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The impact of the TPP on selected ASEAN economies

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Abstract

The Trans Pacific Partnership was set to be the world's largest and most comprehensive FTA linking 12 countries on both sides of the Pacific. In a major turnaround, late January 2017, USA—one of the major trading partners to the region announced its decision to withdraw from it. Four of the ASEAN members under the TPP, namely Brunei, Malaysia, Singapore and Vietnam, have a number of existing FTAs with some major TPP members and hold a significant trade share with them. However, these countries do not have any agreements with Canada and Mexico and except Singapore, have no other trade negotiation with the USA, though the USA absorbs a significant share of the exports of the TPP-ASEAN nations, particularly of Vietnam. Given this background, withdrawal of the USA seems to be a major setback for the TPP-ASEAN countries as these economies are expected to be the largest beneficiaries of the agreement. This study investigates how far the non-participation of the USA would affect the overall growth and welfare of each of the TPP-ASEAN countries. For this purpose, the study separately evaluates the impact of the TPP on each of the TPP-ASEAN countries. As an analytical framework, the paper uses a global CGE model and attempts a number of simulations by calibrating various trade integration scenarios, such as tariff reduction and input-augmenting technological change. Results of the study show that all of the TPP-ASEAN members enjoy a welfare gain and positive growth in total output and trade when the USA is a member. Vietnam and Malaysia, in particular are the largest beneficiaries. When the USA is omitted, these countries continue to have positive growth rates but the rates fall considerably.

Keywords: TPP, ASEAN, CGE model, Tariff, Trade, Welfare

JEL Classification: F14, F15

1 Introduction

In October 2015, the twelve Pacific Rim countries, after several years of ongoing talks, successfully concluded negotiations on the Trans-Pacific Partnership (TPP), the largest, most diverse and potentially most comprehensive regional trade agreement to date (Global Economic Prospects 2016). The twelve countries that participated in the negotiation process were Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New

Zealand, Peru, Singapore, USA and Vietnam, which together account for 37.6% of global GDP, 11.1% of world population and 26.3% of world trade in 2015,¹ making the agreement the largest of its kind. The participating countries are also highly diverse—both commercially and in terms of their economic structure.

The target of the TPP is to promote trade and strengthen the relationships between the twelve member countries by reducing and eliminating tariffs and non-tariff barriers, fostering competition and creating greater opportunities for businesses. In fact, the scope and significance of TPP extends far beyond the traditional trade issues such as trade in goods and rules of origin, and touches on many other emerging and novel trade issues (TPP Full Text, Office of the United States Trade Representative),² including the Internet and the digital economy, various aspects of the law, data protection, intellectual property, participation of state-owned enterprises and competition policy. It also imposes labour standards and environmental conditions on the participating countries (Schott 2013; Cimino-Isaacs and Schott 2016). The comprehensiveness of this trade accord makes it a “landmark of the 21st century agreement”. The agreement was signed by the member countries in February 2016 and decided to undergo a two-year ratification period before implementation. However, in a major turnaround the USA, one of the largest and major players of the trade deal, decided to withdraw from the TPP making the future of the agreement uncertain. On January 23, 2017, President of the USA signed a memorandum that withdrew the USA from negotiations involving the TPP (Presidential Memoranda, Office of Press Secretary, The White House). The action ended US involvement in the multilateral trade deal, which had not been ratified by the Congress.

The twelve countries that constitute the group of TPP participants prior to the withdrawal of the USA are highly diverse in terms of their size of economies, levels of economic development and political system (Cimino-Isaacs and Schott 2016). Most of the members of the TPP are high- or upper-middle-income democracies, whereas the only member with an intensive state-run economy is Vietnam. In terms of GDP and population size, the USA is the largest among the TPP members, followed by Japan. GDP of the USA alone is a little less than twice of the combined GDP of the rest of the TPP members (Table 1). GDP per capita at PPP, a rough measure of a country’s level of economic development, ranges from \$6 thousand in Vietnam to over \$85 thousand in Singapore (Table 1). The member countries vary greatly in their geography as well. They range from Australia, a large and resource-rich continent to Singapore, a small trade-dependent city-state (Williams 2013).

Most of the TPP member’s trade with the other members as a percentage of their world trade varies between a modest share of 30 and 42%, except for Australia, Canada and Mexico (Table 1) indicating that with greater economic integration and elimination of tariff and non-tariff barriers, these countries could be the significant beneficiaries of the TPP agreement. Canada and Mexico have a TPP trade share of more than 70%

¹ The shares are computed using the following database: World Development Indicators, <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators> (accessed in April, 2017). UnComtrade. <https://comtrade.un.org/data/> (accessed in April, 2017).

² Available at <https://ustr.gov/trade-agreements/free-trade-agreements/trans-pacific-partnership/tpp-full-text> (accessed in April, 2016).

Table 1 Economic profile of TPP member countries in 2015. Source: World Development Indicators (<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>). UnComtrade (<https://comtrade.un.org/data/>)

TPP members	GDP (billion US \$)	Population (million)	GDP per capita (in thousand US \$ at PPP)	Merchandise trade with world (billion US \$)	Merchandise trade with TPP 12* (billion US \$)	TPP 12* trade as % of world trade	Merchandise trade with TPP 11# (billion US \$)	TPP 11# trade as % of world trade
Australia	1339.1	23.8	46.3	387.9	124.5	32.1	91.9	23.7
Brunei Darussalam	12.9	0.4	78.4	9.6	5.3	55.1	4.9	51.1
Canada	1550.5	35.9	44.2	828.0	606.0	73.2	69.2	8.4
Chile	240.8	17.9	23.4	126.4	38.2	30.2	18.2	14.4
Japan	4383.1	127.0	40.8	1250.4	380.1	30.4	185.4	14.8
Malaysia	296.3	30.3	27.0	376.4	142.5	37.9	109.3	29.0
Mexico	1143.8	127.0	17.0	775.8	558.5	72.0	62.0	8.0
New Zealand	173.8	4.6	37.6	70.9	29.9	42.2	21.6	30.4
Peru	189.1	31.4	12.5	71.3	23.7	33.3	10.9	15.2
Singapore	292.7	5.5	85.4	643.4	200.4	31.1	143.8	22.4
Viet Nam	193.6	91.7	6.0	327.8	98.4	30.0	57.2	17.4
USA	18,036.6	321.4	56.1	3815.3	1539.0	40.3	xx	xx

* TPP 12 includes the USA, # TPP 11 excludes the USA

only on account of these countries' strong trade relation with the USA resulting from NAFTA; otherwise, these countries have an insignificant TPP trade share of around 8% only (Table 1).

Liberalization of tariff is the most traditional component in the TPP's wide coverage. Over the years, the existing tariff prevalent between the TPP countries has reduced significantly and is already low on average, on account of various existing free trade agreements like NAFTA, ASEAN, etc., signed by between the TPP members. However, there is still substantial scope for the liberalization of trade by reducing tariff barriers. Figure 1 points out that the average applied rate of the TPP members is relatively low, except for Mexico and Vietnam whose average applied tariff rate is more than 5%. Likewise, the average import tariff imposed by the TPP counterparts, faced by Brunei (3.4%), Canada (3.1%), Japan (3.3%), Mexico (3.6%), New Zealand (3.7%) and Vietnam (4.4%), is sufficiently high (Fig. 1).

Immediately with the implementation of the TPP agreement, three-fourths of the existing nonzero tariff will be eliminated and gradually 99% of goods trade will be liberalized (Table 2). Tariff liberalization will be nearly complete after 16 years and fully complete only after 30 years (Table 2). As the agreement is between countries of different sizes and stages of economic development, different phasing out periods for tariff liberalization and different tariff reduction schedules across partners are allowed.

Among the ASEAN member States, only four countries—Brunei Darussalam, Malaysia, Singapore and Vietnam³—are currently parties to the TPP. These four countries vary in terms of liberalization and applied tariff rates. Among these four nations, Singapore is the most open one with most of its MFN tariff rates nearer to zero. In contrast, Brunei, Malaysia and Vietnam are comparatively less liberalized and these countries tend to have higher MFN tariffs going into the TPP. For Brunei and Malaysia, the shares of tariff lines already at zero under MFN rates are 75.4 and 60.6%, respectively, whereas for Vietnam the corresponding share is as low as 33.1%. The simple average of MFN nonzero tariff in Malaysia is considerably high at 9.2% while in Vietnam, this average is 15.8%, highest among the TPP members (details in Table 8 in “Appendix”).

Along with the current applied tariff rates, the extent of liberalization between two members is also reflected in the existing free trade agreements (FTAs) between them. Since the 1990s, after the establishment of AFTA, the ASEAN became a formidable economic powerhouse and signed a number of trade pact as a group with other large economies. Prior to TPP, the TPP-ASEAN countries have already engaged in FTAs with some of the TPP partners. Brunei, Malaysia and Singapore, being the members of AFTA, have already reduced tariffs among themselves to almost zero. Vietnam, as a latecomer in the group of ASEAN, is also in the process of meeting AFTA's tariff reduction obligations. These four countries, as the members of ASEAN, also have trade agreements with some of the large economies like Japan, Australia and New Zealand, which are also the signatories of the TPP. In fact, these four TPP-ASEAN countries, before joining the TPP, were engaged in 17 FTAs with the other eight members of TPP (Deardorff 2014), suggesting that these countries had already committed to some greater integration. However, none of the TPP-ASEAN members has signed any FTA with Canada and Mexico [Asia

³ In subsequent discussion, these countries will be referred to as TPP-ASEAN countries.

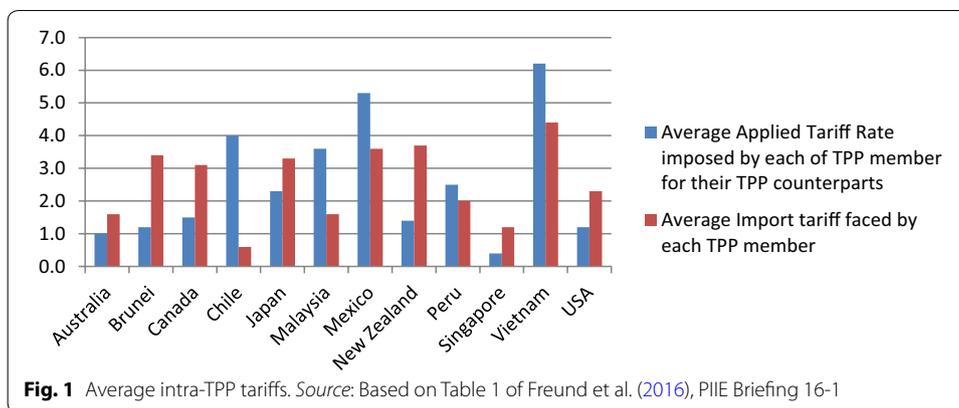


Table 2 Proposed tariff elimination under TPP by the members. *Source:* TPP tariff schedules, <http://ustr.gov/trade-agreements/free-trade-agreements/trans-pacific-partnership/tpp-full-text>

TPP members	Share of nonzero tariffs eliminated immediately under TPP	Share of nonzero tariffs eliminated at full implementation	Maximum years until tariff is eliminated
Australia	87	100	4
Brunei Darussalam	68	100	11
Canada	89	97	12
Chile	95	100	8
Japan	77	95	16
Malaysia	61	100	16
Mexico	48	99	16
New Zealand	88	100	7
Peru	59	100	16
Singapore	100	100	0
Viet Nam	47	97	16
USA	85	99	30
Average	75	99	13

Regional Integration Center (<https://aric.adb.org/fta>]. In addition, Brunei, Malaysia and Vietnam have no existing FTA with Peru and recently withdrawn member, the USA. So, upon implementation of the TPP and tariff liberalization, the preferential access into the North American market is expected to boost the TPP-ASEAN economies, given the trade shares of these countries with the USA in particular. USA is one of the important export destinations and import origins of the TPP-ASEAN nations. In 2014, almost 20% of Vietnam’s exports were destined to the USA while 8.4% of Malaysia’s total exports are destined to the USA (Table 3). In case of import, 7.7 and 4.3% of total imports of Malaysia and Vietnam are originated from the USA, respectively. Given this scenario, the withdrawal of the USA from the TPP seems to be a big setback for the TPP-ASEAN nations. In the absence of the USA in the TPP, Malaysia’s and Singapore’s trade share to the TPP members would reduce by almost 9%, whereas for Vietnam, it would be more, by almost 13% (Table 1).

Table 3 Share (in %) of trade partners in TPP in export and import of each of the TPP-ASEAN economies in 2014. Source: ASEAN Secretariat, ASEAN Statistics available at <https://data.aseanstats.org/>

Trade partners	Brunei		Malaysia		Singapore		Vietnam	
	Export	Import	Export	Import	Export	Import	Export	Import
Australia	7.6	1.4	4.3	3.0	3.8	1.3	2.4	1.4
Brunei	NA	NA	0.4	0.1	0.5	0.1	0.0	0.1
Canada	2.3	0.9	0.3	0.4	0.2	0.3	1.4	0.3
Chile	0.0	0.0	0.1	0.1	0.0	0.0	0.4	0.3
Japan	37.2	4.0	10.8	8.0	4.1	5.5	9.8	7.8
Mexico	0.0	0.2	0.7	0.2	0.2	0.8	0.7	0.2
Malaysia	3.5	20.6	NA	NA	12.0	10.7	2.6	2.8
New Zealand	3.5	0.3	0.7	0.4	0.5	0.2	0.2	0.3
Peru	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Singapore	3.3	20.5	14.2	12.6	NA	NA	1.8	4.5
United states	0.2	9.0	8.4	7.7	5.6	10.3	19.4	4.3
Vietnam	1.0	0.3	1.9	2.2	3.1	0.9	NA	NA

NA Not applicable

Since the beginning of the TPP negotiation, there has been a great deal of literature on ex ante assessment of TPP's impacts on the participating as well as non-participating economies. However, these studies mostly estimate the likely impact of the TPP on trade of various countries mainly due to the confidentiality clause in the negotiation of the agreement (Li and Whalley 2012; Petri et al. 2012; Todsadee et al. 2012; Kawasaki 2014; Itakura and Lee 2012; Cheong 2013). A few studies were also conducted after the treaty was made public in November 2015 (World Bank 2016; Petri and Plummer 2016). While these studies are based on the static CGE model, some of them also use the dynamic CGE model to analyse the impact of the TPP (Itakura and Lee 2012). Here, we are presenting those papers which applied the computable general equilibrium model (CGE) as the methodology of the study.

Using a computable general equilibrium model (CGE), Li and Whalley (2012) and Petri et al. (2012) have found that the TPP will have positive effects on all participating countries, Vietnam and Malaysia in particular, although gains will be mostly small. Todsadee et al. (2012) used static GTAP model and GTAP 7 database to simulate TPP's impacts on the TPP economies and a number of livestock sub-sectors. At macrolevel, they share relatively similar results with above studies. Itakura and Lee (2012) implemented simulations with the recursively dynamic GTAP which extends the standard GTAP model by incorporating the international capital mobility and accumulation of capital stock, based on GTAP database version 7.1. Besides the baseline scenario, the authors constructed 4 scenarios for simulation: TPP-track, Asia-track, and delayed-Asia-track and global trade liberalization. Their results shows that Asia-track will give larger welfare gains than the TPP-track; however, due to uncertainty about the creation of pan-Asia FTA, TPP is now a more desirable option for Asia-Pacific countries. Cheong (2013) assessed the impacts of TPP in period 2013–2027 through three scenarios: TPP9, TPP12 and TPP12 + PRC. Results reveal that the economic gains for member countries will increase if the coverage of integration expands. This, however, does not apply to Peru, Malaysia and Vietnam, though the difference is not too great in terms of per cent change of GDP. Kawasaki (2014) used GTAP

8 database for his static GTAP model to assess the impacts of TPP, RCEP1 and FTAAP2 on Asia-Pacific economies (APEC). Results reveal that the income gain for APEC from TPP is 1.2% of regional GDP, from RCEP 1.0% and from FTAAP 4.3%. Moreover, the tariff removal together with NTB reduction will bring larger income gains than tariff removal only, implying that domestic reforms are necessary for signatory countries to take advantage from integration. Burfisher et al. (2014) uses a static GTAP model and GTAP database version 8 in order to analyse the impacts of TPP on agriculture. The results show that compared to the baseline scenario, TPP helps increase the intra-TPP agricultural trade by 6% and the USA accounts for largest part (33%) of agricultural export increase while Japan makes up the biggest share (70%) of agricultural import increase.

More recently, the World Bank (2016) has also indicated that the TPP will have generally positive effects on participating economies and generally negative effects on non-participating economies. Gilbert et al. (2016) have observed that most of the TPP members are likely to benefit from the TPP in aggregate, though the gains are not even. Among all TPP members, largest gains accrue to Vietnam and Malaysia, when the gains are measured in terms of their economic size, whereas largest gains in absolute value are accrue to Japan. Petri and Plummer (2016) updated the results reported in Petri et al. (2012) with more recent data and information from the agreement. They found that the TPP agreement would generate substantial gain for Japan, Malaysia and Vietnam, other than the USA. Petri and Plummer (2016) projected that real income of Vietnam would grow by 2.3 and 8.1% in 2020 and 2030, highest among all TPP members. The corresponding growth rates for Malaysia are projected as 1.6 and 7.6%, respectively. The projections also showed that export would grow by 20 and 30% by 2030 for Malaysia and Vietnam, respectively.

So, these previously published studies have shown that the TPP-ASEAN countries, Malaysia, and Vietnam in particular, would be the most important beneficiaries among all TPP members (Petri et al. 2012; World Bank 2016; Petri and Plummer 2016; Gilbert et al. 2016). However, all these studies were conducted considering the USA as a significant member of the agreement. As discussed earlier, tariff liberalization under TPP might lead to a greater access to the North American market for the TPP-ASEAN countries, particularly for Malaysia and Vietnam. So, given the recent development in the situation with the withdrawal of the USA from the agreement, the major trade partner of the TPP-ASEAN countries in North American, it needs to reassess the impact of the TPP on the TPP-ASEAN countries in the absence of the USA. The present paper aims to address this issue. Precisely, the objective of the study is to separately evaluate the impact of the TPP on each of the TPP-ASEAN countries in two situations—first, where the USA is a member of the TPP and secondly, where the country is not a member of the TPP. By doing this, the study tries to find out how far the non-participation of the USA would affect the overall growth and welfare of the TPP-ASEAN countries. For analytical purpose, the paper resorts to a global CGE framework. It uses the Global Trade Analysis Project (GTAP) and applies a number of simulations through GTAP data by calibrating various trade integration scenarios. The analysis includes the impact of the agreement on several economic variables like total output, export, import, labour employment, welfare, household income, etc. The present study uses the latest version of the GTAP database with the base year 2011 for the analysis.

The paper is structured in the following order: Methodology, data and scenario development will be discussed in Sect. 2. Section 3 will present the results of the study. Summary and conclusion of the study will be presented in Sect. 4.

2 Methodology, data and scenario development

2.1 Model specification

The CGE modelling framework has been chosen to undertake the present analysis. The database and model is called the Global Trade Analysis Project (GTAP). This applied general equilibrium model is thoroughly documented in Hertel (1997) and in the GTAP V7 database documentation (Narayanan and Walmsley 2008). It is a comparative static multi-commodity multi-regional CGE model.

The basic structure of the GTAP model includes: industrial sectors, households, Governments and global sectors 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. The five main factors of production included in the model are skilled, unskilled labour, capital, natural resources and land. The total supply of labour and land is fixed in the model, while capital is allowed to be mobile across country depending on its rate of return.

In the model, the firms minimize costs of inputs given their level of output and fixed technology. Producers operate under constant return to scale, where the technology is described by the Leontief production function. This means that the relationship between intermediate inputs is fixed. Similarly, the relationship between the amount of intermediate inputs and outputs is also fixed. Primary factors of production are assumed to substitute for one another according to constant elasticity of substitution. The overall elasticity of substitution among the primary factors determines the ability of the economy to change its output mix in response to changes in relative prices or changes in the endowment of the factors.

Firms can purchase intermediate inputs locally or import them from other countries. It is also assumed that domestically produced goods and imports are imperfectly substituted. This is modelled using the Armington structure.

Household behaviour in the model is determined from an aggregate utility function. The aggregate utility is modelled using a Cobb–Douglas function with constant expenditure shares. This utility function includes private consumption, Government consumption and savings. Private household consumption is explained by a constant difference elasticity (CDE) expenditure functions. 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: transportation and banking. The transportation sector takes into account the difference in the price of a commodity as a result of the transportation of the good between countries. The global banking sector brings the savings and investment into equilibrium in the model.

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 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).

A standard GTAP closure considers full employment in the factor markets. It is a neo-classical approach whereby the endowments of the factors of production are fixed allowing the market prices to adjust so as to maintain full employment. But while doing the simulation exercises in the present study, the assumption of full employment is replaced by the existence of unemployment for unskilled labour for all the countries/regions under consideration. This is done by swapping the fixed endowment of unskilled labour with fixed real wage of unskilled labour.

In equilibrium, all firms have zero real profit, all households are on their budget constraint and global investment is equal to global savings. Changing the model's parameters allows one to estimate the impact from a countries/region original equilibrium position to a new equilibrium position.

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. Details of this framework is given in supplementary file (Additional file 1).

The GTAP framework has strength because of theoretical regards, ability to represent the direct and indirect interactions among all sectors of the economy and precise detailed quantitative results (Thierfelder et al. 2007).

2.2 Data and aggregation scheme

To undertake the analysis, the present study uses the version 9 of the GTAP model and database based on 2011 (Narayanan et al. 2012).⁴ This version of the model includes 57 commodities (sectors) and 140 countries (regions). The 57 industrial sectors have been aggregated to 28 sectors. The 140 countries have been aggregated into 13 regions, with an emphasis on the countries engaged in TPP agreement, including the USA. This aggregation considers Brunei Darussalam, Malaysia, Singapore, Vietnam, Canada, Japan, Mexico, USA and five other regions which includes Australia and New Zealand (Oceania TPP countries), Chile and Peru (Latin American TPP members), Non-TPP ASEAN countries, remaining OECD member states and the rest of the world. The paper focuses on 28 sectors for each of the 13 regions considered in the model.

2.3 Scenario development

To analyse the impact of the TPP agreement on trade and other economic variables of TPP-ASEAN nations, the present paper does a number of simulations by calibrating various trade liberalization scenarios between the TPP countries. The simulation exercise includes the following four scenarios:

⁴ Available at <https://www.gtap.agecon.purdue.edu> (accessed in June, 2016).

Scenario 1 Business as Usual (BAU)—In BAU, the tariff structure remains same as in the base year 2011, that is, the structure prior to the TPP agreement (Tables 9 and 10). BAU remains same throughout the analysis and is the base from which other scenarios will be compared.

Scenario 2 Reduction in import tariff by other TPP members for each of the TPP-ASEAN countries.

Scenario 3 Reduction in import tariff by each of TPP-ASEAN countries for the other TPP members.

In the last two scenarios, the actual tariff liberalization commitments that immediately apply (i.e. at year zero) between TPP-ASEAN countries and the other TPP members as the TPP agreement goes into force, are taken into account, assuming the tariff structure of other non-TPP-countries/regions are remaining the same. On average, tariffs are reduced by 50 or 100%. In this exercise, tariff reduction by each of the TPP member, which is applied to each of the other members, is done by considering some selected sectors (Tables 9 and 10). The sectors are identified only after thoroughly checking the tariff commitments proposed in the tariff reduction schedules of each of the members (TPP Tariff Schedules, Office of the United States Trade Representative) and also on the basis of the trade intensiveness between each of the TPP-ASEAN countries with other TPP members. The TPP tariff commitments comprise more than 100,000 tariff lines and more than 400 pages of tariff-rate quotas (TRQs) commitments for various products including agriculture, industry and manufacturing. These tariff lines and TRQs were carefully formulated to fit within the GTAP sector framework, and all of these data points were incorporated into our assessment. The details of the sectors on which the tariff reductions are applied are given in Tables 9 and 10 in “Appendix”.

Scenarios 2 and 3 are separated into two sub-scenarios: a) USA is a member of the TPP and b) USA is a non-member of the TPP.

3 Results and discussions: economic effects of TPP agreement

The model is run to address tariff liberalization as committed in the TPP agreement between TPP-ASEAN countries and other member countries of TPP. As the trade flow between countries changes as a result of tariff reduction, economic growth will be impacted, so will sectoral output, export–import, factor incomes and welfare of the countries. Table 4 presents the impact on these variables among TPP-ASEAN members that arise from different tariff reduction scenarios compared to the BAU. Results of scenario 2 (i.e. the combined impact of tariff reduction by all other TPP members, that is, Oceania TPP countries, Canada, Japan, Mexico, USA and Latin American TPP countries) are presented in the table along with the results of the scenario 3 (i.e. the impact of each of TPP-ASEAN country’s own tariff liberalization). Let us discuss the results presented in Table 4.

Table 4 Impact on various economic variables in Scenario 2 and Scenario 3. Source: Results from the study

Economic variables	Scenario 2: Reduction of tariff by the other TPP members						Scenario 3: Reduction of tariff by TPP-ASEAN member									
	Brunei		Malaysia		Singapore		Vietnam		Brunei		Malaysia		Singapore		Vietnam	
	With USA	Without USA	With USA	Without USA	With USA	Without USA	With USA	Without USA	With USA	Without USA	With USA	Without USA	With USA	Without USA	With USA	Without USA
1. Total Output growth (in %)	0.1	0.0	1.3	1.2	0.3	0.3	5.8	1.0	2.0	1.2	5.8	3.7	0.2	0.2	13.9	11.6
2. Total Export growth (in %)	0.2	0.1	3.0	2.3	0.1	0.1	3.6	2.5	-2.0	-1.3	3.2	1.0	0.1	0.1	4.8	2.9
3. Total Import growth (in %)	0.1	0.0	0.1	0.0	0.3	0.2	-2.9	-0.8	6.0	3.9	0.9	-2.8	1.7	1.5	8.2	7.2
4. Welfare change (in million \$)	1.8	1.4	693.0	395.0	82.1	74.8	5927.1	1209.1	33.9	19.9	360.0	280.4	0.4	0.3	135.0	111.7
5. Labour income growth (in %)																
a. Unskilled labour	0.1	0.0	0.6	0.3	0.1	0.1	10.6	2.2	0.3	0.3	1.0	0.9	0.0	0.0	1.0	0.9
b. Skilled labour	0.1	0.0	0.5	0.3	0.1	0.1	11.0	2.2	0.2	0.2	0.8	0.8	0.0	0.0	0.8	0.7
6. Household income growth (in %)	0.1	0.0	0.6	0.3	0.1	0.1	10.1	2.1	0.1	0.1	0.1	0.1	0.0	0.0	0.3	0.3

3.1 Output growth

3.1.1 Results of scenario 2

Trade liberalization impacts output growth in two ways, by affecting demand in outputs and supply of inputs. Table 4 reveals that tariff reduction by the other TPP members has a positive impact on the total output growth for all of the TPP-ASEAN nations, though the growth rate is found to be not significantly high. When the USA is considered a member of the TPP, Vietnam is expected to register the highest growth of output at almost 6% among the TPP-ASEAN countries, whereas when the USA is omitted from the list of TPP members, the country is found to be the biggest loser among them, implying that Vietnam would have significantly benefit from the participation of the USA in the TPP agreement. Malaysia also marginally loses from non-participation of the USA.

Given changes in total output, the tariff reductions by the member countries of TPP appear to have varying impacts on the associated sectors. Table 5 presents the top five sectors in terms of sectoral output growth in scenario 2.

The sectors appeared in top five in scenario 2 are more or less same in the scenarios of “with USA” and “without USA”. For Brunei, transport equipment, machinery equipments and chemicals, rubber and plastic register modest output growth whereas for Singapore, food products and petroleum and coal tar products perform well in terms of growth in output. For Vietnam and Malaysia, textiles and apparel sectors are expected to exhibit significant growth. For Malaysia, wood products, electronic equipment, chemicals, rubber and plastic and machine equipments also show growth. Vietnam does the same in leather products, fishing, animal products and mineral products. However, the growth of output of these sectors greatly affected when the USA is considered a non-member. For instance, output growth rates of textiles and apparel in Malaysia and Vietnam are 26 and 32.3%, respectively, with the inclusion of the USA in the TPP whereas the corresponding percentages are reduced to 10 and 3.6%, respectively, when the USA is omitted.

3.1.2 Results of scenario 3

Table 4 also shows that each of the TPP-ASEAN nations would be benefitted in terms of output growth by their own tariff reduction; the growth rate is highest for Vietnam followed by Malaysia. However, the growth rate would be lower considerably if the USA is not joining the TPP.

Sector-wise growth rates show each of the TPP-ASEAN countries experience a positive growth in service sector's output (Table 5) with tariff reduction. For Singapore, the top five sectors mostly constitute the services. In other TPP nations, construction, other services and transport and communication services are also likely to exhibit a positive output growth. This output growth of services in scenario 3 could be explained through increased level of domestic production in the TPP-ASEAN countries resulting from increased import of intermediate goods entering into these economies in response to their own tariff reduction.

3.2 Export growth

3.2.1 Results of scenario 2

Accompanying the impact on output arising from trade liberalization, there are changes in export and import patterns. Table 4 shows that in scenario 2 export increases by a

Table 5 Top five sectors in output growth* in Scenario 2 and Scenario 3. Source: Results from the study

	Brunei		Malaysia		Singapore		Vietnam				
	With USA	Without USA	With USA	Without USA	With USA	Without USA	With USA	Without USA			
Scenario 2	3.6	Transport equipments	2.9	Textiles and apparel	15.5	Petroleum and coal tar products	3.6	Petroleum and coal tar products	32.3	Leather products	7.2
	1.7	Machine equipments	1.4	Wood products	9.8	Food products	3.3	Food products	17.5	Textiles and apparel	3.6
	1.6	Chemicals, rubber and plastic	1.2	Electrical equipment	0.6	Textiles	2.3	Textiles	6.7	Mineral products	1.8
	1.0	Chemicals, rubber and plastic	0.7	Chemicals, rubber and plastic	0.8	Oil and gas	1.8	Leather products	5.4	Fishing	1.4
	0.4	Other metallic minerals	0.3	Machine equipments	0.1	Leather products	1.1	Oil and gas	5.4	Animal products	1.0
Scenario 3	4.4	Coal and Other minerals	3.7	Construction	9.5	Construction	6.3	Construction	18.9	Textiles and apparel	13.2
	3.2	Metal products	2.9	Transport and communication services	6.9	Other services	6.1	Other services	15.5	Textiles and apparel	12.7
	3.1	Other services	2.5	Financial services	6.5	Transport and communication services	5.7	Transport and communication services	10.0	Other services	8.0
	2.8	Metal products	2.4	Electronic equipments	3.9	Financial services	5.4	Financial services	8.9	Other services	7.8
	2.4	Chemicals, rubber and plastic	1.7	Other services	3.8	Utility services	3.2	Utility services	8.7	Transport and communication services	7.3

* Growth rates (in %) are mentioned beside sector name

positive growth rate in all of the TPP-ASEAN countries. Among them, Malaysia and Vietnam benefit the most out of the other members in this respect. This indicates that tariff liberalization by the other TPP members would create a good scope for these two economies to serve a wider international market. However, like total output, growth rate of total export is found to be lower when the USA is treated as a non-member. For Vietnam, export growth reduces from 3.6 to 2.5% in scenario 2 without the USA. For Malaysia, the corresponding figure reduces from almost 3 to 2.31%. USA is the prime export destination of Vietnam, whereas the country is among Malaysia's top three export destinations. So, non-participation of the USA in the TPP would definitely have an adverse impact on the export of these economies but at the same time it could be said that these countries would enjoy a positive export growth rate even without getting any preferential access into the US market through the TPP.

Coming next to the export growth at the sector-level, the sectors appeared in top five are same in the two tariff reduction scenarios of with the USA and without the USA (Table 6). It is also observed that in scenario 2 some of the sectors that gained greatest export shares are also directly impacted by tariff reductions in terms of output growth. These sectors are—chemicals, rubber and plastic, machine equipments, transport equipments and non-metallic mineral products for Brunei, textiles and apparel, wood products, electronic equipments and machine equipments for Malaysia, petroleum and coal tar products and food products for Singapore, and textiles and apparel, leather products, animal products and fishing for Vietnam.

Export growth of textiles and apparel in Malaysia and particularly in Vietnam is significantly high. Since the Vietnamese Government introduced the policies of innovation, international economic integration and deployed the strategy of industrialization and modernization of the country, there have been outstanding developments in the textile industry, which has developed as a key economic sector (Viet 2015). However, the export growth of these two economies in textiles could have been larger if the USA continued to be a member of the TPP, since it is a major export destination for Malaysian and Vietnamese textiles. Vietnam is the second largest apparel supplier in the US market, accounted for almost 13% of total US import of textiles and apparel. In the absence of the USA in TPP, Vietnam and Malaysia could boost their export of textiles and apparel and also that of Leather products with greater market access in Japan, Australia, Canada, Mexico and Chile, as these two TPP-ASEAN countries are already the important suppliers of these products to those countries. The yarn-forward rule of origin under the TPP agreement, which requires TPP countries to use yarn produced from a TPP country only in textiles to qualify for duty-free access, could increase the export competitiveness of textile industries of Malaysia and Vietnam. These countries could take the advantage of high demand for yarn in the TPP countries by investing and expanding their operations in upstream production, which have higher value-added than the downstream garment production (Final Report, PWC 2015).

Similarly, Brunei's export of chemicals might be adversely affected by the absence of the USA in TPP but the country could boost its exports of rubber and plastic in the markets of Canada and Japan with the implementation of TPP negotiations on tariff.

Table 6 Top five sectors in export growth* in Scenario 2 and Scenario 3. Source: Results from the study

	Brunei			Malaysia			Singapore			Vietnam						
	Without USA			With USA			Without USA			With USA						
	Without USA	With USA	Without USA	With USA	Without USA	With USA										
Scenario 2	Chemicals, rubber and plastic	3.3	Chemicals, rubber and plastic	1.6	Textiles and apparel	40.5	Textiles and apparel	25.1	Petroleum and coal tar products	6.0	Petroleum and coal tar products	5.2	Textiles and apparel	55.4	Textiles and apparel	23.5
	Machine equipments	1.1	Machine equipments	0.6	Wood products	5.3	Wood products	3.5	Food products	3.9	Food products	3.9	Leather products	30.9	Leather products	15.5
	Transport equipments	0.3	Transport equipments	0.3	Electrical equipment	0.9	Machine equipments	0.5	Textiles	2.7	Textiles	2.0	Animal products	2.9	Animal products	2.0
	Oil and gas	0.3	Oil and gas	0.2	Machine equipments	0.7	Electrical equipment	0.5	Paper products	0.8	Paper products	0.5	Fishing	2.6	Vegetable and fruits	2.0
	Other metallic minerals	0.1	Other metallic minerals	0.1	Chemicals, rubber and plastic	0.5	Chemicals, rubber and plastic	0.5	Leather products	0.4	Leather products	0.3	Vegetable and fruits	2.4	Fishing	1.8
Scenario 3	Chemicals, rubber and plastic	1.3	Chemicals, rubber and plastic	1.0	Textiles and apparel	19.1	Wood products	13.2	Petroleum and coal tar products	2.1	Petroleum and coal tar products	2.0	Textiles and apparel	25.7	Textiles and apparel	15.2
	Machine equipments	1.0	Machine equipments	0.6	Wood products	15.2	Textiles and apparel	10.7	Food products	1.3	Food products	1.4	Leather products	18.9	Leather products	10.3
	Transport equipments	0.5	Transport equipments	0.4	Electrical equipment	5.9	Machine equipments	5.0	Textiles	1.3	Textiles	1.0	Animal products	10.4	Animal products	8.4
	Oil and gas	0.0	Oil and gas	0.2	Machine equipments	5.4	Electrical equipment	4.6	Paper products	1.0	Paper products	0.9	Fishing	5.8	Vegetable and fruits	5.5
	Other metallic minerals	0.0	Other metallic minerals	0.0	Chemicals, rubber and plastic	3.3	Chemicals, rubber and plastic	3.1	Leather products	0.8	Leather products	0.7	Vegetable and fruits	4.1	Fishing	3.6

* Growth rates (in %) are mentioned beside sector name

Reduction in tariff line in wood products is expected to increase Malaysia's export of this product to a large extent. In 2014, 46% of Malaysia's exports of wood-related products were to the TPP agreement countries, with Japan and the USA accounting for 33% of total wood-related exports. Growth rate of export of wood products reduces to 3.5% from 5.3% when the USA is omitted in the list of TPP members. So, there seems to be an adverse impact in case of wood products too. Still, Malaysia can benefit from its trade with Japan as 5% of wood-related exports to Japan still incur tariffs of up to 9%. In addition to this, Malaysia's Electronic equipments export, which could be increased due to lower tariffs and access to US Government procurement is the another sector adversely affected due to withdrawal of the USA.

3.2.2 Results of scenario 3

In case of tariff reduction by TPP-ASEAN countries too, export of Malaysia and Vietnam grows at a modest rate of 3.2 and 4.8%, respectively, with the USA as a member. The corresponding rates in case of without the USA are 1.0 and 2.9%, respectively. This implies that increased imports of these countries resulting from their own tariff cut also boost their exports to some extent. This is an indirect impact on the export resulting from increased import of intermediate goods following the tariff reduction by the TPP-ASEAN countries. However, for Brunei, export growth is found to be negative in response to its own tariff reduction. The top five sectors in scenario 3 (Table 6) are more or less same as in scenario 2 for all of the TPP-ASEAN countries, implying that increased import in response to their own tariff liberalization enhances the export growth more.

3.3 Import growth

In response to their own tariff reduction, that in scenario 3, TPP-ASEAN countries experience a growth in their import, though the impact would vary among these four nations. While Brunei, Malaysia and Singapore register a modest import growth, Vietnam is witnessed to have a significant growth in import. In FTAs, the developing countries generally benefit most from their own tariff liberalization (Cimino-Isaacs and Schott 2016). Vietnam registers 8.2 and 7.2% of import growth in the tariff reduction scenarios with the USA and without the USA, respectively (Table 4). USA is not included in Vietnam's top import origins, so withdrawal of the USA from the TPP might have no major impact on the growth of import. In contrast, Malaysia is found to be affected more in terms of import growth with the omission of the USA from the TPP. The study finds that in the absence of the USA, Malaysia registers a negative growth in import (Table 4). The USA features among the top three import origins of Malaysia along with China and Singapore, so withdrawal of the USA undoubtedly has an adverse impact on Malaysia as far as the growth of import is concerned. For Brunei too, import growth reduces from 6.05 to 3.92% when the USA is considered as the non-member of TPP. USA is among the top five import origins of Brunei. So, the withdrawal of the USA from the TPP results in decline of total import growth for the country.

Table 7 presents the top 5 sectors in terms of growth in import. Like exports, the sectors which show high output growth, also register a significant growth in imports. Thus, it seems that there is a correlation between changes in output and changes in the export–import shares.

Table 7 Top five sectors in import growth* in Scenario 2 and Scenario 3. Source: Result from the study

	Brunei		Malaysia		Singapore		Vietnam							
	With USA	Without USA												
Scenario 2	Coal and other minerals	4.6	Transport equipments	3.0	Textiles and apparel	22.8	Leather products	9.4	Leather products	8.9	Textiles and apparel	27.9	Leather products	8.6
	Transport equipments	3.2	Food products	1.6	Leather products	11.8	Textiles and apparel	5.2	Food products	4.3	Leather products	27.7	Textiles and apparel	7.3
	Machine equipments	1.7	Machine equipments	1.1	Food products	6.6	Food products	4.8	Textiles and apparel	2.3	Coal and other minerals	9.2	Fishing	3.7
	Food products	1.6	Coal and other minerals	1.0	Wood products	3.4	Chemicals, rubber and plastic	2.0	Petroleum products	1.6	Fishing	6.4	Coal and other minerals	5.0
	Chemicals, rubber and plastic	1.0	Chemicals, rubber and plastic	0.6	Chemicals, rubber and plastic	0.7	Chemicals, rubber and plastic	0.2	Wood products	1.0	Vegetable and fruits	5.7	Vegetable and fruits	1.3
Scenario 3	Vegetable oil	10.3	Vegetable oil	9.5	Grains	2.3	Grains	1.2	Oil and gas	5.4	Oil and gas	4.7	Vegetable oil	12.8
	Transport equipments	9.9	Transport equipments	8.5	Paper products	2.1	Paper products	1.0	Grains	4.2	Grains	3.2	Petroleum products	10.5
	Food products	8.4	Food products	8.0	Leather products	1.5	Leather products	1.0	Vegetable and fruits	4.0	Vegetable and fruits	3.7	Transport equipments	10.4
	Leather products	5.2	Leather products	4.1	Vegetable and fruits	1.4	Vegetable and fruits	0.8	Wood products	3.8	Wood products	3.0	Iron and steel	8.8
	Other crops	5.1	Other crops	3.5	Transport equipments	1.0	Transport equipments	0.6	Animal products	3.0	Animal products	2.8	Fishing	7.4

* Growth rates (in %) are mentioned beside sector name

3.4 Changes in welfare

This section discusses changes in output and trade arising from the aforementioned tariff reductions as mandated by the TPP members in different scenarios. How did these changes in tariff structures by the TPP members affect the welfare of the different regions involved? Table 4 also outlines the welfare changes for the TPP-ASEAN countries. Welfare results indicate that tariff liberalization under TPP leads to a net improvement in welfare levels of TPP-ASEAN countries, though the gains are not spread evenly for these countries. In other words, the welfare of TPP-ASEAN countries responded differently in case of tariff reduction. For Vietnam and Malaysia, welfare levels improve to a considerable extent whereas for Brunei and Singapore the gain in welfare is very marginal. It is also reflected in the table that Vietnam and Malaysia would lose significantly in terms of welfare change with the withdrawal of the USA from the TPP. If the USA would have been in the agreement, then the welfare change for Vietnam would be \$ 5927.1 million which would be reduced to \$ 1209.1 million without the USA in TPP, that is, the welfare of the country would lose by almost 80%. Malaysia would lose by 43% in terms of welfare with the withdrawal of the USA from the TPP. USA's withdrawal from the TPP implies a loss of an important market for Vietnam and Malaysia, resulting in a significant loss of welfare. In comparison, the loss for Brunei and Singapore is not so significant.

Another important finding in this regard is that the welfare of non-TPP-ASEAN countries reduces, indicating that trade agreement under TPP leads to welfare-level improvement in agreement countries of ASEAN at the expense of the non-agreement countries of the region. Thailand and Philippines have strong trade ties with the TPP-ASEAN nations as well as the other TPP members, so these two economies could be adversely affected to a large extent through the processes of trade diversion and preference erosion (Gilbert et al. 2016). The study finds that the global welfare would increase as the TPP agreement comes into effect, though it reduces with the omission of the USA.

3.5 Growth in household income and labour income

Trade liberalization measures also have an impact on the income of the household income and labour income, particularly in a developing country. It is seen that withdrawal of the USA adversely affects the household income and labour income, both of skilled and unskilled incomes. In this case too, Vietnam is the biggest loser as its growth of household income as well as the growth of wages to the skilled and unskilled labour reduces to a large extent when the USA is considered as a non-member (Table 4). Implementation of TPP is expected to create large employment opportunities for both skilled and unskilled labour in a labour-surplus economy like Vietnam, given the significant growth in output and export. However, the adverse impact of non-participation of the USA on household and labour income indicates the expected gain in terms of creation of job opportunities would be much lesser.

4 Summary and conclusions

The present paper focuses on the impact on the TPP agreement and aims to investigate the effect of the withdrawal of the USA and how it would affect the TPP-ASEAN economies. Based on a CGE framework, the study develops two scenarios taking into account the reduction of tariff applied immediately with the implementation of the agreement.

The scenarios are first developed considering the USA as a member of TPP and then as a non-member of the agreement.

Results of the study show that in the tariff reduction scenarios with the USA as a member, all of the TPP-ASEAN countries enjoy positive growth in total output and export as well as in import. Vietnam registers the most significant growth in total output and total import as compared to the other TPP-ASEAN countries whereas in terms of export growth, Vietnam and Malaysia are the largest beneficiaries. These findings are in tune with those of the previous studies by Petri et al. (2012), Gilbert et al. (2016) and Petri and Plummer (2016).

When the USA is omitted in the list of TPP members, the growth rates appear to fall considerably in all respects. USA is the prime export destination of Vietnam, whereas the country is among Malaysia's top three export destinations. Therefore, the withdrawal of the USA from TPP is likely to have an adverse impact on the export of these economies. However, these countries are likely to continue to have a positive output and export growth rates in the absence of the USA. The study also reflects that welfare of the TPP-ASEAN countries as well as the global welfare would increase as the TPP agreement comes into effect. But with the withdrawal of the USA, welfare of these countries reduces specially for Vietnam and Malaysia. Global welfare also reduces when the TPP is implemented without the USA. In this case, the country itself incurs welfare loss whereas the Oceania TPP countries, Canada and particularly Japan enjoy more gain in welfare, as they would become the major players in the TPP agreement in the absence of the USA. The other economic variables, household income and skilled and unskilled labour income experience a meagre but positive growth rates with tariff reduction. However, these growth rates too fall if the USA is not a part of the TPP.

Overall, the study finds that among the four TPP-ASEAN members, Vietnam and Malaysia are the two most adversely affected economies if the USA is not a part of the TPP. The other two countries, Singapore and Brunei, are relatively less affected in this regard. This may be due to the fact that, unlike Vietnam and Malaysia, Singapore already has the preferential access in the US market through the existing bilateral FTAs and Brunei is mostly engaged in trade with the South and Southeast Asian countries rather than with the USA.

Textiles and apparel made in Vietnam and Malaysia as well as wood products from Malaysia appear the most affected sectors in this regard. To boost the export of textiles to the TPP members other than the USA, these economies need to specialize in upstream production, that has higher value-added than the downstream garment production, given the yarn-forward rule of origin under the TPP (PWC, Final Report 2015). For wood products too, Malaysia has specialization in downstream products, which has a significant market shares in the USA and Japan. The country needs to expand operations to upstream products too, to capture a wider market in other TPP countries.

Joining the TPP is an opportunity to make a big leap for the TPP-ASEAN nations, particularly for Vietnam and Malaysia, in areas such as economic development, export promotion, trade facilitation, efficiency in supply chain, modernization and upgrading services. However, such benefits largely depend on their trade relation with the USA. Given the withdrawal of the USA from the TPP, the benefits of these economies are not of the same magnitude as was expected to be. So, in order to reap the potential benefit from the TPP agreement these countries should intensify trade relations with the other TPP members and change their trade pattern accordingly.

Additional file

Additional file 1. Methodological description.

Authors' contributions

Both authors have more or less equally contributed in designing the research, in the process of data collection and calculation as well as in drafting the manuscript and revising it. Both authors read and approved the final manuscript.

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Competing interests

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Availability of data and materials

The dataset supporting the conclusions of this article is available in and bought from the GTAP database version 9.

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Appendix

See Tables 8, 9, and 10.

Table 8 Current applied tariff rates of TPP members. *Source:* TPP tariff schedules, <http://ustr.gov/trade-agreements/free-trade-agreements/trans-pacific-partnership/tpp-full-text>

Country	Share of tariff lines already at zero under MFN rates	Simple average MFN tariff	Simple average MFN nonzero tariff	Maximum MFN tariff rate
Australia	46.2	2.9	5.3	10
<i>Brunei</i>	<i>75.4</i>	<i>0.3</i>	<i>1.4</i>	<i>30</i>
Canada	53.7	3.9	8.5	238
Chile	0.5	6	6	9
Japan	41.9	4.6	7.9	62
<i>Malaysia</i>	<i>60.6</i>	<i>3.6</i>	<i>9.2</i>	<i>60</i>
Mexico	56.1	6.9	15.7	254
New Zealand	57.8	2.4	5.6	10
Peru	53.4	5.1	10.9	17
<i>Singapore</i>	<i>100</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Vietnam</i>	<i>33.1</i>	<i>10.6</i>	<i>15.8</i>	<i>135</i>
United States	36.4	4.6	7.9	62

The italics highlight relevant ASEAN member countries

Table 9 Top export commodities of TPP-ASEAN countries considered for tariff cut in the study and the average ad valorem tariff applied in BAU scenario. Source: GTAP database, version 9

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country
Oceania TPP countries	Other food products, beverages and tobacco	8.70	Vegetables, fruits and nuts	5.20	Vegetables, fruits and nuts	6.21	Vegetables, fruits and nuts	0.04
	Textiles and apparel	8.59	Fishing	0.41	Fishing	0.30	Fishing	2.00
	Wood products	1.69	Vegetable oils and fats	0.78	Vegetable oils and fats	0.79	Oil and Gas	0.00
	Chemicals, rubber and plastics	4.26	Other food products, beverages and tobacco	3.95	Other food products, beverages and tobacco	1.13	Vegetable oils and fats	0.00
	Transport equipment	22.70	Textiles and apparel	2.90	Textiles and apparel	2.57	Other food products, beverages and tobacco	0.41
	Electronic equipment	0.54	Leather products	4.84	Leather products	1.56	Textiles and apparel	4.45
	Machinery equipment	0.00	Wood products	1.57	Wood products	2.38	Leather products	1.43
			Petroleum and coal products	0.11	Petroleum and coal products	4.39	Wood products	1.11
			Chemicals, rubber and plastics	1.29	Chemicals, rubber and plastics	0.17	Petroleum and coal products	0.26
			Transport equipment	1.01	Transport equipment	0.72	Chemicals, rubber and plastics	0.55

Table 9 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country
Japan	Leather products	0.00	Electronic equipment	0.19	Electronic equipment	0.11	Transport equipment	0.86
			Machinery equipment	1.89	Machinery equipment	1.38	Electronic equipment	0.04
			Vegetables, fruits and nuts	0.61	Fishing	3.53	Machinery equipment	0.27
			Fishing	2.75	Other food products, beverages and tobacco	1.66	Vegetables, fruits and nuts	2.92
			Vegetable oils and fats	0.10	Textiles and apparel	0.13	Fishing	2.52
			Other food products, beverages and tobacco	10.30			Coal and other minerals	0.00
			Textiles and apparel	0.00			Vegetable oils and fats	2.30
			Leather products	4.47			Other food products, beverages and tobacco	3.16
			Wood products	4.09			Textiles and apparel	0.01
			Chemicals, rubber and plastics	0.00			Leather products	10.20
						Wood products	0.19	
						Chemicals, rubber and plastics	0.09	

Table 9 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country
Canada	Textiles and apparel	17.60	Vegetables, fruits and nuts	0.00	Other food products, beverages and tobacco	57.00	Vegetables, fruits and nuts	0.03
	Leather products	7.29	Fishing	0.00			Fishing	0.10
	Chemicals, rubber and plastics	2.99	Vegetable oils and fats	9.34			Vegetable oils and fats	0.02
	Electronic equipment	0.00	Other food products, beverages and tobacco	8.23			Other food products, beverages and tobacco	1.16
			Textiles and apparel	12.80			Textiles and apparel	16.00
			Leather products	11.80			Leather products	12.70
			Wood products	3.05			Wood products	4.24
			Chemicals, rubber and plastics; transport equipment	3.41			Paper products	0.00
			Transport equipment	2.37			Chemicals, rubber and plastics; transport equipment	1.93
			Electronic equipment	0.04			Transport equipment	3.86
			Machinery equipment	2.03			Electronic equipment	0.01
							Machinery equipment	3.13

Table 9 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country
USA	Oil and gas	0.10	Vegetables, fruits and nuts	0.55	Other food products, beverages and tobacco	0.69	Vegetables, fruits and nuts	0.03
	Textiles and apparel	13.00	Fishing	0.03	Textiles and apparel	2.68	Fishing	0.14
	Leather products	7.37	Oil and Gas	0.10	Leather products	2.83	Oil and Gas	0.10
	Chemicals, rubber and plastics	2.75	Vegetable oils and fats	0.03			Vegetable oils and fats	1.77
	Transport equipment	0.46	Other food products, beverages and tobacco	1.51			Other food products, beverages and tobacco	1.63
	Electronic equipment	0.12	Textiles and apparel	12.70			Textiles and apparel	12.50
	Machinery equipment	0.00	Leather products	15.40			Leather products	15.40
			Wood products	0.68			Wood products	0.13
			Paper products	0.00			Chemicals, rubber and plastics; transport equipment	2.66
			Chemicals, rubber and plastics; transport equipment	3.30			Transport equipment	0.58
			Transport equipment	0.88			Electronic equipment	0.28
			Electronic equipment	0.13			Machinery equipment	1.41
		Machinery equipment	2.04					

Table 9 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country
Mexico	Textiles and apparel	9.80	Vegetable oils and fats	0.52	Other food products, beverages and tobacco	20.00	Vegetables, fruits and nuts	20.00
	Chemicals, rubber and plastics	11.10	Other food products, beverages and tobacco	58.20	Textiles and apparel	24.60	Forestry	1.12
			Textiles and apparel	27.00	Leather products	30.00	Other food products, beverages and tobacco	19.90
			Leather products	25.70	Wood products	19.80	Textiles and apparel	28.90
			Wood products	15.40	Paper products	5.00	Leather products	27.20
			Paper products	5.85	Petroleum and coal products	4.11	Wood products	16.30
			Petroleum and coal products	0.92	Chemicals, rubber and plastics; transport equipment	8.64	Paper products	8.35
			Chemicals, rubber and plastics; transport equipment	6.66	Transport equipment	8.56	Chemicals, rubber and plastics; transport equipment	9.01
			Transport equipment	6.46	Electronic equipment	0.10	Transport equipment	7.15
			Electronic equipment	0.65	Machinery equipment	17.80	Electronic equipment	1.48
		Machinery equipment	12.20			Machinery equipment	14.70	

Table 9 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country
Latin American TPP countries	Textiles and apparel	7.37	Vegetables, fruits and nuts	6.00	Vegetables, fruits and nuts	5.10	Other food products, beverages and tobacco	3.08
			Fishing	0.34	Vegetable oils and fats	5.99	Textiles and apparel	7.06
			Vegetable oils and fats	3.03	Other food products, beverages and tobacco	3.02	Leather products	7.52
			Other food products, beverages and tobacco	2.86	Textiles and apparel	6.08	Wood products	6.00
			Textiles and apparel	6.92	Leather products	7.12	Paper products	5.77
			Leather products	12.40	Wood products	5.66	Chemicals, rubber and plastics; transport equipment	3.20
			Wood products	5.99	Paper products	5.62	Transport equipment	5.85
			Paper products	5.11	Petroleum and coal products	5.97	Electronic equipment	3.21
			Petroleum and coal products	2.30	Chemicals, rubber and plastics; transport equipment	5.09	Machinery equipment	5.64

Table 9 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country	Export commodities	Average ad valorem tariff applied by the importing country
			Chemicals; rubber and plastics; transport equipment	4.90	Transport equipment	3.20		
			Transport equipment	4.28	Electronic equipment	4.87		
			Electronic equipment	3.53	Machinery equipment	5.91		
			Machinery equipment	5.54				

Table 10 Top import commodities of TPP-ASEAN countries considered for tariff cut in the study and the average ad valorem tariff applied in BAU scenario.
Source: GTAP database, version 9

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Import commodities	Average ad valorem tariff applied by Brunei	Import commodities	Average ad valorem tariff applied by Malaysia	Import commodities	Average ad valorem tariff applied by Singapore	Import commodities	Average ad valorem tariff applied by Vietnam
Oceania TPP Countries	Other crops	0.65	Crops and cereals	0.10			Crops and cereals	1.24
	Other food products, beverages and tobacco	1.45	Vegetables, fruits and nuts	2.33			Vegetables, fruits and nuts	16.10
	Textiles and apparel	1.95	Other crops	1.05			Other crops	0.16
	Leather products	0.27	Fishing	0.53			Fishing	1.46
	Wood products	4.79	Vegetable oils and fats	1.79			Oil and gas	1.72
	Petroleum and coal products	0.59	Other food products, beverages and tobacco	4.24			Vegetable oils and fats	9.86
	Chemicals, rubber and plastics	0.80	Textiles and apparel	2.23			Other food products, beverages and tobacco	15.60
	Transport equipment	10.30	Leather products	5.58			Textiles and apparel	6.70
	Electronic equipment	4.18	Wood products	3.53			Leather products	3.22
	Machinery equipment	1.54	Petroleum and coal products	1.05			Wood products	1.39
			Chemicals, rubber and plastics	3.85			Petroleum and coal products	5.49
			Iron and steel and non-metallic mineral product	0.97			Chemicals, rubber and plastics	3.30
			Transport equipment	3.40			Iron and steel and non-metallic mineral product	0.68
			Electronic equipment	0.49			Transport equipment	19.10
			Machinery equipment	5.36			Electronic equipment	4.27
						Machinery equipment	19.40	

Table 10 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Import commodities	Average ad valorem tariff applied by Brunei	Import commodities	Average ad valorem tariff applied by Malaysia	Import commodities	Average ad valorem tariff applied by Singapore	Import commodities	Average ad valorem tariff applied by Vietnam
Japan	Other food products, beverages and tobacco	0.28	Crops and cereals	39.90	Crops and cereals		Crops and cereals	34.20
	Textiles and apparel	0.71	Vegetables, fruits and nuts	0.55	Vegetables, fruits and nuts		Vegetables, fruits and nuts	14.50
	Leather products	3.41	Other crops	0.27	Other crops		Other crops	0.38
	Wood products	2.06	Fishing	0.01	Fishing		Fishing	8.61
	Petroleum and coal products	1.05	Oil and gas	0.00	Oil and gas		Vegetable oils and fats	19.00
	Chemicals, rubber and plastics	5.09	Vegetable oils and fats	1.24	Vegetable oils and fats		Other food products, beverages and tobacco	14.70
	Transport equipment	19.40	Other food products, beverages and tobacco	14.60	Other food products, beverages and tobacco		Textiles and apparel	8.66
	Electronic equipment	2.72	Textiles and apparel	9.53	Textiles and apparel		Leather products	10.30
	Machinery equipment	1.80	Leather products	10.20	Leather products		Wood products	15.90
			Wood products	1.88	Wood products		Petroleum and coal products	7.02
			Petroleum and coal products	0.48	Petroleum and coal products		Chemicals, rubber and plastics	6.20
			Chemicals, rubber and plastics	7.88	Chemicals, rubber and plastics		Iron and steel and non-metallic mineral product	1.71
			Iron and steel and non-metallic mineral product	18.10	Iron and steel and non-metallic mineral product		Transport equipment	18.20
			Transport equipment	20.50	Transport equipment		Electronic equipment	0.89
		Electronic equipment	0.12	Electronic equipment		Machinery equipment	23.70	
		Machinery equipment	9.37	Machinery equipment				

Table 10 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Import commodities	Average ad valorem tariff applied by Brunei	Import commodities	Average ad valorem tariff applied by Malaysia	Import commodities	Average ad valorem tariff applied by Singapore	Import commodities	Average ad valorem tariff applied by Vietnam
Canada	Other food products, beverages and tobacco	1.14	Vegetables, fruits and nuts	0.45	Crops and cereals	0.97		
	Textiles and apparel	0.28	Oil and gas	1.13	Vegetables, fruits and nuts	16.00		
	Leather products	0.74	Vegetable oils and fats	0.08	Other crops	0.57		
	Wood products	9.98	Other food products, beverages and tobacco	4.04	Fishing	1.24		
	Petroleum and coal products	1.09	Textiles and apparel	15.00	Vegetable oils and fats	1.16		
	Chemicals, rubber and plastics	0.41	Leather products	17.60	Other food products, beverages and tobacco	13.40		
	Transport equipment	3.83	Paper products	4.43	Textiles and apparel	10.60		
	Electronic equipment	6.77	Petroleum and coal products	0.30	Leather products	1.12		
	Machinery equipment	0.29	Chemicals, rubber and plastics	1.37	Wood products	1.82		
			Iron and steel and non-metallic mineral product	3.44	Petroleum and coal products	8.49		
			Transport equipment	1.41	Chemicals, rubber and plastics	1.03		
			Electronic equipment	0.42	Iron and steel and non-metallic mineral product	2.66		
			Machinery equipment	14.80	Transport equipment	33.80		
					Electronic equipment	1.89		
				Machinery equipment	1.87			

Table 10 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Import commodities	Average ad valorem tariff applied by Brunei	Import commodities	Average ad valorem tariff applied by Malaysia	Import commodities	Average ad valorem tariff applied by Singapore	Import commodities	Average ad valorem tariff applied by Vietnam
USA	Other food products, beverages and tobacco	8.79	Crops and cereals	0.05			Crops and cereals	2.17
	Textiles and apparel	1.75	Vegetables, fruits and nuts	2.22			Vegetables, fruits and nuts	20.70
	Leather products	4.09	Other crops	24.80			Other crops	0.23
	Wood products	2.92	Fishing	0.30			Fishing	3.41
	Petroleum and coal products	0.84	Oil and gas	0.67			Oil and gas	1.81
	Chemicals, rubber and plastics	0.56	Vegetable oils and fats	2.05			Other food products, beverages and tobacco	12.30
	Transport equipment	3.87	Other food products, beverages and tobacco	8.43			Textiles and apparel	7.60
	Electronic equipment	4.57	Textiles and apparel	10.80			Leather products	2.77
	Machinery equipment	2.73	Leather products	2.25			Wood products	0.96
			Wood products	1.18			Petroleum and coal products	8.63
			Petroleum and coal products	1.19			Chemicals, rubber and plastics	3.29
			Chemicals, rubber and plastics	5.20			Iron and steel and non-metallic mineral product	0.89
			Iron and steel and non-metallic mineral product	3.86			Transport equipment	29.40
		Transport equipment	0.93			Electronic equipment	1.21	
		Electronic equipment	0.07			Machinery equipment	11.40	
		Miscellaneous manufacturing	7.57					

Table 10 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Import commodities	Average ad valorem tariff applied by Brunei	Import commodities	Average ad valorem tariff applied by Malaysia	Import commodities	Average ad valorem tariff applied by Singapore	Import commodities	Average ad valorem tariff applied by Vietnam
Mexico	Other food products, beverages and tobacco	33.00	Other crops	6.42	Other food products, beverages and tobacco	0	Other crops	0.10
	Textiles and apparel	0.03	Vegetable oils and fats	1.45			Other food products, beverages and tobacco	14.50
	Chemicals, rubber and plastics	1.16	Other food products, beverages and tobacco	8.79			Textiles and apparel	9.68
	Transport equipment	18.90	Textiles and apparel	15.50			Leather products	4.16
	Electronic equipment	3.09	Leather products	12.50			Wood products	9.59
	Machinery equipment	3.22	Wood products	0.03			Paper products	18.80
			Petroleum and coal products	1.24			Chemicals, rubber and plastics	3.55
			Chemicals, rubber and plastics	10.10			Iron and steel and non-metallic mineral product	0.42
			Iron and steel and non-metallic mineral product	2.99			Transport equipment	32.50
			Transport equipment	25.30				
			Electronic equipment	0.52			Electronic equipment	2.76
			Machinery equipment	11.40			Machinery equipment	12.10
			Miscellaneous manufacturing	4.54				

Table 10 continued

Country	Brunei Darussalam		Malaysia		Singapore		Vietnam	
	Import commodities	Average ad valorem tariff applied by Brunei	Import commodities	Average ad valorem tariff applied by Malaysia	Import commodities	Average ad valorem tariff applied by Singapore	Import commodities	Average ad valorem tariff applied by Vietnam
Latin American TPP countries	Electronic equipment	0.78	Vegetables, fruits and nuts	5.01	Vegetables, fruits and nuts		1.540	
	Machinery equipment	0.00	Other crops	0.09	Other crops		1.64	
			Fishing	0.02	Fishing		9.31	
			Other food products, beverages and tobacco	13.40	Other food products, beverages and tobacco		5.36	
			Textiles and apparel	17.20	Textiles and apparel		9.78	
			Leather products	3.03	Leather products		10.90	
			Wood products	0.11	Wood products		0.56	
			Chemicals, rubber and plastics	0.62	Chemicals, rubber and plastics		0.50	
			Iron and steel and non-metallic mineral product	0.74	Iron and steel and non-metallic mineral product		1.75	
			Transport equipment	14.80	Transport equipment		2.22	
			Electronic equipment	3.54	Electronic equipment		9.38	
			Machinery equipment	8.47	Machinery equipment			

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