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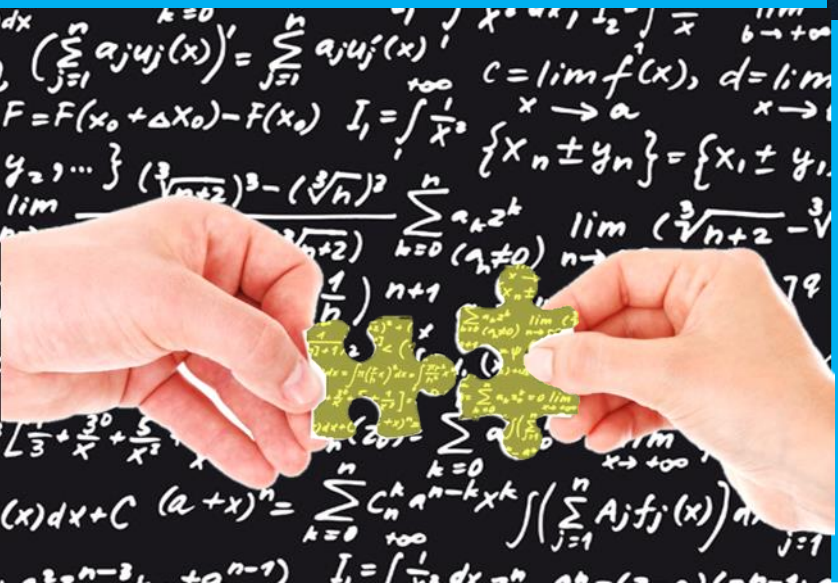
Tariff liberalization in the RCEP trade agreement and impact on India's automobile industry:

An applied general equilibrium analysis



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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

WORKING PAPER

Tariff liberalization in the RCEP trade agreement and impact on India's automobile industry: An applied general equilibrium analysis

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Abstract

Although India has been experiencing a significant trade deficit with respect to RCEP members, and therefore likely to be extremely cautious in terms of committing to any tariff liberalization under a formal RCEP agreement. This is mainly due to the fear that cheaper imports through RCEP will be bad for India's domestic import competing producers and generate job losses, although preferential market access in RCEP countries would be also providing an opportunity for Indian exporters to plug into trade in GVC goods. Therefore, it makes sense to analyse tariff liberalization at a sub-sectoral level, which seems to be more amenable to trade in GVC goods. Surprisingly, adequate attention has not been paid by researchers towards general equilibrium effects of trade liberalization particularly involving trade in global value chains (GVC) goods, in spite of its emergence being an established phenomenon among RCEP members including India.

This paper breaks new ground by undertaking a Computable General Equilibrium (CGE) simulation that utilizes 2015 baseline data in an updated GTAP 9 database to study the automobile sector of trade in GVC goods in the Indian context. The key here is to analyze the welfare effects for India, in a probable futuristic scenario of a full tariff liberalization (with and without any productivity improvement) as part of the ongoing RCEP negotiations, and the specific impact of this on output, prices and trade in the automobile and auto-parts industry, wherein GVC led trade assumes significance.

Specifically, we split the automobiles sector into both parts and components of automobiles, as well as the final assembly, hitherto not attempted in the existing literature. Two policy simulations are conducted, the first involving a full tariff liberalization within RCEP members, while the second scenario adds a sector-specific endogenous productivity shock to it. Our results suggest that there is a positive overall welfare impact due to RCEP on the Indian economy, and trade balance improves. However, the automobiles and auto-parts industry in India will specifically witness an adverse impact, unless an annual productivity growth of at least 2.5% is achieved. The paper therefore suggests that from the perspective of India, it is vitally important to focus on improving domestic productivity in the manufacturing sector, while

considering any future RTAs, including RCEP, that negotiates a phased tariff liberalization.

Keywords: India, RCEP, trade in GVC goods, GTAP model, automobiles, auto-parts, productivity

JEL Codes: F15, F61, O53

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1. Introduction

Trade in global value chains (GVC) goods involving developing countries is now a common phenomenon contributed by several well-known factors.[1] Participating countries in GVCs benefit from access to markets and technology transfer through foreign direct investment (FDI), trade of intermediate goods, and service links in manufacturing trade. For a particular country, linking into GVCs can either be through forward linkages (where the country provides inputs into exports of other countries) or through backward linkages (where the country imports intermediate products to be used in its exports), see Banga (2013) and Johnson and Noguera (2012). In the Asian context, automobiles and electronics industries in China, Republic of Korea, Singapore, Malaysia, Thailand and Indonesia and other East and South-East Asian countries witnessed increasing share of intra-industry trade in machinery parts and components involving these countries during this period, contributing to global growth in trade involving GVCs (Athukorala, 2013).

Compared to its East and South-East Asian neighbours, India, due to its late adoption of outward-orientation and unilateral reduction of trade barriers and involving a "calibrated" globalization, has been involved in trade in GVC goods only in recent years. According to OECD-WTO (2017), its backward linkages in GVCs, measured by share of Foreign Value Added (FVA) in gross exports increased from 11% to 21% over 2000-2014, compared to a decrease from 36% to 32% for China and ASEAN economies over the same time period.

During this time period, India has also enhanced its integration with South-East and East Asian economies through its "Act East Policy" and a web of bilateral and regional trade agreements (RTAs).[2] While it already has a working RTA with the ten member Association of Southeast Asian Nations (ASEAN) enforced since 2010,[3] one of its most important ongoing regional economic integration initiative is the RCEP

[1] These include rapid globalization over the past two decades, involving trade and investment liberalization, as well as innovation in production technology, communication and transportation.
[2] See Asia-Pacific Trade and Investment Agreement Database (APTIAD) at https://www.unescap.org/content/aptiad/ for details on these RTAs.
[3] See https://asean.org/?static_post=asean-india-free-trade-area-3

agreement, led by ASEAN.[4] The RCEP agreement aims to liberalize trade in goods and services, investment, economic and technical cooperation, competition and intellectual property among 16 countries, including the 10 members of ASEAN and its six major trading partners.

As of February 2019, trade ministers of RCEP countries have met in Bali, Indonesia to negotiate and finalize offers on i) import tariff reductions; ii) timelines for phased tariff liberalization and iii) implementation with respect to market access for trade in goods, particularly involving the two largest RCEP member countries, India and China.[5] It is notable that both these countries are also members of the Asia-Pacific Trade Agreement (APTA), initiated and implemented under the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) through mutual exchange of tariff concessions until 2005, but its scope has since expanded to services and investment liberalization, as well as trade facilitation.[6]

As of 2016, India exported goods worth a total of $46 billion to RCEP member countries, constituting a share of 17.6% of India's total merchandise exports (United Nations, 2018). China, Singapore and Viet Nam were the only RCEP members among India's top ten export destinations during this period.[7] Among RCEP members, China, Singapore, Viet Nam and Malaysia constituted more than a half of India's total exports to RCEP during the same period.

In contrast, India imported goods worth $130 billion from RCEP member countries, amounting to 36% of India's total merchandise imports during 2016. China, India's largest source of merchandise imports, and an RCEP member, accounted for $60 billion or nearly half of India's total imports from RCEP member countries. China, Republic of Korea and Indonesia were RCEP members among India's top 10 import

[4] See https://asean.org/?static_post=rcep-regional-comprehensive-economic-partnership
[5] See https://www.thehindubusinessline.com/economy/rcep-india-moves-to-narrow-differences-with-china-on-tariff-elimination-in-bali-round/article26323762.ece
[6] Established since 1975, this was earlier known as the Bangkok Agreement, and Lao Peoples Democratic Republic (PDR) and Republic of Korea are also overlapping members of APTA and RCEP, see https://www.unescap.org/sites/default/files/Brochure-of-the-APTA_Nov-2018.pdf for further details on APTA.
[7] China ranked 4th, Singapore 6th and Viet Nam ranked 8th among India's top 10 export destinations as of 2016 (United Nations, 2018).

sources during this period.[8] This suggests that India has been experiencing a significant trade deficit with respect to RCEP members, and therefore likely to be extremely cautious in terms of committing to any tariff liberalization under a formal RCEP agreement.[9] This is mainly due to the fear that cheaper imports through RCEP will be bad for India's domestic import competing producers and generate job losses, although preferential market access in RCEP countries would be also providing an opportunity for Indian exporters to plug into trade in GVC goods.[10]

Adequate attention has not been paid by researchers towards general equilibrium effects of trade liberalization particularly involving trade in global value chains (GVC) goods, in spite of its emergence being an established phenomenon among RCEP members including India.[11] While Srivastava and Sen (2015) provide a comprehensive analysis of intra-industry trade in parts and components for India's manufacturing trade over 1994-2012 identifying the potential sector for India to plug into Asian International Production Networks (IPNs), it does not analyse any impact of RTAs. Narayanan et al., (2010), is the only study that specifically analysed the effect of tariff liberalization in the Indian automobile industry using an applied general equilibrium analysis but does not specifically focus only on auto-parts and did not consider the implications of creation of a mega-regional RTA such as the RCEP.

Recent studies using computable general equilibrium (CGE) models include Gilbert et al., (2018), Narayanan and Sharma (2016), Hiro and Itakura (2014), Cheong (2013), Oduncu et al., (2014), Xin (2014) and Petri et al. (2011) who have analysed impact of mega-regional agreements such as the erstwhile Trans-Pacific Partnership (TPP) and the RCEP agreement. However, none of these studies have attempted to analyse tariff liberalization at a sub-sectoral level, which is more amenable to trade in GVC goods. As an example, automobiles as a GTAP sector consists of both parts and components of automobiles, as well as the final assembly, but the two have not been separated in any of the above studies. This paper contributes in that aspect by undertaking a

[8] China ranked 1st, while Republic of Korea and Indonesia ranked 7th and 8th respectively among India's top 10 sources for merchandise imports in 2016 (United Nations, 2018).
[9] See https://www.thehindubusinessline.com/opinion/rcep-india-must-exercise-caution/article26195834.ece
[10] See https://economictimes.indiatimes.com/news/economy/foreign-trade/what-is-stopping-india-from-joining-rcep-trade-deal/articleshow/67399881.cms?from=mdr
[11] For further elaboration of this point see Athukorala (2013), Srivastava and Sen (2015) and Tewari et al., (2015).

Computable General Equilibrium (CGE) simulation utilizing the GTAP9 database updated to 2015, augmenting it to study the automobile sector of trade in GVC goods in the Indian context. This industry is chosen for this analysis as this has been identified as one of the high-growth and rapidly liberalizing sectors for India's manufacturing sector, with a potential to integrate into trade in GVC goods and develop as a hub for global exports (Badri Narayanan and Vashisht, 2008; Sen and Srivastava, 2012, 2015, Srivastava and Sen, 2015; Nag, 2011).

We first employ the *Splitcom* tool (Horridge, 2008) to separate automobile sector from auto-components sector across the world, using the data on production and trade of these commodities in several countries, from United Nations (2018). Thereafter, we update the whole dataset to the year 2015, using the data from the World Bank. For this, we conduct a simulation with this updated data targeting GDP and its components as well as population in *GDyn* model, wherein we account for productive capacity growth because of capital accumulation.

We then conduct two policy simulations, based on India's ongoing negotiations with members of the RCEP. The first scenario therefore involves a full tariff liberalization scenario within RCEP members. The second scenario simulates the additional effects of a productivity improvement in India's automobile industry (focusing on automobiles and parts separately) on top of the RCEP tariff reductions.

The key here is to analyze the welfare effects for India, in a probable yet futuristic scenario of a full tariff liberalization (with and without any productivity improvement) as part of the ongoing RCEP negotiations, and the specific impact of this on output, prices and trade in the automobile and auto-parts industry, wherein GVC led trade assumes significance.

The remainder of this paper is organized as follows. Section 2 reviews the existing literature on trade in GVC goods involving India, presenting a brief overview of its trade in GVC goods involving RCEP members. Section 3 analyzes the modeling framework and methodology. Section 4 identifies the policy scenarios and details of the simulations. Section 5 analyzes the results, while Section 6 provides policy implications and concludes the paper.

2. Literature Review

2.1 Trade in GVC goods, RTAs, and India

It is now well recognized in the literature on trade in GVC goods that gross valued trade data tends to double count intermediate inputs and thereby incorrectly estimates the levels of trade and trade balance between trading partners. The theoretical and empirical literature has been focused on improving the measurement of value-added trade data, including indicators of participation of countries in GVC related trade. Koopman et al., (2010) provided a framework to decompose value-added exports domestic value added, returned domestic value added (domestic value added that comes back incorporated in foreign inputs produced with domestic inputs) and foreign value-added. Johnson and Noguera (2012) utilized input–output tables and bilateral trade data to compute the value added to gross exports (VAX ratio) as a measure of the involvement in global production sharing, and GVCs. OECD-WTO (2017), through its TiVA database, provides an internationally comparable dataset on trade in GVC goods involving 63 economies in 34 industrial sectors.

Trade policies through RTAs can facilitate forward and backward linkages in trade in GVC goods through three channels i) lower or no import tariffs, both at home and in export markets, ii) inward FDI openness iii) improved trade facilitation that also involves focus on logistics performance, intellectual property protection and standards, thereby improving institutional quality trade related infrastructure (Kowalski et al., 2015).

In the Indian context, empirical studies on trade in GVC goods have primarily been from the perspective of intra-industry trade and international production fragmentation involving vertically specialized trade.[12] They have concluded that while there is an increasing evidence of international production fragmentation in India, it is in the lower end of the value chain. Studies involving recent data on vertically specialized trade in Indian manufacturing, such as Srivastava and Sen (2015) and Tewari et al., (2015) suggests that the automobile industry has been one of the few sectors in India that

[12] For further elaboration see Veeramani (2002, 2009), Amighini (2012), Athukorala (2013) Srivastava and Sen (2015) and Tewari et.al (2015).

demonstrates emergence of production fragmentation. Since RCEP is an ASEAN-led RTA, it is particularly important to note that India import products of higher value or stage of processing from ASEAN than it exports to them, suggestive of Indian firms to upgrade on the quality ladder of the global value chain.

The evidence of India's increasing involvement in GVC related trade is observed by the fact that its share in domestic value added in its gross exports of all industries has declined from 88% to 76% over 2000-2011, while that in its exports of automobiles and auto-parts have declined more sharply from 82% to 67.5% over the same period. Concomitantly, the share of other RCEP members, most notably China, in India's value added in its gross exports of all industries more than tripled during the same period. This was even higher in case of the automobiles and auto-parts industry only (Table 1).

Which RCEP members contributed the most in India's gross exports of automobiles and parts in terms of value-added? Figure 1 presents this data over 2000-2011, the most recent period for which such data is available. It suggests that while Japan was the largest source of RCEP value added in the year 2000 for this industry (35%), it has halved since then, while China has increased its share from 14% to 37% during same time to become the largest RCEP source of foreign value-added.

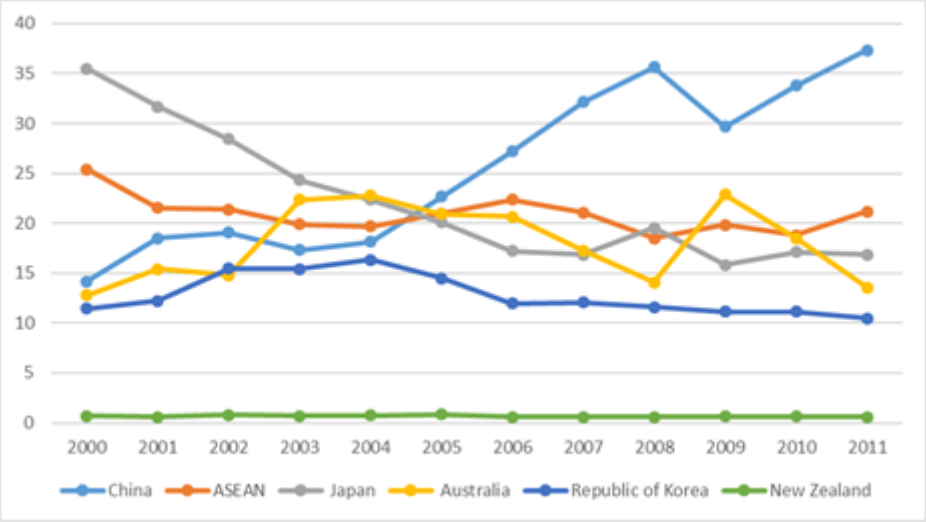

Figure 1 Share of RCEP 13 in foreign origin of value-added in India's exports of motor vehicles and parts (in %)*

Source: OECD-WTO (2017)

*Note: Excludes Brunei Darussalam, Lao PDR, and Myanmar due to lack of data availability.

This trend confirms the fact that automobiles and auto-parts industry in India has been involved in GVC related trade with RCEP members, and removal of trade barriers should facilitate the creation of forward and backward linkages in this industry, thereby boosting India's exports and domestic productive capacity in this sector. This is what we want to check empirically through our CGE model.

2.2 CGE studies on RCEP and India

Narayanan and Sharma (2016) is the most in-depth study yet on the general equilibrium effects of a mega regional trade agreement, such as the original TPP agreement (that included the United States), on a non-member such as India. Using the GTAP 8.2 version of the model on 18 tradable commodities and 16 regions of the world, they observed that focusing only on tariff reduction, there are no strong reasons for India to join the membership of TPP even in future. Their study concludes that agricultural sector in particular would be adversely affected through strong trade diversion even if India were to become a TPP member.

Hiro and Itakura (2014) utilizing a dynamic version of the GTAP model suggest that India will experience a welfare gain in the case of joining the RCEP by 0.5 to 1.3% in comparison to their baseline projections. They considered a scenario of full tariff liberalization in all commodities, except rice, over 2017-2025.

More recently, Gilbert et al., (2018) in a comprehensive survey of CGE studies utilizing GTAP, observe that while results of these models are dependent on set of assumptions, they are by and large consistent in their results and their findings are fairly robust. Based on 2011 as a baseline year, they estimated that India will experience a welfare gain amounting to 0.38% if they join RCEP in a scenario of full tariff liberalization.

While CGE modelling and gravity models are the chosen empirical tools for analyzing the impact of preferential trade agreements, the former is preferred here as this study analyzes a futuristic but hypothetical possibility of an RCEP agreement being enforced

in 2019 or beyond,[13] and gravity models are more appropriate while dealing with past trends related to impact of a trade agreement.

3. Modelling framework and methodology

3.1 The GTAP model

Since Sen and Srivastava (2011, 2012) and Nag (2011) suggest that auto-parts industry has the strongest potential in the Indian economy to attract IPNs, the CGE analysis and the policy simulation scenarios are specifically focused on this industry. The standard GTAP model[14] described in Hertel (1997) with an updated GTAP[15] 9 database for 2015 is utilized for this analysis. Data on GDP, Consumption, Investment, Government expenditure, exports and imports for all countries from the World Bank dataset for 2015 was used for the update of the existing GTAP 9 database. The *GTAPadjust* tool was used to update the dataset while keeping the balance intact. To keep a zero global trade balance, which doesn't necessarily happen in any real dataset due to errors, we let Rest of the World's (ROW) trade adjust to preserve the balance. We employed production data for all countries from United Nations Industrial Development Organization (UNIDO) industrial statistics. Trade and tariff data are from ITC (2006) *MacMAP* database. For specific countries like India, China, United States (US), Canada, Mexico, Japan and Germany, input-output tables provided details on intermediate consumption and final demand; for other countries we assume an average structure in terms of value shares and not absolute values, for developing and developed countries separately.

The simulation involved a 58 sector, 23 region aggregation, with skilled and unskilled labour further disaggregated into 5 more endowments. These were Agricultural Low Skilled labour, Clerks labour, Service Shop Floor labour, Technical Professional labour

[13] See https://www.straitstimes.com/singapore/leaders-vow-to-create-worlds-largest-free-trade-area-in-2019

[14] For details on the structure of GTAP and a full graphical exposition of the multi-region GTAP model, see Hertel (1997) and Brockmeier (2001)

[15] The structure of GTAP consists of a regional household representing an economy, with an open-economy linkage with ROW, the original model consisting of 140 regions with 57 sectors.

and Officers Managers labour. These are the standard categories of labour now available in GTAP Data Base.[16]

The regional aggregation consists of India, 14 RCEP members[17] and its other major trading partners. These include Australia, China, Indonesia, Japan, Republic of Korea, Thailand, Malaysia, New Zealand, Singapore, Viet Nam, Bangladesh, Sri Lanka, Latin America, North American Free Trade Agreement (NAFTA) members, Chile and Peru, EU-25, Rest of the World (ROW) and Other less developed countries (LDCs) for which India already has eliminated tariffs on auto-parts, as a regional grouping.[18] We separate the motor vehicles sector (corresponding to *mvh* code in GTAP), into finished automobiles (hereinafter referred to as *MotorVeh)* and automobile parts (hereinafter referred to as *MotorVehParts* or auto-parts*)* in our model respectively and disaggregate all the other sectors[19].

In the case of auto industry, ours is the first attempt to employ this tool in this context and this is one of the methodological/data contributions of this paper. In addition to production, consumption and trade, we also employ Input-Output data for several counties which do separate automobiles from auto parts, as explained above. The standard GTAP closure was slightly altered to reflect the assumptions of unemployment for all disaggregated categories of skilled and unskilled labour in all countries and fixing trade balances for all regions except EU-25, NAFTA and Japan.

Since RCEP members have already committed to tariff reduction and liberalization under their pre-existing free trade agreements (FTAs), we compare their most-favoured nation (MFN) and preferential tariff rates under recent regional FTAs, for India and three other developing country RCEP members in automobile parts. This ensures that our choice of tariff shocks is consistent with what is already agreed at the Harmonized System (HS) product classification in other FTAs involving RCEP members, as of 2018. Table 2 presents this data for India, Indonesia, Malaysia and

[16] See Mirza et.al (2014) use of these disaggregated labour categories, in the Chinese context.
[17] The analysis excludes Myanmar as disaggregated GTAP region data is yet not available for this RCEP member country.
[18] These are LDCs in the Sub-Saharan African region and are non-members of RCEP.
[19] The *Splitcom* tool was used to split the automobile sector into automobiles and auto-parts, while preserving the balance and keeping most other elements of the data unaffected. This tool has been widely used in the literature (e.g. Narayanan and Khorana, 2014; Taheripour et al., 2007) to disaggregate different GTAP sectors. Given that Input-Output data is difficult to get at disaggregated sectoral levels, we assume the aggregate sales and cost structures, while disaggregating the sectors based on production, consumption and trade datasets.

Viet Nam. It is notable at the outset that India has agreed to reduce or eliminate tariffs in auto-parts only for 8 HS 6-digit codes in the ASEAN-India FTA (AIFTA). While India has agreed to eliminate tariffs on 3 out of these 8 HS categories, Malaysia and Indonesia have already eliminated tariffs on all these categories under the ASEAN-Australia New Zealand FTA (AANZFTA), while Viet Nam has reduced it to 5% across all these categories under the same agreement.

Seven of the RCEP members, i.e. Australia, Brunei Darussalam, New Zealand, Japan, Malaysia, Singapore, and Viet Nam have already agreed to eventually eliminate tariffs in the most recently concluded Comprehensive and Progressive Trans-Pacific Partnership (CPTPP) Agreement which entered into force on December 30.[20] Notably, Viet Nam agreed to a 0.5-2.5% annual phased tariff cut in the CPTPP agreement, agreeing to fully remove tariffs to zero in the 13th year of enforcement of this agreement.

The base simulation in this study therefore assumes that tariffs on imports of all commodities, including automobiles and auto-parts, have been completely eliminated among India and its RCEP member partners. We compare this with a more ambitious scenario of a tariff liberalization along with productivity improvement in the abovementioned sector for India in the next scenario.

[20] See http://www.asiantradecentre.org/talkingtrade/the-cptpp-enters-into-force-on-december-30-2018.

4. Policy scenarios and simulation design

4.1 Full tariff liberalization in RCEP (Scenario 1)

As mentioned, Scenario 1 simulates a RCEP agreement that eliminates tariffs on imports of all tradable commodities within RCEP members, upon entry into force[21]. The results are analyzed for 15 RCEP members, with the exception of Myanmar[22].

Table 3 summarizes the initial Ad-valorem (AV) tariff at the final goods sector i.e. automobiles (*Motorveh*), and the disaggregated, intermediate goods sector, viz. auto-parts *(Motorvehpart)* for India's exports to and imports from RCEP members. This suggests that India's current import tariff barriers in these sectors are not uniformly higher compared to the same for all other RCEP members that import these from India. It is notable that ad-valorem Initial AV tariffs for India in automobiles and auto-parts sector is higher for imports from 5 RCEP members, viz. China, Japan, Republic of Republic of Korea, New Zealand, Singapore and similar to that of Malaysia.

It is therefore expected that if these AV tariffs goes to zero for India and its RCEP members, assuming no changes in current productivity growth (as of 2015), India will likely witness a greater volume of imports of automobiles and auto-parts from these countries, which will substitute for domestic production, thereby hurting Indian automakers and parts manufacturers. Concomitantly, its exports of the same are more likely to expand into newer ASEAN members viz. Viet Nam and Cambodia, as well as Australia and Philippines that presently have high import tariff barriers on these goods from India.

[21] Complete tariff removal was not feasible in the model since initial tariffs are high in this region, with their complete elimination resulting in huge changes in the economies which were not even realistic. So, we chose 80% tariff reduction for all countries except Cambodia for whom the reduction as 40%. This is also realistic since RCEP negotiations do not seem to explicitly consider 100% tariff elimination, given a range of sensitive sectors across the board. Automobiles and auto-parts are one of them. See https://economictimes.indiatimes.com/news/economy/foreign-trade/trade-calculations-india-offers-to-parley-on-rcep-tariff-terms/articleshow/58814035.cms

[22] Note that GTAP 9 database does not provide disaggregated data on Myanmar.

4.2 RCEP with productivity growth in India's auto-parts industry (Scenario 2)[23]

Since there are concerns raised on reduction in domestic industry output due to an RCEP RTA only in the base scenario, we extend the CGE simulations further in order to analyze the potential economy wide impact of a productivity growth in automobiles and auto-parts industry in presence of an RCEP. We need to estimate how much will productivity need to grow in presence of an RTA involving RCEP members?

Following van Meijl and van Tongeren (1999); Golub and Narayanan (2015), Wadhwa et al., 2017, we make output exogenous by making their corresponding technical change variables endogenous, which is achieved in our model by changing the closure to keep output fixed. The results suggest that under Scenario 1 involving a RCEP full tariff liberalization, a 2.4% and 2.2% productivity growth respectively, is needed annually to avoid a decline in domestic output of automobiles and auto-parts industry for India.

How realistic is a 2.2% total factor productivity (TFP) growth in auto-parts in India how does it compare with the current estimates? We use a growth accounting framework that decomposes output growth into the growth of various inputs and productivity to estimate TFP growth (TFPG) in this sector. Assuming competitive factor markets, full input utilization and constant returns to scale (TFP) growth can be estimated by first estimating the following equation:

$$\Delta \ln Y_t = \beta_0 + \beta_1 * \Delta \ln K_t + (1 - \beta_1) * \Delta \ln L_t \ldots (1)$$

where Y_t refers to real income, K_t refers to capital at time t, L_t refers to labour at time t and T is a time trend. Coefficient β_1 estimates the share of capital income, which is then fitted in (1) to obtain TFPG.

[23] This is referred to as the RCEP+PI scenario in Tables 4 to 14.

The average TFP growth rate over 1999-2014 in this sector using the translog index[24] was estimated at 0.12%. This is much lower than 1.84% TFPG estimated by Badri Narayanan and Vashisht (2008) over 1991-92 to 2005-06 period for India's manufacture of two/three wheelers and their accessories, and not for parts and accessories only. Notably, the ASI data suggests negative TFPG of 0.18% and 0.01% in 2012-13 and 2013-14 respectively in this sector.

Based on this, we develop a further simulation scenario of a productivity improvement on top of the baseline endogenous technical change of 2.3%, to analyse what happens to domestic output and exports and imports if there's an RCEP RTA in presence of an improved productivity than that required to keep output unchanged? We shock the *aoall* variable (output-augmenting technical change) in GTAP by 2.5%, analysing what happens to welfare, domestic output and exports and imports if there's an RCEP RTA in presence of an improved productivity than that required to keep output unchanged.

For both scenarios, we analyze sectoral impacts on output, exports, imports, besides overall welfare changes (in terms of equivalent variation, EV, as measured by GTAP). This is the amount of money consumers in each of the analyzed regions would pay instead of responding to changes in prices and quantities due to the simulation scenarios. We also analyze whether these simulated policy scenarios are net trade creating for India if they were to eliminate tariffs in the automobiles and auto-parts sector under RCEP.

[24] The methodology for estimating TFPG in this study using this index relies on India's Annual Survey of Industries (ASI) data available from 1999-2015. TFP growth rates are estimated only for the auto-parts sector that corresponds to National Industrial Classification (NIC) code 343 as per NIC 1998 and 2004 classification, and as NIC code 293 as per NIC 2008 classification. The variables used for estimation of TFP in this industry are Value of Output, Fixed Capital, Working Capital and Total Persons engaged in this industry. Total capital is calculated as the sum of fixed and working capital, while Total persons engaged measure the labour stock in this industry. Capital and output are converted to real values using sub-sectoral Wholesale Price Index (1993-94=100) for the sub-group Automobiles, Motorcycles, Scooters, Bicycles & Parts as estimated by RBI (2012).

A priori, we expect the following impacts as a result of these CGE simulations:

i) Economy wide, tariff liberalization in auto-parts in India and its RCEP partners should improve allocative efficiency and enhance welfare compared to a non-RCEP situation.

ii) This will also boost bilateral exports from India in the automobiles sector, as well as expand import demand in India from these countries. This is expected in the GTAP model as tariff liberalization will reduce domestic market prices of imports, which in turn, induces an increase in import demand by firms for intermediate inputs, private households as well as the government. Cheaper imported intermediate inputs for firms will reduce the cost of production, and reduced demand for domestic production may result in an excess supply situation, which can be rectified by the reduction of market prices to reach equilibrium.

iii) Productivity improvement along with RCEP agreement in India's automobiles and auto-parts sector should expand its domestic output, compared to RCEP only scenario, further reducing prices and increasing import demand in the disaggregated auto-parts sector from its trading partners compared to only a RCEP agreement in this sector. As expected in a GTAP simulation, bilateral trade patterns for India are affected due to import tariff reductions through the net effect of i) trade creation due to overall expansion in demand for cheaper imports from India, and ii) trade diversion due to expansion of bilateral exports by India's trading partners facing higher tariff reduction at the cost of others, that is observed in through the response to price differentials.

5. Results

We first present the sectoral results in terms of specific impact on the automobiles and auto-parts sector, before analyzing the overall welfare impact, decomposing the sources of those changes, and impact on national income. All results are estimated values based on policy simulations and represents a medium-term impact as the model utilized is comparative static in nature.

5.1 Output and supply prices

With full tariff liberalization in RCEP, it is observed that only 5 of the 57 GTAP tradable commodity sectors are affected negatively by a fall in their domestic output. These include vegetable oils and fats (down by 26.2%), oilseeds (down by 9.6%), automobiles and auto-parts (down by 3.6% and 4.3%), wools and silkworm (down by 3.0%) and other crops n.e.c.[25] (down by 1.2%) respectively. The largest increases in domestic output by tradable commodity sectors in India is seen in transport equipment n.e.c. (up by 21%), meat, cattle and livestock (up by 11%), leather products and electronic equipment (both up by 5.1%) and non-ferrous metals (3%) respectively.[26]

The specific impact of the policy scenarios on industry output of automobile and auto-parts sector across all regions modelled are reported in Table 4. A full tariff liberalization hurts India, Australia, New Zealand, China and Indonesia, in terms of decline in domestic output of automobiles and auto-parts among all RCEP members. Viet Nam, Thailand, Republic of Korea and Singapore respectively gain the most in terms of increase in domestic output of auto-parts. Japan, along with these four countries, gains in terms of higher domestic output of automobiles.

It is further observed that for India, domestic output of auto-parts reduces due to RCEP only but increases by 0.15% and 0.53% for both automobiles and auto-parts respectively due to productivity improvement over the baseline endogenous value of 2.3% under the productivity improvement (RCEP+PI) scenario (Table 4). This suggests that RCEP tariff liberalization will benefit domestic automobiles and auto-parts components sector in India if its productivity growth is at least 2.5% or higher, ceteris paribus.

Decomposition and evaluation of the industry demand equations in GTAP reveal that only 10.5% of domestic production of auto-parts is India is exported, so share of domestic demand is about 90%. In case of automobiles, this share is even higher at 93.4%. This is the highest among RCEP members, hence a significant impact is expected on domestic demand for automobiles and auto-parts in India due to RCEP involving a full tariff liberalization. The decline in domestic demand in auto-

[25] This category of grains and crops (not included elsewhere in the GTAP database) excludes rice, wheat, plant based fibres, sugars cane and sugar beet, as well as vegetables fruits and nuts.
[26] The detailed sectoral results can be made available from the author on request.

parts/automobiles (-4.92% / -4.91%) outweighs expansion in export demand (0.61%/1.33%) driven by strong decline in industry demand for domestic intermediate inputs, which is substituted by a strong expansion in demand for imported intermediate inputs, for both automobiles and auto-parts sector. With an improved productivity, a decline in domestic demand by -1.58% (-2.42%) is offset by an increase in export demand by 2.11% (2.57%) in case of auto-parts and automobiles industry respectively.

The reduction in supply price of auto-parts in India is 3.73% compared to 1.25% in scenario 1, while that for automobiles is 4.03% compared to 1.43% in Scenario 1 of RCEP only. While auto-parts supply prices decline more in Viet Nam and Thailand than in India under both scenarios, automobiles supply prices decline the most for India in presence of an improved productivity.

5.2 Trade patterns

When tariffs or import taxes are changed in a GTAP model, the relationship that links its effects in terms of trade creation (expansion effect) and trade diversion (substitution effect) can be stated through equation (2)[27]

$$qxs(i,r,s) = qim(i\,s)\ [\text{Trade Creation}] - ESUBM(i) * pms(i,r,s) - pim(i,s)\ [\text{Trade Diversion}] = - - (2)$$

where, *qxs(i,r,s)* and *pms(i,r,s)* are percentage changes in quantities and prices of bilateral imports of commodity 'i' from region r to region s and *qim (i,s)* and *pim (i,s)* are percentage changes in total quantities and prices of aggregate imports of commodity 'i' by region s, respectively. *ESUBM (i)* refers to the (Armington) elasticity of substitution among imports from different sources for commodity 'i'.

[27] See Narayanan and Sharma (2016).

The first term, *qim (i,s)* in (2) captures the extent of trade created overall due to a given tariff reduction, while the second term captures the substitution between different sources of imports due to the price differential between the exporter and total imports.

As observed in GTAP studies, changes in bilateral import prices are driven by changes in tariffs, and costs, insurance, freight (CIF) prices of imports from the source country, which are driven largely by changes in free on board (FOB) prices, assuming transportation prices do not change. Equation (3) shows this relationship, wherein *tms (i,r,s)* and *pcif (i,r,s)* are percentage changes in tariffs and CIF prices of bilateral imports of commodity 'i' from region 'r' to region 's':

$$pms(\ ,i\ r,\ s) = tms(\ i\ r,s\ ) + pcif\ (\ i,r\ s,\ ) \ldots.(3)$$

The results presented below for exports and imports are therefore interpreted in terms of these price linkages in (2) and (3) above.

5.2.1 Exports

The impact of the two simulation scenarios on aggregate exports of automobiles and auto-parts sector across all regions is reported in Table 5.

It is observed that with RCEP (scenario 1), India's global exports of automobiles is expected to increase by 20.14%, while that of auto-parts are expected to increase by 6.46%. This is the fifth highest increase among all RCEP members in case of auto-parts (after Thailand, Viet Nam, Republic of Korea and Singapore) and third highest (after Japan and Republic of Korea respectively) in case of automobiles. However, with improved productivity (scenario 2), India's exports in this sector is estimated to expand globally by 39.0% for automobiles, and 22.3% for auto-parts (Table 5).

It is observed that India's bilateral exports in the automobile sector increases to all regions due to improvements in productivity and tariff reductions, as expected a priori by theory (Table 6). The scale of the export expansion is largest in case of India's automobiles and auto-parts exports to Viet Nam, Lao Peoples Democratic Republic (PDR), Australia, Philippines, Thailand and Malaysia respectively, all of whom experienced the largest decline in market prices (*pms*) from India (Table 7).

Decomposition and evaluation of the export demand equation (2) reveals that India is a small player in the world market in this sector. With a tariff liberalization, expansion in export demand from India is driven by a strong positive substitution effect from all RCEP partners which outweighs the expansion effect in equation (2) above; tariff liberalization in auto-parts from India lowers market prices (*pms*) in Viet Nam, Lao PDR and Australia by nearly 17%, In Philippines by 12.5% and in Malaysia and Thailand by nearly 8%. (Table 7), among others. These decline further under an endogenous productivity improvement in the RCEP+PI (scenario 2). Notably, market price of composite imports (*pim*) in India of automobiles falls by nearly 9%, and for auto-parts by 6%. All non-RCEP members experience a much smaller decline in their market prices of automobiles and auto-parts.

5.2.2 Imports

The impact of the two simulation scenarios on aggregate imports of automobiles and auto-parts sector across all GTAP modelled regions are reported in Table 8.

Comparing Tables 5 and 8, it is observed that aggregate Imports into India are greater than exports from it to RCEP members. Notably, India's global imports of auto-parts are expected to increase by 7.6% under a tariff liberalization, the fifth highest among all RCEP members. However, with improved productivity, India's imports in this sector is estimated to expand globally by only 4.7% under a tariff liberalization. Automobile imports decline by almost 5% in the face of a tariff liberalization and productivity improvement.

Analyzing trends in region-wise changes in bilateral imports of automobiles and auto-parts into India) in Table 9, it is observed that tariff liberalization lowers import demand from non-RCEP members, and also from Cambodia, Lao PDR, Japan, Republic of Korea and Brunei Darussalam respectively, among RCEP members. The scale of the import expansion is largest in case of India's auto-parts imports from Viet Nam, Thailand, Australia, New Zealand, Malaysia, China, Philippines, Indonesia and Singapore respectively. Evaluating and decomposing the import demand equation (2), we observe that with an RCEP agreement, export demand into India is driven by expansion effect from these countries as tariff liberalization in auto-parts into India

lowers market prices (*pms*) from them (Table 7). Notably, the initial ad valorem import tariff in this sector in the base scenario was already lower than India in 7 of these countries, viz. China, Japan, New Zealand, Singapore, Republic of Korea, Indonesia and Malaysia.

The scale of import expansion is largest in case of India's automobile imports from New Zealand, Malaysia, Viet Nam, China, Thailand, Philippines, Singapore and Republic of Korea respectively. Evaluating and decomposing import demand equations in GTAP, we observe that with RCEP tariff liberalization in automobiles, import demand from India is driven by expansion effect from these countries as tariff liberalization in automobiles into India lowers market prices (*pms*) from them (Table 7).

Comparing the changes in bilateral exports and imports of automobiles from and into India by RCEP members, it is observed that Australia, Viet Nam, Lao PDR, Philippines, Thailand and Cambodia are the members wherein there's a net export expansion, even in the presence of an improved productivity on top of tariff liberalization in the auto-parts sector. 6 countries, viz. Viet Nam, Australia, Philippines, Malaysia, China and Singapore experience a net export expansion in auto-parts from India, with export growth demand outweighing import growth demand due to full tariff liberalization in this sector. Exports also grow from India to Japan, Republic of Korea, Lao PDR, Cambodia and Brunei Darussalam, although import growth declines from them. In spite of full tariff liberalization, net imports into India are higher from New Zealand and Thailand. With an endogenous productivity change, Thailand is the only country in RCEP wherein net imports from India for auto-parts is still higher, as import demand outweighs the export expansion.

The above results therefore imply that as expected from the base scenario, India is not able to expand its net automobiles and auto-parts exports to all RCEP members, even with full tariff liberalization and improved productivity. This is because of the fact that a full tariff liberalization under RCEP and an improved productivity in auto-parts is more likely to lower import prices into India than to its trading partners for both automobiles and auto-parts among 6 RCEP members. Notably, 5 of these viz. Japan, Republic of Korea, China, Malaysia and Singapore are major players in trade in GVC

goods in the automobile industry in Asia, and some of them have already agreed to eliminate or reduce tariffs in a phased manner under existing trade agreements.[28]

5.3 Welfare impact and changes in gross domestic product (GDP)

The changes in overall welfare and the source of those welfare changes are analyzed through the welcome decomposition analysis described by Huff and Hertel (2000) and in Hanslow (2000). The region wise changes in welfare are measured in money metric terms of changes in EV in the post shock compared to a pre-shock period.[29] Tables 10 presents the results of these welfare changes from the three policy scenarios.

It is observed that in Scenario 1 India gains a welfare of US$13 billion from an RCEP, and these welfare gains expand to US$16 billion in the scenario of an improved productivity. RCEP tariff liberalization do not appear to benefit India's domestic auto-parts producers, so protectionist pressures are likely. The gains in welfare are however greater than India for Japan, Republic of Korea, China, and Australia among RCEP partners, while welfare losses are largest for NAFTA and EU-25 regions among non-members.

Figure 2 shows the changes in real GDP for RCEP members under Scenario 1. It suggests that India gains from full tariff liberalization in RCEP by about 1% in terms of real GDP, but gains are higher than India for Republic of Korea, Viet Nam, Singapore, Japan and Australia among RCEP members.[30] It is notable that with the exception of Republic of Korea, the others are members of the already implemented CPTPP agreement.

[28] This would be true for Japan, Malaysia and Singapore under the currently enforced CPTPP agreement. See tariffs schedule for each member available at https://www.mfat.govt.nz/en/trade/free-trade-agreements/free-trade-agreements-in-force/cptpp/comprehensive-and-progressive-agreement-for-trans-pacific-partnership-text/

[29] The EV measure in our model measures the additional dollar of income that a regional household (including RCEP members in this model) would need to obtain the new level of utility, if goods were still to be valued at initial prices.

[30]The welfare change results are consistent with the 2011 base GTAP simulation of RCEP by Gilbert et. al. (2018), that estimated India's gains at 0.38% in an RCEP full tariff liberalization scenario, based on 2011 baseline GDP, since our study is based on the updated 2015 data.

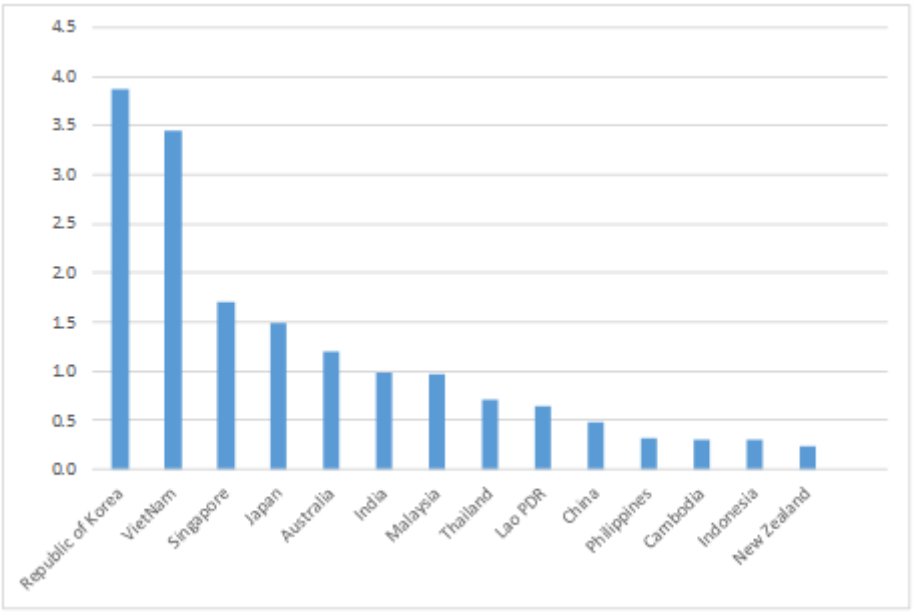

Figure 2 Percentage change in real GDP of RCEP members due to full tariff liberalization*

Source: Author's own calculations based on the GTAP model

*Note: Excludes Myanmar due to lack of data availability. Brunei Darussalam recorded a zero impact hence not shown.

However, in terms of nominal GDP changes due to the policy simulation, India appears to lose the most through full tariff liberalization among RCEP members in spite of a welfare increase. Under a productivity improvement in the automobile industry, these losses are lesser, but are not completely reversed. Japan, Republic of Korea, Australia, China, Singapore, Indonesia and New Zealand gain the most among RCEP members in terms of GDP, and also improve on their welfare.

What causes this decline in GDP for India in spite of a welfare improvement in both scenarios? Table 11 suggests that it is mainly contributed by a decline in domestic consumption, substituted by imports, as well as increase in exports, due to which trade balance improves, by nearly US$819 million in scenario 1. As India cuts tariffs under RCEP, the dynamics in market prices induce a change in the production and consumption with more of domestic production now exported and higher levels of imported consumption compared to a situation wherein RCEP was non-existent. Notably, with the productivity improvement in scenario 2, investment increases substantially, thus reducing the GDP losses from US $ 18 billion to US$14.4 billion.

Analyzing the sources of these welfare changes for India in Table 12, it is noted that while allocative efficiency of resources (due to changes in import taxes) – contributes to positive gains of US$5.3 billion in scenario 1 of a full tariff liberalization, these gains improve further in presence of an endogenous technical change of 2.5% to US$5.6 billion. The largest source of the welfare gains are endowment effects (gross of depreciation), primarily in skilled and unskilled labour. The contribution from technical efficiency (due to productivity shock) is about US$1.6 billion, which is a contributor to the total welfare gains observed under the RCEP+PI[31] scenario. The largest source of welfare losses is due to a negative terms of trade effect resulting from the full tariff liberalization across all scenarios modelled, suggesting that RCEP will lead to cheaper import prices, compared to export prices, for India, even in presence of a domestic productivity improvement. This is also confirmed by negative values for changes in India's trade balance for these sectors in the GTAP model,[32] the second largest source of loss in trade balance by commodity sectors, after vegetable oils and fats.

Since endogenous technical progress changes the magnitude of the terms of trade effects marginally, we decompose the terms of trade effects for India further for both scenarios. The results are presented in Table 13 for not only the auto-parts sector, but also for other sectors that contribute to these negative terms of trade effects.

It is observed that among the three components of the terms of trade effects,[33] it is the world export price effect for India which is largely negative and contributes to the overall negative terms of trade effects in total welfare across both scenarios. The world export price effect stems from the Armington assumption in GTAP that products are differentiated by their country of origin. The export price effect depends on whether the country's free on board (*fob)* export price for its variety of a commodity rises or falls relative to the export prices of competing suppliers of that commodity.

In the context of this study, India has a strong negative world export price effect in manufacturing, including automobiles and auto-parts sector. Its terms of trade deteriorate because of decreased domestic production in India due to tariff

[31] Refers to the productivity scenario that models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.
[32] The trade deficit for India in automobiles is estimated to be US$1.3 billion, while that for auto-parts is estimated to be around US$354 million, as given by the *DTBAL* variable in the GTAP model.
[33] These are the world price effect, the world export price effect and the world import price effect. For further details, see Burfisher (2016).

liberalization, and net imports of automobiles and auto-parts as a result of it, drives down the price of the India variety relative to those of its competing suppliers from RCEP members. This is because, India has higher initial tariffs than the RCEP partners, particularly for those with whom India imports more, implying that India faces greater price cut, relatively speaking, compared to other RCEP partners. This effect is particularly pronounced for automobiles in India as a final good sector than auto-parts, in the RCEP+PI scenario wherein there's productivity improvement in both sectors, driving down its export prices much more sharply.

Table 14 shows that *fob* price of India's manufacturing exports in a number of manufacturing sectors that contribute to automobiles (including chemical rubber plastics, textiles & wearable apparel), as well as services sector (transport and other business services), also fall relative to their global average *fob* price, contributing to the large terms of trade losses. The reason why services become cheaper could be their dependence on automobiles as intermediate inputs that have become cheaper.

The above suggests that pre-existing policy distortions in related intermediate input sectors, by way of taxes, quantitative measures or non-tariff barriers, needs to be removed, in order to reap any benefits of export competitiveness in an RTA like RCEP. Narayanan and Khorana (2010) for example highlights this aspect, of reducing tariffs in intermediate inputs and final products in a way that tariff escalation is avoided, from the perspectives of cotton-cotton textiles and raw/processed coffee sectors. Further Narayanan et al (2010) analyzes the issue of 'false competition' wherein ASEAN members and India may have no direct competition in the auto industry, since some of them are stronger on auto-parts while others are stronger on automobiles. Thus, focusing on auto parts and automobiles separately may be important to understand that India stands to gain due to a tariff liberalization on auto parts where it is already a major player among the RCEP members. This may not hold in the case of automobiles, in which India is more inward-oriented, with high tariffs and focusing on domestic markets with some exceptions like small and compact car segments.

5.4 Trade creation and trade diversion

Since India's real import trade volume[34] changes among RCEP and non-RCEP members due to the model experiment scenarios, it is important to ascertain whether these changes result in this trade agreement being net trade creating. We determine whether RCEP in auto-parts is net trade creating or diverting for India by comparing the change in its real imports from its RCEP partners with its imports from non-members of RCEP (Table 14). An agreement is net trade creating if expansion in imports from within the RCEP members exceed the loss in its imports from non-members.

The results obtained in Table 14, for both final assembly automobiles sector and auto-parts, suggests that while all scenarios modelled in this study will be net trade creating for India in case of auto-parts, it will be net trade diverting for the automobiles sector. Among RCEP members, China, Thailand, Malaysia and Viet Nam are the top RCEP member countries that increase their real imports of auto-parts into India, while for automobiles, there is greatest influx of real imports by volume from China, Republic of Korea, Viet Nam, Singapore and Thailand respectively. EU-25 is the RCEP non-member that suffers the most in form of trade diversion. Given the cascading tariff structure in this sector for India, it is therefore inevitable that RCEP will have an adverse effect on the automobile industry, as also observed in both Narayanan et al (2010) and Narayanan and Khorana (2014), and in Narayanan and Sharma (2016) in case of the erstwhile Trans-Pacific Partnership (TPP) agreement, that also included the US.

5.5 Caveats and limitations

Several caveats and data limitations are noted while interpreting the above results. First, while it is highly unlikely that RCEP would result in the complete removal of tariffs

[34] The real imports are expressed in constant millions of 2011 US dollars, where one unit of the good is the quantity that could be purchased for US$1.00 in the source country prior to the RCEP. This is calculated in the welfare decomposition utility in GTAP model as *VXMD * qxs*. By comparing the two volumes, both valued in the base year prices, the *dvol* term describes the change in quantities, or "real imports" expressed in value terms.

on all products listed in national tariff lines for India, this paper attempted to model the extreme scenario of tariff liberalization within RCEP. Since India is likely to have a sensitive or exclusion list covering products on which tariffs are not liberalized with each partner, the sectoral trade creation and diversion effects are more likely to be mixed.

Second, further, this study does not attempt to analyze any effects of services trade liberalization under RCEP, which is an important part of the negotiations agenda for India. These results are therefore likely to underestimate the potential effect of RCEP that would arise from services and investment liberalization.

Third, the GTAP model has both static and dynamic versions, and this study uses the static version, which does have its disadvantage in terms of focusing only on the outcome of the policy change and not on the time path or transition effects of that policy (Gilbert, 2013; Gilbert, et al., 2018).

Finally, data aggregation is a common issue in GTAP studies, and although attempts have been made here to specifically separate automobiles and auto-parts, the standard model assumes a simplistic market structure of perfect competition, which may not be realistic in a real world. It has been well documented in the recent literature such as Athukorala et al., (2018) that current versions of CGE models, including GTAP, have severe limitations in terms of trade data disaggregation as a result of which income distribution and welfare impacts of GVC related trade, (that fragments production into design, components, assembly, and distribution process, each of them generating economies of scale), can only be estimated with some degree of uncertainty. Indeed, incorporating imperfect competition requires complete market knowledge on firm behavior, pricing and costs across all RCEP members is a limitation in this study.[35] As such, the results are more conservative as the focus here was only on merchandise trade and more specifically on the automobiles and auto-parts industry.

[35] See Akgul et al., (2014) for further details on a recent extension of the GTAP model to firm heterogeneity.

6. Policy implications and concluding remarks

The above limitations notwithstanding, the above study provides important policy implications. First, at the aggregate level, an RCEP RTA with full tariff liberalization,[36] will improve overall welfare for India due to improved allocative efficiency effects, and lead to a 1% improvement in real income. However, this results in lower nominal income due to a decline in domestic consumption, although trade balance improves due to more of domestic production now being exported and higher levels of imported consumption compared to a situation wherein an RCEP agreement did not exist. Further, it will not adversely domestic output of all industries in India individually, and there are clear gainers and losers as one would expect in a trade agreement. This finding suggests policymakers that preferential market access in RCEP members would be providing opportunity for Indian exporters to plug into trade in GVC goods within Asia, and globally. This can potentially reverse job losses that may result in import competing industries due to cheaper foreign imports.

Second, automobiles and auto-parts are among the industrial sectors whose domestic output is likely to fall with tariff liberalization, unless an annual productivity growth of at least 2.5% is achieved in this sector. Under these circumstances, imports of these goods are more likely to increase than exports from India to RCEP members, even in presence of a productivity improvement.

Specifically, an RCEP with full tariff liberalization increases India's exports of automobiles and auto-parts only to newer ASEAN members such as Viet Nam and Lao PDR, as well Australia and Philippines, whose ad-valorem tariffs are higher than India pre-RCEP. India is unable to expand its net auto-parts exports to all RCEP members, even with full tariff liberalization and improved productivity. The results therefore suggest to policymakers that compared to its RCEP members, India's export competitiveness in this sector is much lower, and current low levels of productivity will

[36] The full tariff liberalization scenario in this study is modelled as 80% tariff reduction for all countries except Cambodia for whom the reduction as 40%, which is fairly realistic at the current stage of negotiations. From India's perspective, a tariff elimination offer is likely to be below 80% of goods traded, see https://www.thehindubusinessline.com/economy/rcep-india-moves-to-narrow-differences-with-china-on-tariff-elimination-in-bali-round/article26323762.ece

harm its domestic industry in face of increasing competition through RCEP or other RTAs.

As argued by Srivastava and Sen (2015), the urgent challenge is to address the existing supply and demand side constraints on moving up the global value chain of manufacturing trade, especially auto-parts and components. The constraints relate to mitigating infrastructural bottlenecks that increase the cost of businesses as compared to other RCEP members at similar or higher levels of development, inflexibility in labour laws, and skill development and accumulation of human capital in the manufacturing sector. It is these policy constraints that will inhibit Indian firms, especially small and medium enterprise exporters, to reap the gains from preferential market access into RCEP member export markets, involving trade in GVC goods. India can only link more strongly in GVC related trade if it not only reduces production costs, but also network and service link costs for setting up a global production base. This further requires reduction and eventual liberalization of non-tariff barriers in this sector, which remains an important and unfinished item on the negotiations agenda under the RCEP.

The paper therefore suggests that from the perspective of India, it is vitally important to focus on improving domestic productivity in the manufacturing sector, while considering any future RTAs, including RCEP, that negotiates a phased tariff liberalization. Concerns that RCEP with competing countries do not benefit the domestic automobile industry in India, and that is against the concept of "Make in India"[37] "for local value addition and local employment"[38] (SIAM, 2016), are not completely unfounded. It is important from the Indian trade policymakers' perspective that domestic reforms to boost productivity growth keeps pace with trade liberalization if such industries are to become competitive in the international markets in the near future.

The above results are subject to data limitations and assumptions of production and consumption structure under the standard GTAP model, but the fact that they are comparable with recent studies such as Gilbert et al., (2018) in the TPP context,

[37] See http://www.makeinindia.com/about for details about this initiative launched by the Government of India in 2014.
[38] see http://www.business-standard.com/article/pti-stories/ftas-may-hurt-make-in-india-drive-says-auto-parts-industry-116021700842_1.html

suggests the findings are fairly robust. However, future research is expected to utilize trade and protection data based on firm heterogeneity as and when it is available.[39] Further, this model is may be extended to understand the impact of a more comprehensive RCEP that is likely to include trade facilitation, as well as and reduction/liberalization of non-tariff barriers.

[39] Detailed firm level trade data is required for GTAP-HET modelling as per Akgul et. al. (2014), which is a constraint in the RCEP context.

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Appendix

A 1 Share of Origin of Value Added in India's Gross Exports (%)

India												
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
All Industries	88.7	87.5	87.3	86.7	84.3	82.6	80.5	80.9	77.5	79.1	77.8	76.0
Automobiles and Auto-Parts	82.0	82.2	81.4	82.0	77.6	77.6	74.5	73.4	66.9	70.5	69.7	67.5
Other RCEP												
All Industries	1.6	1.9	2.2	2.3	3.3	3.6	4.0	4.5	5.0	5.4	5.6	5.9
Automobiles and Auto-Parts	2.7	2.9	3.4	3.5	5.1	5.2	6.3	7.5	8.9	8.7	9.2	9.3

Source: OECD-WTO (2017)

A 2 Diagnostics test for spatial dependence

		Base MFN rate (%)			
CODE	**DESCRIPTION**	**India**	**Viet Nam**	**Malaysia**	**Indonesia**
870810	Bumpers and Parts thereof	10%	3-27%	0 to 25%	10%
870840	Gear boxes and parts thereof	10%	3-27%	0 to 25%	10%
870870	Road wheels and parts and accessories thereof	10%	3-27%	5 to 30%	10%
870880	Suspension systems and parts thereof (including shock-absorbers)	10%	3-27%	5 to 30%	10%
870891	Radiators and parts thereof	10%	3-27%	5 to 25%	10%
870892	Silencers (mufflers) and exhaust pipes; parts thereof	10%	3-27%	5 to 25%	10%
870895	Safety airbags with inflater system; parts thereof	10%	7-10%	30%	10%
870899	Others	10%	3-20%	5 to 30%	10%
		Preferential tariffs agreed to in RTAs involving RCEP members (as of 2018)			
CODE	**DESCRIPTION**	**India (AIFTA)**	**Viet Nam (CPTPP at signing)**	**Malaysia (AANZFTA;CPTPP)**	**Indonesia (AANZFTA)**
870810	Bumpers and Parts thereof	0%	2.5% - 24.5%	0%	0%
870840	Gear boxes and parts thereof	0%	2.5% - 24.5%	0%	0%
870870	Road wheels and parts and accessories thereof	5%	2.5% - 24.5%	0%	0%
870880	-Suspension systems and parts thereof (including shock-absorbers)	5%	2.5% - 24.5%	0%	0%
870891	Radiators and parts thereof	0%	2.2% - 20.2%	0%	0%
870892	Silencers (mufflers) and exhaust pipes; parts thereof	5%	2.5% - 24.5%	0%	0%
870895	Safety airbags with inflater system; parts thereof	5%	6.3% - 9%	0%	0%
870899	Others	5%	2.5% - 18.1%	0%	0%

Source: Author's compilation based on WTO Tariff Analysis online and

i) tariff schedule of India agreed under AIFTA, available at http://www.aseansme.org/dbfile/fta/aifta/3.1Tariffs_Schedule_India.pdf
ii) tariff schedules of Indonesia, Malaysia agreed under ANZFTA available at http://www.aseansme.org/zfta_aanzfta
iii) tariff schedule of Malaysia and Viet Nam agreed under CPTPP available at https://www.mfat.govt.nz/assets/Trans-Pacific-Partnership/Annexes/2-D.-Malaysia-Tariff-Elimination-Schedule.pdf and https://www.mfat.govt.nz/assets/Trans-Pacific-Partnership/Annexes/2-D.-Viet-Nam-Tariff-Elimination-Schedule.pdf respectively

A 3 Initial Ad-Valorem tariffs of RCEP members in automobiles and auto-parts at the GTAP sector level[1]

Automobiles (*Motorveh*)[2]			
Exporter	**Initial AV% tariff rate (into India)**	**Importer**	**Initial AV% tariff rate (into India's RCEP trading partners)**
Australia	0.0	Australia	66.9
New Zealand	34.2	New Zealand	11.3
China	22.4	China	14
Japan	20.4	Japan	0.0
Republic of Korea	19.7	Republic of Korea	0.2
Singapore	20	Singapore	0.0
Malaysia	25.2	Malaysia	24.9
Brunei Darussalam	0.0	Brunei Darussalam	0.0
Philippines	20.0	Philippines	47.4
Lao PDR	0.0	Lao PDR	71.7
Cambodia	1.3	Cambodia	10.5
Indonesia	0	Indonesia	0
Thailand	18.4	Thailand	25.3
Viet Nam	20	Viet Nam	75.3
Auto-parts (*Motorvehpart*)[3]			
Exporter	**Initial AV% tariff rate (into India)**	**Importer**	**Initial AV% tariff rate (into India's RCEP trading partners)**
Australia	15.0	Australia	23.4
New Zealand	12.0	New Zealand	4.0
China	7.8	China	4.9
Japan	7.1	Japan	0.0
Republic of Korea	6.9	Republic of Korea	0.1
Singapore	7.0	Singapore	0.0
Malaysia	8.8	Malaysia	8.7

[1] The assumption is that all non-zero initial AV tariffs goes to zero due to RCEP full tariff liberalization (Scenario 1). The ones which are already zero remain unaffected due to the simulation.
[2] Refers to finished Automobiles (final goods) sector
[3] Refers to Automobile parts and accessories (intermediate goods) sector

Brunei Darussalam	0.0	Brunei Darussalam	0.0
Philippines	7.0	Philippines	16.6
Lao PDR	0.0	Lao PDR	25.1
Cambodia	0.5	Cambodia	3.7
Indonesia	6.8	Indonesia	0.0
Thailand	6.4	Thailand	8.8
Viet Nam	7.0	Viet Nam	26.3

A 4 Estimated effects on Industry Output of automobiles and auto-parts sector[4] (% change)

	RCEP	RCEP+PI	RCEP	RCEP+PI
Country	**Automobiles**		**Auto-parts**	
Australia	-8.7	-8.7	-5.2	-5.3
New Zealand	-5.0	-5.1	-6.3	-6.4
China	-4.9	-5.0	-0.8	-0.9
India	-3.6	0.2	-4.3	0.5
Japan	20.0	19.9	10.0	9.9
Republic of Korea	23.2	23.1	15.1	15.1
Singapore	3.5	3.3	10.4	10.3
Malaysia	0.9	0.9	1.1	1.0
Brunei Darussalam	-2.2	-2.3	-1.3	-1.4
Philippines	2.6	2.5	5.1	5.1
Lao PDR	-23.2	-23.3	1.9	1.7
Cambodia	-7.7	-7.8	-4.2	-4.3
Indonesia	-13.6	-13.7	-0.3	-0.4
Thailand	3.4	3.3	29.8	29.6
Viet Nam	10.0	9.7	47.2	47.3
Bangladesh	0.7	0.3	-4.0	-4.2
Sri Lanka	-1.2	-1.4	-0.5	-0.6
Other LDCs	-0.9	-1.0	-0.4	-0.6
Chile & Peru	-1.3	-1.3	-0.3	-0.4

[4] Refers to the GTAP variable *qo*.

NAFTA	-2.9	-2.9	-1.3	-1.3
Latin America	-1.1	-1.1	-1.2	-1.2
EU_25	-1.5	-1.6	-2.5	-2.6
Rest of the World	-3.7	-3.8	-5.8	-5.9

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization[5] across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

A 5 Estimated effects on exports of automobiles and auto-parts sector[6] (% change)

	RCEP	**RCEP+PI**	**RCEP**	**RCEP+PI**
Country	**Automobiles**		**Auto-parts**	
Australia	-0.14	-0.2	-4.97	-5.19
New Zealand	-19.53	-19.73	-7.1	-7.22
China	5.99	5.85	4.1	3.95
India	20.14	39.01	6.46	22.29
Japan	42.76	42.65	0.12	0.03
Republic of Korea	31.66	31.46	18.67	18.59
Singapore	3.53	3.3	10.75	10.67
Malaysia	2.19	2.16	2.05	1.89
Brunei Darussalam	-1.69	-1.76	-1.21	-1.38
Philippines	3.4	3.31	5.18	5.1
Lao PDR	-23.95	-24	3	2.86
Cambodia	-26.46	-26.54	1.41	1.3
Indonesia	-2.59	-2.65	2.59	2.36
Thailand	8.78	8.66	50.57	50.29
Viet Nam	11.72	11.39	48.4	48.44

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

[5] See footnote 22 for details on the actual scenario modelled.
[6] Refers to GTAP variable *qxw.*

A 6 Estimated effects on bilateral exports of India's automobiles and auto-parts sector to selected regions[7] (% changes)

	RCEP	RCEP+PI	RCEP	RCEP+PI
	Automobiles		Auto-parts	
Australia	579.08	684.99	145.42	181.97
New Zealand	70.82	97.78	12.68	29.49
China	19.41	38.3	14.05	31.11
Japan	14.82	32.95	22.83	41.19
Republic of Korea	4.85	21.41	11.93	28.58
Singapore	8.18	25.19	9.3	25.4
Malaysia	44.95	67.84	35.78	55.99
Brunei Darussalam	-14.74	-0.99	3.77	19.17
Philippines	187.02	232.32	69.6	95.02
Lao PDR	427.07	509.68	105.03	135.6
Cambodia	8.86	26.07	-6.4	7.59
Indonesia	-42.04	-32.7	-13.85	-0.7
Thailand	68.57	95.08	24.74	43.27
Viet Nam	513.67	608.99	178.94	220.54
Bangladesh	3.88	19.45	-4.97	8.87
Sri Lanka	4.3	20.02	4.72	19.87
Other LDCs	4.07	20.12	4.79	19.98
Chile & Peru	4.35	20.83	4.6	20.29
NAFTA	3.67	20.02	3.48	18.92
Latin America	5.56	22.25	4.07	19.69
EU_25	5.09	21.63	3.4	18.76
Rest of the World	5.71	22.31	2.31	17.51

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

[7] Refers to GTAP variable *qxs* with India being the source country.

A 7 Estimated effects on domestic price of automobiles and auto-parts sector[8] (% change)

	Into India		From India			
	RCEP		RCEP		RCEP+PI	
	Automobiles	Auto-parts	Automobiles	Auto-parts	Automobiles	Auto-parts
Australia	0.8	-9.5	-33.0	-16.2	-34.7	-18.3
New Zealand	-19.9	-7.9	-9.4	-4.2	-11.8	-6.6
China	-15.3	-6.2	-11.1	-4.9	-13.4	-7.3
Japan	-11.7	-3.1	-1.4	-1.2	-4.0	-3.7
Republic of Korea	-13.0	-4.6	-1.6	-1.3	-4.1	-3.7
Singapore	-13.4	-5.2	-1.4	-1.2	-4.0	-3.7
Malaysia	-17.5	-7.6	-17.2	-7.6	-19.3	-9.9
Brunei Darussalam	-0.1	-0.1	-1.4	-1.3	-4.0	-3.7
Philippines	-14.1	-6.1	-26.8	-12.5	-28.7	-14.6
Lao PDR	-4.7	-4.5	-34.3	-17.1	-36.0	-19.1
Cambodia	-2.2	-1.6	-5.2	-2.6	-7.6	-5.0
Indonesia	-0.5	-5.4	-1.4	-1.3	-4.0	-3.7
Thailand	-14.5	-12.3	-17.3	-7.7	-19.5	-9.9
Viet Nam	-15.5	-12.7	-35.3	-17.7	-37.0	-19.8
Bangladesh	-0.7	-0.7	-1.4	-1.2	-4.0	-3.7
Sri Lanka	-0.4	-0.5	-1.4	-1.2	-4.0	-3.7
Other LDCs	-0.4	-0.4	-1.4	-1.2	-4.0	-3.7
Chile & Peru	-0.2	-0.2	-1.4	-1.2	-4.0	-3.7
NAFTA	-0.5	-0.5	-1.4	-1.2	-4.0	-3.7
Latin America	-0.3	-0.3	-1.4	-1.2	-4.0	-3.7
EU_25	-0.3	-0.3	-1.4	-1.2	-4.0	-3.7
Rest of the World	-0.3	-0.3	-1.4	-1.2	-4.0	-3.7

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.

RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

[8] Refers to GTAP variable *pms.*

A 8 Estimated effects on Import demanded at market price of automobiles and auto-parts sector[49] (% change)

	RCEP	RCEP+PI	RCEP	RCEP+PI
	Automobiles		Auto-parts	
Australia	14.52	14.58	5.06	5.08
New Zealand	1.68	1.69	3.46	3.48
China	27.68	27.68	2.16	2.11
India	19.16	13.69	7.66	4.74
Japan	10.07	10.08	18.53	18.49
Republic of Korea	14.57	14.55	24.55	24.44
Singapore	4.01	3.98	4.73	4.54
Malaysia	7.05	7.03	1.97	1.92
Brunei Darussalam	0.3	0.31	0.13	0.15
Philippines	4.07	4.06	1.25	1.24
Lao PDR	3.58	3.59	-2.7	-2.71
Cambodia	4.7	4.72	2.11	2.12
Indonesia	18.93	18.94	-3.57	-3.58
Thailand	29.6	29.55	12.04	11.93
Viet Nam	29.14	29.15	27.93	27.79
Bangladesh	-0.81	-0.79	0.24	0.25
Sri Lanka	-0.5	-0.42	-1.12	-1.18
Other LDCs	0	0.08	-0.12	-0.06
Chile & Peru	-0.03	-0.03	0.2	0.21
NAFTA	-0.69	-0.68	-1.88	-1.87
Latin America	0.06	0.09	-0.22	-0.22
EU_25	-0.24	-0.23	-1.28	-1.32
Rest of the World	-0.13	-0.1	-2.19	-2.19

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

[49] Refers to GTAP variable *qim*.

A 9 Estimated effects on bilateral imports of automobiles and auto-parts into India[50] from selected regions (% change)

	RCEP	RCEP+PI	RCEP	RCEP+PI
	Automobiles		Auto-parts	
Australia	-33.7	-36.8	33.2	29.5
New Zealand	139.3	128.2	20.8	17.5
China	75.9	67.8	9.0	6.0
Japan	39.5	33.1	-9.4	-11.8
Republic of Korea	51.5	44.5	-1.0	-3.6
Singapore	55.1	48.0	2.9	0.1
Malaysia	103.5	94.1	18.9	15.6
Brunei Darussalam	-30.2	-33.4	-23.2	-25.3
Philippines	62.7	55.2	8.5	5.6
Lao PDR	-9.5	-13.6	-1.4	-4.1
Cambodia	-21.6	-25.2	-16.6	-18.9
Indonesia	-28.8	-32.1	4.2	1.3
Thailand	67.0	59.3	58.7	54.4
Viet Nam	78.2	70.1	63.5	59.2
Bangladesh	-27.9	-31.3	-20.7	-22.9
Sri Lanka	-29.2	-32.4	-21.8	-24.0
Other LDCs	-29.3	-32.5	-22.2	-24.3
Chile & Peru	-29.9	-33.1	-22.9	-25.0
NAFTA	-28.7	-32.0	-21.4	-23.6
Latin America	-29.6	-32.8	-22.7	-24.8
EU_25	-29.5	-32.8	-22.3	-24.4
Rest of the World	-29.5	-32.8	-22.7	-24.8

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

[50] Refers to GTAP variable qxs wherein India is the destination country.

A 10 Estimated effects on welfare and GDP in medium-run (US $ billion)

	RCEP	RCEP+PI	RCEP
	Welfare in Equivalent variation (EV)		Gross Domestic Product (GDP)
Country			
Australia	21.9	22.0	40.6
New Zealand	0.8	0.8	2.2
China	46.7	46.3	12.6
India	13.3	16.5	-18.0
Japan	91.1	90.9	222.2
Republic of Korea	61.4	61.3	78.0
Singapore	8.1	8.1	9.9
Malaysia	2.8	2.8	-1.6
Brunei Darussalam	0.0	0.0	0.0
Philippines	-1.0	-1.0	-6.6
Lao PDR	0.0	0.0	-0.3
Cambodia	-0.1	-0.1	-0.3
Indonesia	3.1	3.1	3.3
Thailand	1.2	1.2	-0.1
Viet Nam	0.3	0.3	-3.0
Bangladesh	-0.4	-0.4	-1.5
Sri Lanka	-0.3	-0.3	-0.8
Other LDCs	-0.2	-0.2	-1.0
Chile & Peru	-0.2	-0.2	-1.2
NAFTA	-57.3	-57.6	-176.7
Latin America	-1.7	-1.6	-14.5
EU_25	-18.9	-19.0	-75.3
Rest of the World	-9.9	-9.8	-35.8

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

A 11 Changes in GDP components in India (US$ billion)

Simulation Scenario	Consumption	Investment	Government	Exports	(-) Imports	Total
RCEP	-17.5	1.4	-2.7	30.2	-29.4	-18.0
RCEP+PI	-16.0	3.4	-2.4	29.7	-29.0	-14.4

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

A 12 Welfare impact on India decomposed by main sources (US$ billion)

Simulation Scenario	Resource allocation effect/excess burden	Endowment effect	Technical Change	Terms of trade	Investment-savings terms of trade	Total
RCEP	5.3	15.0	NA	-5.7	-1.2	13.3
RCEP+PI	5.6	16.2	1.6	-5.6	-1.3	16.5

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models full tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

A 13 Decomposition of Terms of Trade Effects on India (all prices) by selected GTAP sectors (by value US $ million)

	RCEP				RCEP+PI			
GTAP Sectors	World price	India world export price	India world import price	Total	World price	India world export price	India world import price	Total

Other Business services	-57.8	-647.3	-61.9	-767.0	-55.5	-586.6	-59.8	-702.0
Manufactures, n.e.c.	-41.3	-305.1	-12.1	-358.5	-40.0	-272.6	-11.7	-324.3
Chemical, Rubber, Plastics	-0.4	-619.0	-71.8	-691.2	-0.4	-586.2	-70.8	-657.3
Transport Equipment, n.e.c.	-7.2	-564.0	-24.5	-595.6	-7.0	-562.1	-24.1	-593.2
Automobiles	24.3	-37.0	21.1	8.5	24.3	-134.4	19.6	-90.5
Transport services n.e.c.	-0.7	-103.0	6.5	-97.2	-0.6	-98.6	6.6	-92.6
Textiles	-21.7	-233.5	-5.7	-260.9	-21.0	-216.7	-5.4	-243.2
Wearing Apparel	-64.8	-162.5	-3.5	-230.9	-64.5	-146.4	-3.4	-214.3
Auto-parts	44.9	-18.6	37.0	63.4	45.0	-80.2	35.6	0.4

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models Full Tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

A 14 Estimated changes in real import volumes of Automobiles and Auto-Parts into India from RCEP and non-RCEP members (US$ million)

Simulation Scenario	**RCEP**	**RCEP+PI**
	Automobiles	
RCEP Members	4820.1	4242.4
Non-RCEP	-1711.8	-1903.5
	Auto-parts	
RCEP Members	1641.1	1190.0
Non-RCEP	-364.7	-399.1

Source: Authors calculations in GTAP based on policy simulations

Note: RCEP scenario models Full Tariff liberalization across 15 RCEP members, excludes Myanmar due to lack of data availability.
RCEP+PI scenario models RCEP with a productivity improvement of 2.5% in automobiles and auto-parts sector.

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