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Impact of Liberalization and Improved Connectivity and Facilitation in ASEAN for the ASEAN Economic Community

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Abstract: This study evaluates the impacts of liberalization and improved connectivity and facilitation among the ASEAN member countries. This study attempts to evaluate economic impacts of the liberalization in ASEAN by applying economy-wide simulation analysis based on a recursively dynamic CGE model. We conduct policy simulations to capture the impacts of broader regional trade liberalization. Three main components driving the FTAs are to reduce average applied tariffs on goods, to lower barriers to trade in services, and to save time-cost arising relating to logistics.

Simulation results reveal that reducing ad valorem equivalents of trade barriers has significantly positive impact on economic welfare. Although there are differences in magnitude of positive contributions to welfare, all of the FTAs of which the ASEAN member countries are participating tend to raise welfare. Among the FTA policy scenarios examined in this study, the ASEAN+6 FTA leads to the largest positive impact on real GDP for most of the ASEAN member countries. Consequently, liberalization reforms among the ASEAN member countries attract more investments into the region both from domestic and foreign households, as well as generating higher volumes of international trade.

***Keywords*:** ASEAN; FTA; CGE model

***JEL Classification*:** F15, F17

1. Introduction

This study evaluates the impacts of liberalization and improved connectivity and facilitation among the ASEAN member countries. The subject of such wider liberalization encompasses reforms that have been implemented or will be accomplished in the near future in the ASEAN region. This study attempts to evaluate economic impacts of the liberalization undertaken in the region towards freer trading area by applying economy-wide simulation analysis.

Impacts of liberalization of trade in goods and services would be arising from lowering barriers to trade; for example, reducing import tariffs, ameliorating custom procedures, removing potential barriers to trade in services as well as improving logistics. Collecting information and estimates of tariffs and trade costs associating with liberalization potential is essential part of this study in order to conduct quantitative evaluation. We relied on variety of database and estimates from international organizations, national research institutions, and researchers in this field of impact study.

The liberalization reforms will have economy-wide effects covering all the ASEAN member countries for sectors ranging from agriculture, resources, manufacturing, and service industries. To capture the impacts of such broad regional trade liberalization, it would be desirable to use a multi-country, multi-sector applied economic model of international trade, capable of handling changes in tariffs and trade costs both in the past and the future for welfare

evaluation.

In the next section, we begin describing database and estimates used in this study and outline the recursively dynamic Computable General Equilibrium model in Section 3. Experimental design for our simulation exercises is listed in Section 4, Section 5 reports simulation results, and a summary follows.

2. Database and Estimates

2.1. GTAP Database

In this report, we utilized the GTAP Data Base version 7.1 (Narayanan & Walmsley, 2008) as a fundamental input to our analysis. The GTAP Data Base version 7.1 covers 112 countries/regions and 57 sectors in production, international trade, protection, and consumption, so it can serve as a bird's-eye view of the world economy corresponding to the year of 2004. We aggregated the GTAP Data Base to 22 countries/regions and 23 sectors, and the mappings from the original data are reported in Table 1 and Table 2, regional aggregation mapping and sectoral aggregation mapping, respectively.

Among the ASEAN member countries the GTAP Data Base has detailed economic data covering Singapore, Indonesia, Malaysia, the Philippines, Thailand, Viet Nam, Lao PDR, and Cambodia. Due to the data limitation, however, Brunei is included in the "Rest of Southeast Asia" along with Timor Leste, while Myanmar is

aggregated in the “Rest of the World.”

Table 1: Regional Aggregation of the GTAP Data Base

No.	Region	GTAP 112 regions
1	Japan	Japan
2	China	China; Hong Kong
3	Korea	Korea
4	Taiwan	Taiwan
5	Singapore	Singapore
6	Indonesia	Indonesia
7	Malaysia	Malaysia
8	Philippines	Philippines
9	Thailand	Thailand
10	VietNam	Viet Nam
11	Lao PDR	Lao People's Democratic Republic
12	Cambodia	Cambodia
13	RoSEAsia	Rest of Southeast Asia
14	India	India
15	AusNzl	Australia; New Zealand
16	USA	United States of America
17	Canada	Canada
18	Mexico	Mexico
19	ChilePeru	Chile; Peru
20	Russia	Russian Federation
21	EU_27	Austria; Belgium; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Slovakia; Slovenia; Spain; Sweden; United Kingdom; Bulgaria; Romania

No.	Region	GTAP 112 regions
22	RestofWorld	Rest of Oceania; Rest of East Asia; Bangladesh; Pakistan; Sri Lanka; Rest of South Asia; Rest of North America; Argentina; Bolivia; Brazil; Colombia; Ecuador; Paraguay; Uruguay; Venezuela; Rest of South America; Costa Rica; Guatemala; Nicaragua; Panama; Rest of Central America; Caribbean; Switzerland; Norway; Rest of EFTA; Albania; Belarus; Croatia; Ukraine; Rest of Eastern Europe; Rest of Europe; Kazakhstan; Kyrgyztan; Rest of Former Soviet Union; Armenia; Azerbaijan; Georgia; Iran Islamic Republic of; Turkey; Rest of Western Asia; Egypt; Morocco; Tunisia; Rest of North Africa; Nigeria; Senegal; Rest of Western Africa; Central Africa; South Central Africa; Ethiopia; Madagascar; Malawi; Mauritius; Mozambique; Tanzania; Uganda; Zambia; Zimbabwe; Rest of Eastern Africa; Botswana; South Africa; Rest of South African Customs

Source: GTAP Data Base version 7.1.

Table 2: Sectoral Aggregation of the GTAP Data Base

No.	Sector	GTAP 57 sectors
1	Rice	Paddy rice; Processed rice
2	GrainOthFood	Wheat; Cereal grains nec; Food products nec
3	VegeFruit	Vegetables, fruit, nuts
4	VegeSeedsOil	Oil seeds; Vegetable oils and fats
5	SugarCropBt	Sugar cane, sugar beet; Crops nec; Sugar; Beverages and tobacco products
6	FiberTex	Plant-based fibers; Wool, silk-worm cocoons; Textiles
7	MeatDairy	Cattle,sheep,goats,horses; Animal products nec; Raw milk; Meat: cattle,sheep,goats,horse; Meat products nec; Dairy products
8	WoodPaper	Forestry; Wood products; Paper products, publishing
9	Fishery	Fishing
10	Energy	Coal; Oil; Gas; Petroleum, coal products
11	Minerals	Minerals nec; Mineral products nec

No.	Sector	GTAP 57 sectors
12	Apparel	Wearing apparel
13	Chemical	Chemical,rubber,plastic prods
14	Metal	Ferrous metals; Metals nec; Metal products
15	Auto	Motor vehicles and parts
16	Machinery	Transport equipment nec; Machinery and equipment nec
17	ElecEquip	Electronic equipment
18	OthMnfct	Leather products; Manufactures nec
19	Utilities	Electricity; Gas manufacture, distribution; Water
20	Trade	Trade
21	TransComm	Transport nec; Sea transport; Air transport; Communication
22	FinsBusi	Financial services nec; Insurance; Business services nec
23	CnstOthSrv	Construction; Recreation and other services; Public Administration, Defence, Health, Education; Dwellings

Source: GTAP Data Base version 7.1.

A summary of GDP data calculated from the aggregated GTAP Data Base is reported in Table 3. There are significant variations in the size of GDP and corresponding GDP components among the ASEAN member countries; for example, Lao PDR's GDP is 2.5 billion US$ as compared to the larger GDP of 255 billion US$ in Indonesia. It is interesting to see that the total GDP of ASEAN as a whole becomes a considerable size exceeding India, Korea, and Mexico.

Table 3: Summary Macro Variables (US$, billion)

	GDP	C	I	G	EXP	IMP
Lao PDR	2.5	1.8	0.7	0.3	0.7	-0.9
Cambodia	4.9	2.5	0.9	0.4	4.2	-3.2
RoSEAsia	13.3	6.9	2.6	1.2	7.6	-5.0
VietNam	43.0	29.1	15.1	2.8	32.7	-36.6
Philippines	84.5	58.9	14,1	8.7	51.5	-48.8
Singapore	106.8	55.3	31.4	13.9	166.9	-160.7

	GDP	C	I	G	EXP	IMP
Malaysia	114.9	37.4	17.3	11.6	154.9	-106.3
ChilePeru	158.3	98.4	31.2	17.0	51.5	-39.8
Thailand	161.7	86.9	40.3	16.1	121.2	-102.8
Indonesia	254.7	174.8	49.3	20.0	87.5	-76.9
Taiwan	305.3	171.8	54.9	34.1	222.5	-178.0
Russia	569.8	289.8	106.5	96.9	204.9	-128.3
India	641.3	434.0	156.4	74.0	104.2	-127.3
Korea	676.5	339.9	194.8	89.0	308.9	-256.1
Mexico	683.2	462.3	139.4	78.7	191.3	-188.4
AusNzl	734.2	438.3	177.8	131.3	136.4	-149.6
ASEAN	773.0	446.6	169.2	74.0	619.5	-536.3
Canada	979.1	560.8	205.5	198.2	327.9	-313.3
China	1,837.1	789.5	722.0	206.9	826.1	-707.3
RestofWorld	4,371.8	2,589.7	916.5	728.3	1,559.1	-1,421.8
Japan	4,658.7	2,628.9	1,095	818.7	655.7	-539.5
USA	1,1673.4	8,233.0	2,198.5	1,809.9	1,088.9	-1,656.9
EU_27	12,895.4	7,680.0	2,530.1	2,742.2	4,185.6	-4,242.5

Source: GTAP Data Base version 7.1.

Table 4 reports the ASEAN's sectoral imports (US$ billion), and corresponding average applied tariff rates reported in percent (%). Electric Equipments are the largest sectoral import in ASEAN, which amounts to US$ 122 billion, followed by Machinery (US$ 88 billion), Chemical (almost 60 billion), and Energy (about 50 billion). Among the average applied tariff rates aggregated for ASEAN, relatively high tariff rates are observed in food and agricultural sectors such as Sugar Crops and Beets (33.3%) and Fiber and Textile (16.9%). Import tariff on Automobile (22.5%) is outstanding among manufacturing sectors, and tariffs on service sectors

are reported as zeros according to the GTAP Data Base.

Table 4: ASEAN's Sectoral Imports (US$, billion) and Average Applied Tariff Rates (%)

	Import	Tariff
Rice	0.9	17.7
GrainOthFood	10.4	11.0
VegeFruit	2.2	9.1
VegeSeedsOil	5.0	6.8
SugarCropBt	5.7	33.3
FiberTex	16.9	13.2
MeatDairy	4.9	4.5
WoodPaper	11.4	6.5
Fishery	0.6	4.6
Energy	49.5	2.0
Minerals	8.0	5.1
Apparel	3.3	9.9
Chemical	59.6	4.8
Metal	41.7	5.1
Auto	17.5	22.5
Machinery	88.0	3.6
ElecEquip	122.0	1.1
OthMnfct	9.5	6.7
Utilities	0.8	0.0
Trade	12.3	0.0
TransComm	19.3	0.0
FinsBusi	33.3	0.0
CnstOthSrv	13.3	0.0

Source: GTAP Data Base version 7.1.

We should note first that the average tariff rates reported in Table 4 is based on the aggregates of the ASEAN rather than each member country's detailed applied tariff data, which records different applied rates on goods with information on source and destination countries. Secondly, zero import tariffs on service trade do not

necessarily mean that the service sectors are free of impediments to trade, but simply it lacks information regarding to the barriers in service trade expressed in ad valorem tariff equivalents. Lastly, the applied tariff rates are based on the benchmark year of 2004.

Changes in average applied tariff rates since 2004 is in our interest of study, but it turned out to be a very challenging and complex task to update the rates recorded in the GTAP Data Base beyond 2004. To understand the reason, we will describe an impressive work on the average applied tariff rates in the next sub-section.

2.2. Market Access Maps Database

The applied tariff rates recorded in the GTAP Data Base version 7.1 are originating from the Market Access Maps (MacMapHS6v2) database version 2, which was improved and updated by Boumellassa, *et al*. (2009) over the prior release of the database (ITC, 2006).

The Market Access Maps database compiled ad valorem equivalents of tariffs and tariff rate quotas from fine-detailed 6 digits level of the Harmonized System, surpassing 5,000 products for 163 importing countries with 208 sourcing countries. Specific duties and tariff rate quotas found in the original data from national custom agencies are converted into ad valorem equivalents, and then they are aggregating up to the regional and sectoral classification of the GTAP Data Base. Thus, this is not a task easily replicated or updated by other researchers. Horridge & Laborde (2008) released a software program named TASTE, a tool for accessing to the Market

Access Maps database (Boumellassa, *et al*. 2009), and users can aggregate ad valorem equivalents to their specification.

Inferring from the size and scope of the Market Access Maps database, it seems very challenging and complex to update the aggregated applied tariff rates beyond 2004. In the next sub-section, however, we describe our attempt to obtain partial information of more recent applied tariff rates.

2.3. WTO's Tariff Download Facility

Information about changes in applied tariff rates beyond 2004 is a part of desirable inputs to our simulation analysis. WTO (2011) provides a web facility allowing anyone to access to the database containing Most Favored Nation applied and bound tariff rates for WTO member countries at 6 digits level of the Harmonized System (HS). Among the 22 countries / regions used in our study, there are 12 countries / regions that have both updated MFN applied tariff rates and import data. The 2009 data available for Japan, Korea, Taiwan, Indonesia, Thailand, New Zealand, USA, Canada, Mexico, Chile, and EU 27, and the 2008 data available for China, Australia.

MFN applied tariff rates from more than 5,000 products are extracted from the HS07 classification, then converted them into HS96 definition so as to match the GTAP Data Base's 57 sector classification for further aggregation to our 22 region specification.

For the ASEAN member countries, changes in applied tariff rates are computed

for Indonesia and Thailand only, because necessary data are not available other than these two ASEAN countries. Table 5 reports the changes in MFN average applied tariff rates from 2004 to 2009. There are several caveats on the results. Specific tariffs and tariff rate quotas are not included in these import-weighted averages so that there might exist downward bias in resulting figures. If a rate in 2004 is zero or missing, change in the corresponding product is dropped out from computation due to an obvious reason. For service sectors, there are not much information recorded in the original WTO (2011).

Because of the limited data availability for the ASEAN member countries in WTO (2011), we repeated this exercise of data collection, aggregation, and computing changes in applied tariff rates, by using the World Integrated Trade Solution (WITS) software.[2] WITS is a very rich source of tariff data, and which benefits us with additional information gains, especially on preferential tariff rates for trading partners. However, we could not cover more than Indonesia and Thailand even with WITS as of this writing.[3]

Table 5: Changes in MFN Average Applied Tariff Rates in Indonesia and Thailand (2009)

	Indonesia	Thailand
Rice	n.a.	n.a.
GrainOthFood	0.62	1.21
VegeFruit	1.52	1.72
VegeSeedsOil	1.41	0.49
SugarCropBt	0.47	2.27
FiberTex	1.07	0.78
MeatDairy	0.87	1.08
WoodPaper	1.37	0.96

	Indonesia	Thailand
Fishery	1.1	0.94
Energy	0.18	0.96
Minerals	0.84	0.92
Apparel	1.05	0.92
Chemical	0.71	0.81
Metal	0.58	0.58
Auto	0.95	0.9
Machinery	0.85	0.61
ElecEquip	0.26	0.51
OthMnfct	1.38	1.38
Utilities	1.42	n.a.
Trade	n.a.	n.a.
TransComm	n.a.	n.a.
FinsBusi	n.a.	n.a.
CnstOthSrv	n.a.	n.a.

Note: 2004 = 1.0
Source: Computed from WTO (2011)

2.4. Estimates on Trade Cost Equivalents of Service Trade Barriers

In addition to the difficulty obtaining changes in average applied tariff rates, it is a formidable task to estimate tariff or trade cost equivalents of service trade barriers to trade. Adopting the methodology in Copenhagen Economics (2008) and Copenhagen Economics and Francois (2007), Wang, *et al*. (2009) estimated the tariff equivalents of service trade barriers. Their estimating equation is based on sector specific gravity model such as

$$M_{i,j} = \mathrm{a}_i + \mathrm{a}_j + \mathrm{a}_1 \ln GDP_j + \mathrm{a}_2 \ln PCI_j + \varepsilon_{j.}$$

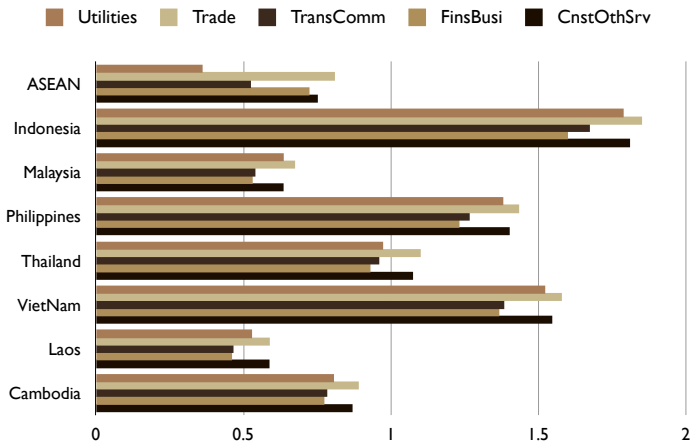
Imports of sector i in country j is regressed upon sector dummy a_i, country dummy a_j,

GDP, and per capita income *PCI*, by utilizing the GTAP Data Base version 7. Then, country average of trade-cost equivalent (T_j) is computed with the import substitution elasticity parameter (σ) extracted from the GTAP Data Base.

$$a_j = -\sigma \ln T_j \quad (\bullet)$$
$$T_j = \exp(-a_j/\sigma)$$

Similarly, tariff equivalents of service trade barriers for the ASEAN member countries are obtained and reported in Figure 1.

Figure 1: Tariff Equivalents of Service Trade Barriers



Source: Computed from Wang, *et al*. (2009)

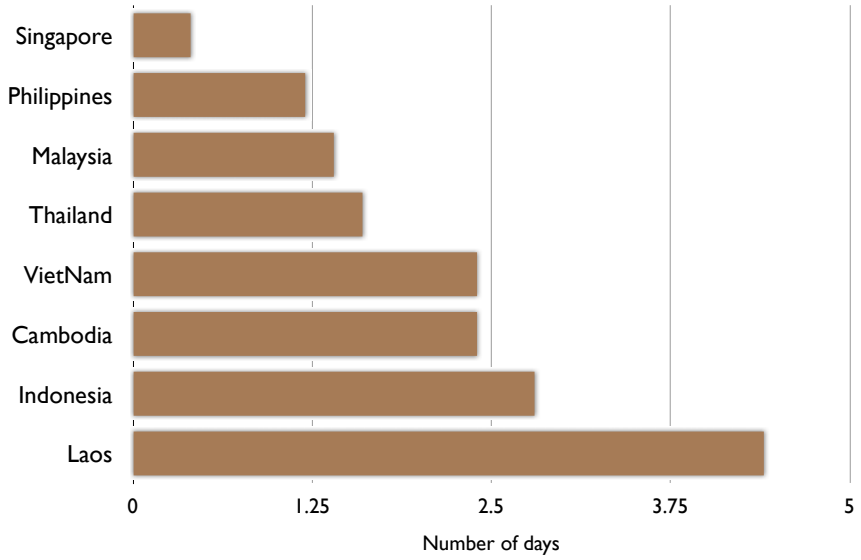
2.5. Time Cost on Trade

Minor & Hummels (2011) made available their estimates of the average costs of time delays in trade. They considered shipping delays caused by regulatory procedures and inadequate infrastructure would be one of the most significant trade barriers to trade in goods. Also, Minor & Hummels (2011) provide time information based on the World Bank Doing Business, which can be used in combination of their ad valorem equivalents of time costs for our simulation

analysis.

If we assumed 20% improvements in logistics associating importing goods, for example, then the resulting time-savings would be about half a day in Singapore and more than two and a half days in Indonesia. This example is depicted in Figure 2.

Figure 2: Time saving from Logistic Improvement on Imports (in number of days)



Source: Computed from Minor & Hummels (2011)

The time saving can have varying effects on different goods because ad valorem equivalents of time costs would differ from one good and the other. These variations in potential effects are captured in out simulation analysis.

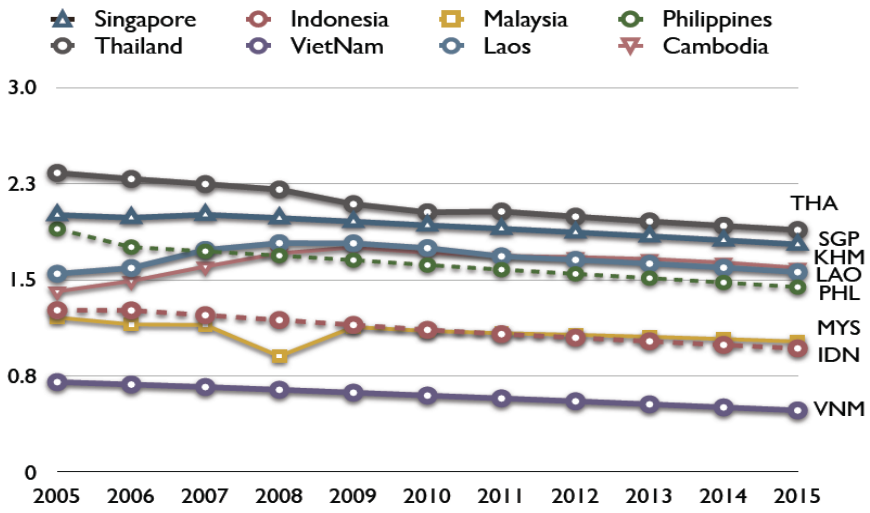
2.6. Dynamic GTAP Data Base and Macro Projections

By incorporating international capital mobility and capital accumulation as well as foreign income payments and receipts, the GTAP Data Base version 7.1 is extended to the Dynamic GTAP Data Base. This extended database is employed in our simulations along with macro economic projections published by various

international organizations.

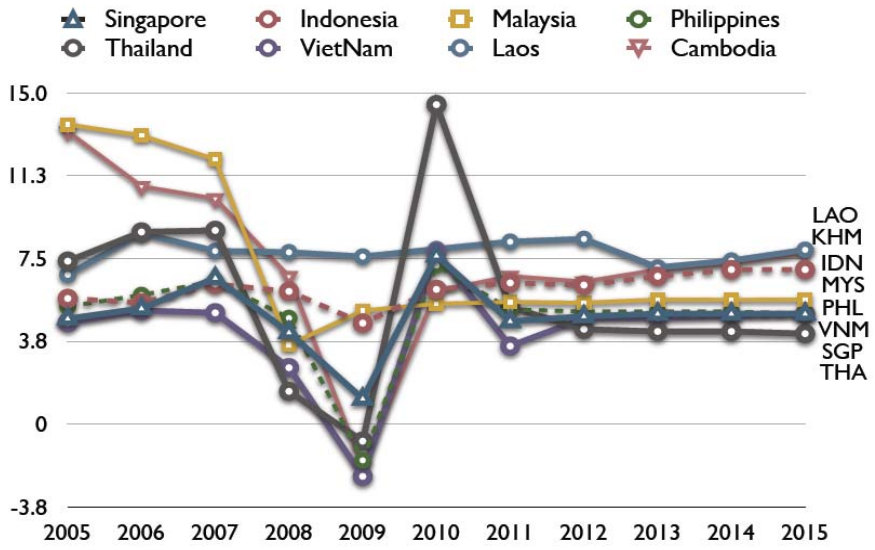
Projections on population growth are obtained from U.S. Census Bureau (2011) and aggregated to match our 22 regional specification. In Figure 3, slow declining trends are observed for the ASEAN member countries. Projections on real GDP growth rates are from IMF (2011), and Figure 4 shows them for the ASEN countries. Growth rates of labor are based on the estimates of economically active population by ILO (2011) (Figure 5).

Figure 3: Projections on Population Growth (%)



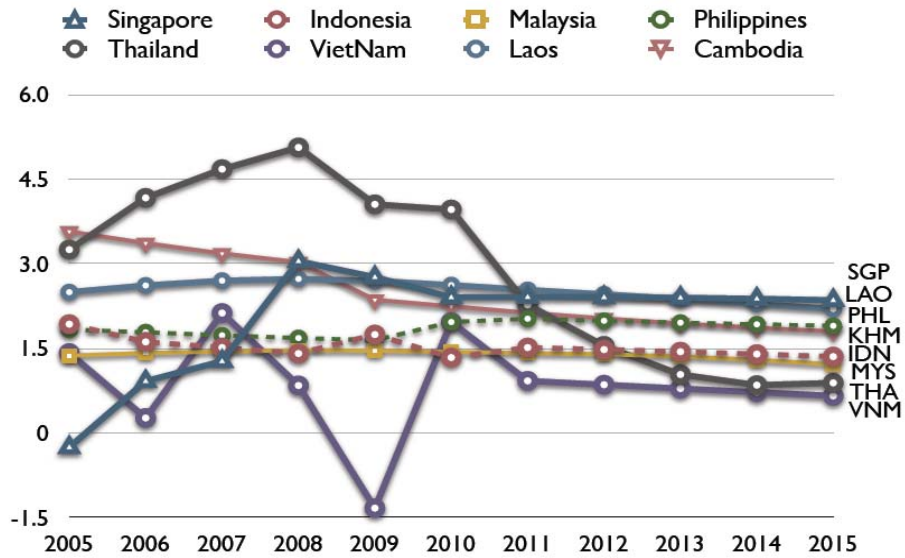
Source: Computed from U.S. Census Bureau (2011)

Figure 4: Projections on GDP Growth (%)



Source: Computed from IMF (2011).

Figure 5: Projections of Growth in Labor (%)



Source: Computed from ILO (2011).

3. Overview of Dynamic GTAP Model

For all the simulation analysis in this study, we applied the Dynamic GTAP model developed by Ianchovichina & McDougall (2001). At the Center for Global Trade Analysis, Purdue University, the Dynamic GTAP model has been improved and maintained for further development.[4]

Here we briefly describe the Dynamic GTAP model, following Itakura (2008) and Itakura & Lee (2010).

Ianchovichina & McDougall (2001) extend the comparative static framework of the standard GTAP model developed by Hertel (1997) and improvements made by McDougall (2000), to incorporate international capital mobility and capital accumulation. In the standard comparative static GTAP model, capital can move across sectors within a region, but not across borders. For the long run analysis, the model needs to capture cross-border investment, hence allowing international capital mobility and capital accumulation.

The Dynamic GTAP model preserves all of the main features of the standard GTAP model, such as constant return to scale production technology, perfectly competitive markets, and product differentiation by origin, which is known as Armington assumption (Armington, 1969). The Dynamic GTAP model also uses the GTAP Data Base (Narayanan & Walmsley, 2008) supplemented with foreign income data from the IMF's Balances of Payments Statistics, to track international capital ownership and foreign wealth.

In the Dynamic GTAP model, each of the regions is endowed with fixed physical capital stock owned by domestic firms. The physical capital is accumulated over the time with new investment. This dynamics is driven by the net investment, which is sourced by regional households' savings. Regional households own indirect claims on the physical capital in the form of equity. There are two types of equities such as equity in domestic firms and equity in foreign firms. The household directly owns the domestic equity but only indirectly the foreign equity. To access foreign equities, the household needs to own shares in a portfolio of foreign equities provided by the "global trust" that is assumed to be the sole financial intermediary for all foreign investments. Values of the household's equity holdings in domestic firms and in the global trust evolve over the time, and the household allocates all her savings for investment. Collecting such investment funds across regions, the global trust re-invests the funds in firms around the world and offers a portfolio of equities to households. The sum of household's equity holdings in the global trust is equal to the global trust's equity holdings in firms around the world.

The savings in one region will be invested directly in domestic firms and indirectly in foreign firms through the global trust, which in turn re-invested in all regions. The dynamics arising from positive savings in one region is related to the dynamics from the net investment in other regions. Overall, at the global level, it must hold that all the savings across regions are completely invested in home and overseas markets.

In theory, incentives for investments or equity holdings are governed by rates of

return, which will be equalized across regions if capital is perfectly mobile. However, this equalization of rates of return seems unrealistic, at least in the short-run. Further, there exists well-known empirical observations so-called "home bias" in savings and investment, equity holdings by households, and capital flows. Home bias refers to empirical observations that domestic market is preferred to foreign market. These empirical observations suggest that the capital is not perfectly mobile, so leaving the rates of return varying across regions. The dynamic GTAP model allows inter-regional differences in rates of return in the short run, which will be eventually equalized in the very long run. This may be considered as a realistic approach, but it calls for a mechanism to allocate equity holdings of the households and the global trust in a way consistent with the observed data. Differences in rates of return are attributed to the errors in investor's expectation about the future rate of returns. However, the errors in expectation are gradually adjusted to the actual rate of return as the time elapses. Eventually the errors are eliminated, and the unique rate of return across regions can be attained.

Therefore we assume perfect capital mobility applies only in the very long run. Investment is the result of a gradual movement of expected rates of return to equality across regions, but the expected rate of return may differ from the actual rate of return due to errors in expectations.

Explicit modeling of the ownership of regional investment allows for the determination of the accumulation of wealth by foreigners. In addition, the ownership of domestic and foreign assets can also be tracked. Income accruing

from the ownership of these foreign and domestic assets can then be appropriately incorporated into total regional income.

Participating in FTA could lead to more investment from abroad. Trade liberalization often makes prices of goods from a participating country cheaper due to removal of tariffs, creating an increase in demand for the goods. Responding to the increased demand, production of the goods may expand in the exporting country. To increase the production, more intermediate goods, labor, capital, and other primary factors are demanded. These increased demands for production inputs raise the corresponding prices, wage rates, and rental rates. Higher rental rates are translated into higher rate of return, attracting more investment from both home and foreign countries.

4. Simulation Design and Policy Scenarios

This section describes our simulation design and policy scenarios. For conducting simulations with the Dynamic GTAP model, we begin by establishing the baseline scenario, a base of comparison with policy scenarios. The baseline scenario is built on the projections of population (U.S. Census Bureau, 2011), real GDP (IMF, 2011), and labor (ILO, 2011) so that the Dynamic GTAP model closely tracks all the projections.

Baseline Scenario (2004–2015)

Policy Scenarios:

• (A1): ASEAN (2011) Tariff
• (A5): ASEAN (2011–2015) Tariff
• (AS): ASEAN (2011–2015) Tariff+Service
• (AT): ASEAN (2011–2015) Tariff+Service+Time

Policy scenarios below implement Tariff+Service+Time over 2011–2015 period, unless otherwise specified.

• (C): ASEAN–China FTA
• (J): ASEAN–Japan FTA
• (K): ASEAN–Korea FTA
• (N): ASEAN–India FTA
• (U): ASEAN–Australia and New Zealand FTA

• (Ax5): Five ASEAN+1s;
ASEAN–China, –Japan, –Korea, –India, –Australia and New Zealand
with additional costs of compliance with divergent rules of five FTAs
• (Ax5+CJK): Five ASEAN+1s and China–Japan–Korea (CJK) FTA
• (CJK): China–Japan–Korea FTA
• (CJKa): Alternative CJK scenario embedding C + J + K in the Baseline
with additional cost of compliance with divergent rules

• (A+3): ASEAN+3 (China, Japan, Korea) FTA
• (A+3t): ASEAN+3 (China, Japan, Korea) FTA, Tariff only
• (A+6): ASEAN+6 (+3, India, Australia, New Zealand) FTA
• (A+6t): ASEAN+6 (+3, India, Australia, New Zealand) FTA, Tariff only
• (GLB): Global Liberalization

In the policy scenarios, we assumed (a: Tariff) complete elimination of the tariffs over the specified period of time, and (b: Service) reduction of ad valorem

equivalents of service trade barriers by 20% and (c: Time) improvements in logistics cutting the ad valorem time cost by 20%. All of the three liberalization components are applied to all FTA partner countries.

Policy scenarios from A1 to AT are focusing on the ASEAN FTA with different FTA settings of duration of implementation and liberalization components. Scenario A1 assumes all the FTA implementation to be completed within one year. Although such assumption is unrealistic given the fact that many FTAs have been accomplished gradually over a period of multiple years, the scenario A1 is to reveal effects of gradual implementation assumed in A5. Scenarios AS and AT are to distinguish the contribution of reducing service trade barriers and of improving logistics, respectively.

Five pairs of ASEAN+1 FTA are considered in scenarios from C to U; C for China, J for Japan, K for Korea, N for India, and U for Australia and New Zealand. All of the liberalization components are carried out for the 2011-2015 period.

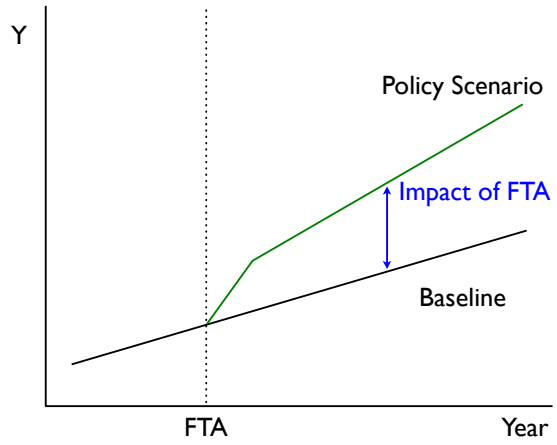
Scenario Ax5 assumes that all of the five ASEAN+1s are concurrently implemented over the 2011-2015 period. Each of the five ASEAN+1 maintains own rules and regulations regarding to liberalization, for example the rule of origins. Complying with different rules and regulations would incur additional costs, which effectively diminish the benefits of freer trade in goods and services. For this additional cost of compliance to be highlighted, the degree of reduction in service trade barriers and improvement in logistics are halved in this scenario. Scenarios CJK are for the implementation of China-Japan-Korea FTA in which no ASEAN

member countries takes part. Scenario Ax5+CJK is a combination of the two scenarios and aims to make a contrast with scenario A+6.

Scenario A+3 and A+3t simulate ASEAN+3 (China, Japan, Korea) FTA with and without reduction of service trade barriers and enhancement of logistics, respectively. Similarly, A+6 and A+6t are simulation settings for ASEAN+6 (China, Japan, Korea, India, Australia, New Zealand) FTA. A+6 and A+6t are different from the scenario Ax5 where the bilateral FTAs are not implemented among the 6 countries.

Before examining the simulation results, Figure 6 illustrates how we can measure the policy impact of FTA on a variable Y, for example. Deviation from the baseline caused by the policy "shock", i.e. FTA, is computed in terms of a percentage point difference from the baseline, accumulated over the simulation period.

Figure 6: Baseline and Policy Scenarios



5. Simulation Results

For all policy scenarios, Table 6 summarizes impacts of various FTAs on economic welfare for ASEAN countries. The impact is evaluated in a percentage point deviation from the baseline, accumulated to 2015. At a glance of Table 6 it is clear that most of figures are positive, indicating that the FTAs of ASEAN countries' participation will lead to higher economic welfare. China–Japan–Korea FTA doesn't include ASEAN countries at all, so adverse effects are expected, and the simulation results reported in CJK agree with such anticipation.

Policy scenarios from A1 to AT are simulating trade liberalization among ASEAN countries, with different specifications of duration of implementation and components of liberalization such as removal of tariff, reduction in service trade barriers, and lowering trade cost of time. Comparing A1 with A5 in Table 6, we can see the difference in welfare effects caused by the difference in the duration of FTA implementation, within one year (A1) or for five-year period (A5). Shorter implementation of FTA tends to have larger welfare results, except for Viet Nam.

There are small negative welfare impacts observed in the Philippines and Lao PDR for the scenario A1 and A5. Welfare impact reported in the Table 6 is computed from changes in regional household's utility, which reflects changes in regional household's real income. In the Dynamic GTAP model, regional household's income is based on factor income, equity income, and indirect taxes. For the Philippines, factor income accrued from land resulted in small negative

number because of lowered production of rice sector. Small negative impact on factor income from land leads to negative welfare. For Lao PDR, abolishing import tariffs reduced tariff revenues so as to indirectly affect income, thereby resulted in small welfare loss.

With respect to FTA components of "tariff," "service," and "time," the more one country commits areas of liberalization, the more economic welfare gains are accrued to that country. This point can be confirmed for all ASEAN countries by comparing the welfare results of A5 (tariff), AS (tariff+service), AT (tariff+service+time) in Table 6. The degree of welfare increase becomes considerably large as service trade liberalization enters into the FTA components (AS over A5).

Policy scenarios from C to U compare five partners for ASEAN+1 FTA in terms of economic welfare gain. China (C), Japan (J), Korea (K), India (N), Australia and New Zealand (U) are the five partners in comparison. It is clear that ASEAN member countries' welfare gain become significantly larger as FTA with China is simulated. India and Japan tend to bring the second largest welfare gain, but its degree differs among the ASEAN countries.

Having considered five ASEAN+1 FTAs separately, policy scenario Ax5 simulates the five ASEAN+1 FTAs all at once, with additional costs caused by maintaining different rules and regulations adopted by each of five ASEAN+1 FTAs. For example, there would be diverse regulations regarding to the rule of origin adopted by ASEAN+1s.

As is expected, welfare gains from Ax5 exceed any of individual ASEAN+1 FTA. Since ASEAN countries are not involved, CJK policy scenario, China-Japan-Korea FTA, negatively affects ASEAN countries' welfare, but magnitudes of the negative effect are not significantly large except Viet Nam. Because of this adverse effect, combined impact of Ax5 and CJK is less than Ax5 policy scenario.

ASEAN+3 (China, Japan, Korea) FTA and ASEAN+6 (China, Japan, Korea, India, Australia, New Zealand) are considered in policy scenarios from A+3 to A+6t in Table 6. Also, "tariff" is singled out from the liberalization components in scenario A+3t and A+6t, to distinguish the impact of abolishing tariff from the impact of reducing service trade barrier and trade cost of time. For all of the ASEAN countries except Lao PDR, welfare gain from ASEAN+6 FTA (A+6) is larger than ASEAN+3 (A+3). The impact of tariff elimination alone is small for most of the ASEAN countries in both policy scenarios of ASEAN+3 (A+3t) and ASEAN+6 (A+6t), as compared with full implementation of FTA with tariff removal and reduction of service trade barrier and trade cost of time.

Table 6: Impact on Welfare (2015)

	Indonesia	Malaysia	Philippines	Thailand	Viet Nam	Lao PDR	Cambodia	RoSEAsia	Singapore
A1	0.05	0.08	-0.02	0.52	0.19	-0.23	1.84	0.32	1.33
A5	0.02	0.07	-0.05	0.46	0.26	-0.38	1.61	0.27	1.18
AS	1.36	0.62	0.50	1.53	2.23	0.13	2.69	0.25	4.01
AT	1.65	0.93	0.69	1.90	2.90	1.62	3.87	0.64	4.87
C	4.26	4.01	2.74	7.91	7.94	2.94	7.27	0.60	11.64
J	2.47	1.28	0.72	4.97	4.74	1.47	4.24	0.77	4.59
K	1.97	1.15	0.82	2.38	4.40	1.65	4.23	0.81	5.28
N	2.74	1.94	0.96	2.71	4.17	1.89	4.15	1.10	7.25
U	1.98	1.17	0.86	2.29	3.48	1.63	3.99	0.64	4.82
Ax5	4.75	5.20	2.37	10.80	11.14	1.80	6.68	1.08	11.22
Ax5+CJK	4.32	4.54	1.91	9.22	9.50	1.48	5.31	0.68	8.68
CJK	-0.32	-0.40	-0.35	-0.75	-1.19	-0.28	-0.65	-0.48	-0.74
A+3	4.57	4.23	2.40	9.69	10.31	2.53	6.42	0.51	8.48
A+3t	-0.18	1.04	-0.63	4.27	2.80	-0.80	0.33	-0.04	2.00
A+6	5.39	5.19	2.44	10.03	11.19	2.49	6.44	0.81	9.21
A+6t	0.24	1.55	-0.72	4.12	2.80	-0.99	0.29	0.20	2.34

Note: percentage point cumulative deviation from the baseline
A1: tariff (2011), A5: tariff (2011-15), AS: tariff + service, AT: tariff + service + time
C: China, J: Japan, K: Korea, N: India, U: Australia and New Zealand
Ax5: five ASEAN+1s, with compliance costs, Ax5+CJK: Ax5 and China-Japan-Korea (CJK) FTA, with compliance costs
A+3: ASEAN+3, A+3f: ASEAN+3(tariff only), A+6: ASEAN+6, A+6f: ASEAN+6(tariff only)
Source: Simulation results

Recall that Singapore is a special case in estimating trade cost equivalents of service trade barrier. Singapore is set as benchmark country in the estimation, thereby leaving that country's estimate unavailable. This is a reason for explaining a unique pattern of impact reported in tables; from Table 6 to Table 12. Also, the Rest of Southeast Asia, "RoSEAsia," is reported in these tables for a crude approximation of Brunei, for which most of economic data and estimates required in this study are not available.

Table 7 reports the simulation results on real GDP for the ASEAN member countries, obtained from the FTA policy scenarios in terms of cumulative percentage point deviation from the baseline in 2015. Except for the CJK scenario, all the ASEAN countries are positively affected by all of the FTAs of which they are part of the liberalization. Among the various FTA scenarios, the ASEAN+6 (A+6) scenario leads to the largest gains in real GDP for most of the ASEAN countries. Among the contributions to the GDP gains, "service" component of liberalization remains significant for most of the ASEAN countries, while "time" component is more important for Lao PDR and Cambodia to improve logistics.

Impacts on international trade for the ASEAN countries are reported in Tables 8 and 9. Trade liberalizations simulated in this study generally resulted in higher trade volume of exports and imports, with a few exceptions: Singaporean exports due to her absence from "service" component and the CJK scenario's negative impacts on imports. By removing barriers to trade in goods and services as well as increasing efficiency in logistics, the ASEAN member countries raise both imports and exports with the world.

Table 7: Impact on GDP (2015)

	Indonesia	Malaysia	Philippines	Thailand	Viet Nam	Lao PDR	Cambodia	RoSEAsia	Singapore
A1	0.3	0.3	0.5	0.7	1.3	1.2	3.6	1.3	0.6
A5	0.2	0.1	0.3	0.4	0.8	0.7	2.2	0.9	0.3
AS	1.6	0.6	0.8	1.2	2.7	0.8	2.9	0.9	1.4
AT	2.0	0.9	1.0	1.5	3.5	2.3	4.4	1.5	1.6
C	4.5	2.7	2.7	5.7	8.9	2.9	8.3	1.8	3.6
J	3.4	2.2	1.6	4.3	6.3	2.4	5.7	2.0	1.7
K	2.4	1.4	1.2	1.9	5.4	2.4	4.7	1.7	1.9
N	2.4	1.4	1.2	1.9	4.5	2.4	4.6	1.8	2.4
U	2.4	1.2	1.3	2.0	4.2	2.5	4.7	1.6	1.6
Ax5	4.8	4.5	3.0	8.0	12.1	2.2	8.6	2.3	3.6
Ax5+CJK	4.5	4.2	2.7	7.3	11.2	2.0	8.1	2.0	2.7
CJK	-0.3	-0.3	-0.3	-0.7	-0.7	-0.1	-0.4	-0.2	-0.5
A+3	5.4	4.4	3.1	7.8	12.5	2.9	9.3	2.1	2.7
A+3t	0.4	1.4	0.5	3.0	4.7	0.5	2.9	1.2	0.3
A+6	5.8	5.0	3.3	8.3	13.4	3.0	9.5	2.3	2.9
A+6t	0.4	1.6	0.5	3.0	4.7	0.6	3.0	1.4	0.4

Note: percentage point cumulative deviation from the baseline
A1: tariff (2011), A5: tariff (2011-15), AS: tariff + service, AT: tariff + service + time
C: China, J: Japan, K: Korea, N: India, U: Australia and New Zealand
Ax5: five ASEAN+1s, with compliance costs, Ax5+CJK: Ax5 and China-Japan-Korea (CJK) FTA, with compliance costs
A+3: ASEAN+3, A+3f: ASEAN+3(tariff only), A+6: ASEAN+6, A+6f: ASEAN+6(tariff only)
Source: Simulation results

Table 8: Impact on Export (2015)

	Indonesia	Malaysia	Philippines	Thailand	Viet Nam	Lao PDR	Cambodia	RoSEAsia	Singapore
A1	1.4	0.8	2.1	1.5	4.1	7.4	7.9	1.6	0.1
A5	1.3	0.6	1.9	1.0	2.8	6.5	6.0	1.1	-0.1
AS	3.2	0.4	2.2	0.7	3.0	6.2	5.0	1.1	-2.9
AT	3.8	0.7	2.2	0.8	3.2	5.9	5.3	1.3	-2.6
C	9.9	3.2	5.8	3.7	12.7	4.3	9.2	1.6	-7.0
J	7.0	2.3	3.2	0.3	7.7	5.7	6.5	1.0	-2.2
K	5.0	1.5	2.5	0.7	7.7	6.1	5.5	1.4	-2.9
N	4.6	0.5	2.2	-0.1	3.0	5.4	4.7	1.3	-4.3
U	4.8	1.0	2.8	1.5	4.1	5.8	6.0	1.3	-2.4
Ax5	12.4	4.9	6.6	2.7	17.0	4.8	10.2	1.4	-6.8
Ax5+CJK	13.5	5.2	7.0	4.6	16.9	5.8	12.0	2.0	-4.5
CJK	1.3	0.1	0.4	0.6	0.2	0.8	0.5	0.6	0.5
A+3	14.4	5.7	7.3	5.1	17.4	5.5	12.5	2.0	-3.9
A+3t	4.5	3.6	3.9	1.3	13.5	7.3	8.8	1.6	-0.4
A+6	16.0	5.7	7.8	5.9	18.0	5.7	13.4	2.1	-4.0
A+6t	5.5	3.5	4.2	2.0	13.9	7.5	9.2	1.7	-0.5

Note: percentage point cumulative deviation from the baseline
A1: tariff (2011), A5: tariff (2011-15), AS: tariff + service, AT: tariff + service + time
C: China, J: Japan, K: Korea, N: India, U: Australia and New Zealand
Ax5: five ASEAN+1s, with compliance costs, Ax5+CJK: Ax5 and China-Japan-Korea (CJK) FTA, with compliance costs
A+3: ASEAN+3, A+3f: ASEAN+3(tariff only), A+6: ASEAN+6, A+6f: ASEAN+6(tariff only)
Source: Simulation results

Table 9: Impact on Import (2015)

	Indonesia	Malaysia	Philippines	Thailand	Viet Nam	Lao PDR	Cambodia	RoSEAsia	Singapore
A1	1.9	1.5	2.3	3.4	5.2	7.8	14.5	3.7	1.2
A5	1.8	1.3	2.1	3.0	4.9	7.6	13.0	3.4	1.0
AS	4.0	1.2	2.6	4.2	6.5	8.6	13.5	3.3	0.9
AT	5.0	1.7	2.8	5.1	7.3	9.8	14.8	4.1	1.8
C	14.2	7.4	7.8	20.8	24.4	11.5	24.3	4.8	3.5
J	7.5	4.2	3.8	11.5	13.6	8.5	15.9	3.9	1.9
K	6.3	3.4	3.2	6.4	14.4	9.8	15.4	4.6	2.0
N	8.0	2.4	3.2	6.3	8.8	10.2	14.8	5.8	2.3
U	6.1	2.1	3.4	6.4	8.3	9.8	15.6	4.1	1.9
Ax5	17.4	10.8	8.7	27.0	32.5	9.6	24.4	6.3	3.3
Ax5+CJK	15.8	10.2	7.7	24.1	29.1	9.0	23.2	5.0	2.7
CJK	-1.0	-0.4	-0.8	-1.7	-1.7	-0.5	-1.2	-1.2	-0.6
A+3	15.4	10.0	7.9	24.4	29.1	9.5	24.1	3.7	3.0
A+3t	5.2	7.0	4.2	14.7	22.4	6.1	16.0	3.1	1.0
A+6	17.4	10.6	7.9	25.3	30.1	9.1	24.4	4.7	3.2
A+6t	6.7	7.4	4.4	15.2	22.8	6.0	16.3	4.0	1.1

Note: percentage point cumulative deviation from the baseline
A1: tariff (2011), A5: tariff (2011-15), AS: tariff + service, AT: tariff + service + time
C: China, J: Japan, K: Korea, N: India, U: Australia and New Zealand
Ax5: five ASEAN+1s, with compliance costs, Ax5+CJK: Ax5 and China-Japan-Korea (CJK) FTA, with compliance costs
A+3: ASEAN+3, A+3f: ASEAN+3(tariff only), A+6: ASEAN+6, A+6f: ASEAN+6(tariff only)
Source: Simulation results

Liberalization in the ASEAN region also fosters economic environment for attracting investment. Table 10, 11, and 12 confirm that all of the ASEAN member countries increase investment larger than the baseline level (Table 10). Regional households in ASEAN find investment opportunity in their home market generated by the FTAs, thereby shifting their portfolio of ownership in capital from foreign to home market. Table 11 shows this shift from foreign to home ownership by negative changes in ownership of foreign capital. Not only the ASEAN regional households but also foreign regional households adjust their portfolio of ownership in capital towards the ASEAN member countries (Table 12), where the FTAs stimulate the ASEAN economies to hire more capital inputs for their production activities.

Table 10: Impact on Investment (2015)

	Indonesia	Malaysia	Philippines	Thailand	Viet Nam	Lao PDR	Cambodia	RoSEAsia	Singapore
A1	1.1	2.3	1.6	4.9	9.9	6.2	19.9	4.3	3.3
A5	1.0	2.1	1.4	4.5	10.8	5.8	17.2	3.7	2.8
AS	2.8	2.8	2.0	7.8	16.8	6.7	20.8	3,9	10.6
AT	3.7	3.7	2.5	9.8	20.5	9.6	24.8	5.3	12.3
C	9.0	13.2	6.1	36.5	55.3	12.3	41.3	6.9	28.2
J	5.7	8.5	4.0	26.9	34.2	8.7	28.5	6.8	11.6
K	4.4	6.8	3.2	12.8	34.0	9.5	26.0	6.1	13.6
N	5.1	6.6	3.0	13.5	26.6	10.3	25.9	7.4	18.0
U	4.4	4.4	2.9	11.6	22.0	10.3	25.5	5.4	12.1
Ax5	10.4	20.7	7.9	53.0	73.2	9.8	42.2	9.5	27.5
Ax5+CJK	8.4	18.0	5.7	44.3	63.4	8.3	37.1	7.3	19.2
CJK	-1.8	-2.0	-2.0	-5.4	-5.7	-1.2	-3.3	-1.8	-3.5
A+3	9.2	16.6	5.7	44.6	64.7	9.3	39.6	6.5	18.1
A+3t	2.7	10.9	3.3	28.8	46.0	4.0	22.9	4.6	3.1
A+6	9.6	19.0	5.5	45.3	66.9	9.1	39.0	7.7	19.1
A+6t	2.7	12.8	3.3	29.0	46.3	4.1	23.0	5.4	3.6

Note: percentage point cumulative deviation from the baseline
A1: tariff (2011), A5: tariff (2011-15), AS: tariff + service, AT: tariff + service + time
C: China, J: Japan, K: Korea, N: India, U: Australia and New Zealand
Ax5: five ASEAN+1s, with compliance costs, Ax5+CJK: Ax5 and China-Japan-Korea (CJK) FTA, with compliance costs
A+3: ASEAN+3, A+3f: ASEAN+3(tariff only), A+6: ASEAN+6, A+6f: ASEAN+6(tariff only)
Source: Simulation results

Table 11: Impact on Ownership of Foreign Capital (2015)

	Indonesia	Malaysia	Philippines	Thailand	Viet Nam	Lao PDR	Cambodia	RoSEAsia	Singapore
A1	-0.6	-0.7	-1.4	-3.1	-23.9	-4.3	-24.1	-4.1	0.2
A5	-0.2	-0.3	-0.8	-1.5	-14.1	-2.5	-14.7	-2.3	0.2
AS	-0.9	-0.3	-0.9	-2.1	-18.4	-1.8	-16.0	-2.0	0.6
AT	-0.9	-0.3	-1.0	-2.6	-21.9	-2.4	-17.9	-2.5	0.7
C	-2.2	-0.8	-2.3	-9.4	-44.7	-1.1	-25.7	-2.5	1.6
J	-2.8	-1.2	-2.0	-9.1	-34.2	-2.2	-20.6	-3.3	0.7
K	-1.2	-0.8	-1.3	-3.7	-33.4	-2.4	-18.7	-2.7	0.8
N	0.0	-0.3	-1.0	-3.2	-25.8	-1.8	-18.3	-2.2	1.1
U	-1.3	-0.4	-1.3	-3.4	-23.4	-2.9	-18.5	-2.6	0.7
Ax5	-2.5	-1.9	-3.3	-14.8	-54.5	-0.7	-27.3	-3.1	1.6
Ax5+CJK	-2.5	-2.1	-2.8	-13.4	-51.4	-1.4	-26.1	-3.3	0.9
CJK	0.2	-0.2	0.6	1.9	6.3	-0.4	1.6	-0.1	-0.5
A+3	-3.8	-2.1	-2.8	-13.7	-52.1	-1.6	-26.9	-3.7	0.7
A+3t	-1.0	-1.8	-2.0	-9.4	-43.5	-2.4	-20.3	-3.6	0.1
A+6	-3.2	-2.2	-2.9	-14.1	-53.2	-1.7	-26.8	-3.5	0.8
A+6t	-0.3	-1.9	-2.1	-9.6	-43.8	-2.7	-20.5	-3.5	0.2

Note: percentage point cumulative deviation from the baseline
A1: tariff (2011), A5: tariff (2011-15), AS: tariff + service, AT: tariff + service + time
C: China, J: Japan, K: Korea, N: India, U: Australia and New Zealand
Ax5: five ASEAN+1s, with compliance costs, Ax5+CJK: Ax5 and China-Japan-Korea (CJK) FTA, with compliance costs
A+3: ASEAN+3, A+3f: ASEAN+3(tariff only), A+6: ASEAN+6, A+6f: ASEAN+6(tariff only)
Source: Simulation results

Table 12: Impact on Foreign Ownership of Capital (2015)

	Indonesia	Malaysia	Philippines	Thailand	Viet Nam	Lao PDR	Cambodia	RoSEAsia	Singapore
A1	1.2	2.1	1.3	4.7	34.9	4.3	39.1	3.3	1.8
A5	0.9	1.1	0.7	2.9	18.9	2.4	20.6	1.2	1.3
AS	1.1	1.5	0.9	4.7	26.3	4.0	25.0	1.8	4.6
AT	1.9	1.9	1.3	6.0	33.0	5.8	29.2	2.8	5.4
C	4.4	5.1	2.9	20.1	94.9	9.7	50.0	4.9	12.7
J	1.6	3.5	1.8	14.4	58.6	5.5	31.4	2.9	5.2
K	2.1	2.7	1.6	7.6	59.8	5.8	31.0	3.0	6.0
N	3.5	3.7	1.8	8.6	43.2	7.1	31.4	5.7	8.2
U	2.0	2.0	1.3	6.9	35.1	5.7	29.8	2.8	5.3
Ax5	5.2	8.2	3.7	29.6	145.0	8.4	50.7	6.4	12.7
Ax5+CJK	3.7	7.2	2.4	24.4	122.5	6.5	43.1	4.2	9.2
CJK	-1.3	-0.6	-1.1	-3.0	-8.2	-1.2	-3.7	-1.4	-1.3
A+3	3.0	6.1	2.3	23.9	122.9	7.3	44.8	2.8	8.6
A+3t	1.8	4.5	1.4	16.0	90.6	1.6	28.7	0.4	1.8
A+6	3.6	7.2	2.1	24.5	128.5	7.0	43.6	4.5	9.2
A+6t	2.2	5.7	1.4	16.2	92.1	1.3	28.7	1.5	2.1

Note: percentage point cumulative deviation from the baseline
A1: tariff (2011), A5: tariff (2011-15), AS: tariff + service, AT: tariff + service + time
C: China, J: Japan, K: Korea, N: India, U: Australia and New Zealand
Ax5: five ASEAN+1s, with compliance costs, Ax5+CJK: Ax5 and China-Japan-Korea (CJK) FTA, with compliance costs
A+3: ASEAN+3, A+3f: ASEAN+3(tariff only), A+6: ASEAN+6, A+6f: ASEAN+6(tariff only)
Source: Simulation results.

6. Summary

In this study, we conduct policy simulations to capture the impacts of broader regional trade liberalization, such as ASEAN FTA, ASEAN+1s with various trading partner countries, ASEAN+3, and ASEAN+6, with a recursively dynamic CGE model of global trade, namely the Dynamic GTAP model. Three main components driving the FTAs are to reduce average applied tariffs on goods, to lower barriers to trade in services, and to save time-cost associated with logistics.

Simulation results reveals as overall summary that, as compared to the baseline, welfare from gradual implementation of tariff removal tends to be dominated by faster FTA implementation, and also that reducing ad valorem equivalents of service trade barriers has significant positive impacts on economic welfare. With respect to time saving due to improvements in shipping goods, there are steady contributions to welfare gains for many ASEAN member countries. Although there are differences in magnitude of positive contributions to welfare, all of the FTAs in which the ASEAN member countries are participating tend to raise welfare above the baseline. Among the FTA policy scenarios, the ASEAN+6 FTA leads to the largest positive impact on real GDP for most of the ASEAN member countries. Liberalization reforms among the ASEAN member countries attract more investments into the region both from domestic and foreign households, as well as generating higher volumes of international trade.

Given the ASEAN member countries' dynamic nature of economic activities,

policy simulation results, which depend on underlining database and estimates, would be subject to further improvements and updates. As an area of future study, we would like to strive for building an efficient way to incorporate more recent economic information into our database, estimates, and simulation model.

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Appendix

Table A1. Projected Trade Shares in the baseline, 2011

Export share by destination (%)

Origin	Destination				
	ASEAN	CJK	ANI	ROW	TTL
ASEAN	21.9	33.9	4.4	39.8	100
CJK	11.0	32.8	3.0	53.2	100
ANI	9.8	29.3	7.6	53.3	100
ROW	4.2	13.6	2.5	79.7	100

Import share by origin (%)

Origin	Destination			
	ASEAN	CJK	ANI	ROW
ASEAN	20.7	11.5	10.1	3.6
CJK	29.4	30.3	17.8	13.0
ANI	3.9	4.2	6.8	2.0
ROW	46.1	54.0	65.4	81.5
TTL	100	100	100	100

Note: CJK: China, Japan, Korea; ANI: Australia, New Zealand, India

Table A2. A+3 (A33)
1. Sectoral Exports from ASEAN countries (percentage point difference from the baseline)

	Singapore	Indonesia	Malaysia	Philippines	Thailand	VietNam	Lao PDR	Cambodia	RoSEAsia
Rice	52.5	1,892.9	146.0	1,133.0	24.3	23.7	111.2	-43.4	294.4
GrainOthFood	21.1	0.6	19.6	18.8	4.0	-14.6	39.6	-16.3	4.3
VegeFruit	-15.4	69.0	6.6	15.2	-5.6	49.3	78.0	-16.2	1.3
VegeSeedsOil	-4.6	-8.4	-3.5	-10.0	-1.1	-13.8	-62.1	18.4	3.5
SugarCropBt	62.0	-0.3	47.8	214.6	146.7	-18.8	-12.7	1426.1	87.7
FiberTex	-20.5	7.9	30.8	14.5	-17.3	59.5	-13.6	7.4	-1.4
MeatDairy	-1.0	52.4	6.9	10.4	-25.9	-46.0	-24.8	-50.8	278.9
WoodPaper	-15.5	6.6	-3.2	3.7	-16.6	-18.1	-22.4	-20.0	-6.4
Fishery	-3.6	-3.8	-9.4	4.4	2.6	-0.4	-11.7	4.2	11.5
Energy	7.9	0.5	-2.5	57.7	10.2	-1.2	12.5	24.1	-0.3
Minerals	-7.3	-2.8	6.1	3.7	-11.4	-8.3	5.6	13.0	6.2
Apparel	-38.5	-3.8	16.7	2.9	-31.7	121.6	-13.4	-1.5	2.1
Chemical	-9.3	17.6	16.9	28.0	4.5	18.6	69.9	-14.1	52.7
Metal	-12.9	1.6	10.6	4.5	4.7	-10.0	-4.3	8.3	-2.8
Auto	-25.5	-14.1	101.8	-7.6	5.9	35.0	46.7	65.5	87.9
Machinery	-21.3	23.4	8.2	22.3	5.8	23.1	54.4	63.4	-5.5
ElecEquip	-10.8	53.2	-0.1	-0.1	4.5	24.7	53.3	39.2	20.9
OthMnfct	-26.9	7.4	7.5	4.6	-26.2	38.2	1.5	4.0	1.0
Utilities	143.8	94.2	108.7	172.7	70.0	36.3	127.6	120.7	135.5
Trade	4.5	15.0	1.1	18.7	-16.5	4.4	0.6	-8.7	27.8
TransComm	1.6	45.7	16.3	29.6	7.7	29.4	25.4	30.9	29.5
FinsBusi	24.8	67.2	51.5	66.6	3.1	21.1	27.8	51.5	74.1
CnstOthSrv	40.4	62.5	43.8	83.6	25.7	28.4	45.0	49.4	67.3

2. Sectoral Imports to ASEAN countries (percentage point difference from the baseline)

	Singapore	Indonesia	Malaysia	Philippines	Thailand	VietNam	Lao PDR	Cambodia	RoSEAsia
Rice	-3.6	22.8	-13.8	82.9	418.7	173.3	-3.7	57.4	-34.9
GrainOthFood	14.4	9.8	3.4	3.7	22.9	12.5	35.7	30.2	5.2
VegeFruit	11.8	6.6	9.0	11.5	79.5	50.7	31.3	23.4	-2.9
VegeSeedsOil	-1.1	8.5	4.7	4.0	30.7	17.3	40.8	52.0	-0.2
SugarCropBt	12.6	24.8	51.6	7.9	97.3	75.8	39.3	38.0	17.8
FiberTex	-8.3	11.1	18.2	4.9	34.1	72.8	-2.0	3.2	2.8
MeatDairy	10.1	14.6	11.5	7.8	33.1	52.5	49.0	123.1	0.6
WoodPaper	4.4	10.6	9.8	5.6	24.9	19.6	20.2	28.9	1.6
Fishery	6.4	9.9	7.0	2.6	8.6	-5.0	17.3	23.5	-4.3
Energy	4.9	4.8	5.3	4.7	7.0	7.7	21.4	31.3	2.4
Minerals	8.5	12.9	10.2	3.7	20.8	34.1	3.9	26.8	1.2
Apparel	5.4	19.0	14.8	39.5	208.0	137.6	48.4	79.2	9.3
Chemical	-2.6	13.5	9.7	5.2	11.3	13.3	-1.4	3.4	-1.6
Metal	-4.2	14.8	7.5	6.9	10.9	25.8	3.8	8.8	-0.3
Auto	11.4	15.2	23.5	9.1	51.2	35.6	8.1	52.9	18.9
Machinery	9.4	9.6	10.2	7.7	31.5	25.4	5.2	27.4	4.8
ElecEquip	-5.4	11.7	6.7	1.9	18.7	26.7	7.4	41.4	5.6
OthMnfct	6.6	22.7	26.8	17.6	37.7	48.2	24.7	25.8	5.8
Utilities	4.8	175.8	40.6	115.7	75.8	238.0	24.7	29.3	5.9
Trade	13.2	104.4	60.5	103.1	90.2	112.0	34.0	72.7	-0.2
TransComm	8.2	49.2	7.1	32.7	38.0	23.2	21.8	22.3	0.7
FinsBusi	8.2	0.1	10.1	18.4	37.1	12.9	12.4	22.9	3.6
CnstOthSrv	15.8	64.7	15.2	35.5	58.2	68.8	12.2	71.1	3.4

Table A3. A+6 (A63)

1. Sectoral Exports from ASEAN countries (percentage point difference from the baseline)

	Singapore	Indonesia	Malaysia	Philippines	Thailand	VietNam	Lao PDR	Cambodia	RoSEAsia
Rice	59.0	1,502.3	122.2	1,065.6	23.3	22.7	115.6	-42.0	216.0
GrainOthFood	19.1	-6.1	18.5	17.6	5.1	-15.6	31.2	-17.2	-0.6
VegeFruit	-15.0	74.0	5.9	15.5	-3.9	48.3	74.3	-16.7	48.1
VegeSeedsOil	-3.8	54.6	19.4	-7.8	11.2	-13.9	-61.7	18.3	-6.4
SugarCropBt	65.1	-3.5	47.6	209.7	139.1	-8.0	-12.4	1437.9	74.0
FiberTex	-21.4	3.8	30.4	13.4	-16.7	59.0	-13.9	7.8	-7.9
MeatDairy	-6.6	30.9	1.1	25.1	-32.3	-46.0	-24.3	-47.0	133.9
WoodPaper	-11.7	4.3	-2.2	7.1	-15.1	-17.2	-21.3	-17.9	-2.8
Fishery	-4.1	-6.1	-10.5	4.6	3.2	-0.7	-11.2	5.0	6.6
Energy	8.5	6.3	-2.7	59.1	10.7	-1.3	12.3	24.2	-0.4
Minerals	-6.2	-0.8	9.1	8.4	-8.7	-5.6	7.5	14.8	16.7
Apparel	-40.6	-7.9	15.4	3.3	-32.0	122.1	-13.9	-0.7	-4.5
Chemical	-8.8	15.6	17.6	30.0	6.3	19.5	70.5	-14.1	50.0
Metal	-7.1	6.1	14.6	8.9	13.5	-9.6	-2.9	11.5	-4.5
Auto	-25.6	-16.7	101.1	-7.1	9.3	33.4	46.4	64.3	90.5
Machinery	-21.0	21.0	6.3	23.2	7.8	23.2	56.8	64.9	-10.9
ElecEquip	-11.8	51.6	-3.0	-0.1	4.2	24.0	54.3	39.8	17.2
OthMnfct	-27.0	2.1	5.2	5.3	-26.3	39.2	3.2	9.7	-7.5
Utilities	168.0	85.8	100.4	205.0	94.1	27.4	133.5	134.8	164.5
Trade	2.3	13.9	0.7	22.3	-16.0	6.5	3.8	-6.3	24.5
TransComm	0.6	39.5	13.6	29.4	8.0	29.3	23.3	28.9	27.2
FinsBusi	25.9	70.2	50.9	72.5	4.0	25.7	24.8	46.1	69.6
CnstOthSrv	40.8	63.5	43.1	87.2	26.7	31.0	47.8	50.7	68.4

2. Sectoral Imports to ASEAN countries (percentage point difference from the baseline)

	Singapore	Indonesia	Malaysia	Philippines	Thailand	VietNam	Lao PDR	Cambodia	RoSEAsia
Rice	-3.1	35.0	-11.2	82.5	503.1	181.3	-4.3	58.0	-26.9
GrainOthFood	14.3	8.3	4.1	4.0	26.2	14.2	35.8	30.1	5.3
VegeFruit	11.8	12.9	10.4	11.8	90.2	52.1	29.7	22.3	8.4
VegeSeedsOil	-0.7	36.6	19.2	4.9	32.7	18.5	38.7	50.2	0.3
SugarCropBt	13.0	28.6	52.4	7.4	99.9	78.1	38.3	37.6	19.5
FiberTex	-8.0	9.7	19.0	5.0	34.6	73.4	-2.3	3.8	-1.2
MeatDairy	7.7	10.1	4.9	3.3	30.9	60.7	48.0	123.1	4.4
WoodPaper	5.4	11.5	10.6	5.7	25.3	20.4	20.2	27.8	5.5
Fishery	6.1	11.7	8.2	2.0	12.3	-3.4	16.5	22.7	-4.3
Energy	5.3	9.4	6.1	4.5	7.3	7.5	20.9	30.9	2.6
Minerals	9.3	15.4	10.6	3.9	22.1	35.3	3.8	26.0	3.1
Apparel	5.8	20.9	15.9	39.9	216.5	138.6	48.1	78.8	11.6
Chemical	-2.1	15.2	10.5	5.2	12.0	14.0	-1.3	3.4	-2.0
Metal	-2.8	15.9	7.4	7.5	11.6	26.6	2.0	8.4	0.1
Auto	12.2	16.5	23.9	8.8	52.6	36.8	8.1	51.9	19.9
Machinery	10.1	10.0	11.5	7.8	32.4	26.4	5.1	26.9	6.0
ElecEquip	-6.0	12.0	6.4	1.9	18.9	27.2	7.4	40.8	6.7
OthMnfct	7.1	25.1	28.0	17.6	38.6	49.7	23.7	32.7	8.7
Utilities	5.9	227.6	54.5	145.6	80.1	292.1	25.6	30.5	8.2
Trade	14.7	109.1	62.4	102.9	91.6	113.1	33.8	72.1	2.0
TransComm	8.2	55.4	7.7	35.4	40.2	24.3	23.2	23.4	1.8
FinsBusi	8.7	0.0	12.9	21.5	39.2	13.1	12.8	24.3	5.8
CnstOthSrv	16.7	72.7	18.0	38.5	62.4	74.4	13.4	72.1	6.3

Figure A1. ASEAN FTA(2011-2015) Gradual, tariff only

Philippines

Impact on Real Rate of Return to Primary Production Factors for ASEAN countries (2015)
percentage point deviation from the baseline

	2011	2012	2013	2014	2015
Land	-1.1	-2.3	-3.6	-4.8	-6
UnskLab	0.1	0.2	0.3	0.5	0.8
SkLab	0.2	0.5	0.8	1.1	1.6
Capital	0.2	0.5	0.7	1	1.4
NatlRes	0.3	0.7	1	1.3	1.6

Projected share of Land use in the baseline, 2011 (%)

	Land Use
Rice	19.5
GrainOthFood	6.6
VegeFruit	27.7
VegeSeedsOil	4.8
SugarCropBt	8.1
FiberTex	0.3
MeatDairy	33
total	100

Laos

Projected share of net income in the baseline, 2011 (%)

	Factor Income	Taxes	
Laos	77.1	22.9	
		4.77	(tariff revenues)

Projected share of tariff revenues in the baseline, 2011 (%)

	%
Japan	3.4
China	11.8
Korea	2
Taiwan	0.2
Singapore	10.7
Indonesia	0.1
Malaysia	0.2
Philippines	0
Thailand	50.3
VietNam	4.9
Lao PDR	0
Cambodia	0.1
RoSEAsia	0
India	0.2
AusNzl	1.3
USA	0.8
Canada	0.1
Mexico	0
ChilePeru	0
Russia	0.7
EU_27	12.7
RestofWorld	0.6

ENDNOTES

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[2]WITS is available at the World Bank's web site, http://wits.worldbank.org/wits/index.html

[3]Most recently in March 2012, the latest GTAP Data Base version 8.0 was released with multiple benchmark years of 2004 and 2007. This dual reference year of GTAP Data Base will provide us with average applied tariff rates for computing changes between 2004 and 2007. However, it won't reach to the year 2009, so we decides not to adopt the latest GTAP for this study.

[4]Information and the code of the Dynamic GTAP model is available from the GTAP project Homepage (https://www.gtap.agecon.purdue.edu/models/Dynamic/model.asp). A book is recently published to summarize the past and ongoing development of the Dynamic GTAP model (Ianchovichina & Walmsley, 2012).

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