Economic impact of East and South-East Asian free trade agreements

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ABSTRACT

The expansion of the economies of East and South-East Asia over the last 15-20 years has heralded one of the most dramatic periods of economic growth and development the world has experienced. Even without the support of formal regional trade agreements, countries in East and South-East Asia have lowered barriers to intraregional trade, increased trade both within the region and with world markets, diversified their production and trade, and increased foreign direct investment (FDI), which all contributed to growth.

The current trend in the region is towards the conclusion of free trade agreements (FTAs) and economic partnership agreements. All countries in East Asia, including China and Japan, are accelerating their move towards concluding such agreements with other countries in the region. The potential of an East Asian free trade area may be realized by 2010 and an East Asian multilateral regional trading community is expected to be established by 2020, with the aim of creating a stable, prosperous and highly competitive region with the free movement of goods and services, freer movements of capital, equitable economic development and reduced poverty and socio-economic disparities.

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This study addresses regional economic integration within the Association of Southeast Asian Nations (ASEAN) plus China, Japan and the Republic of Korea (ASEAN+3) and assesses its possible economic impact in 2020 using the Global Trade Analysis Project (GTAP) model.

The objective of the present study is to estimate the detailed economic impacts of trade liberalization in East and South-East Asian countries by the year 2020 under various possible scenarios. A recursive updating procedure has been used to forecast assessments based on the model for three time periods: 2000-2010, 2010-2015 and 2015-2020.

The liberalization of trade through tariff reductions influenced the share and direction of trade in the countries included in the simulated agreements. The share of important export items rose for most of the countries included in the agreements and it shifted away from the rest of the world towards the ASEAN region. On the whole, the analysis of this result clearly shows that an ASEAN+3 agreement would be more beneficial than agreements for other regional clusters in terms of output growth and trade and, thus, in terms of the welfare of all of the participating countries in the year 2020.

1. INTRODUCTION

Over the past decade, we have witnessed the worldwide proliferation of regional trade agreements (RTAs). Even after the launch of the World Trade Organization (WTO) multilateral trading system, RTAs have continued to spread, in particular in the Asia-Pacific region. However, there have been marked differences across regions and subregions[1] in terms of the degree to which regional trade integration has been carried out. Although the East Asian region had traditionally been characterized by a dearth of RTAs, in recent years, the region's focus has shifted from multilateral trade agreements to RTAs. Recent developments in individual economies, such as China's miraculous export-driven growth performance and entry into WTO, Japan's prolonged recession and desire to regain its leadership in the region, the Republic of Korea's regime change towards a more liberalized economic system and Singapore's active intention to become a hub of regionalism, are factors behind this change in East Asian commercial policy towards regionalism.

[1] Region here is specified as East and South-East Asia.

The Asian movement towards regionalization[2] —known as ASEAN 10+3, +4 or +6—is relatively new, but it may take on major importance, as it concerns China, Japan and the Republic of Korea. The move in the region is now towards the conclusion of free trade agreements (FTAs) and economic partnership agreements. All countries in East Asia, including China and Japan, are moving towards the conclusion of such agreements with other countries in the region. The potential of an East Asian free trade area may be realized by 2010. It is also expected that an East Asian multilateral regional trading community will be established by 2020 (Hew, 2006).[3] This multilateral regional trading community is expected to decrease the current barriers to trade between individual countries, expand the movement of goods and services between countries, and boost the economic growth of individual countries.

This article seeks to assess the possible economic impact of regional economic integration under ASEAN+3 by 2020 using the Global Trade Analysis Project (GTAP) model. In particular, the study estimates the detailed economic impacts that could result from trade liberalization in the ASEAN+3 region by the year 2020 for six countries (China, Indonesia, Japan, the Republic of Korea, Thailand and Viet Nam).

The structure of the paper is as follows. A brief review of the literature is presented in section 2. Section 3 briefly explains the method of analysis. Details on databases, the aggregation scheme and scenario development are described in section 4. Section 5 deals with analysis of the results. Section 6 concludes the paper.

2. LITERATURE SURVEY

Numerous studies have been conducted on the impacts of various trade liberalization mechanisms, including WTO agreements, and the economic effects of RTAs and their sectoral and regional implications for both the environment and poverty. In order to address all of those impacts, empirical research is usually based on two distinct methodologies. One relies on a simulation approach based on global general equilibrium models to analyse the economic effects of policy changes as a result of the formation of an RTA. The simulation approaches are useful in specifying the mechanism by which the formation of an RTA translates into improvements in the economy. There are a number of

[2] ASEAN+3 comprises the 10 ASEAN members plus China, Japan and the Republic of Korea. ASEAN+4 includes ASEAN members plus China, Japan, the Republic of Korea and India. ASEAN+6 covers the East Asia Summit group, comprising ASEAN+3, Australia, New Zealand and India.

[3] At the Ninth ASEAN Summit in Bali in October 2003, ASEAN leaders agreed to establish an ASEAN Economic Community (AEC) by 2020. AEC is one of three pillars (the other two being the ASEAN Security Community and the ASEAN Socio-cultural Community) that make up the ASEAN Community, as declared by ASEAN leaders in the Bali Concord II (available at www.aseansec.org/15159.htm). In line with the ASEAN Vision 2020, it is envisaged that AEC will be a single market and production base with a free flow of goods, services, investment, capital and skilled labour.

articles on the computable general equilibrium (CGE) and Global Trade Analysis Project frameworks. Some worth mentioning are JETRO (2003); Park (2006); Lee and Park (2005); Igawa and Kim (2005); Chawin (2006); Scollay and Gilbert (2001); McKibbin, Lee and Cheong (2004); Urata and Kiyota (2003); Ando and Urata (2006); McDonald, Robinson and Thierfelder (2007); and Strutt and Rae (2007). Lee and Park (2005) mentioned that the trade creation effect expected from the proposed East Asian FTAs would be significant enough to overwhelm the trade diversion effect. Ando and Urata (2006) found that the ASEAN+3 FTA was more desirable than the bilateral FTAs (ASEAN-China, ASEAN-Japan, ASEAN-Republic of Korea) for all member countries at the macrolevel. However, in these general equilibrium model-based studies, it was unclear whether the member economies ultimately realized the potentially beneficial effects.

The other method applies econometric approaches to historical trade data and assesses the impacts of the formation of an RTA on bilateral trade flows. The most important contributions in this respect are from Aitken (1973); Frankel (1993); Braga, Safadi and Yeats (1994); and Dee and Gali (2003). Most studies found that RTAs tended to increase trade between members and the rest of the world, thereby fostering greater trade worldwide. However, some RTAs were estimated to have negative effects on extra-bloc trade. Furthermore, Dee and Gali (2003) argued that traditional gravity equation analyses had not been successful in quantifying the impact of "new age" provisions of RTAs on trade and investment. They indicated that 12 of 18 recent RTAs examined had diverted more trade from non-members than they had created among members.

It is an open question whether RTAs create more trade than they divert. If an RTA has damaging economic effects on non-members, it could become a stumbling—rather than a building—block of global free trade. The simulation approaches from various pieces of literature showed the reallocation of global production and welfare gains across countries. Some studies found that RTAs expanded intra-bloc trade, while contracting trade and output in non-member countries.

For instance, Burfisher, Robinson and Thierfelder (2004) carefully reviewed the empirical findings on the trade effect of RTAs based on both methodologies. They indicated that the empirical evidence resulting from CGE models showed a relatively stronger net trade creation effect and positive welfare effects of RTAs on member economies compared with evidence resulting from gravity models. While carefully considering caveats about CGE models, Lloyd and MacLaren (2004) suggested that RTAs had positive welfare and net trade creation effects for members, while the effects for non-members were negative and tended to increase with the size of the RTA.

3. METHODOLOGY: GTAP MODEL[4]

The most widely recognized method used to undertake the analysis of impacts of trade liberalization is the CGE model for global trade. The CGE modelling framework that was chosen to undertake the analysis in this paper was produced by the Center for Global Trade Analysis at Purdue University, United States of America. The database and model are called the Global Trade Analysis Project (GTAP) (Hertel, 1997).

The basic structure of the GTAP model includes industrial sectors, households, Governments and global sectors (transport and banking) across countries. Countries and regions in the world economy are linked together through trade. Prices and quantities are simultaneously determined in both factor markets and commodity markets. Three main factors of production are included in the model: labour, capital and land. Each industrial sector requires labour and capital, while the agricultural and forestry sectors require all three factors. Labour and land cannot be traded, while capital and intermediate inputs can be traded. It is assumed that the total available amount of labour and capital is fixed.

In the model, firms minimize the cost of inputs given their level of output and fixed technology. The production functions used in the model are of a Leontief structure. This means that the relationship between fixed and intermediate inputs is fixed. Similarly, the relationship between the amount of intermediate inputs and outputs is also fixed. Firms can purchase intermediate inputs locally or import them from other countries.

Household behaviour in the model is determined with an aggregate utility function. This utility function includes private consumption, Government consumption and savings. Current Government expenditures are covered by the regional household utility function as a proxy for Government provision of public goods and services.

Domestic support and trade policy (tariff and non-tariff barriers) are modelled as ad valorem equivalents. These policies have a direct impact on the production and consumption sectors in the model. Changes in these policies have an impact on the production and consumption decisions of sectors in the model.

There are two global sectors in the model: transport and banking. The transport sector takes into account the difference in the price of a commodity as a result of the transport of the good between countries. The global banking sector brings into equilibrium savings and investments in the model.

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[4] As the world economy becomes more integrated, there is an increasing demand for quantitative analyses of policy issues on a global basis. The Global Trade Analysis Project (GTAP) model was established in 1992, with the objective of facilitating multi-country, economy-wide analyses (Hertel, 1997). Since its inception, GTAP has rapidly become a common "language" for many of those conducting global economic analyses.

In equilibrium, all firms have zero real profit, all household expenditures are within their budget, and global investments equal global savings. Changing the model's parameters allows one to estimate the impact from a country's or region's original equilibrium position to a new equilibrium position.

Closure plays a very important role in GTAP modelling. Closure is the classification of the variables in the model as either endogenous or exogenous variables. Endogenous variables are determined (solved for) by the model and exogenous variables are predetermined outside the model and can therefore be changed from the outside, or shocked. Closure can be used to capture policy regimes and structural rigidities. The closure elements of GTAP can include population growth; capital accumulation, including FDI; industrial capacity; technical change; and policy variables (taxes and subsidies).

The number of endogenous variables has to equal the number of equations. This is a necessary but not sufficient condition for a solution. It may be general equilibrium (GE) or partial equilibrium (PE) depending on the choice of the exogenous variables. The standard GTAP closure has the following characteristics: all markets are in equilibrium, all firms earn zero profits and regional household expenditures are on budget constraint (i.e. there are no savings and no loans).

4. MODEL AGGREGATION, SCENARIOS AND MACRO-VARIABLE ASSUMPTIONS

(a) Introduction

Version 6 of the GTAP model and database was used to undertake the analysis.[5] This version of the model includes 57 commodities (sectors) and 87 regions. The 57 industrial sectors in the model provided a broad disaggregation of the industrial sectors in each country and region. The 87 regions were aggregated into 14 regions, with an emphasis on the countries in East and South-East Asia. Given the regional emphasis of the study, the greatest level of disaggregation occurred for the countries in East and South-East Asia, while other countries not included in the economic integration process were aggregated into larger regional areas. This aggregation included nine individual countries in East Asia and five other regions. The nine individual countries were China, Indonesia, Japan, Malaysia, the Philippines, the Republic of Korea, Singapore, Thailand and Viet Nam, while the aggregated regions were: the remaining countries in South-East Asia (other ASEAN); the members of the North American Free Trade Agreement (NAFTA); the rest of

[5] GTAP 6 has 87 regions—more than six times the number in the original GTAP 1 database. All of these additions to the database have been provided by members of the GTAP network. The regional sectoral data (57 sectors) draw heavily on the source input-output tables from varying years. The GTAP 6 database was constructed by combining the I-O tables with 2001 macroeconomic data. Details are available in Dimaranan and McDougall (2006) and Hertel (2006).

the Organisation for Economic Co-operation and Development (OECD) countries, meaning all OECD countries except Canada, Japan, the Republic of Korea and the United States; the Rest of the World (ROW)1, which included South Asian countries and Hong Kong, China; and the rest of the countries in the world (ROW2). Data for 57 industrial sectors were included for all 14 regions (9 individual countries and 5 aggregated regions) in the model that was used to address the study objective.

(b) Scenarios

The following scenarios were used in this analysis:

(i) Business-as-usual

We took the 2000 model and used our macroeconomic shocks—changes in the values of the macroeconomic variables (GDP, skilled and unskilled labour, and capital)—to generate a new economy for the years 2010, 2015 and 2020. In this analysis, the tariff structure for all regions and countries remained unchanged from 2000. This business-as-usual (BAU) scenario remained the same throughout the analysis and was the base to which the other scenarios were compared.

(ii) Medium economic integration

Medium economic integration (MEI) describes a scenario where the timing of the tariff reductions—both import tariffs and export subsidies—is delayed. This scenario was simulated for an FTA within ASEAN (W-ASEAN) and for bilateral agreements between ASEAN and China, ASEAN and Japan, and ASEAN and the Republic of Korea (ASEAN-CJK), analysed together.

(iii) Deep economic integration

Deep economic integration (DEI) describes a scenario where economic integration, (i.e. reductions in both import tariffs and export subsidies) occurs within a rapid time frame. This scenario was also simulated for both W-ASEAN and for ASEAN-CJK. The last simulation was part of the DEI scenario. In this simulation, tariff barriers were reduced further for ASEAN plus China, Japan and the Republic of Korea. This simulation differed from the others because, in this case, the tariff barriers between China, Japan and the Republic of Korea were reduced to defined levels. This was the simulation that treated ASEAN+3 as a fully integrated trading block where tariffs were reduced for all countries and between all countries. The ASEAN+3 integration was part of the DEI scenarios and materialized only in 2020. The above scenario description required a change in the development of the GTAP model to undertake the analysis. In this case, the updating of the model to 2020 required a number of discrete steps. These steps for the scenario analysis are described in table 1.

Table 1. Descriptions of business-as-usual, medium and deep scenarios

Regional scope	*Commodity scope*	*By 2010*	*By 2015*	*By 2020*
Business-as-usual (BAU)				
ASEAN, whole study region (ASEAN+3), other regions	All commodities	Current tariffs	Current tariffs	Current tariffs
Tariff reductions under medium economic integration (MEI)				
Within ASEAN, ASEAN with each of China, Japan and the Republic of Korea	Agricultural commodities	Current tariffs	40%	80%
	Non-agricultural commodities	Current tariffs	50%	100%
Whole study region (ASEAN+3)	Agricultural commodities	Current tariffs	Current tariffs	Current tariffs
	Non-agricultural commodities	Current tariffs	Current tariffs	Current tariffs
Tariff reductions under deep economic integration (DEI)				
Within ASEAN, ASEAN with each of China, Japan and the Republic of Korea	Agricultural commodities	40%	80%	Current tariffs
	Non-agricultural commodities	50%	100%	Current tariffs
Whole study region (ASEAN+3)	Agricultural commodities	Current tariffs	Current tariffs	80%
	Non-agricultural commodities	Current tariffs	Current tariffs	100%

(c) Modifications of the GTAP model to 2020

There are two general approaches to updating the model: a recursive process and the use of dynamic GTAP. For the current study, we used the recursive updating process. The recursive process uses projections of macroeconomic variables into the future to simulate what the various economies would look like in the future. The recursive updating process is based on forecasting the economies of the countries and regions by exogenously shocking the baseline model with projections of selected macroeconomic variables. These projections of the macroeconomic variables were taken from various sources.

(d) Macroeconomic variable estimates and underlying assumptions

The five primary factors of production used in the production system were land, natural resources, unskilled labour, skilled labour and physical capital. The first step in the process was to develop a BAU projection to 2010 from the benchmark 2000 GTAP 6 database. The projection of the global economy to 2010 was made with assumptions

concerning economic and factor growth rates. Exogenous projections of each region's GDP growth[6] were estimated, as were factor endowments such as population, skilled and unskilled labour, and capital stock (Walmsley, 2007; Dimaranan, Ianchovichina and Martin, 2007; United Nations, 2007). Total factor productivity was endogenously determined to accommodate the combination of these exogenous shocks. This approach allowed us to predict the level and growth of GDP as well as trade flows, input use, welfare and a wide range of other variables. Instead of considering capital accumulation, we added the extra change in investment in period t (I_t) resulting from trade liberalization shocks along with the baseline capital forecast for the next time period (t+1). The resulting forecast provided a projection of the global economy in 2010 that was in equilibrium. This forecasted economy in 2010 provided the starting point for a subsequent simulation exercise. A similar procedure was followed for the years 2015 and 2020.

The GTAP model simulates the impact of trade liberalization (reductions in import tariffs and export subsidies) under several scenarios. It estimates how trade flows will change as import tariff restrictions and export subsidies are reduced. As the trade flow between countries changes as a result of trade liberalization, economic growth will be impacted, as will industrial sectoral output, trade and welfare.

5. ANALYSIS OF THE RESULTS

The model was run to address trade liberalization by simulating a regional trade agreement that reduced import tariff restrictions and export subsidies between the six individual countries chosen for the study and other ASEAN countries. Particular attention was given to how the changes in import tariff and export subsidy reductions affected key variables such as trade patterns, terms of trade, industrial structure, factor returns and welfare levels for each phase of integration. Poverty implications were also considered.

(a) Effects on output

Trade liberalization has two offsetting effects on output levels. On the one hand, reductions in the costs of intermediate inputs create beneficial forward linkages to domestic production and promote industrialization (Puga and Venables, 1998). On the other hand, more intense import competition has an adverse effect on the profitability of import-competing firms.

Results showed that the output growth rate was highest for China, followed by Viet Nam, Thailand and Indonesia, and was lowest for Japan in the BAU periods (see table 2). The output growth of ROW1 was also higher compared with the rest of OECD and NAFTA. The real output trend was maintained in almost all trade scenarios.

[6] Projections are from World Bank (2007), adjusted to the 2000 base, and estimated and projected values developed by the Economic Research Service of the United States Department of Agriculture.

The percentage changes in output growth under each scenario involving trade liberalization were compared with the BAU 2020 period. Table 2 focuses on the extent to which the growth of different countries and regions changed after each scenario.

Let's take a look at the projected world economic situation as a result of the ASEAN agreement scenarios. The results indicate that regions outside the agreements were net losers with negative output growth. The total output growth performance of most of the ASEAN member countries in the agreements was highest under the ASEAN+3 agreement at 2020. The output growth of the countries in the agreement fluctuated in each phase of subsequent trade liberalization. The highest output growth was achieved by Viet Nam, followed by Thailand, Singapore, Malaysia and Indonesia, under all scenarios. The performance was not too rosy for Japan or the Republic of Korea, though the ASEAN+3 agreement at 2020 was good for them in terms of growth of output. Besides that, Japan was a loser under the DEI 2020 scenario and the Republic of Korea was a loser in the case of MEI 2020. Though China's output growth was not significant, it was at least positive under all scenarios.

Table 2. Percentage change in the real value of output during 2000-2020 under various trade scenarios

	2000-2010	*2010-2015*	*2015-2020*	*BAU 2020-MEI 2020*	*BAU 2020-DEI 2020*	*BAU 2020-ASEAN+3*
China	137.68	53.22	54.39	0.22	0.22	0.24
Japan	21.39	11.15	11.05	0.038	-0.05	0.008
Republic of Korea	60.08	28.41	29.38	-0.21	0.15	0.307
Indonesia	68.88	36.27	37.78	1.30	1.97	2.30
Malaysia	66.04	33.41	34.07	2.06	2.34	3.30
Philippines	54.50	26.23	27.15	2.004	2.70	2.31
Singapore	58.88	26.19	25.77	3.056	3.29	2.07
Thailand	69.58	33.20	34.62	5.31	7.81	6.88
Viet Nam	97.43	41.74	40.06	6.52	8.42	13.58
Other ASEAN	53.31	26.30	26.28	0.042	0.25	0.13
Rest of OECD	24.40	12.91	14.47	-0.27	-0.15	-0.60
NAFTA	34.36	16.83	15.60	-0.26	-0.27	-0.68
ROW1	71.33	35.20	31.75	-0.71	-0.75	-0.76
ROW2	53.63	25.05	24.72	-0.16	-0.23	-0.61
Total	40.59	21.20	22.27	-0.08	-0.04	-0.29

As expected, countries and regions included in the regional trade agreements increased their industrial output, while regions not included in the regional trade agreements decreased their industrial output. The reason for this result is as follows. A reduction in import tariffs lowers the import price, and domestic users immediately substitute domestic

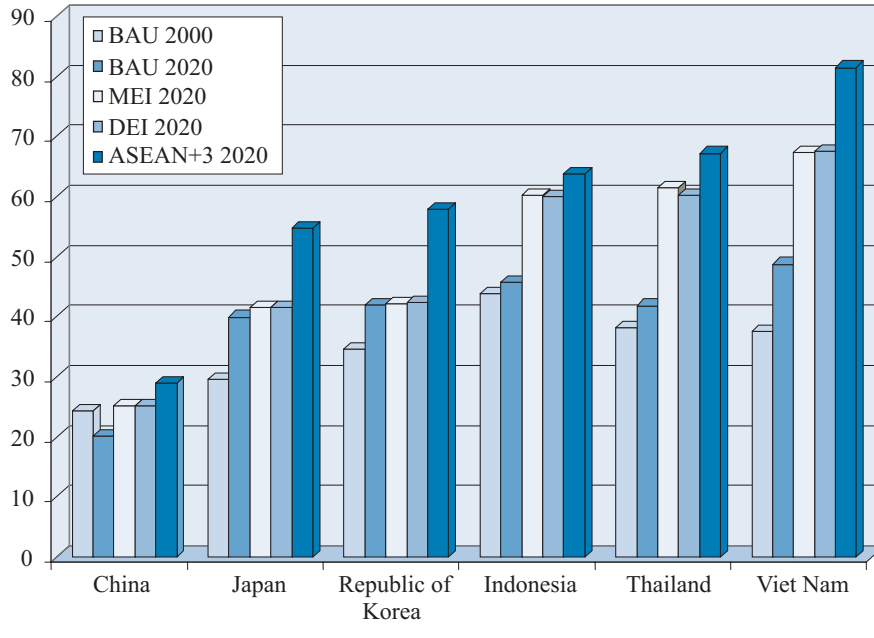
products with competing imports, which increases the aggregate demand for imports. The cheaper imports serve to lower the price of intermediate goods, which causes excess profits. This, in turn, induces output to expand.

(b) Export and import shares

The result of output growth under the different agreement scenarios during the period 2000-2020 can be further analysed by investigating the export and import share of each country both in the study region and outside the region. The share of China's exports to and imports from other countries within the region included in the agreement scenarios declined, having the lowest share of all the participating countries throughout the study period (see figures 1 and 2). For China, shares of exports and imports within the region varied between 23 and 25 per cent in the DEI and MEI scenarios in 2020, but under the ASEAN+3 scenario in 2020, shares increased to approximately 28 per cent for both exports and imports, while the shares of Japan and the Republic of Korea increased gradually throughout the period (2000-2010, 2000-2015 and 2000-2020). The share increase was noted only in the ASEAN+3 agreement at 2020, where it increased by almost 10-12 per cent more.

Figure 1. Export share of six countries in ASEAN+3[a]

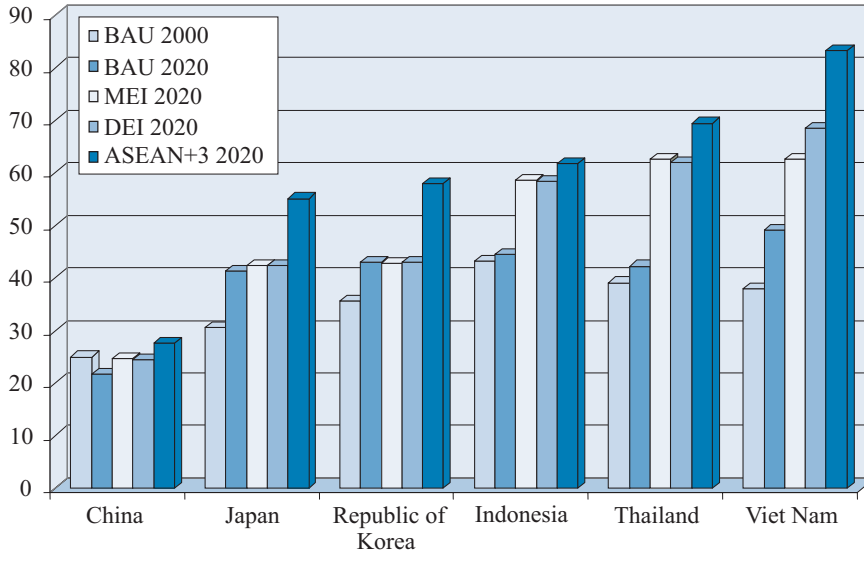
(Percentage)



[a] ASEAN+3 includes Brunei Darussalam, Cambodia, China, Indonesia, Japan, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, the Republic of Korea, Singapore, Thailand and Viet Nam.

Figure 2. Import share of six countries in ASEAN+3[a]

(Percentage)



[a] ASEAN+3 includes Brunei Darussalam, Cambodia, China, Indonesia, Japan, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, the Republic of Korea, Singapore, Thailand and Viet Nam.

The export and import shares increased for other countries in the region under all scenarios (MEI, DEI and ASEAN+3) at 2020. Overall, these shares show that the RTAs of ASEAN countries with China, Japan and the Republic of Korea enhanced the economic growth of each individual country taking part in the RTAs. The export and import shares in different tariff reduction scenarios showed considerable trade diversion. The simulation showed an increase in trade among countries in the ASEAN+3 region; basically it created more intra-bloc trade, but diverted trade with non-members. The highest trade diversion was observed in ASEAN+3 scenarios at 2020.

(c) Sectoral analysis

(i) Output

The sectoral rankings of output, export and import for the countries in each scenario can add more insight to the study. The rank of the top six sectors in output growth is presented in table 3. The rank remained almost constant in each BAU period (2000, 2010, 2015 and 2020), while fluctuations in rank were observed within the sectors for all six countries. In the case of China, vegetables, fruits and nuts and animal products were in the top 10 in 2000 and 2010, while from 2015 onwards, electronic equipment entered the top 10 list. For Indonesia and Thailand, the food products sector was major until 2015 and was taken over by manufacturing equipment and paper and paper products in 2020.

Table 3. Rank of the top six sectors in output growth, BAU 2020

China	*Japan*	*Republic of Korea*	*Indonesia*	*Thailand*	*Viet Nam*
Machinery and equipment nec	Motor vehicles and parts	Machinery and equipment nec	Electronic equipment	Electronic equipment	Mineral products nec
Chemical, rubber, plastic products	Chemical, rubber, plastic products	Electronic equipment	Textiles	Machinery and equipment nec	Leather products
Electronic equipment	Electronic equipment	Chemical, rubber, plastic products	Chemical, rubber, plastic products	Motor vehicles and parts	Paddy rice
Textiles	Machinery and equipment nec	Ferrous metals	Paper products, publishing	Textiles	Oil
Mineral products nec	Ferrous metals	Motor vehicles and parts	Machinery and equipment nec	Chemical, rubber, plastic products	Food products nec
Manufactures nec	Paper products, publishing	Petroleum, coal products	Motor vehicles and parts	Wearing apparel	Machinery and equipment nec

Abbreviation: nec – not elsewhere classified.

In the case of medium and deep integration, the same sectors were in the top six, across the countries. Fluctuations in rank within the sectors were observed for Indonesia, Thailand and Viet Nam only. It was observed that paddy rice was in third place for Viet Nam in BAU 2020, but the sectoral rank dropped down to sixth in the other scenarios.

With widespread liberalization, agricultural processing in Viet Nam expanded but experienced competitive pressure from other rice-producing countries. As the profitability of agricultural processing fell in Viet Nam due to the increasing competition, Vietnamese labour and other resources moved to more profitable labour-intensive sectors such as clothing and light manufacturing, the expansion of which was stimulated by increased market access to the ASEAN countries.

Output growth increased across the countries after 2015 for a few common sectors, such as electronic equipment; machinery and equipment; and chemical, rubber and plastic products. These sectors became more prominent under the medium and deep integration scenarios in 2020. Thus, both under the ASEAN+3 2020 scenario and under the other two integration scenarios, output in heavy manufacturing—rather than in primary and light manufacturing—increased for the countries participating in the agreements.

(ii) Export share

The export share rank for the top six sectors was almost the same as the output share rank for all six countries, with only a few changes (see table 3). For China, wearing apparel took the place of mineral products. For Japan, metals not elsewhere classified (nec) took the place of paper products and publishing, while for Indonesia, coal took the place of motor vehicles. Similarly, for the Republic of Korea, textiles replaced petroleum and coal products. Sugar replaced wearing apparel in Thailand. In Viet Nam, leather, oil, and machinery and equipment remained in the list of top six sectors, while the other three top sectors changed in the ASEAN+3 2020 scenario compared with the BAU 2020 output share.

The rank of export share for the top six sectors remained constant in both the medium and deep integration scenarios, but the shares of a few sectors increased under each scenario. For example, the export share of electronic equipment from China and Thailand always ranked first, while its share increased from 17.64 per cent (BAU 2000) to 27.94 per cent (ASEAN+3 2020) in China and from 24.08 per cent to 36.18 per cent in Thailand.

The most interesting result was observed for Japan. The following sectors reduced their export shares from BAU 2000 to ASEAN+3 2020: manufacturing equipment (from 26.06 per cent to 23.73 per cent), electronic equipment (from 20.86 per cent to 11.12 per cent) and motor vehicles (from 17.84 per cent to 15.82 per cent). On the other hand, ferrous alloys increased their share from 3.30 per cent to 8.46 per cent in the same period. A minor increase in the export share of textiles was observed for the Republic of Korea for the same period, while its export share of manufacturing equipment increased from 11.59 per cent to 15.46 per cent. For Viet Nam, the chemical, rubber and plastic products sector was a new addition to the export list, and under the ASEAN+3 2020 scenario, it had a large share, at 25.90 per cent. Paddy rice was an important sector under all trade scenarios in Viet Nam, though it did not appear in the list of the top six sectors. Further, two new additional sectors appeared on the list (chemical, rubber and plastic products and textiles), covering almost 32 per cent of the export share.

In the case of Viet Nam, tradable commodities such as paddy rice responded marginally to most of the tariff reduction scenarios. Viet Nam is the third largest rice-exporting country in the world and has recently pursued policies to expand its rice export market. The Vietnamese rice export regime involved an export tax until 1998 but, after that, the Government of Viet Nam removed the rice export quota (Nielsen, 2003). On the other hand, in Thailand, export shares of electronic equipment and manufacturing equipment have increased by a factor of 1.5. Thailand has had a comparative advantage in electrical and electronic equipment since the 1990s. The implications of tariff reductions on the electrical and electronic appliances are quite obvious in Thailand. The export-led industrial boom began in the mid-1980s in Thailand and electrical and electronic appliances captured market shares of 21.55 per cent in 1990 and 48.87 per cent in 2000 (Mukhopadhyay, 2006).

From the above export share analysis, it is clear that the top six sectors were not too sensitive for Japan (except for ferrous metals), but they were sensitive for other countries, such as Indonesia, Thailand and Viet Nam. To explain further, we have presented the performance of the top six export sectors under different trade scenarios in table 4.

Table 4. Share of export of the top six sectors in 2000 (BAU) and 2020 (ASEAN+3)
(Percentage)

BAU 2000					
China		**Japan**		**Republic of Korea**	
40 ele	17.64	41 ome	26.06	40 ele	28.26
41 ome	15.05	40 ele	20.86	41 ome	11.59
42 omf	11.07	38 mvh	17.84	33 crp	10.24
28 wap	9.69	33 crp	9.22	38 mvh	8.83
29 lea	8.33	39 otn	3.73	27 tex	7.69
33 crp	6.31	35 i_s	3.30	39 otn	5.48
Indonesia		**Thailand**		**Viet Nam**	
40 ele	12.41	40 ele	24.08	29 lea	17.58
30 lum	8.72	41 ome	12.30	16 oil	13.91
33 crp	7.51	33 crp	8.91	28 wap	10.29
28 wap	6.81	25 ofd	6.81	25 ofd	8.83
27 tex	6.48	42 omf	4.28	41 ome	5.14
41 ome	5.51	27 tex	4.07	8 ocr	5.10
ASEAN+3 2020					
China		**Japan**		**Republic of Korea**	
40 ele	27.95	41 ome	23.73	40 ele	25.55
41 ome	19.26	38 mvh	15.82	41 ome	15.46
42 omf	12.06	33 crp	12.64	33 crp	9.05
28 wap	6.85	40 ele	11.12	27 tex	8.91
33 crp	6.82	35 i_s	8.46	38 mvh	8.58
27 tex	5.51	36 nfm	4.63	35 i_s	6.89
Indonesia		**Thailand**		**Viet Nam**	
40 ele	19.49	40 ele	36.18	33 crp	25.90
27 tex	10.48	41 ome	19.11	29 lea	18.87
33 crp	10.07	33 crp	13.20	16 oil	14.97
41 ome	7.65	24 sgr	5.07	28 wap	8.82
31 ppp	6.56	38 mvh	3.52	27 tex	6.71
15 coal	5.38	27 tex	3.33	41 ome	6.56

Note: The two-digit codes and their three-letter counterparts represent sectoral classifications in the GTAP database.

Table 4. *(continued)*

Abbreviations:

crp – chemical, rubber, plastic products
ele – electronic equipment
i_s – ferrous metals
lea – leather products
lum – wood products
mvh – motor vehicles and parts
nfm – metals not elsewhere classified
ocr – crops not elsewhere classified
ofd – food products not elsewhere classified
ome – machinery and equipment not elsewhere classified
omf – manufactures not elsewhere classified
otn – transport equipment not elsewhere classified
ppp – paper products and publishing
sgr – sugar
tex – textiles
wap – wearing apparel

It is interesting to note that ferrous metals were always among the top six for Japan in the entire DEI scenario, with metals not elsewhere classified entering the list when there were higher tariff reductions. Similarly, for Thailand, sugar was added to the top six lists as tariff reductions increased.

(iii) Import share

In the case of imports, the share of the top six sectors changed under the ASEAN+3 2020 scenario across the countries (see table 5). Some new sectors entered the list compared with BAU 2000. One interesting point is that the top six sectors were common for exports and imports in most cases. This happened due to intra-industry trade. The top exports and imports of most industrial countries are actually similar items. Such trade is more beneficial than inter-industry trade because it stimulates innovation and exploits economies of scale. Here we considered BAU 2000 as a representative of all other BAU periods (2010, 2015, and 2020). Though the percentage shares fluctuated within the BAU period, the sectors remained constant in terms of trade importance.

For Japan, the import shares of the sectors declined (except for ferrous alloys and chemical, rubber and plastic products), while for China, the Republic of Korea and Indonesia, the import share of most of the top six sectors increased compared with BAU 2000. In the case of Thailand, electronic equipment and manufacturing equipment import shares increased by a factor of 2.5. For Viet Nam, three new additional sectors appeared in the list, which covered almost 44 per cent of total imports.

The concepts of trade creation and trade diversion as a result of discriminatory trade liberalization can be mentioned here. Trade creation measures the gains from expanding trade in the products being liberalized. Trade diversion, by contrast, measures the reductions in the trade of products that are disadvantaged by preferential liberalization. In the case of Japan, the trade diversion effect dominated, while for Thailand and Viet Nam, there was a net trade creation effect.

Table 5. Import share of the top six sectors in 2000 (BAU) and 2020 (ASEAN+3)
(Percentage)

BAU 2000					
China		**Japan**		**Republic of Korea**	
40 ele	16.42	41 ome	25.87	40 ele	26.82
41 ome	14.46	40 ele	20.18	41 ome	11.55
42 omf	10.87	38 mvh	18.29	33 crp	10.67
28 wap	10.31	33 crp	9.45	38 mvh	9.05
29 lea	8.81	39 otn	3.80	27 tex	8.42
27 tex	6.50	35 i_s	3.52	39 otn	5.57
Indonesia		**Thailand**		**Viet Nam**	
40 ele	11.42	40 ele	22.25	29 lea	18.29
30 lum	9.01	41 ome	11.80	16 oil	13.32
33 crp	7.56	33 crp	9.31	28 wap	10.54
28 wap	7.33	25 ofd	6.93	25 ofd	8.65
27 tex	6.71	28 wap	4.28	8 ocr	5.16
41 ome	5.12	27 tex	4.24	41 ome	4.95
ASEAN+3 2020					
China		**Japan**		**Republic of Korea**	
40 ele	26.92	41 ome	23.39	40 ele	24.60
41 ome	19.16	38 mvh	16.21	41 ome	15.39
42 omf	12.42	33 crp	12.64	27 tex	9.42
28 wap	7.51	40 ele	10.77	33 crp	9.17
33 crp	7.01	35 i_s	8.66	38 mvh	9.06
27 tex	5.81	27 tex	4.71	35 i_s	7.03
Indonesia		**Thailand**		**Viet Nam**	
40 ele	18.38	40 ele	53.23	33 crp	28.12
27 tex	10.59	41 ome	27.48	29 lea	17.35
33 crp	9.99	33 crp	13.29	16 oil	12.35
41 ome	7.34	38 mvh	10.60	23 pcr	10.28
31 ppp	6.60	27 tex	6.86	28 wap	7.91
30 lum	5.35	32 p_c	4.88	27 tex	5.93

Note: The two-digit codes and their three-letter counterparts represent sectoral classifications in the GTAP database.

Abbreviations:

crp – chemical, rubber, plastic products
ele – electronic equipment
i_s – ferrous metals
lea – leather products
lum – wood products
mvh – motor vehicles and parts
ocr – crops not elsewhere classified
ofd – food products not elsewhere classified
ome – machinery and equipment not elsewhere classified
omf – manufactures not elsewhere classified
otn – transport equipment not elsewhere classified
p_c – petroleum and coal products
pcr – processed rice
ppp – paper products, publishing
tex – textiles
wap – wearing apparel

Clearly, the gains from trade creation are larger the higher the rate of protection initially applied to these trade flows and the more price responsive total domestic demand is for these goods. Trade diversion costs are likely to be greater the higher the tariffs applied in the non-partner markets and the greater the reduction in the quantity of imports from these markets.

On the other hand, import liberalization typically brings about an increase in exports by changing the real exchange rate. Lowering the domestic price of at least some imports causes consumers to substitute these goods for non-traded goods. The reduction in demand for the non-traded good lowers its price relative to the prices of traded goods—a relative price change that is frequently termed a real exchange rate depreciation (Salter, 1959). This reduction in the profitability of non-traded goods production makes production for export relatively more attractive and increases the supply of exports.

(d) The effects on factor returns

Besides the effects on output, export and import, FTAs also have some impact on factor returns. As regional integration makes trade easier, it tends to raise the returns on at least some factors of production (Winters, 1996). A simple application of the Heckscher-Ohlin model to our scenarios might lead us to expect ASEAN returns on capital to fall since ASEAN and China are capital-scarce relative to their partners, Japan and the Republic of Korea. Since international trade tends to increase the returns on the abundant factor and reduce those on the scarce factor, increased trade might be expected to reduce the returns on capital in ASEAN members. However, there are a number of reasons to believe that the basic Heckscher-Ohlin model is too simple for our purposes and one might expect ASEAN to raise the rates of return on capital for both partners under trade liberalization regardless of capital abundance.

First, the standard Heckscher-Ohlin model applies only to a so-called square model with equal numbers of factors of production and goods. The GTAP 6 database identifies five factors of production—land, unskilled labour, skilled labour, capital and natural resources—and 57 commodities. Second, the Heckscher-Ohlin model presumes homogeneous products, whereas experience suggests that many markets are better represented by differentiated products and intra-industry trade. The GTAP model makes the Armington assumption.[7] In addition, the substitutability of domestic and foreign goods is also very important. Third, integration might affect the rate of return on capital through the price of intermediate and capital goods. A reduction in tariffs and trading costs on the

[7] The Armington assumption differentiates commodities by their country of origin. It takes the products of an industry which come from different countries to be imperfect substitutes for each other. This has become a standard assumption of international CGE models. These models generate smaller and more realistic responses of trade to price changes than implied by models of homogeneous products.

imports of capital equipment reduces the prices which industry has to pay for investment goods (Fukase and Martin, 1999). (The model does not capture this effect directly because the total stock of capital in each country is fixed in these simulations.) Table 6 shows the results of the simulation for the changes in returns on the factors of production. The measure reflects the changes in factor prices relative to the price index for private consumption expenditure. It does not, however, take into account the effects of changes in the revenue position of the Government and its ability to redistribute tax revenues to individuals, either through transfers or through the provision of public goods.

Table 6. Real returns on the factors of production
(Percentage change)

	MEI 2020			*ASEAN+3 2020*		
	Unskilled labour	***Skilled labour***	***Capital***	***Unskilled labour***	***Skilled labour***	***Capital***
China	0.519	0.558	0.599	1.04	1.072	1.026
Japan	0.004	0.015	0.029	0.259	0.139	0.176
Republic of Korea	0.199	0.139	0.136	0.765	0.093	0.448
Indonesia	1.737	1.574	2.113	-0.277	-0.419	-0.504
Malaysia	5.185	4.44	4.793	2.022	1.898	2.067
Philippines	2.077	2.407	3.504	0.802	0.837	1.502
Singapore	2.582	2.261	2.074	1.16	0.904	0.342
Thailand	4.079	3.247	4.26	0.271	-0.315	-1.896
Viet Nam	11.883	5.758	9.084	10.067	4.511	8.195
Other ASEAN	0.35	0.366	0.362	-0.312	-0.203	-0.304
Rest of OECD	-0.136	-0.112	-0.068	-0.132	-0.101	-0.072
NAFTA	-0.038	-0.038	-0.032	-0.037	-0.032	-0.041
ROW1	-0.195	-0.179	-0.213	-0.447	-0.37	-0.42
ROW2	-0.105	-0.073	-0.099	-0.105	-0.083	-0.127

If we compare the scenarios, then MEI 2020 showed a favourable return in the countries participating in RTAs (except China, Japan and the Republic of Korea) for three factors: skilled labour, unskilled labour and capital. It seems that high tariff reductions were not beneficial to achieving good factor returns in the ASEAN region. In ASEAN, Viet Nam had good returns, followed by Malaysia, in MEI 2020, which reflected the wider scope of Viet Nam's liberalization, which is likely to induce its industrialization. Further, the concept of comparative advantage is supported by the case of Viet Nam because unskilled labour returns were comparatively higher than capital returns. On the contrary, the comparative advantage theory is not supported in the case of Indonesia and Thailand. Though they are labour-intensive countries, the capital returns increased more under the MEI 2020 scenario. The welfare decomposition result provides further insight into the analysis.

(e) Welfare implications

The impact of trade liberalization on welfare differs between large and small countries. A large country can affect the international terms of trade by raising the world prices of its imports and lowering the world prices of its exports. In contrast, since a small country cannot influence the international terms of trade, it has to accept the world prices of its exports and imports. The present analysis included both small economies, such as Thailand and Viet Nam, and large economies, such as China and Indonesia. Welfare gains from a multilateral (i.e. regional) liberalization are fundamentally determined by two factors: (a) the change in efficiency with which any given economy utilizes its resources; and (b) changes in a country's terms of trade, which permit us to calculate the regional equivalent variation—or the amount of money that could be taken away from consumers, at initial prices, while leaving them at the same level of post-simulation utility.[8] If a particular country experiences an improvement in its terms of trade, i.e. export prices rise relative to import prices, then the equivalent variation[9] gain will be larger than the efficiency gain.[10] If the terms of trade deteriorate, then the opposite will happen. From table 7, we can observe that trade liberalization under the MEI, DEI and ASEAN+ 3 scenarios led to increased global welfare. However, the gains in welfare were mainly attributed to the countries belonging to the ASEAN+3 region involved in the trade liberalization, while the rest of the regions faced a loss in welfare, with the exception of ROW2 under the MEI 2020 scenario. However, not all of the welfare gains were distributed evenly among the 10 economies involved in the trade agreement. In the MEI 2020 scenario, China, Malaysia and Thailand were the countries that experienced the greatest welfare increases, while the Republic of Korea actually faced a decline in total welfare. When we applied the ASEAN+3 2020 scenario, China, the Republic of Korea and Thailand gained, while Japan actually experienced a welfare decline. From these two scenarios, China and Thailand appeared to gain the most welfare from trade liberalization in the region.

If we further decompose these two results (see table 7), most countries involved in the various trade liberalization scenarios improved their allocative efficiency, resulting in an increase in global allocative efficiency. The exceptions were Singapore under the MEI 2020 scenario and Japan under the ASEAN+3 2020 scenario, which experienced a deterioration in allocative efficiency ($8,249.6 million). On the other hand, the various trade agreements appear to have caused a huge deterioration in the terms of trade for China in both scenarios.

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8 Post-simulation utility is the level of utility obtained after the trade scenario exercise is carried out.

9 Equivalent variation is a measure of how much more money a consumer would pay *before* a price increase to avert the price increase. John Hicks is attributed with introducing the concept of equivalent variation.

10 When a country participates in a free trade region, it may gain due to trade creation and may either gain or lose due to trade diversion. The former has a positive effect on welfare because the removal of tariffs within the region allows the country to allocate its resources more efficiently in production. The country can import the goods that it formerly produced inefficiently under tariff from member countries that are more efficient producers (Caves and Jones, 1981).

Table 7. Welfare decomposition in different trade scenarios
(Millions of United States dollars)

	MEI 2020			*ASEAN+3 2020*		
	Allocative efficiency	***Terms of trade effect***	***Total***	***Allocative efficiency***	***Terms of trade effect***	***Total***
China	10 072.4	-5 991.6	4 373.1	27 833.1	-13 692.5	15 894.8
Japan	2 253.5	-707.1	1 627.9	-8 249.6	7 686.1	-1 624.8
Republic of Korea	477.8	-726.1	-225.2	1 849	4 416.3	5 939.1
Indonesia	1 059.4	1 793	2 753.2	634.9	130.8	894.1
Malaysia	2 909.8	3 183.7	6 688.9	2 092.5	-272.4	2 070.3
Philippines	996.6	374.3	1 379.3	477.9	-108.6	375.1
Singapore	-222.1	3 108.6	3 035.3	81	993.4	1 115.4
Thailand	3 628.4	3 088	6 842.3	2 217.3	6 504.2	8 833.7
Viet Nam	2 812.1	360	3 578.3	1 692.4	1 292.3	4 698
Other ASEAN	401.5	-139.3	238.4	541.1	-78.6	455.3
Rest of OECD	-847.8	-3 613.7	-3 976.6	-213.5	-3 266.6	-3 028
NAFTA	-652	-1 771.1	-3 888.6	-580.8	-1 512.4	-4 158.4
ROW1	-1 431.7	-2 200.6	-3 743.3	-1 700.3	-4 094	-6 033.8
ROW2	-1 248.1	3 241.8	1 526.9	-1 750.1	2 002.1	-505.9
Total	20 209.7	0	20 209.7	24 924.9	0	24 924.9

We have already noted that the terms of trade effect was negative for China, Japan and the Republic of Korea under MEI 2020, while a positive terms of trade effect was observed for Japan and the Republic of Korea under ASEAN+3 2020.

From the analysis above, it can be observed that Japan was the loser under DEI 2020, but it was a winner under ASEAN+3 2020 and MEI 2020. It experienced negative output growth, followed by reductions in both export and import shares under DEI 2020 compared with BAU 2020. The Republic of Korea was a loser under MEI 2020. It had negative output growth, though its exports increased marginally, but imports also declined as compared with BAU 2020. While real output growth was insignificant under the various trade scenarios, China gained under all scenarios. Its export and import shares also increased marginally compared with BAU 2000. Other countries involved in the economic integration scenarios benefited from increased industrial output growth, with Viet Nam ranking first under the various scenarios, followed by Thailand. It was also observed that, when an economy moved to higher tariff reduction scenarios, output growth, exports and imports all increased for the participating countries in the agreement under the scenario (except China, Japan and the Republic of Korea), while non-agreement countries decreased industrial output growth and were losers in all scenario cases. Moreover, the direction of trade for the member countries under the agreement predicted a trade diversion movement

(i.e. trade moving away from non-agreement countries). Further, if the ASEAN+3 2020 scenario materializes at all, the results of the study indicate that it will not improve the poverty situation in the region, even though all participating countries expect to benefit overall.

Our current study supports Urata and Kiyota (2003), Scollay and Gilbert (2001), Lloyd and MacLaren (2004) and McDonald, Robinson and Thierfelder (2007) regarding the gains achieved by the countries participating in the various agreements and the fact that the countries or regions outside the agreements were losers. The study also supports Ando and Urata (2006) and Park (2006) since the highest growth was achieved in the case of ASEAN+3 integration.

6. CONCLUSIONS

East and South-East Asian free trade agreements increased output growth for all participating countries. Other countries in the world had marginal negative growth. Among the countries in the agreements, Viet Nam achieved the highest growth, followed by Thailand. The lowest positive growth was attained by Japan and the Republic of Korea. Japan was a net loser under the DEI scenario, but a net gainer under the ASEAN+3 and MEI scenarios in 2020. The ASEAN+3 2020 scenario was favourable for all countries participating in the agreement. Though real output growth was insignificant, China was a net gainer in all trade liberalization scenarios.

It was also observed that if an economy moved to a higher tariff reduction scenario, output, export and import growth all increased for the participating countries (except China, Japan and the Republic of Korea), while non-agreement countries decreased industrial output growth and were losers in all scenarios. Moreover, the direction of trade for member countries in each agreement under various scenarios was concentrated among the countries participating in the agreement, which predicts a trade diversion movement (i.e. trade is diverted away from non-agreement countries).

The total export and import shares of the countries belonging to the ASEAN+3 region increased under different trade liberalization scenarios during the period 2000-2020, especially those of Indonesia, Thailand and Viet Nam. The sectoral responses to trade liberalization were high for electronic equipment in China, Thailand and Indonesia; chemical, rubber and plastic products in Viet Nam; manufacturing equipment in the Republic of Korea; and ferrous metals in Japan.

However, with the adoption of trade liberalization among all countries under the ASEAN+3 2020 scenario, we can see that all countries tended to benefit. This may provide a further incentive to pursue greater trade liberalization among the countries in the study.

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