technique

Trefler (1993) argues that the formation of RTAs is not exogenously determined. If the presence or absence of RTAs is endogenously determined, an econometric issue in the estimation of trade effects of RTAs incurs an endogeneity problem arising from the correlation of an RTA variable with the error term. Baier and Bergstrand (2007) argue that the omitted variable bias is the major source of the endogeneity facing the estimation of RTA effects in Gravity equations using cross-section data. The standard solutions to address the omitted variable bias are using instrumental variables (IV) or Heckman control function. Magee (2003) and Baier and Bergstrand (2007) attempt to adjust for the endogeneity problem using the IV or control function but fail to solve the endogeneity bias. Bayoumi and Eichengreen (1997) estimate the Gravity model in first differences to correct the problem. Haveman and Hummels (1998), however, indicate that the first-differencing method may not remove time-varying bias.

Furthermore, Anderson and Van Wincoop (2003) show that the omitted variable bias is generated if multilateral trade resistance (expressed in price terms) is ignored in the cross-sectional Gravity equation. The standard way to account for the multilateral price terms is using country-specific fixed effects, as Anderson and Van Wincoop (2003) suggest. However, recent studies use panel data rather than cross-section data. Thus the country-specific fixed effects are not enough to remove the omitted variable bias since the multilateral price terms would vary by time. Therefore, the literature suggests alternative methodologies to deal with this problem.

Baldwin and Taglioni (2006) discuss the methodologies to adjust the endogeneity bias from a theoretical perspective and suggest introducing the time-varying country dummies in the ordinary least squares (OLS) estimation. However the fixed effect OLS technique ignores unobserved heterogeneity and thus the resulting estimates are likely to be biased.[8] Baier and Bergstrand (2007) address the panel estimation with country pair fixed effects and country-and-time effects. The country pair fixed effects control for unobserved time-invariant heterogeneity and the country-and-time effects account for the time-varying multilateral price terms. We use this alternative approach. Similarly, Magee (2008) adopts the approach controlling for country-pair, importer-year, and exporter-year fixed effects but uses a Poisson pseudo-maximum likelihood estimator in order to include zero trade flows instead of the panel estimation in Baier and Bergstrand (2007).

C. Data

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[8] For this research, we applied OLS estimations with three different dummies (exporter, importer and time dummy, one time-varying country dummy, and two time-varying country dummies) and found that there is an unobserved heterogeneity among country pairs. Therefore, the biased OLS estimates are not used and reported for our Gravity analysis.

The panel data comes from Rose (2004), which covers 186 countries from 1948 to 1999. Except in Europe, RTAs have been proliferating globally since the 1970s. Thus we limit our sample to the period from 1970 to 1999. To control the selection bias, we include as many RTAs as possible. Thirty one RTAs that have notified the WTO are included in this empirical experiment. The types of RTAs are shown in Table 1.

D. Estimation Results

Table 2 presents the estimation results of the impact of RTAs on intra- and extra-bloc memberships in general. As we interpret the random effects with time varying country dummies in the first two columns, the conventional variables behave the way the model predicts, and the estimated coefficients are statistically significant. To summarize briefly, the estimated coefficients on bilateral distance, landlocked dummy, and log of area in pairs are significantly negative. The estimated coefficients on log of GDP in pairs, land border dummy, common language dummy, colony dummy are all significantly positive. This indicates that the transaction cost and market size matter in creating more bilateral trade.

In fact, our interest is in the impact of RTAs broken down by type. In order to control for unobserved time-invariant heterogeneity and the time-varying multilateral price terms, we focus on the estimates reported in column 4 of Table 2, that is, the county pair fixed effects with time varying country dummies, as Baier and Bergstrand (2007) use.[9]

The GSP has a positive trade effect, as we expected, and is statistically significant in most cases, except the case with time varying country dummies in column 4. The estimated coefficient on the RTA membership dummy variable is positive and statistically significant. The estimate on the intra-bloc membership implies that a pair of countries that joins an RTA experiences an increase in trade of 18.3 percent, with other variables constant.[10] The estimate

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[9] There are two different estimation techniques in the panel setting: random effects and fixed effects. The generally accepted way of choosing between fixed and random effects is performing the Hausman specification test (Hausman, 1978), which compares the fixed to random effects under the null hypothesis that the individual effects are uncorrelated with the other regressors in the model. We conducted the Hausman test and found that the null hypothesis is rejected, as Egger (2000) finds evidence for the rejection of random effects in the gravity estimation. Therefore, we report here only the results of fixed effects in Tables 3 and 4.

[10] Since $e^{0.168}$=1.183, an increase from zero (no membership) to one (membership) in the RTA dummy variable raises bilateral trade by 18.3 percent.

on the extra-bloc dummy variable is also positive and statistically significant. The estimate implies that RTA members' trade with non-members is estimated to rise by 11.0 percent, reflecting the strong growth effects. Hence, RTAs do create trade among members and do not divert trade from other countries that do not belong to the bloc.

In Table 3, we estimate the trade effects of RTAs by type—FTAs and CUs. All the RTAs examined increase both trade between members and trade between members and nonmembers. In comparison with FTAs, CUs raise more intra-bloc trade but less extra-bloc trade. More specifically, the estimates (0.133 and 0.135 in column 2) on the FTA membership dummies imply that a country that joins an FTA experiences an increase in trade of 14.2 percent with members and 14.5 percent with nonmembers. Similarly, the estimates (0.282 and 0.057 in column 2) on the CU membership dummies imply that a country that joins a CU experiences an increase in trade of 32.6 percent with members and 5.9 percent with nonmembers. In sum, RTAs are trade-creating, not trade-diverting. In particular, CUs raise more intra-union trade and less extra-union trade as compared to FTAs.

III. REGIONAL TRADE AGREEMENTS IN EAST ASIA: FTA OR CU?

Regionalism in East Asia: RTAs have proliferated in East Asia since the late 1990s,[11] particularly FTAs. As of September 2008, 26 RTAs have been implemented, 8 RTAs have been signed, and more than three dozen RTAs are being negotiated or considered by East Asian countries. Among the 26 implemented RTAs considered, 21 are bilateral FTAs.[12] The 1997 East Asian financial crisis, sluggish progress of multilateral efforts under the Doha Development Agenda, deepening regional interdependence among the East Asian economies,[13] and regionalization around the world forced the East Asian countries to shift their policy stance from favoring multilateral liberalization to favoring regional trade agreements.

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[11] For proliferating RTAs in East Asia, see JETRO (2003), Lu (2003), Kawai (2004), Feridhanusetyawan (2005), Lee and Park (2005), Park (2006), Kawai and Wignaraja (2008), and ADB (2008).

[12] See Table 1 in Park (2008).

[13] The intra-regional trade share in the region, especially in the case of ASEAN+3, has been steadily rising from 29.4 percent in 1990, 37.3 percent in 2000, 38.9 percent in 2005, to 38.3 percent in 2006. See Kawai (2007).

Rules of Origin and FTAs: As we mentioned earlier in Section II, however, there is a strong negative opinion against regionalism because of the spaghetti bowl phenomenon expected from the hub-and-spoke type of overlapping RTAs, which are very common in East Asian FTAs.[14] Manchin and Pelkmans-Balaoing (2007) estimate the effect of member-specific discriminatory trade policies on intra-AFTA (ASEAN Free Trade Area) imports with 15 different preferential margins and emphasize that the additional administration costs to prove origin may exceed the initial cost gain from tariff reduction. In particular, for East Asian FTAs, which include members with a relatively wide range of tariff differentials, they argue that trade deflection through the use of backdoors is likely to be a more serious problem, making it even more complicated to verify RoO. These factors may result in FTAs being protectionist in nature rather than movement toward global free trade.

One more important characteristic of East Asian FTAs we should consider is the relatively stronger intra-regional division of labor. Kuroiwa (2006) shows that the local content of the East Asian production process has declined. Urata (2006) also finds development of an increasing vertical intra-industry trade between East Asian countries. There is an increasing intra-regional trade in manufacturing parts and components that is closely connected to the supply chain. The intra-regional division of labor in East Asia over the numerous locations of production facilities may require even more complicated and strict RoO.

East Asian CUs: Salvatore (2007) lists some critical factors that maximize the trade creation effect and minimize the trade diversion effect of CUs. Larger union size, higher pre-union tariff structure between members, lower pre-union tariff structure between members and nonmembers, higher pre-union intra-regional trade, greater substitutability of production structures between members and nonmembers, and geographical proximity will all create larger trade gains. Applying these criteria, we expect that the East Asian CUs will likely produce positive static and dynamic welfare effects.[15]

In addition, Andresen (2004) analyzes the relative extent of integration among East Asian countries by calculating intra-regional trade share, especially the increasing intra-industry trade and the intra-regional trade of parts and components, compared to Europe at the time of the completion of its customs union. Based on this analysis, he proposes that the

[14] See Lee, Park and Shin (2008), Park (2006), and Kawai (2007).
[15] See Lee and Park (2005).

East Asian region form a preferential trade agreement such as a free trade area or a customs union. In particular, he suggests that an East Asian customs union is a more desirable form of RTA, considering the significant external trade relations with large trade blocs like the European Union and the U.S.A. more far-reaching integration relative to FTAs will create more gains from free trade by enhancing the region's bargaining power with extra-East Asian trading partners.

More specifically, Plummer (2006) strongly suggests that ASEAN countries move toward the formation of ASEAN Economic Community (AEC). He argues that the evolution toward an ASEAN customs union (ACU) will make the region more successful by creating an ASEAN single market. This will have large trade benefits for the region, as well as attracting more foreign direct investment and preventing the spaghetti bowl phenomenon. The formation of an ACU will also improve ASEAN's bargaining power at international forums and raise economic efficiency by reinforcing the reform programs of the members.

In sum, considering the above-mentioned regional characteristics and external relations, harmonizing commercial policy among the regional members and nonmembers is preferable. Both the additional costs of complicated RoO regimes and the necessity of communication between members under FTAs suggest that a more desirable type of RTA for East Asian countries is a CU.

IV. EAST ASIAN RTAs: A CGE MODEL ANALYSIS

1. Model and Data

In order to search for a more desirable type of RTA in East Asia, we attempt to quantitatively assess the effects of different types of RTAs by adopting a CGE model analysis. In particular, we employ the commonly used GTAP (Global Trade Analysis Project) model as our basic model. This is a standard general equilibrium model that has been extensively used in studies to examine a wide range of trade policy issues.[16] The adopted GTAP model assumes constant returns to scale technology, perfect competition, and a global bank designed to achieve a balance between world savings and investment. The three production factors

[16] For more detailed information about the GTAP model, see Hertel (1997) and visit https://www.gtap.agecon.purdue.edu/models/current.asp

(land, labor, and capital) are assumed to be mobile across sectors within a country but not mobile across borders. Aggregate household expenditure is determined as a constant share of total regional income. The household maximizes utility subject to its expenditure constraints. The constant difference of elasticities (CDE) consumer demand system is designed to capture differential price and income responsiveness across countries. International trade is linked through Armington substitution. Product differentiation between imports by region of origin allows for two-way trade across regions in each tradable product.

We work with a multi-sector and multi-region CGE model of the world economy.[17] The CGE model is calibrated using the GTAP database Version 6, which represents the world economy in the year 2001.[18] We do a comparative static analysis of the welfare and GDP effects on the regional economies considered before and after changes in trade regimes.

2. Scenarios

A. Regional Trade Agreements

In order to quantitatively compare the welfare and GDP effects of different types of East Asian RTAs on each of the member countries, members as a whole, nonmembers, and the world economy, we consider a Northeast Asian RTA that competes with the existing Southeast Asian RTA (AFTA) and an East Asian RTA with which both regions are cooperating. The following four RTA scenarios will be empirically examined:

- **CJK FTA**: An FTA between China, Japan, and Korea
- **ASEAN+3 FTA**: An FTA between ASEAN, China, Japan, and Korea
- **CJK CU**: A CU between China, Japan, and Korea
- **ASEAN+3 CU**: A CU between ASEAN, China, Japan, and Korea

[17] For the sectoral and regional classification, we simply divide the world economy into 10 sectors and 5 regions because the main objective of this research is to compare the relative effectiveness of CUs to FTAs instead of analyzing the effects of a particular RTA on both participating and non-participating economies. The 10 sectors are: Agriculture/Forestry/Fishing, Beverage, Textile and Clothing, Chemical Product, Metal Product, Transport Equipment, Electronic Product, Machine, Other Manufacturing, and Services. The 5 regions are ASEAN, China, Japan, Korea, and the Rest of the World.

[18] See Dimaranan and McDougall (2006) for the database.

For each of the scenarios, both import tariffs and export taxes between members will be eliminated, but the trade barriers between members and nonmembers will be retained.

B. Common External Tariffs

A CU imposes a CET on importables from nonmembers. According to the applied assumptions for the determination of the CET, the structure of a CU is very different. Since Viner (1950) and Kemp and Wan (1976) proved the existence of welfare-improving CUs with CET and a system of lump-sum compensatory payment, some theoretical analyses on the determination of CET have been done. Bhagwati (1991) proposes that a CU should set its CET at the minimum of the pre-union members' import tariffs to satisfy GATT Article XXIV. However, Srinivasan (1997) and Krueger (1995) suggest that the CET should be maintained at the pre-union average level. Syropoulos (2003) builds a model for the endogenous relationship between distribution rules of tariff revenues between CU members and the determination of CET preferences with special attention to factor abundance. He finds that CET should be set at the most-preferred tariff of the member with the median capital/labor ratio. Moreover, Brown, Deardorff, and Stern (2001) quantitatively estimate effects of the harmonized NAFTA (North American FTA) with three different vectors of CET: simple arithmetic average, import-weighted average, and production-weighted average, assuming NAFTA evolves into a CU by using the Michigan CGE model. They find that the effects of the theoretical North American CU will heavily depend on the CET measures implemented.

We consider the following four sets of CET rates for the proposed East Asian RTAs[19]:

- **Simple average** of members' import tariffs against nonmembers;
- **Import-weighted average** of members' import tariffs against nonmembers;
- **Consumption-weighted average** of members' import tariffs against nonmembers;

[19] Unlike the free riding effort of lobbying for protection in Panagariya and Findlay (1996) and Richardson (1994) as we mentioned in the Section II.1, if the lobbying effort becomes very successful, a CU may raise the CET and make the CU more protective than an FTA. In order to analyze the case, we may include one more CET system into our simulation analysis, for example, **maximum** external tariffs against nonmembers among members. It is hypothetically possible but it is not a realistic scenario considering GATT Article XXIV. However, we examined (but not reported) the case and found that the welfare effects of the CUs are worse than those of the corresponding FTAs.

- **Minimum** import tariffs against nonmembers among members

Using the trade barriers (tf_{ij}) presented in the GTAP database, we calculate the common external tariffs under above-mentioned four alternative measures. The weighted-averaged CETs are calculated as $CET_i = \sum_j s_{ij} tf_{ij}$ where s_{ij} is the import (or consumption) share of country j (ASEAN+3 or China, Japan and Korea) in industry i.

The calculated CET of the CJK CU and the ASEAN+3 CU are shown in Table 4. We find some interesting characteristics from the calculated CET of the East Asian CUs. First, there is a great deal of variance in the CETs, especially, in primary and labor-intensive products such as Agriculture/Forestry/Fishing, Beverage, and Textile and Clothing. In particular, the tariff for Agriculture/Forestry/Fishing is highly affected by which measure is used in the calculation of the CET. For example, in the case of the ASEAN+3 CU, if the CET rate is calculated by the import-weighted average, then it amounts to 12.99 percent. However, if the CET rate is determined by the minimum, this rate is only 1.30 percent. Second, following the case of minimum CET rate, the CET estimated by consumption-weighted average is lowest and mostly balanced on average and the import-weighted average CET is the highest and mostly unbalanced on average. Third, as we compare the CJK CU with the ASEAN+3 CU, the ASEAN+3 CU has a relatively higher and wider CET system for nonmembers. This is reasonable if we consider the significant gaps in development levels of member countries in the ASEAN+3 CU.

3. Simulation Results[20]

A. Welfare and Output Effects

Table 5 presents the impacts of East Asian RTAs on real GDP and welfare. The positive effects of a CU on members outweigh those of an FTA.[21] For instance, the member's

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[20] Country-specific effects are not reported because the main objective of this research is to compare the effectiveness of different types of RTAs for members, nonmembers, and the world as a whole. However, for the most desirable type of RTA, we will report the country-specific effects as a reference in Tables 6 and 7.

[21] We would like to acknowledge that the CGE model analysis examined in this paper focused more on the benefit side of the trade liberalization. The additional verifying costs of origins are not included in its estimation of trade costs. It will overestimate the gains from the

welfare from an ASEAN+3 CU increases by 0.63 percent on average, while that from an ASEAN+3 FTA increases by 0.52 percent. Furthermore, the global gains from a CU are larger than those from an FTA. As we compare the relative size of the effect of a CU to corresponding FTA, the real GDP gains from CUs are larger by 19 percent in the case of ASEAN+3 and 25 percent in the case of CJK on average and the welfare gains from CUs are larger by 25 percent in the case of ASEAN+3 and 6 percent in the case of CJK on average.

In Table 5, we note that the formation of a CU in East Asia has insignificant effects on nonmembers in terms of real GDP. However, the impact on nonmembers' welfare is somewhat different. When the minimum tariffs are adopted as the common external tariffs of a CU, the nonmembers experience the largest decline in the welfare. This is because the worsened terms of trade effect exceeds the efficiency effect.

Let us turn to a discussion of the impact of CET measures. There is no difference between the real GDP and welfare effects of FTAs and CUs with an import-weighted CET system. For the ASEAN+3 CU, the real GDP for members increases by 0.27 percent for the minimum tariffs, while it ranges from 0.23 percent to 0.25 percent for the alternative CET system. With the minimum tariffs, the largest global welfare is also induced. The adoption of minimum CET rates may be an appropriate choice for the maximization of members' welfare as well as world welfare. These results imply that a CU with the minimum CET is the optimum RTA strategy for East Asian countries.

B. Country-specific Effects of the ASEAN+3 CU

Table 6 summarizes the likely impacts of the most desirable East Asian RTA, an ASEAN+3 CU, on each member's economy. In terms of welfare and real GDP, Korea as the smallest country has the largest gains from freer trade, and Japan as the most advanced and liberalized country in terms of import tariffs has the smallest gains. The ASEAN's gains are larger than China's. The ASEAN+3 CU raises intra-regional trade from a minimum of 4.24 percent for ASEAN to a maximum of 19.03 percent for China.

The effect of the ASEAN+3 CU on output production by sector is summarized in Table 7. East Asian regional integration restructures the regional industrial structure based on each economy's comparative advantages. ASEAN's and China's primary industries, Japan's

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formation of the East Asian FTAs. It can be a reason why the additional gains from the formation of the proposed East Asian CUs are not significantly large compared with corresponding FTA's.

advanced manufacturing industries, and Korea's light manufacturing industries will achieve more gains.

V. CONCLUDING REMARKS

In order to support the second best theory of customs union, we quantitatively estimated the trade effect of CUs and FTAs by using a Gravity regression analysis and found that CUs raise more intra-union trade and less extra-union trade compared to FTAs.

For the East Asian case (both for the China-Japan-Korea RTAs and the ASEAN+3 RTAs), we quantitatively evaluated the welfare and output effects of CUs compared to FTAs by applying a CGE model analysis. From our experiments, we found that (i) the effects of the proposed East Asian CUs heavily depend on the CET measures applied; (ii) the East Asian CUs, especially with the minimum CET rates, generate significant net trade-creating effects but worse nonmembers' welfare; (iii) both positive welfare and real GDP effects of the East Asian CUs on members outweigh those of the East Asian FTAs; (iv) the global welfare and output gains from the East Asian CUs are larger than those from the East Asian FTAs; and (v) an ASEAN+3 CU with the minimum CET is the most desirable type of RTA for both the East Asian member countries and the world economy as a whole.

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Table 1. Regional Trade Agreements (RTAs) by Type

FTA	*CU*
1. ASEAN Free Trade Area (AFTA) 2. The Australia New Zealand Closer Economic Relations Trade Agreement (ANZCERTA) 3. Canada-Chile 4. Canada-Israel 5. Chile-Mexico 6. Commonwealth of Independent States (CIS) 7. Common Market for Eastern and Southern Africa (COMESA) 8. Costa Rica-Mexico 9. European Communities (EC)-Iceland 10. EC-Norway 11. EC-Switzerland 12. EC-Syria 13. EC-Tunisia 14. European Free Trade Association (EFTA) 15. EFTA-Israel 16. EFTA-Moroco 17. EFTA-Turkey 18. Mexico-Nicaragua 19. North American Free Trade Agreement (NAFTA) 20. Pan-Arab Free Trade Area 21. New Guinea - Australia Trade and Commercial Relations Agreement (PATCRA) 22. Papua South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA) 23. Turkey-Israel 24. USA-Israel	1. Central American Common Market (CACM) 2. Andean Community (CAN) 3. Caribbean Community and Common Market (CARICOM) 4. Economic and Monetary Community of Central Africa (CEMAC) 5. EC 6. EC-Turkey 7. Southern Common Market (MERCOSUR)

Table 2. Effects of RTAs on Trade Flows

	Country pair random effects		Country pair fixed effect	
	Time dummy (1)	Time varying country dummies (2)	Time dummy (3)	Time varying country dummies (4)
$\ln(GDP_iGDP_j)$	0.851 (0.006)***	0.865 (0.007)***	0.525 (0.009)***	0.587 (0.009)***
$\ln(dist_{ij})$	-1.349 (0.026)***	-1.404 (0.026)***		
Landlocked	-0.613 (0.035)***	-0.490 (0.036)***		
Border	0.734 (0.136)***	0.744 (0.135)***		
Common language	0.342 (0.050)***	0.395 (0.050)***		
$\ln(Area_iArea_j)$	-0.069 (0.006)***	-0.074 (0.006)***		
Colony	2.212 (0.177)***	1.876 (0.175)***		
GSP	0.264 (0.018)***	0.211 (0.019)***	0.052 (0.194)***	0.027 (0.020)
RTA_{ij}	0.421 (0.035)***	0.258 (0.036)***	0.281 (0.036)***	0.168 (0.036)***
$RTAOut_{ij}$	0.154 (0.013)***	0.074 (0.013)***	0.137 (0.013)***	0.104 (0.013)***
No. observations	188,065	188,065	188,065	188,065
R-sq	0.61	0.62	0.49	0.50
F-test (Ho: $\delta_{ij} = 0$)			24.60 (p-value: 0.00)	24.51 (p-value: 0.00)

Notes: Robust standard errors are in parentheses. Intercept is included but not reported. *, **, and *** indicate that the estimated coefficients are statistically significant at 10 percent, 5 percent, and 1 percent, respectively.

Table 3. Effects of RTAs by Type on Trade Flows: FTAs vs CUs

	Country pair fixed effect	
	Time dummy (1)	Time varying country dummies (2)
FTA_{ij}	0.237 (0.045)***	0.133 (0.046)***
$FTAOut_{ij}$	0.163 (0.012)***	0.135 (0.012)***
CU_{ij}	0.396 (0.057)***	0.282 (0.058)***
$CUOut_{ij}$	0.064 (0.017)***	0.057 (0.018)***
No. observations	188,065	188,065
R-sq	0.49	0.50
F-test(Ho: $\delta_{ij} = 0$)	24.37 (p-value:0.00)	24 .31 (p-value:0.00)

Notes: Robust standard errors are in parentheses. Intercept, ln(GDP_iGDP_j), and *GSP* are included but not reported. *, **, and *** indicate that the estimated coefficients are statistically significant at 10 percent, 5 percent, and 1 percent, respectively.

Table 4. Common External Tariffs of the East Asian CUs

CJK CU						
	Simple Average	Import-weighted Average	Consumption-weighted Average	Minimum	Mean	Standard Deviation
Agriculture/Forestry/Fishing	6.50	8.28	6.81	1.30	5.72	3.05
Beverage	11.13	8.95	9.72	6.60	9.10	1.90
Textile and Clothing	12.00	13.47	10.52	8.40	11.10	2.16
Chemical Product	5.13	4.90	4.72	4.30	4.76	0.35
Metal Product	4.97	4.93	4.98	4.60	4.87	0.18
Transport equipment	6.70	6.79	6.34	4.60	6.11	1.02
Electronic Product	1.60	1.56	1.53	1.40	1.52	0.09
Machine	3.77	3.22	3.28	3.00	3.32	0.32
Other Manufacturing	4.53	4.90	3.70	2.80	3.98	0.93
Mean	6.26	6.33	5.73	4.11	5.61	1.03
Standard Deviation	3.37	3.54	2.95	2.33	2.92	
ASEAN+3 CU						
	Simple Average	Import-weighted Average	Consumption-weighted Average	Minimum	Mean	Standard Deviation
Agriculture/Forestry/Fishing	8.63	12.99	8.09	1.30	7.75	4.83
Beverage	10.75	9.37	9.70	6.60	9.11	1.77
Textile and Clothing	12.30	13.39	10.82	8.40	11.23	2.16
Chemical Product	5.13	4.96	4.78	4.30	4.79	0.36
Metal Product	4.85	4.86	4.94	4.50	4.79	0.20
Transport equipment	5.80	6.49	5.86	3.10	5.31	1.51
Electronic Product	1.48	1.37	1.49	1.10	1.36	0.18
Machine	3.60	3.20	3.25	3.00	3.26	0.25
Other Manufacturing	4.85	5.10	3.99	2.80	4.19	1.04
Mean	6.57	7.08	6.12	4.04	5.95	1.33
Standard Deviation	3.68	4.43	3.20	2.51	3.22	

Table 5. Welfare and Real GDP Effects of East Asian RTAs

(% Deviations from the base)

Actual Effects		CJK		ASEAN+3	
		Real GDP	Welfare	Real GDP	Welfare
FTA	**Members**	**0.21**	**0.45**	**0.23**	**0.52**
	Nonmembers	**-0.01**	**-0.06**	**-0.01**	**-0.08**
	World	**0.03**	**0.04**	**0.04**	**0.04**
CU (Average of the 4 Measures)	**Members**	**0.23**	**0.52**	**0.25**	**0.63**
	Nonmembers	**-0.01**	**-0.07**	**0.00**	**-0.09**
	World	**0.04**	**0.04**	**0.05**	**0.05**
Simple Average	Members	0.22	0.47	0.24	0.57
	Nonmembers	-0.01	-0.06	0.00	-0.08
	World	0.04	0.04	0.04	0.05
Import-weighted Average	Members	0.21	0.46	0.23	0.52
	Nonmembers	-0.01	-0.06	-0.01	-0.08
	World	0.03	0.04	0.04	0.04
Consumption-weighted Average	Members	0.23	0.52	0.25	0.61
	Nonmembers	0.00	-0.06	0.00	-0.09
	World	0.04	0.04	0.05	0.05
Minimum	Members	0.25	0.63	0.27	0.80
	Nonmembers	0.00	-0.08	0.01	-0.12
	World	0.04	0.05	0.06	0.06
Ratio to FTA		CJK		ASEAN+3	
		Real GDP	Welfare	Real GDP	Welfare
CU (Average of the 4 Measures)	**Members**	**1.08**	**1.16**	**1.08**	**1.20**
	Nonmembers	**0.50**	**1.08**	**0.00**	**1.16**
	World	**1.25**	**1.06**	**1.19**	**1.25**
Simple Average	Members	1.05	1.04	1.04	1.10
	Nonmembers	1.00	1.00	0.00	1.00
	World	1.33	1.00	1.00	1.25
Import-weighted Average	Members	1.00	1.02	1.00	1.00
	Nonmembers	1.00	1.00	1.00	1.00
	World	1.00	1.00	1.00	1.00
Consumption-weighted Average	Members	1.10	1.16	1.09	1.17
	Nonmembers	0.00	1.00	0.00	1.13
	World	1.33	1.00	1.25	1.25
Minimum	Members	1.19	1.40	1.17	1.54
	Nonmembers	0.00	1.33	-1.00	1.50
	World	1.33	1.25	1.50	1.50

Table 6. Effects of an ASEAN+3 CU with Minimum CET Rates
(% Deviations from the Base)

	ASEAN	China	Japan	Korea
Welfare	1.64	0.70	0.32	4.06
Real GDP	0.30	0.21	0.03	2.71
Trade	4.24	19.03	7.02	11.04

Table 7. Effects of an ASEAN+3 CU with Minimum CET Rates on Sectoral Output (% Deviations from the Base)

	ASEAN	China	Japan	Korea
Agriculture/Forestry/Fishing	3.38	5.40	-3.28	-14.75
Beverage	3.21	0.64	-0.54	10.66
Textile and Clothing	8.21	3.57	4.46	22.22
Chemical Product	-0.89	-5.31	-0.02	20.66
Metal Product	-8.61	-6.58	0.87	-8.08
Transport Equipment	-8.84	-3.90	5.51	2.50
Electronic Product	-3.37	3.76	-2.72	-16.42
Machine	0.80	-6.62	-0.90	-14.51
Other Manufacturing	1.93	-2.16	-1.14	3.89
Services	-0.89	-0.49	0.04	0.87