What Might be a Desirable FTA Path towards Global Free Trade for Asia-Pacific Countries?*

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Abstract

In response to the lack of progress and the subsequent suspension of negotiations in the Doha Round, a number of Asia-Pacific countries have accelerated bilateral and regional trade initiatives. While global free trade is the ultimate goal, many countries strive not to be left out of the recent wave of free-trade agreements (FTAs). Indeed, all major Asia-Pacific countries are currently negotiating bilateral and/or regional FTAs. Is there a preferred FTA sequencing that would eventually lead to global free trade? Although there are a number of studies on sequencing of real and monetary integration, studies on desirable sequencing of FTAs are extremely scarce.

The objective of this paper is to investigate what might be a desirable path of FTAs for countries in the Asia-Pacific using a dynamic computable general equilibrium (CGE) model. In particular, we shed light on the relationship between sequencing of FTAs and the extent of structural adjustments. The preliminary results suggest that the combination of the Trans-Pacific track sequencing (moving from TPP12 to enlarged TPP and FTAAP) and Regional Comprehensive Economic Partnership (RCEP) would move the industrial structure within each member country closer to that which would prevail under global free trade, while increasing economic welfare of the member countries.

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1. Introduction

In the past decade, a growing number of bilateral and plurilateral free-trade agreements (FTAs) involving Asia-Pacific countries have been ratified. For example, the ASEAN countries have implemented FTAs with six major trading partners in the region – China, Japan, Korea, India, and Australia/New Zealand – while they aim to create a single market (ASEAN Economic Community) across the 10 member states by 2015. Korea became the first country to sign an FTA with the EU under the "Global Europe" initiative, and the EU-Korea FTA entered into force in July 2011. The Korea-US FTA also entered into effect in March 2012. In addition, Japan was extended to join the Trans-Pacific Partnership (TPP) negotiations in July 2013 as the 12th member, and the EU and the US agreed to start negotiating an FTA, known as Transatlantic Trade and Investment Partnership (TTIP). Furthermore, negotiations on the Regional Comprehensive Economic Partnership (RCEP) – involving 10 ASEAN countries and their six FTA partners – began in May 2013, and the creation of a Free Trade Area of the Asia-Pacific (FTAAP) has been proposed by leaders of several Asia-Pacific countries. The acceleration of bilateral and regional trade initiatives, to a large extent, has stemmed from the lack of progress and the subsequent suspension of negotiations in the Doha Round.[1]

A number of studies have quantified the effects of various FTAs in the Asia-Pacific region using a computable general equilibrium (CGE) model (e.g., Itakura and Lee, 2012; Kawai and Wignaraja, 2008; Lee et al., 2009; Li and Whalley, 2012; Park, 2006; Petri, Plummer and Zhai, 2012ab). In addition, there have been studies on the sequencing of real and monetary integration (e.g., Baldwin, 2008; Kreinin and Plummer, 2009). In contrast, studies on industrial adjustments and consequent optimum sequencing of FTAs are extremely scarce. Bond (2008) considers the relationship between adjustment costs and sequencing of trade liberalization, such as the elimination of tariffs, liberalization of financial markets, and adoption of common policies, but not the sequencing of FTAs. However, the magnitudes of sectoral output and employment adjustments resulting from different FTAs will be a great concern to policy makers. In this paper, we shed light on the

[1] Whether the growth of FTAs has a positive or negative impact on multilateral trade liberalization under the WTO has been debated intensely. See, for example, Krueger (1999), Panagariya (2000), and Lloyd and MacLaren (2004).

relationship between sequencing of FTAs and the extent of industrial adjustments for Asia-Pacific countries.

In this paper, we compare five alternative sequencings of FTAs in the Asia-Pacific region, namely (1) TPP12, followed by TPP16 and FTAAP,[2] (2) ASEAN+3 FTA, followed by Regional Comprehensive Economic Partnership (RCEP) and FTAAP, (3) TTIP and EU-Japan FTA, followed by EU-ASEAN, EU-China and EU-India FTAs, (4) TPP12, followed by TPP16, RCEP and FTAAP, and (5) Combination of (3) and (4). Using a global dynamic CGE model, we examine which scenario might be most advantageous in terms of welfare gains and industrial adjustments. This requires three steps. We first establish the baseline scenario for the period up to 2030. Second, for each scenario of FTA sequencing, we compute changes in economic welfare and the extent of sectoral output adjustments of the member countries relative to the baseline. Third, we calculate the rank correlation between the extent of adjustments under each FTA sequencing and the extent of adjustments that would prevail under global trade liberalization (GTL). If a particular FTA sequencing would change the industrial structure within each country closer to that which would prevail under free trade, while increasing economic welfare of the member countries, then that FTA sequencing may be considered as a facilitating intermediate step towards GTL.

An overview of the model and data is given in the next section, followed by descriptions of the baseline scenario and three FTA sequencing scenarios in section 3. In section 4 assessments of welfare effects and sectoral output adjustments under alternative FTA sequencings are offered. Concluding remarks are provided in the final section.

2. Analytical Framework and Data

2.1 Overview of the Dynamic GTAP Model

The numerical simulations undertaken for this study are derived from the dynamic GTAP model, described in detail by Ianchovichina and McDougall (2001) and Walmsley

[2] The members of TPP12 are Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, United States and Vietnam. The members of TPP16 consist of the members of TPP12, plus Indonesia, Korea, the Philippines and Thailand.

and Ianchovichina (2012). This model extends the comparative static framework of the standard GTAP model developed by Hertel (1997) to the dynamic framework by incorporating international capital mobility and capital accumulation. The dynamic GTAP model allows international capital mobility and capital accumulation, while it preserves all the features of the standard GTAP, such as constant returns to production technology, perfectly competitive markets, and product differentiation by countries of origin, in keeping with the so-called Armington assumption.[3] At the same time, it enhances the investment theory by incorporating international capital mobility and ownership. In this way it captures important FTA effects on investment and wealth that are missed by a static model.

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 time with new investment. This dynamics are driven by net investment, which is sourced from regional households' savings. The savings in one region are invested directly in domestic firms and indirectly in foreign firms, which are in turn reinvested 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 the short run, an equalization of the rates of return seems unrealistic, and there exist well-known empirical observations for "home bias" in savings and investment. These observations suggest that capital is not perfectly mobile, causing some divergence in the rates of return across regions. The dynamic GTAP model allows inter-regional differences in the rates of return in the short run, which will be eventually equalized in the very long run. It is assumed that differences in the rates of return are attributed to the errors in investors' expectations about the future rates of return. During the process, these errors are gradually adjusted to the actual rate of return as time elapses, and eventually they are eliminated and a unified rate of return across regions can be attained. Income accruing

[3] See Armington (1969). The model uses a nested CES structure, where at the top nested level, each agent chooses to allocate aggregate demand between domestically produced goods and an aggregate import bundle, while minimizing the overall cost of the aggregate demand bundle. At the second level, aggregate import demand is allocated across different trading partners, again using a CES specification, wherein the aggregate costs of imports are minimized.

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

Participating in an FTA could lead to more investment from abroad. Trade liberalization often makes prices of goods in a participating country lower due to removal of tariffs, creating an increase in demand for the goods. Responding to the increased demand, production of the goods expands in the member country. The expansion of production is attained by using more intermediate inputs, labor, capital, and other primary factor inputs. These increased demands for production inputs raise the corresponding prices, wage rates, and rental rates. Higher rental rates are translated into higher rates of return, attracting more investment from both home and foreign countries.

2.2 Data, aggregation, and initial tariffs

In this study we employ the GTAP version 8 database, which has a 2007 base year and distinguishes 129 countries/regions and 57 sectors (Narayanan et al., 2012). For the purposes of the present study, the data has been aggregated to 22 countries/regions and 32 sectors, as shown in Table 1. Foreign income data are obtained from the International Monetary Fund (IMF)'s *Balance of Payments Statistics*, which are used to track international capital mobility and foreign wealth. The values of key parameters, such as demand, supply and CES substitution elasticities, are based upon previous empirical estimates. The model calibration primarily consists of calculating share and shift parameters to fit the model specifications to the observed data, so as to be able to reproduce a solution for the base year.

The sectoral tariff rates for the 22 countries/regions in 2007 are summarized in Table 2. There are striking differences in the tariff structures across the countries/regions. Singapore is duty free with the exception of alcohol and tobacco. The exceptionally high tariff rate on rice in Japan and on other grains in Korea stands out. The tariff rates in a number of other agricultural and food products are also high in the two countries, as well as in India. With the exception of Australia, New Zealand and Chile, the tariff rates on some agricultural and food products are also relatively high in other regions, such as sugar in the United States, Russia and the EU, dairy products and meats in Canada, and rice in

the Philippines. In manufacturing the tariff rates on textiles and apparel are relatively high in all regions except China, Singapore, Chile and the EU. The rates on motor vehicles are quite high in Thailand, Vietnam, the rest of ASEAN and India.

Ad valorem tariff equivalents of nontariff barriers (NTBs) in nine services sectors are computed as weighted averages of the gravity-model estimates of Wang et al. (2009) and the values employed by the Michigan Model of World Production and Trade (e.g. Brown, Kiyota and Stern, 2010). There are even greater variations in tariff equivalents of NTBs in services than in commodities.

3. The Baseline and Policy Scenarios

3.1 The Baseline Scenario

In order to evaluate the effects of various sequencing of FTAs, the baseline scenario is first established, showing the path of each of the 22 economies/regions over the period 2007-2030. The baseline contains information on macroeconomic variables as well as expected policy changes. The macroeconomic variables in the baseline include projections for real GDP, gross investment, capital stocks, population, skilled and unskilled labor, and total labor. Real GDP projections were obtained from IMF's *World Economic Outlook Database*. The data on gross fixed capital formation were acquired from the IMF's *IFS Online*. Projections for population were taken from the U.S. Census Bureau's *International Data Base*, while those for labor were obtained from International Labor Organisation (ILO)'s *Economically Active Population Estimates and Populations*.

The projections for population, investment, skilled labor and unskilled labor obtained for over 150 countries were aggregated, and the growth rates were calculated to obtain the macroeconomic shocks describing the baseline. Changes in the capital stocks were not imposed exogenously, but were determined endogenously as the accumulation of projected investment. Any changes in real GDP not explained by the changes in endowments are attributed to technological change.

In addition, policy projections are also introduced into the baseline. The policies included in the baseline are those which are already agreed upon and legally binding,

including the ASEAN Free Trade Area (AFTA), the ASEAN-China, ASEAN-Korea, ASEAN-Japan, ASEAN-Australia-New Zealand, ASEAN-India, EU-Korea, and Korea-US FTAs.

3.2 Policy Scenarios

Welfare and sectoral output effects of alternative sequencings of FTAs are to be evaluated in this study. The following five scenarios, as well as the global trade liberalization (GTL) scenario, are designed:

***Scenario 1 (Trans-Pacific track)*:** TPP12 over the period 2014-2019, TPP16 over the period 2020-2024, and FTAAP over the period 2025-2030.

***Scenario 2 (Asian track)*:** ASEAN+3 FTA over the period 2016-2019, RCEP (ASEAN+6 FTA) over the period 2020-2024, and FTAAP over the period 2025-2030.

***Scenario 3 (EU-Asia-Pacific)*:** Transatlantic Trade and Investment Partnership (TTIP) and EU-Japan FTA over the period 2016-2022, and EU-ASEAN, EU-China and EU-India FTAs over the period 2023-2030.

***Scenario 4 (two-track)*:** TPP12 over the period 2014-2019, TPP16 and RCEP over the period 2020-2024, and FTAAP over the period 2025-2030.

***Scenario 5 (three-track)*:** Combination of Scenarios 3 and 4.

***GTL*:** Global trade liberalization over the period 2014-2030.

It is assumed that tariff rates on commodities decline linearly to zero and tariff equivalents of NTBs in services are reduced by 25 percent during the periods in consideration among the member countries. In addition, time cost of trade – e.g. shipping delays arising from regulatory procedures and inadequate infrastructure – is assumed to fall by 20 percent among them.[4] One can design an infinite number of scenarios, but we have chosen to compare among Trans-Pacific track, Asian track, EU-Asia-Pacific scenario, two-

[4] For a detailed analysis of time cost of trade, see Minor and Hummels (2011).

track and three-track scenarios to examine which sequencing would be most attractive to Asia-Pacific countries.

Petri, Plummer and Zhai (2012b) also compare a Trans-Pacific track and Asian track FTAs. There are, however, three notable differences between their scenarios and ours. First, we have a slightly longer time periods (2014-2030 versus 2012-2025) to allow for more gradual implementation of region-wide FTAs. Second, they assume that in the Asian track an FTA among China, Japan and Korea is implemented first, followed by EAFTA and FTAAP. We assume that a China-Japan-Korea (CJK) FTA is unlikely to be realized mainly because there are territorial disputes between China and Japan, and also between Japan and Korea. Such disputes represent an additional barrier that must be surmounted in negotiations aiming to fashion an FTA. It is assumed in this paper that an ASEAN+3 FTA is more likely to be realized than a CJK FTA. In addition, compared with TPP12 we assume that it takes longer for an Asia-wide FTA to be implemented.

Three caveats should be borne in mind when interpreting the results presented in the next section. First, investment liberalization among the member countries is not considered because it requires data on foreign direct investment (FDI) flows by source and host countries and industry, which are unavailable. A challenging extension of the paper would be to endogenize FDI flows to consider attraction of these flows to developing member countries, which may have a significant impact, as were the cases for Mexico joining NAFTA in 1994 and Spain and Portugal joining the EU in 1986. Second, NTBs in manufacturing are not incorporated in this study due to a lack of reliable empirical estimates. NTBs also exist in a number of manufacturing sectors, including automobiles, pharmaceutical products, and some food products. In these products regulatory and other barriers, such as stringent standards and testing and certification procedures, exist. Thus, reductions of NTBs in manufacturing are expected to enlarge the benefits of the FTAs. Third, we do not incorporate compliance costs associated with rules of origin (ROOs), nor the cost-mitigating effects arising from consolidating FTAs. As smaller FTAs are consolidated, the harmful “noodle bowl” effects – caused by different FTAs having different ROOs and varying coverage – can be mitigated. The compliance cost eventually becomes zero when all countries participate in a trade agreement because there will be no ROOs under global trade liberalization (GTL). These issues are left for future research.

4. Empirical Findings

4.1 Welfare Effects of Alternative Sequencing of FTAs

Economic welfare is largely determined by four factors: (1) allocative efficiency, (2) the terms of trade, (3) the contribution to equivalent variation (EV) of change in the price of capital investment goods, and (4) the contribution to EV of change in equity owned by a region. The fourth factor is determined by the change in equity income from ownership of capital endowments, and it can be further decomposed into three parts: a change in the domestic capital stock, a change in household income earned on capital abroad, and a change in the domestic capital owned by foreigners.

With respect to these four factors, the direction of a welfare change may be summarized as follows. The allocative efficiency effect is generally positive for members of consolidated FTAs such as those examined in this paper. This effect is particularly large for a country with high average initial tariffs. However, it may become negative when the extent of trade diversion is considerably large in FTAs with relatively low intraregional trade. The terms-of-trade effect is usually positive for the members with low average initial tariffs and negative for those with high initial tariffs. An increase in the price of capital investment goods generally raises welfare. A welfare change resulting from a change in the equity holdings is positive if the sum of the region's foreign income receipts and an increase in the domestic capital stock is greater than the foreign income payment, and vice versa.

The welfare results for the five policy scenarios, as percentage point deviations in equivalent variation from the baseline for the years 2020, 2025 and 2030, are summarized in Table 3. Under Scenario 1 (Trans-Pacific track), the welfare level of all TPP member countries increases in 2020-2030, whereas that of all APEC members increases in 2025 and 2030. The economic welfare of several nonmember regions decreases slightly in 2020 and/or 2025. The welfare gains of prospective TPP16 countries in 2025 range from 0.3% (United States) to 4.1% (Thailand). Ten countries, namely Japan, Korea, six ASEAN countries, Australia and New Zealand, are both TPP16 and RCEP members. For most of these countries, trade with the RCEP members is projected to be greater than trade with the

TPP16 members during 2014-2020. For most of the ASEAN countries, however, welfare gains in 2025 are smaller under the Asian track than under the Trans-Pacific track. This is because ASEAN countries' FTAs with Japan, China, Korea, India and Australia/New Zealand are included in the baseline scenario, thereby limiting their gains from an Asia-wide FTA.

Under Scenario 2 (Asian track), the economic welfare of all RCEP members increases in 2020-2030, ranging from 0.2% (Malaysia) to 4.6% (Korea) in 2025. Taiwan is not a member of the ASEAN+3 or RCEP grouping, and its welfare is predicted to fall by 1.6% in 2020 largely because the shares of its trade with these regions is high (about 60% of its total trade) and the extent of trade diversion would be large. Thus, it has a strong incentive to convince the other APEC members of the benefits of FTAAP, as its welfare is projected to increase by 5.2% in 2030 when FTAAP is assumed to be fully implemented.

In Scenario 3 (EU-Asia-Pacific) the welfare gains for the United States and Japan resulting from TTIP and EU-Japan FTA are rather small (0.1-0.2% for the U.S. and 0.3-0.4% for Japan in 2020-2025). This is because the tariff rates of the two countries and the EU are quite low, except for some agricultural products. When the EU implements FTAs with China, India and ASEAN countries over the 2023-2030 period, the welfare gains are relatively large for China (1.1%), India (1.7%) and the EU (1.7%) in 2030. However, several ASEAN countries are expected to incur small welfare losses in 2030. Compared with China and India, on average ASEAN countries have a lower trade share with the EU.[5] In addition, they do not have a competitive advantage in labor-intensive products vis-à-vis China or India.

Scenario 4 (two-track scenario) combines the Trans-Pacific track with an Asia-wide FTA (RCEP). Compared with Scenarios 1 and/or 2, the welfare gains of APEC economies generally increase in 2020-2025. For the year 2030, when FTAAP is assumed to be fully implemented, the differences in welfare effects between Scenarios 1 and 4 are rather small except India, which is an RCEP member but not an APEC member.

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[5] The percentage shares are computed from projected values of exports and imports by region in the baseline scenario for the year 2014. The sum of exports to and imports from the EU as a percentage of total trade is 12% for ASEAN countries, 16% for China and 19% for India.

Scenario 5 (three-track scenario) combines Scenarios 3 and 4. While adding FTAs with the EU would increase the welfare gains of China, India and the EU, those of the United States, Japan and ASEAN countries do not change significantly from Scenario 4. On the one hand, adding FTAs with the EU tends to increase the welfare gains of member countries. On the other hand, the extent of preferential access to rapidly growing markets (e.g. China and India) by Japanese and U.S. firms, for example, will decline when the EU implements FTAs with China, India and ASEAN countries, largely offsetting the benefits of realizing FTAs in three major regions of the world.

4.2 Sectoral Output Adjustments and the Spearman Rank Correlation Coefficients

Structural adjustments and resource reallocations result from trade accords. The sequencings of FTAs and differences in the initial tariff rates across sectors play a critical role in determining the direction of the adjustments in sectoral output. Other factors that affect the magnitude and direction of output adjustments for each product category include the import-demand ratio, the export-output ratio, the share of each imported intermediate input in total costs, and the elasticity of substitution between domestic and imported products.[6]

Table 4 presents the Spearman rank correlation coefficients between sectoral adjustment rankings in 2020 and 2025 and those between rankings in 2025 and 2030 for each scenario, as well as the Spearman rank correlation coefficients between sectoral adjustment in each scenario and GTL for the year 2030. Overall differences in the Spearman rank correlation coefficients between the Trans-Pacific track and the Asian track are relatively small with a few exceptions. Under the Asian track, the coefficient of 0.60 for Japan might indicate that Japan would undergo relatively large sectoral adjustments

[6] A sector with a larger import-demand ratio generally suffers from proportionately larger output contraction through greater import penetration when initial tariff levels are relatively high. In contrast, a sector with a higher export-output ratio typically experiences a larger extent of output expansion, as a result of the removal of tariffs in the member countries. The share of imported intermediate inputs in the total cost of a downstream industry (e.g., the share of imported textiles in the cost of the apparel industry) would evidently affect the magnitude and direction of output adjustments in the latter sector. Finally, the greater the values of substitution elasticities between domestic and imported products, the greater the sensitivity of the import-domestic demand ratio to changes in the relative price of imports, thereby magnifying the effects of FTAs.

between 2025 and 2030. Sectoral rankings are predicted to change significantly between those years in machinery, electronic equipment, motor vehicles and other transport equipment (sectors 19-22), in which there are considerable parts and components trade. However, the inclusion of both intermediate and final products could lower the rank correlation coefficient. This is because large increases in imports of parts and components might lead to overall reduction of output in sectors 19-22 when ASEAN+3 FTA and RCEP are being implemented, while considerable increases in exports of final products could increase output of these sectors when FTAAP is being implemented. If one could disaggregate sectors these sectors between parts and components and final products, the rank correlation coefficient would have been significantly greater.

In Singapore, opposite patterns are observed. Output of metal products, machinery, electronic equipment and motor vehicles is projected to increase when ASEAN+3 FTA and RCEP are being implemented, whereas output of these sectors contracts under GTL. In addition, Singapore has comparative advantage in financial and other private services vis-à-vis Asian countries but not vis-à-vis the United States. Significant changes in sectoral adjustment rankings in a few sectors often lower the Spearman rank correlation coefficients considerably.

In 2025, when TPP is fully implemented and FTAAP is partially implemented, Canada expands output in such sectors as other grains, meats, other food products, machinery and electronic equipment, and contracts output in dairy products, textiles, apparel, and many services sectors. When TPP is fully implemented in 2030, however, Canada contracts output in meats, machinery and electronic equipment, and expands output in many services sectors. This is because Canada has comparative advantage in machinery and electronic equipment vis-à-vis other TPP countries but not vis-à-vis East Asian countries. Similarly, Canada has comparative advantage in many services sectors vis-à-vis East Asian countries except Singapore, but not vis-à-vis other TPP countries, particularly the United States.

Under the Asian track, output of machinery and electronic equipment increases in China, Korea, Indonesia, Malaysia, the Philippines, Thailand, Vietnam and India. For these countries, intra-ASEAN+6 trade in machinery and electronic equipment comprise very

large shares of the total trade in these products. Thus, production networks in these products are likely to play an even more important role under region-wide FTAs, further bolstering investment and fostering the transfer of technology.[7] Output of several agricultural sectors falls significantly in Japan and Korea, while that of motor vehicles increases considerably in these countries under FTAAP and GTL. Output of textiles and apparel increases substantially in China, Indonesia, Thailand and Vietnam, and that of most services sectors increases in Singapore, Australia and New Zealand under the Asian track.

The correlations between sectoral adjustment rankings in 2020 and 2025, as well as between rankings in 2025 and 2030, under the Trans-Pacific track and Asian track scenarios are generally high. Neither scenario would divert the industrial structure of member countries from that which is projected under multilateral free trade. Nevertheless, some sectors in several countries, including rice, other grains, meats and dairy products in Japan and Korea, and textiles and apparel in the United States, Australia and New Zealand are expected to contract substantially by 2030 if no domestic reforms aimed at increasing the competitiveness of these sectors are implemented.

When several Asia-Pacific countries are assumed to implement FTAs with the EU (Scenario 3), the Spearman rank correlation coefficients between sectoral adjustment in this scenario and GTL for the year 2030 are relatively small in the Philippines, Vietnam, the rest of ASEAN and the United States. This is not surprising since bilateral FTAs with the EU covers relatively small shares of trade for these countries. In the United States, for example, output of nonferrous metal (e.g. aluminum), motor vehicles and natural resources expands under TTIP but contracts under GTL, whereas output of rice, dairy products and sea transport decreases under TTIP but increases under GTL.

The rank correlation coefficient of a country between a particular scenario and GTL generally become greater when the country's trade with FTA members comprises a greater share of its total trade. This is the case for Scenarios 4 and 5, in which Scenarios 1-2 and Scenarios 1-3 are respectively combined. Scenario 5 appears to change the industrial

[7] Since the dynamic GTAP model does not incorporate the FDI-productivity effect, an inclusion of such an effect is left for future research.

structure within each APEC economy closer to that which would prevail under global free trade.

5. Conclusion

In this paper, we have used the dynamic GTAP model to investigate how alternative sequencings of FTAs in the Asia-Pacific region might affect the welfare changes and sectoral output adjustments. Under the assumption that the TPP12 agreement and ASEAN+3 FTA will enter into force in 2014 and 2016, respectively, followed by more enlarged FTAs in the first two scenarios, more Asian countries are expected to realize larger welfare gains under the Trans-Pacific track. This is because ASEAN+1 FTAs are included in the baseline scenario, thereby producing relatively small benefits for most ASEAN countries under the Asian track. When several Asia-Pacific countries are assumed sign FTAs with the EU in the third scenario, expected welfare gains are rather small for the United States and Japan, while they are relatively large for China, India and the EU. In the two-track scenario that combines the Trans-Pacific track with RCEP, many Asia-Pacific countries welfare gains increase slightly over the first two scenarios. In the three-track scenario that combines the two-track scenario and FTAs with the EU, any additional gains in welfare gains are rather small.

With respect to sectoral output adjustments, there appear to be no significant differences between the Trans-Pacific track and Asian track scenarios. In both scenarios, the Spearman rank correlation coefficients between sectoral adjustment rankings in 2020 and 2025, those between 2025 and 2030, and those between a scenario and GTL for the year 2030 are relatively high, ranging from 0.59 to 0.98. In the third scenario where several Asia-Pacific countries are assumed to implement FTAs with the EU, the rank correlations coefficients between this scenario and GTL become substantially smaller than the first two scenarios. The rank correlations between the two-track scenario and GTL slightly increase in many countries, and further increases occur between the three-track scenario and GTL. Structural adjustments of Asia-Pacific countries under the three-track scenario would change in the most similar direction to those under global free trade. This suggests that

Asia-Pacific countries benefit most from simultaneous trade accords that cover Asia, North and South America, and Europe.

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Table 1: Regional and sectoral aggregation

A. Regional aggregation

	Country/region	Corresponding economies/regions in the GTAP database
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	Vietnam
11	Rest of ASEAN	Cambodia, Laos, rest of Southeast Asia
12	India	India
13	Australia	Australia
14	New Zealand	New Zealand
15	United States	United States
16	Canada	Canada
17	Mexico	Mexico
18	Chile	Chile
19	Peru	Peru
20	Russia	Russia
21	EU-27	Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom
22	Rest of world	All the other economies/regions

Table 1 (continued)

B. Sectoral aggregation

	Sector	Corresponding commodities/sectors in the GTAP database
1	Rice	Paddy rice, processed rice
2	Other grains	Wheat, cereal grains nec
3	Sugar	Sugar, sugar cane and sugar beet
4	Other crops	Vegetables and fruits, oil seeds, plant-based fibers, crops nec
5	Livestock	Cattle, sheep and goats, animal products nec, raw milk, wool
6	Fossil fuels	Coal, oil, gas
7	Natural resources	Forestry, fishing, minerals nec
8	Meats	Cattle, sheep, goat, and horse meat products, meat products nec
9	Dairy products	Dairy products
10	Other food products	Vegetable oils, food products nec, beverages and tobacco products
11	Textiles	Textiles
12	Apparel	Wearing apparel, leather products
13	Wood and paper	Wood products, paper products, publishing
14	Petroleum products	Petroleum, coal products
15	Chemical products	Chemical, rubber, plastic products
16	Steel	Iron and steel
17	Nonferrous metal	Nonferrous metal
18	Metal products	Fabricated metal products
19	Machinery	Machinery and equipment
20	Electronic equipment	Electronic equipment
21	Motor vehicles	Motor vehicles and parts
22	Other transport equip.	Transport equipment nec
23	Other manufactures	Mineral products nec, manufactures nec
24	Construction and utilities	Construction, electricity, gas manufacture and distribution, water
25	Trade	Trade
26	Sea transport	Sea transport
27	Air transport	Air transport
28	Other transport	Other transport
29	Communication	Communication
30	Financial services	Insurance, financial services nec
31	Other private services	Business services, recreation and other services
32	Government services	Public administration and defense, education, health services

Source: GTAP database, version 8.0.

Note: nec = not elsewhere classified.

Table 2: Tariff rates on merchandise imports and tariff equivalents of nontariff barriers on services, 2004 (%)

	Sector	Japan	China	Korea	Taiwan	Singapore	Indonesia	Malaysia	Philippines	Thailand	Vietnam	Rest of ASEAN
1	Rice	433.4	32.0	4.7	0.2	0.0	8.6	39.7	50.0	6.0	13.6	2.6
2	Other grains	27.4	6.5	296.1	2.9	0.0	2.6	0.0	5.1	2.6	4.2	1.5
3	Sugar	43.1	41.3	5.6	10.4	0.0	20.2	0.0	21.5	11.7	16.5	6.2
4	Other crops	4.6	8.8	127.6	8.4	0.0	2.3	11.3	6.6	13.2	12.9	8.3
5	Livestock	5.7	15.5	6.8	5.2	0.0	3.0	0.1	6.0	4.6	1.3	3.3
6	Fossil fuels	0.0	0.3	2.7	1.0	0.0	0.1	2.2	3.0	0.0	1.1	1.3
7	Natural resources	0.3	0.3	1.1	1.5	0.0	1.1	0.2	2.9	1.7	2.3	3.0
8	Meats	24.1	4.7	29.2	16.4	0.0	3.7	0.3	15.8	15.6	18.8	4.8
9	Dairy products	56.4	6.5	46.6	11.2	0.0	4.3	0.8	1.9	9.3	17.6	7.4
10	Other food products	9.6	7.9	31.5	14.5	0.4	7.1	13.6	5.7	14.5	17.3	14.2
11	Textiles	6.3	5.3	8.5	7.5	0.0	7.7	7.2	7.2	6.7	28.9	7.7
12	Apparel	9.6	4.0	8.9	8.2	0.0	7.7	8.1	9.1	20.1	19.2	11.6
13	Wood and paper	1.0	1.8	1.9	0.9	0.0	3.5	6.6	5.1	6.1	8.5	5.4
14	Petroleum products	0.4	4.6	4.4	2.5	0.0	1.7	0.2	2.2	7.8	11.5	8.1
15	Chemical products	1.0	37.4	4.9	2.9	0.0	4.8	5.7	3.9	8.6	4.5	3.8
16	Steel	0.7	3.9	0.3	0.4	0.0	3.9	18.2	2.9	4.2	3.9	2.2
17	Nonferrous metal	0.4	2.8	2.5	1.0	0.0	2.9	3.4	2.1	1.6	0.9	3.6
18	Metal products	0.4	8.2	5.3	6.1	0.0	6.9	10.4	6.7	11.3	10.9	4.2
19	Machinery	0.1	6.1	5.5	3.1	0.0	3.1	3.1	2.6	5.1	4.6	5.2
20	Electronic equipment	0.0	1.3	1.3	2.0	0.0	0.5	0.1	0.7	1.8	5.0	7.9
21	Motor vehicles	0.0	14.6	7.2	12.1	0.0	14.0	14.6	11.7	23.8	23.6	19.3
22	Other transport equip.	0.0	2.8	1.2	3.9	0.0	1.9	2.2	3.9	4.0	12.3	7.3
23	Other manufactures	0.7	6.4	6.1	5.0	0.0	7.0	7.1	5.4	40.0	16.0	6.3
24	Construction and utilities	5.0	25.2	13.0	10.8	0.0	64.4	17.4	52.6	44.9	53.7	20.6
25	Trade	22.7	109.6	33.0	28.8	1.3	98.5	36.0	80.2	63.5	82.7	32.5
26	Sea transport	7.6	21.5	15.7	12.6	1.3	67.3	17.6	53.5	40.5	54.4	6.4
27	Air transport	19.5	61.5	29.4	25.4	1.3	91.9	32.1	74.6	58.7	76.7	28.4
28	Other transport	20.2	74.3	30.2	26.1	1.3	93.4	33.0	75.8	59.7	78.0	14.9
29	Communication	17.8	48.1	27.4	23.6	1.3	88.4	30.0	71.5	56.1	73.5	32.8
30	Financial services	17.1	83.3	30.4	27.5	1.5	92.5	30.2	72.6	58.1	74.7	20.0
31	Other private services	16.6	81.2	29.2	26.7	1.5	91.1	29.8	70.8	54.9	73.7	7.3
32	Government services	25.9	84.1	34.3	29.1	2.8	97.8	36.5	76.9	61.5	84.2	24.1

Table 2 (continued)

	Sector	India	Australia	New Zealand	United States	Canada	Mexico	Chile	Peru	Russia	EU-27	Rest of world
1	Rice	40.6	0.0	0.0	2.0	0.0	0.2	5.8	17.7	9.4	9.4	16.0
2	Other grains	98.9	0.0	0.0	0.0	0.0	12.0	0.5	8.0	2.6	1.4	10.2
3	Sugar	80.4	0.0	0.0	23.2	0.4	5.1	2.5	2.5	49.1	25.7	15.1
4	Other crops	34.5	0.3	0.0	2.1	0.2	1.4	1.1	8.0	5.8	1.7	8.8
5	Livestock	12.5	0.1	0.0	0.3	16.3	0.5	0.3	6.7	4.3	0.4	5.8
6	Fossil fuels	11.1	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.1	0.0	1.4
7	Natural resources	8.9	0.1	0.0	0.1	0.0	1.6	0.1	6.9	2.6	0.1	1.6
8	Meats	21.6	0.2	0.8	2.4	31.1	0.7	3.4	10.8	23.7	5.4	20.9
9	Dairy products	31.9	2.1	1.3	15.6	144.6	9.0	0.9	16.3	7.4	1.6	14.9
10	Other food products	79.8	1.6	1.0	2.2	10.7	2.5	1.1	4.0	12.9	1.7	14.4
11	Textiles	15.9	9.1	5.9	7.1	6.4	4.6	3.3	13.5	12.4	2.1	10.0
12	Apparel	13.2	11.7	11.5	9.9	11.7	16.8	3.8	16.3	16.5	3.4	9.9
13	Wood and paper	13.6	3.0	1.3	0.2	0.6	1.6	0.9	5.8	11.6	0.1	5.4
14	Petroleum products	13.8	0.0	0.1	0.7	0.3	0.8	1.7	2.5	4.0	0.1	4.8
15	Chemical products	13.8	1.9	1.4	1.1	0.6	1.3	0.8	6.1	8.6	0.4	4.1
16	Steel	19.0	3.5	1.6	0.2	0.1	2.5	1.2	6.0	3.0	0.1	4.8
17	Nonferrous metal	14.8	0.6	0.9	0.6	0.1	0.6	0.8	4.4	4.0	0.4	1.5
18	Metal products	14.9	4.3	3.0	1.4	1.0	2.8	1.1	7.6	12.1	0.4	6.8
19	Machinery	13.9	2.3	2.5	0.7	0.5	2.7	0.8	5.4	4.5	0.4	4.9
20	Electronic equipment	2.3	0.9	0.9	0.3	0.2	1.4	0.6	5.1	6.0	0.7	3.6
21	Motor vehicles	25.4	11.8	7.2	0.6	1.0	3.5	3.1	7.2	10.5	0.9	9.3
22	Other transport equip.	6.5	0.8	0.6	0.4	0.7	1.6	0.2	8.9	9.3	0.7	4.9
23	Other manufactures	14.7	2.8	2.6	1.3	1.2	3.4	1.1	9.0	12.4	0.7	6.4
24	Construction and utilities	109.7	4.3	1.0	2.3	9.2	40.8	25.8	27.2	52.9	5.6	26.7
25	Trade	153.3	18.2	8.2	6.8	20.7	61.8	33.8	51.0	73.5	12.0	48.2
26	Sea transport	109.6	3.3	3.3	6.8	6.0	38.8	16.7	30.7	48.2	5.4	22.0
27	Air transport	144.1	15.1	5.7	6.8	17.6	56.9	30.2	46.7	68.1	11.1	49.5
28	Other transport	146.1	15.7	6.2	6.8	18.3	58.0	31.0	47.7	69.3	10.3	39.9
29	Communication	139.2	13.4	4.3	6.8	15.9	54.3	28.3	44.4	65.3	9.3	36.6
30	Financial services	139.5	13.5	4.3	7.8	19.8	57.6	27.5	46.4	65.9	8.7	43.3
31	Other private services	137.1	13.5	3.7	7.8	19.2	58.2	26.5	43.8	65.1	9.7	40.5
32	Government services	154.8	23.5	10.2	6.3	17.5	60.3	33.0	47.3	69.7	14.2	45.8

Source: Sectors 1-23: GTAP database, version 8.0. Sectors 24-32: weighted averages of the gravity-model estimates of Wang et al. (2009) and the values employed by the Michigan Model of World Production and Trade.

Table 3: The welfare effects of alternative scenarios
(Percentage deviations in utility from the baseline)

	Scenario 1 (Trans-Pacific-track)			Scenario 2 (Asian-track)			Scenario 3 (EU-Asia-Pacific)		
	2020	2025	2030	2020	2025	2030	2020	2025	2030
Japan	0.6	1.1	2.2	2.2	3.0	2.2	0.3	0.4	0.4
China	-0.2	0.9	5.0	0.9	1.5	4.9	0.0	0.7	1.1
Korea	0.1	2.2	5.9	3.1	4.6	5.5	0.0	0.0	0.0
Taiwan	-0.1	0.9	6.4	-1.6	-1.3	5.2	0.1	0.2	0.4
Singapore	1.0	1.7	0.7	0.9	1.5	0.6	0.0	-0.1	-0.3
Indonesia	0.1	1.3	1.4	1.3	1.2	1.0	0.0	0.0	-0.1
Malaysia	1.2	1.1	0.8	0.3	0.2	0.3	0.0	-0.1	-0.3
Philippines	0.2	2.0	2.2	1.3	1.6	1.3	0.0	0.1	0.0
Thailand	0.0	4.1	3.2	0.1	0.2	0.9	0.0	0.0	-0.2
Vietnam	2.1	2.2	3.6	2.6	3.4	4.5	-0.1	0.0	0.2
Rest of ASEAN	-0.1	0.1	2.6	2.1	2.5	2.9	0.0	-0.1	-0.1
India	-0.1	-0.2	-1.2	0.1	2.1	2.0	0.0	0.7	1.7
Australia	0.4	0.5	0.7	0.2	3.0	3.4	-0.1	-0.2	-0.4
New Zealand	1.1	1.6	1.1	-0.3	0.5	1.0	-0.1	-0.3	-0.5
United States	0.2	0.3	1.6	-0.2	-0.2	1.5	0.1	0.2	0.2
Canada	0.8	0.7	0.5	-0.1	0.2	0.6	-0.1	-0.2	-0.3
Mexico	1.1	1.2	0.9	-0.1	0.0	0.8	-0.1	-0.2	-0.3
Chile	0.9	1.6	1.1	-0.6	-0.2	1.8	-0.1	-0.3	-0.3
Peru	0.3	0.4	0.4	-0.1	0.1	0.3	-0.1	-0.2	-0.5
Russia	-0.1	0.1	1.0	0.0	0.3	1.3	-0.1	-0.2	-0.3
EU-27	0.0	-0.1	-0.6	-0.2	-0.3	-0.7	0.1	0.4	1.7
Rest of world	-0.1	-0.3	-0.2	0.0	0.1	0.1	-0.1	-0.3	-0.6

Table 3 (continued)

	Scenario 4 (Two-track)			Scenario 5 (Three-track)			Global Trade Liberalization		
	2020	2025	2030	2020	2025	2030	2020	2025	2030
Japan	0.9	4.3	2.3	1.1	4.4	2.3	0.9	1.4	1.8
China	0.2	1.2	4.6	0.2	1.7	5.4	3.9	5.6	6.2
Korea	0.7	5.7	6.2	0.7	5.6	5.4	2.2	4.3	6.4
Taiwan	-0.2	-0.5	5.6	-0.2	-0.3	5.1	2.3	4.0	5.8
Singapore	1.0	2.0	0.9	0.9	1.9	0.8	0.2	0.4	0.7
Indonesia	0.1	1.2	1.0	0.1	1.2	1.2	0.4	1.0	1.7
Malaysia	1.0	0.5	0.4	1.0	0.5	0.6	0.2	0.7	1.6
Philippines	0.4	2.6	1.8	0.4	2.7	1.6	1.0	1.2	0.8
Thailand	0.0	3.4	2.2	0.0	3.7	2.5	2.0	3.0	2.8
Vietnam	2.2	3.5	4.4	2.1	3.5	5.0	2.3	4.7	7.5
Rest of ASEAN	0.2	2.0	2.9	0.1	1.8	3.0	0.5	2.0	4.0
India	0.6	2.4	2.1	0.6	2.9	3.0	3.3	5.4	6.2
Australia	0.6	2.9	3.2	0.5	2.7	3.1	0.6	1.7	3.2
New Zealand	1.1	1.2	1.0	1.0	1.1	0.7	0.6	1.5	3.6
United States	0.2	0.2	1.6	0.3	0.3	1.6	0.3	0.7	1.5
Canada	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.9	1.5
Mexico	1.0	1.1	0.8	1.0	1.0	0.6	0.5	0.7	0.8
Chile	0.9	1.5	1.9	0.7	1.2	1.3	0.5	1.1	1.7
Peru	0.3	0.4	0.8	0.2	0.3	0.5	0.1	0.2	0.6
Russia	-0.1	0.0	1.2	-0.2	-0.1	1.3	0.8	2.4	3.9
EU-27	0.0	-0.3	-0.7	0.0	0.2	0.7	0.5	0.8	1.1
Rest of world	-0.2	-0.3	0.0	-0.3	-0.5	-0.1	0.1	0.8	1.7

Definitions of scenarios:

Scenario 1 (Trans-Pacific track): TPP12 over the period 2014-2019, TPP16 2020-2024, and FTAAP 2025-2030. Scenario 2 (Asian track): ASEAN+3 FTA over the period 2016-2019, RCEP 2020-2024, and FTAAP 2025-2030. Scenario 3 (EU-Asia-Pacific): Transatlantic Trade and Investment Partnership (TTIP) and EU-Japan FTA 2016-2022, and EU-ASEAN, EU-China and EU-India FTAs 2023-2030. Scenario 4 (two-track): TPP12 2014-2019, TPP16 and RCEP 2020-2024, and FTAAP 2025-2030. Scenario 5 (three-track): Combination of Scenarios 3 and 4.

Source: Model simulations.

Table 4: Spearman rank correlation coefficients between sectoral adjustment rankings in 2020-2025 and 2025-2030 for each scenario, and those between rankings in each scenario and GTL for the year 2030

	Between rankings in 2020 and 2025	Between rankings in 2025 and 2030	Between rankings in each scenario and GTL, 2030
Scenario 1 (Trans-Pacific-track)			
Japan	0.94	0.79	0.82
China	-	0.75	0.86
Korea	-	0.68	0.79
Singapore	0.80	0.61	0.60
Indonesia	-	0.63	0.81
Malaysia	0.93	0.73	0.93
Philippines	-	0.78	0.69
Thailand	-	0.75	0.80
Vietnam	0.78	0.71	0.79
Rest of ASEAN	-	-	0.88
India	-	-	-
Australia	0.91	0.77	0.78
New Zealand	0.85	0.69	0.70
United States	0.96	0.81	0.99
Canada	0.88	0.59	0.73
Mexico	0.95	0.85	0.82
Chile	0.64	0.60	0.59
Peru	0.97	0.61	0.95
Russia	-	-	0.85
Scenario 2 (Asian-track)			
Japan	0.98	0.60	0.85
China	0.84	0.75	0.94
Korea	0.91	0.91	0.85
Singapore	0.85	0.61	0.85
Indonesia	0.59	0.74	0.87
Malaysia	0.93	0.73	0.95
Philippines	0.92	0.73	0.77
Thailand	0.93	0.77	0.89
Vietnam	0.88	0.97	0.82
Rest of ASEAN	0.66	0.88	0.84
India	-	0.86	0.70
Australia	-	0.91	0.88
New Zealand	-	0.67	0.65
United States	-	-	0.97
Canada	-	-	0.83
Mexico	-	-	0.87
Chile	-	-	0.78
Peru	-	-	0.92
Russia	-	-	0.85

Table 4 (continued)

	Between rankings in 2020 and 2025	Between rankings in 2025 and 2030	Between rankings in each scenario and GTL, 2030
Scenario 3 (EU-Asia-Pacific)			
Japan	0.83	0.69	0.74
China	-	0.93	0.86
Korea	-	-	-
Singapore	-	0.88	0.71
Indonesia	-	0.95	0.87
Malaysia	-	0.97	0.80
Philippines	-	0.71	0.49
Thailand	-	0.86	0.83
Vietnam	-	0.76	0.59
Rest of ASEAN	-	0.58	0.57
India	-	0.82	0.82
Australia	-	-	-
New Zealand	-	-	-
United States	0.86	0.60	0.56
Canada	-	-	-
Mexico	-	-	-
Chile	-	-	-
Peru	-	-	-
Russia	-	-	-
Scenario 4 (Two-track)			
Japan	0.76	0.61	0.81
China	0.74	0.84	0.95
Korea	0.73	0.89	0.83
Singapore	0.80	0.59	0.87
Indonesia	0.78	0.59	0.84
Malaysia	0.88	0.54	0.95
Philippines	0.73	0.86	0.77
Thailand	0.71	0.81	0.84
Vietnam	0.76	0.86	0.78
Rest of ASEAN	0.63	0.71	0.83
India	0.78	0.78	0.71
Australia	0.89	0.94	0.88
New Zealand	0.65	0.79	0.53
United States	0.82	0.62	0.97
Canada	0.86	0.66	0.75
Mexico	0.89	0.85	0.89
Chile	0.54	0.74	0.60
Peru	0.95	0.75	0.94
Russia	-	-	0.85

Table 4 (continued)

	Between rankings in 2020 and 2025	Between rankings in 2025 and 2030	Between rankings in each scenario and GTL, 2030
Scenario 5 (Three-track)			
Japan	0.77	0.56	0.87
China	0.72	0.92	0.96
Korea	0.73	0.87	0.83
Singapore	0.80	0.64	0.88
Indonesia	0.87	0.60	0.90
Malaysia	0.86	0.59	0.95
Philippines	0.71	0.87	0.77
Thailand	0.73	0.81	0.93
Vietnam	0.77	0.87	0.85
Rest of ASEAN	0.60	0.72	0.83
India	0.71	0.79	0.78
Australia	0.86	0.97	0.88
New Zealand	0.63	0.81	0.60
United States	0.86	0.68	0.99
Canada	0.87	0.60	0.80
Mexico	0.91	0.78	0.90
Chile	0.55	0.72	0.60
Peru	0.93	0.74	0.97
Russia	-	-	0.87

Source: The authors' calculation based on the results of model simulations.