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Trade creation and diversion effects of ASEAN-plus-one free trade agreements

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Abstract

This article examined the trade creation and diversion effects of ASEAN-plus-one free trade agreements (FTAs) by estimating the gravity trade model for the recent two decades between 1993 and 2013. The estimation applied the panel-data with fixed effects to clear the FTA-endogeneity problem. The empirics showed that the trade creation effect in ASEAN-China FTA (ACFTA) was much larger than those in ASEAN-Korea FTA (AKFTA) and ASEAN-Japan FTA (AJFTA), and that the trade diversion effects were commonly negative in ACFTA, AKFTA and AJFTA as expected. The larger trade creation effect in ACFTA might come from the wider gap between the general tariff rate and the preferential tariff rate for ASEAN in China.

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1. Introduction

Regional trade agreements (RTAs) including free trade agreements (FTAs) have become acceleratingly prevalent since the early 2000s, in particular, in Asian area. According to the list of all RTAs in force presented by the World Trade Organization (WTO), the total 273 RTAs in the list contain the 75 RTAs covering Asian economies, and the 72 RTAs out of them were in force since the 2000s.[1] In this context, the Association of South-East Asian Nations (ASEAN) has played a core role in forming FTAs. ASEAN itself initiated the ASEAN Free Trade Area (AFTA) in 1992, and has extended its framework by adding up plus-one economies: ASEAN-China FTA (ACFTA, effect in 2004), ASEAN-Korea FTA (AKFTA, effect in 2007), ASEAN-Japan FTA (AJFTA, effect in 2008), ASEAN-Australia-New Zealand FTA (AANZFTA, effect in 2010), and ASEAN-India (AIFTA, effect in 2010). In addition, the comprehensive RTAs among ASEAN and the six countries above, named Regional Comprehensive Economic Partnership (RCEP), is under negotiation at present.

This trend has also encouraged a number of academic studies on RTAs from the theoretical and empirical perspectives. One of the issues in the context of the recent theoretical developments in this field is whether or not regional trade blocs are viable in the endogenous decision-making terms. The literature has given mixed conclusions about regionalism and globalism: Oladi and Beladi (2008), for instance, argues that not regional trade blocks but a global trade bloc can be stable, while Yi (2000) shows the possibility of instability of a global free trade. Regarding the empirics, the focus has been to investigate the economic impacts of FTAs. When it comes to the issues on the FTA effect on trade flows, the central question has been about whether FTAs have "trade creation" and/or "trade diversion" effects, since Jacob Viner (1950) argued on these effects for the first time. The trade creation occurs when joining a FTA leads to replacement of high-cost domestic production by imports from within the FTA members. Under this case, the trade is increased and/or created within member countries. The trade diversion, on the other hands, takes place when joining a FTA leads to replacement of cheap imports from outside the FTA members by more expensive imports from inside. Under this occasion, the trade is reduced and/or even eliminated with non-members. In practice, both trade creation and diversion effects take place due to the FTA formation, and which effects are dominant is a crucial question.

For evaluating the trade effects of FTAs in *ex post* manner, a number of empirical studies have estimated the "gravity trade model". Tinbergen (1962) and Pöyhönen (1963) were the first to apply the "Newton's Law of Gravitation" to international trade flows. In

[1] See WTO webpage: http://rtais.wto.org/UI/PublicAllRTAList.aspx.

its original form, the gravity equation explains bilateral trade flows by the economic size of two countries and the distance between them. Since Anderson (1979) assigned the model with theoretical underpinnings for the first time, the gravity trade model has been established as being consistent with theories of trade based upon models of imperfect competition and with the Heckscher-Ohlin model (see, e.g. Helpman and Krugman, 1985; and Deardorff, 1998). The model has often provided a useful tool to assess the trade-integration effects of regional economic ties such as FTAs. The intensity of the trade-integration caused by FTAs is usually measured by the coefficients of dummy variables, which are added in the gravity trade equation for the FTA partners during the FTA-in-force period. A positive and statistically significant coefficient for the dummy shows that the trade flows exceed the normal level predicted by the country's economic sizes and the distance between them, thereby implying an intensive trade-integration effect caused by the FTA.

Looking at the empirical literature, even after forty years of gravity equation estimates of the effect of FTAs on trade flows, there seemed no clear and convincing empirical evidence, until Baier and Bergstrand (2007) presented a thorough empirical analysis on the FTA treatment effects.[2] They pointed out that trade policy is not exogenous variable, and addressed econometrically the endogeneity of FTAs: the FTA dummy variable is correlated with the error term. They argued that standard cross-section techniques using instrumental variables and control functions did not provide stable estimates of the FTA effects in the presence of endogeneity, and instead utilized a theoretically-motivated gravity equation using panel data with fixed effects. They finally found that, on average, an FTA approximately doubles two members' bilateral trade after ten years, i.e., seven times the effect estimated using the standard cross-section techniques.

Following the econometrical methodologies of Baier and Bergstrand (2007), Urata and Okabe (2014) examined the impacts of RTAs including FTAs on trade flows, with a particular focus on their trade creation and diversion effects. They estimated the gravity trade equation covering 67 countries/regions for 27 years from 1980 to 2006 at a disaggregated level of 20 products. Their estimation addressed the problem of the RTA-endogeneity bias and zero trade flows by applying the panel-data analysis with fixed effects and the Poison pseudo-maximum likelihood model as its estimating technique. Their main findings were as follows: plurilateral RTAs produce trade creation for many more products compared with bilateral RTAs; RTAs among developed countries generate trade creation for a half of all products but not trade diversion for most of products, whereas RTAs among developing countries give rise to trade diversion for many more products – probably due to high tariffs imposed on imports from non-members by

[2] Baier and Bergstrand (2007) expressed the past unreliable estimates of FTA treatment effects as "fragile" estimates by citing Frankel (1997) and Ghosh and Yamarik (2004).

developing countries. Regarding the literature on empirical studies of ASEAN-plus-one FTAs, Yang and Martinez-Zarzoso (2014) estimated the effect of China-ASEAN FTA using gravity equation in agricultural and manufactured products with three dummies: (1) trade creation dummy within bloc, (2) export creation between intra- and extra-bloc, and (3) trade diversion between intra- and extra-bloc. They found trade creation effect not only within ASEAN but also for China-ASEAN FTA on the whole and positive export creation effect on the exports of agriculture and major manufactured products.

This article aims to examine the trade creation and diversion effects of ASEAN-plus-one FTAs by estimating the gravity trade model for the recent two decades between 1993 and 2013. The estimation, as in Baier and Bergstrand (2007) and Urata and Okabe (2014), applies the panel-data with fixed effects to clear the FTA-endogeneity problem. The main contribution of this article, which Baier and Bergstrand (2007) and Urata and Okabe (2014) did not cope with, is to investigate an individual trade effect of each of ASEAN-plus-one FTAs: ACFTA, AKFTA, AJFTA, AANZFTA and AIFTA, by utilizing the updated trade data towards 2013. The empirical outcomes on the trade effects of ASEAN-plus-one FTAs might also provide some implication for the ongoing negotiation of RCEP framework covering all the countries related with ASEAN-plus-one FTAs. The next section presents empirical analyses containing methodology, data, and estimation results, and the last section summarizes and concludes.

2. Empirics on Trade Effects of ASEAN-Plus-One FTAs

This section focuses on the empirical analysis of the trade creation and diversion effects of ASEAN-plus-one FTAs by estimating the gravity trade model. We first clarify the methodology and data, and then represent the estimation outcomes and discuss them.

2.1 Methodology

We herein adopt a theoretically-motivated gravity trade model using panel data with bilateral fixed effects and multilateral time-varying price resistance terms. The equation for estimation is specified as follows.

$$\ln\left[X_{ijt}/\left(GDP_{it}GDP_{jt}\right)\right] = \alpha_0 + \alpha_1 FTAC_{ijt} + \alpha_2 FTAD_{ijt} + \alpha_3 D_{ij} + \alpha_4 rex_{ijt} + \varepsilon_{ijt} \quad (1)$$

where X_{ijt} is the value of the merchandise trade flow from exporter i to importer j, $GDP_{it}(GDP_{jt})$ is the level of nominal gross domestic product in country i (j), D_{ij} is a bilateral dummy variable between i and j, rex_{ijt} is a bilateral real exchange rate in the

logarithm, and ε_{ijt} is an error term. We also insert the time dummy from 1993 to 2013. Regarding the FTA effects on trade flows, the equation includes two kinds of dummy variables as in Urata and Okabe (2014). $FTAC_{ijt}$, a variable for denoting trade creation effect, takes a value 1 if both importer and exporter belong to the same FTA and 0 otherwise, and $FTAD_{ijt}$, a variable for denoting trade diversion effect, takes a value 1 if the importer is a member of the FTA, but the exporter is not and 0 otherwise, respectively. From the concept of trade creation and diversion effects we described in the introduction, the sign of the coefficient, α_1, is expected to be positive while α_2 is expected to be negative.

To address the FTA-endogeneity bias, the equation includes a bilateral dummy variable between i and j, D_{ij}. Baier and Bergstrand (2007) argued that the FTA is not exogenous variable but is influenced by considerable unobserved time-invariant heterogeneity among country pairs such as policy-related barriers (that also affects trade volume), and that this omitted variable bias is the major source of endogeneity facing estimation of FTA effects in gravity equations using cross-section data. They examined the validity of cross-section techniques using instrumental variables and control functions, but concluded that these techniques were not reliable enough to provide stable estimates of the FTA effects, and that the unobserved time-invariant bilateral variables were best controlled by using bilateral "fixed effects" in the gravity equation using panel data.[3] There would be another potential endogeneity bias created by simultaneity: GDP is a function of net exports. Although the simultaneity bias is considered to be not so large in the literature, the specification (1) has GDPs on the left hand side.[4]

The specification (1) includes a bilateral real exchange rate, rex_{ijt}, to account for the theoretically-motivated multilateral time-varying price resistance terms. The gravity trade model suggested by recent formal theoretical developments requires the multilateral price variables. Anderson and van Wincoop (2003) suggested the use of country-specific fixed effects as the method for accounting for multilateral price terms in cross section. In a panel setting, however, the multilateral price terms would be time-varying. One way to control for price changes is to introduce, similarly to Rose (2000) and Vandenbussche and Zanardi (2010), the bilateral real exchange rate that varies over time and tracks price changes, the coefficient of which is expected to have a negative sign.

We introduce lagged effects of FTAs on trade, since FTA is in general "phased-in" for some years and terms-of-trade changes caused by FTA also tend to have lagged effects on

[3] Baier and Bergstrand (2007) conducted the estimation using first-differenced data as well as fixed effects for robustness analysis, and found no significant differences in the estimation outcomes. Thus we herein only focus on the fixed-effect estimation.

[4] Scaling the left-hand-side trade flow by product of GDPs means imposing the restriction of unitary income elasticities. Baier and Bergstrand (2007), however, showed that imposing the unitary income elasticities had no impact on the FTA coefficient estimate.

trade. Although Baier and Bergstrand (2007) supposed around a ten-year lagged period, we include lagged effects by three years, since all the ASEAN-plus-one FTAs were just in force within these ten years. ACFTA was in force in January 2004 and thus its dummy takes value 1 from 2004, 2005, 2006 and 2007, AKFTA in force in June 2007 and its value 1 from 2007, 2008, 2009, and 2010, and AJFTA in force in December 2008 and its value 1 from 2009, 2010, 2011 and 2012. AANEFTA and AIFTA came into force very recently, in January 2010, and their dummies take value 1 only from 2010 with no lags.

Some of the studies on gravity trade model encounter the treatment of zero trade flow values, as Urata and Okabe (2014) applied the Poison pseudo-maximum likelihood model to cope with it. This study, however, deals with total values of trade flows of selected major countries, which do not include zero values.

2.2 Data

The sample period is from 1993 to 2013. The reason why we choose 1993 as its starting year is that the FTA within ASEAN named AFTA was in force in January 1992, and so after this we can concentrate only on the effects of ASEAN-plus-one FTAs.

The sample covers 14 countries/regions: Australia, China, E.U. (28 countries), India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Taiwan, Thailand, U.S., and the rest of the world (RW). Regarding ASEAN, we focus on four countries above (ASEAN4), since the latecomers such as Cambodia, Lao PDR, Myanmar and Vietnam have their different schedules of tariff reduction in AFTA.[5] Table 1 summarizes the trade flows in the sample countries/regions in 2013. It shows that the exports of China, Korea, Japan and ASEAN4 to the sample countries/regions except RW occupy more than sixty percent of their exports to the world. Figure 1 describes the trends in the trade flows between ASEAN4 and China, Korea and Japan. It represents rapid two-way trade growth between them, in particular, in China, except in the crisis periods of 1997-98 and 2009.

We then construct panel data for the period between 1993 and 2013 with 14 countries/regions. The trade data are retrieved from RIETI-TID 2013, the database produced by the Research Institute of Economy, Trade and Industry (RIETI) in Japan.[6] The GDP and the data for calculating a bilateral real exchange rate, i.e. consumer prices and bilateral nominal exchange rates, are from World Economic Outlook (WEO) Database, April 2015, by the International Monetary Fund.

2.3 Estimation Outcomes and Discussion

Table 2 reports the estimation outcomes of the gravity trade model on the trade creation and diversion effects of ASEAN-plus-one FTAs. The main points we observe here

[5] We also exclude Singapore Brunei due to transit-trading and oil producing country, respectively.
[6] See http://www.rieti-tid.com/.

are as follows. First, the cumulative coefficients of the FTAC and FTAD dummy variables have expected signs except the cases of trade diversion in the three-lagged AKFTA and of trade creation in AANZFTA and AIFTA: the trade creation effects are significantly positive on trade flows while the trade diversion effects are significantly negative on them. Second, much difference lies in the trade creation effects between in ACFTA and in AKFTA and AJFTA. The trade creation effect in ACFTA, around 0.3, is much larger than those in AKFTA (around 0.1) and AJFTA (less than 0.1). The coefficient, 0.3, suggests that the effect of the presence of a free trade agreement is to increase trade by 35 percent between the country pairs ($e^{0.3} = 1.35$). This estimated outcome is also consistent with the previous study of ACFTA trade effects, Yang and Martinez-Zarzoso (2014). Third, trade diversion effects are around -0.05 in ACFTA, AKFTA and AJFTA except the three-lagged AKFTA. Lastly, the coefficient of the bilateral exchange rate is significantly negative as expected in each case.

We interpret the estimation outcomes above in the following ways. Regarding the difference in the trade creation effects between in ACFTA and in AKFTA and AJFTA, we infer the following possible reasons. First, the wider gap between the general tariff rate and the preferential tariff rate for ASEAN in China might create the larger trade creation effect in ACFTA. Since the tariffs in ASEAN seem to be common for China, Korea and Japan under ACFTA, AKFTA and AJFTA, the comparison of tariff levels should be made in the side of China, Korea and Japan. The general tariff rates can typically be indicated by "Most Favored Nation (MFN) duty rate". According to the tariff database by World Integrated Trade Solutions (WITS),[7] in 2011, for instance, the average MFN duty rate in China is 11.98 percent and that in Japan is 7.71 percent. On the other hand, the average preferential tariff rate for ASEAN in China under ACFTA is 0.13 percent and that in Japan under AJFTA is 1.32 percent.[8] Thus, the wider gap in China between general tariff rate, 11.98, and preferential rate, 0.13, compared with that in Japan, might give the greater incentive for ASEAN to export more to China, thereby causing "more trade creation" under ACFTA. It should be also noted that the average level of preferential tariff for ASEAN in China under ACFTA, 0.13, is lower than that in Japan under AJFTA, 1.32, and that the coverage of the products applied for ACFTA in China is also wider than that for AJFTA in Japan.[9] In this situation, the trade creation effect in AJFTA might be offset by more robust one in ACFTA. This situation might be in line with the argument of Fugazza and Nicita (2013): some countries see part of the trade effects provided by improvements in "direct" market access conditions eroded by the deterioration in their "relative" market

[7] See https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx.
[8] The preferential tariff rate for ASEAN in Korea under AKFTA is not disclosed in the database.
[9] The number of product codes applied for ACFTA in China is 6,673, while that applied for AJFTA in Japan is 4,312, in 2011, according to WITS database.

access conditions. Another background for less trade creation effect in AJFTA is that the bilateral FTAs such as those between Japan and Malaysia and between Japan and Thailand were in force in July 2006 and in November in 2007, respectively, before the enforcement of AJFTA, so that some of the trade creation effect of AJFTA could be absorbed ahead by those of bilateral FTAs.

As for the trade diversion effects, the negative impacts of ACFTA should be larger since ACFTA in the presence of the "higher" general tariff rate in China might usually produce "more" of trade diversion. The estimated effect of ACFTA is, however, not so large compared with those of AKFTA and AJFTA. One of the speculations is that the imports of China depend more on primary goods than those of Korea and Japan[10], and also that the coverage of the products imported from least developed countries with zero-tariff in China is wider than that in Japan.[11] The primary goods imported from developing countries might be insensitive to tariff rates and/or might be under preferential treatment.

3. Concluding Remarks

This article examined the trade creation and diversion effects of ASEAN-plus-one FTAs by estimating the gravity trade model for the recent two decades between 1993 and 2013. The estimation applied the panel-data with fixed effects to clear the FTA-endogeneity problem. The empirics showed that the trade creation effect in ACFTA was much larger than those in AKFTA and AJFTA, and that the trade diversion effects were commonly negative in ACFTA, AKFTA and AJFTA as expected. The larger trade creation effect in ACFTA might come from the wider gap between the general tariff rate and the preferential tariff rate for ASEAN in China.

The implication of the empirics above is that the formation of RCEP is one of the desirable directions to maximize trade creation effect and minimize trade diversion effect. Since the RCEP has a function to merge all the individual ASEAN-plus-one FTAs, it will reduce trade diversion effect at least among plus-one countries such as China, Korea and Japan, and will expand trade creation effect if the preferential tariff rates are unified to the lowest level.

[10] The share of primary goods in total imports in 2013 is 33.6 percent in China, 29.6 in Korea and 29.1 in Japan, respectively, according to RIETI-TID 2013.

[11] The number of product codes with preferential tariff for least developed countries in China is 4,557, while that in Japan is 3,567, in 2011.

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Table 1 Summary of Trade Flows in Sample Countries/Regions in 2013

Billion U.S. dollars

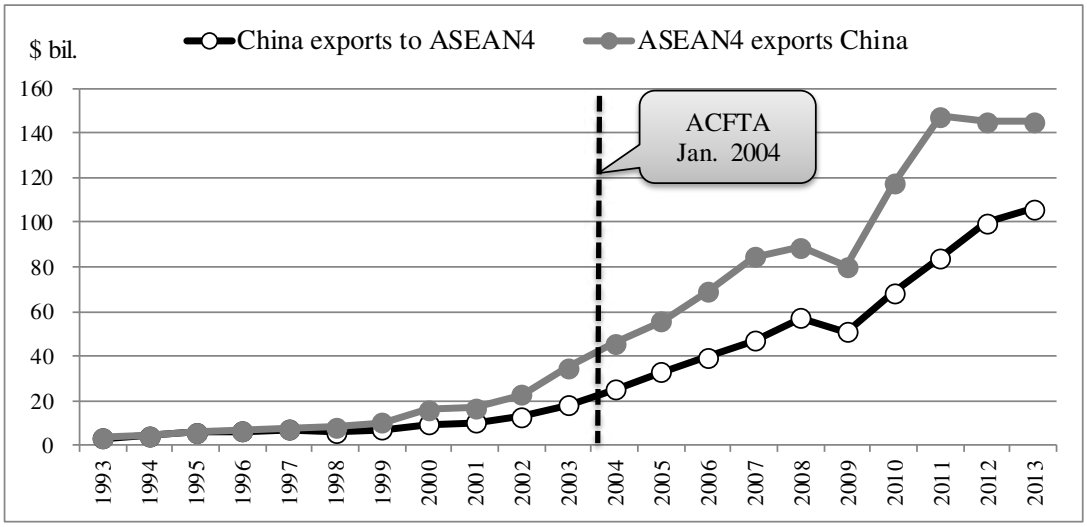
Exporter / Importer	China	Korea	Japan	ASEAN 4
China		171.5	156.9	145.1
Korea	79.3		59.1	32.5
Japan	169.8	34.0		86.3
ASEAN 4	106.0	35.2	81.5	
Taiwan	41.9	15.6	42.9	21.1
U.S.	421.2	62.1	133.4	74.4
EU(28)	384.8	55.1	85.2	77.5
Australia	42.0	9.4	17.5	25.3
New Zealand	6.3	1.6	2.5	3.7
India	46.1	11.6	10.1	29.6
World	2,047.0	546.3	762.5	772.5

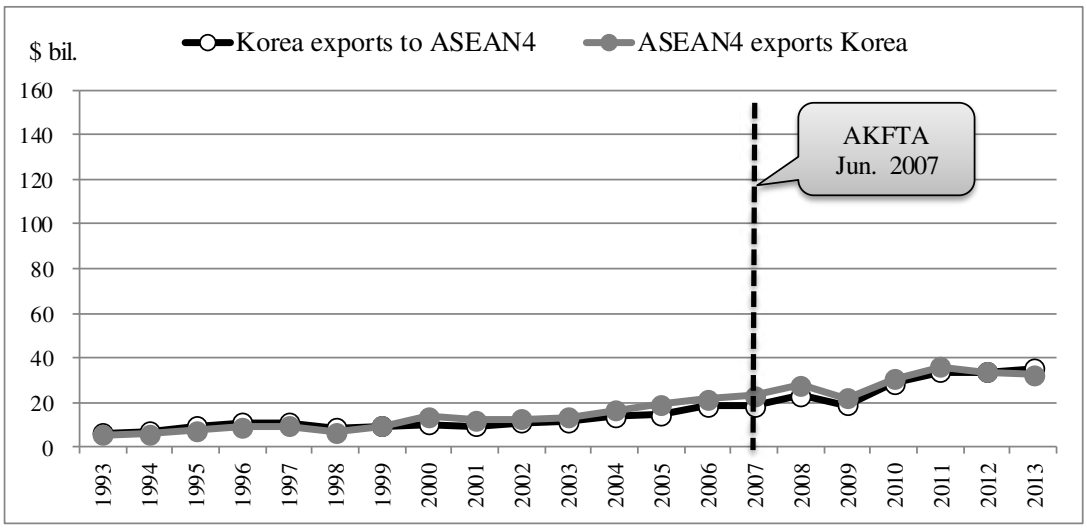
% of exports to the world

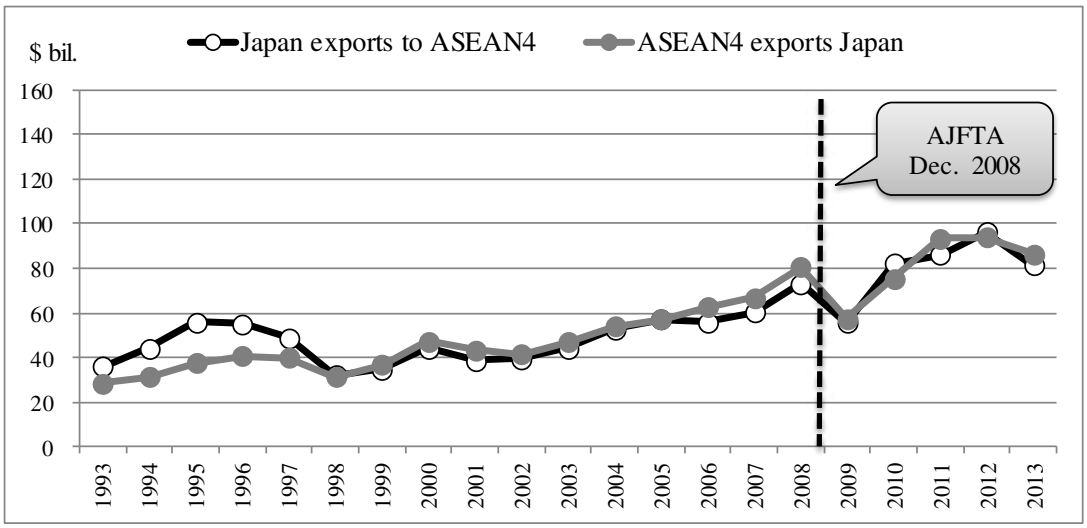
Exporter / Importer	China	Korea	Japan	ASEAN 4
China		31.4	20.6	18.8
Korea	3.9		7.7	4.2
Japan	8.3	6.2		11.2
ASEAN 4	5.2	6.4	10.7	
Taiwan	2.0	2.9	5.6	2.7
U.S.	20.6	11.4	17.5	9.6
EU(28)	18.8	10.1	11.2	10.0
Australia	2.0	1.7	2.3	3.3
New Zealand	0.3	0.3	0.3	0.5
India	2.3	2.1	1.3	3.8
Total /World	63.4	72.5	77.3	64.1

Source: RIETI-TID2013

Figure 1 Trends in Trade Flows between ASEAN4 and Plus-One Countries







Source: RIETI-TID2013

Table 2 Estimation Outcomes on Trade Effects of ASEAN-Plus-One FTAs

Variable	(1)	(2)	(3)	(4)
ACFTA: Trade Creation				
FTA	0.34*** (3.25)	0.63*** (8.15)	0.63*** (8.14)	0.63*** (8.14)
FTA-1		-0.32*** (-4.74)	0.01*** (81.26)	0.01*** (80.90)
FTA-2			-0.38** (-6.18)	-0.11*** (-80.55)
FTA-3				-0.29*** (-4.78)
Total	0.33	0.31	0.26	0.24
ACFTA: Trade Diversion				
FTA	-0.04 (-1.58)	0.04*** (3.15)	0.04*** (3.14)	0.04 ** (3.08)
FTA-1		-0.10*** (-4.88)	-0.09*** (-118.75)	-0.09*** (-118.27)
FTA-2			0.00 (0.01)	-0.05*** (-10.11)
FTA-3				0.07** (2.49)
Total	-	-0.06	-0.05	-0.03
AKFTA: Trade Creation				
FTA	0.03 (0.43)	-0.26*** (-6.10)	-0.26*** (-6.04)	-0.27*** (-6.47)
FTA-1		0.35*** (8.56)	0.22*** (720.18)	0.22*** (717.15)
FTA-2			0.16*** (4.97)	0.21*** (31.71)
FTA-3				-0.05 (-1.59)
Total	-	0.09	0.12	0.16
AKFTA: Trade Diversion				
FTA	-0.02 (-0.64)	0.04*** (3.15)	0.04*** (3.14)	-0.17*** (-6.23)
FTA-1		-0.10*** (-4.88)	-0.09*** (-118.75)	0.10*** (88.99)
FTA-2			0.00 (0.01)	0.14*** (13.97)
FTA-3				-0.02** (-0.69)
Total	-	-0.06	-0.05	0.05
AJFTA: Trade Creation				
FTA	0.02 (0.46)	-0.10*** (-4.90)	-0.12*** (-5.64)	-0.14*** (-7.16)
FTA-1		0.14*** (4.94)	0.12*** (9.53)	0.13*** (10.56)
FTA-2			0.02 (0.64)	-0.04*** (-352.38)
FTA-3				0.11*** (2.79)
Total	-	0.04	0.00	0.06
AJFTA: Trade Diversion				
FTA	-0.06 (-1.57)	-0.17*** (-5.68)	-0.20*** (-7.52)	-0.22*** (-14.14)
FTA-1		0.11*** (5.52)	0.07*** (3.70)	0.09*** (6.12)
FTA-2			0.04* (1.73)	-0.00*** (-18.07)
FTA-3				0.08*** (3.96)
Total	-	-0.06	-0.09	-0.05
AANZFTA+AIFTA: Trade Creation				
FTA	-0.12*** (-3.30)	-0.14*** (-3.81)	-0.15*** (-3.98)	-0.15*** (-4.07)
AANZFTA+AIFTA: Trade Diversion				
FTA	-0.10** (-2.14)	-0.12*** (-2.65)	-0.13*** (-2.75)	-0.12*** (-2.66)
REX	-0.17*** (-3.55)	-0.17*** (-3.71)	-0.17*** (-3.72)	-0.17*** (-3.69)
Constant	-17.86*** (-79.28)	-17.84*** (-80.32)	-17.83*** (80.26)	-17.84*** (79.90)
Adjusted R*R	0.8449	0.8451	0.8452	0.8451
No. Observation	3,780	3,780	3,780	3,780

Notes: *t*-statistics are in parentheses. **, ***, denotes statistical significance at 5, and 1 percent level.
"Total" is sum of the statistically-significant FTA coefficient estimates.
Source: RIETI-TID2013, and WEO database, April 2015.