THE US-CHINA TRADE WAR: IMPACT ON INDIA AND ITS POLICY CHOICES

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I. Backdrop

The five-year period 2012-13 to 2016-17 witnessed a decline in Indian merchandise exports at an average rate of 4.5 percent per annum. The Ministry of Commerce and Industry initiated a discussion in August 2018 on designing a strategy for doubling India's exports by 2025. This growth from US$ 504 billion exports of goods and services in 2017-18 to above US$ 1,000 billion in 2025-26 would imply an underlying growth rate of exports of above 9 percent per annum. While merchandise exports constitute close to 63 percent of total exports, the share of service exports has been 37 percent during the last three years, 2015-16 to 2017-18. Assuming these proportions remain unchanged, a doubling of merchandise exports in six years would mean going from the base 2017-18 level of US$ 309 billion to about US$ 618 billion by 2025-26, and service exports going from US$ 195 billion to US$ 390 billion.

These are challenging targets. They raise the question of whether there are unexplored strategic opportunities in the current global trade situation, including in the looming US-China trade war, which can help India either achieve these targets or at least ensure that there are no significant reversals on the path to achieving them. It is this question that motivates this NCAER paper on how India should react to the trade tensions between the world's two largest economies.

More recently, of course, there has been an improvement in India's export performance, keeping it about the 9 percent required for doubling exports by 2025. Total exports registered a growth of 13.4 percent in 2017-18, with merchandise exports posting a growth of 10.3 percent and service export growing by 18.8 percent. This has been followed by further increases during April-August 2018, with total exports growing by 20.7 percent, merchandise exports by 16.1 percent and service exports by 28.7 percent.

Simply put, export growth depends both on domestic and global factors. While domestic factors include the efficient allocation and use of productive resources and supportive policy, global factors relate to the international trading regime, global demand and the exchange rate. For example, the decline in exports during 2012-13 to 2016-17 is

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explained by dampened global demand and the appreciation of India's real exchange rate in a recent seminal paper for the NCAER *India Policy Forum* (Chinoy and Jain, 2018).[2]

Globally, the multilateral trade discipline that marked the post-war years has been diluted by the emergence of bilateral and plurilateral preferential trade agreements. The web of preferential trading blocs has deflected attention from the consolidation of multilateral trade discipline, a key goal of the World Trade Organization (WTO).

The latest and perhaps most potent shocks to the liberal global trading regime have come from US President Trump's "America First" and "Make America Great Again" policies. Its most extreme manifestation is the trade war the US has declared with China, for the moment in a temporary truce while the US and Chinese negotiators try to avert a tit-for-tat battle.

Most professional economists and economic commentators agree that President Trump's approach to making America great again using trade protection is likely to cause economic losses for the US, China, and the global economy.[3] A recent special issue of the *Journal of Policy Modelling* provides a cross section of such views.[4] Under these circumstances, what should India do? Should it also raise import tariffs when its exports to the US and China are hurt by higher US and China tariffs? Or should it lower them? Should it respond to opportunities to be part of bilateral or plurilateral free trade agreements enthusiastically or with much caution?

This paper seeks to provide answers to such questions using simulations done at NCAER with its computable general equilibrium (CGE) model described briefly in the next Section and in detail in **Annex-1**.

Two recent empirical papers attempt similar answers at a global level. Bollen and Rojas-Romagosa (2018) have worked out the economic consequences of the ongoing trade disputes between the US, China, Mexico, Canada, the EU and other OECD countries. The analysis is based on the WorldScan CGE model, a multi-country, multi-sector global model.

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[2] Chinoy, Sajjid and Toshi Jain (2018), "What Drives India's Exports and What Explains the Recent Slowdown? New Evidence and Policy implications," presented at the NCAER India Policy Forum 2018 (forthcoming in the *IPF 2018 volume*).

[3] Martin Wolf, Chief Economics Commentator of the *Financial Times,* spoke eloquently about this in his 7th NCAER C D Deshmukh Memorial Lecture, "Challenges for India from the Global Economic Upheavals," January 15, 2019.

[4] Salvatore, Dominick (ed.), 2018. Kaushik Basu shows how US protectionist policies may provide some short-run benefits, but will be detrimental to the US economy in the long-run. Sherman Robinson and Karen Thierfelder show how the collapse of NAFTA and the trade war with other countries will damage the US, and even more so, Canada and Mexico. Justin Yifu Lin and Xin Wang suggest that increased tariff on Chinese imports will not reduce the overall US trade deficit nor increase US jobs. Fred Campano and Dominick Salvatore point out that a better way to close the US trade deficit would be to revitalise some of its faded industries by introducing new technology and making them internationally competitive. Joseph Stiglitz shows how protectionism will have major negative effects on living standards across the world, including in the US.

In their analysis, a full blown trade war, in which the US and its partner trading countries raise tariffs across the board, would lead to losses for all participating countries.

Devarajan et al (2018) at the World Bank and elsewhere use a multi-country, multi-sector global CGE model called GLOBE to analyse the economic impact of a full-blown trade war between the United States and its trading partners. They seek to advise developing countries on how they should respond. They conclude that developing countries should refrain from retaliatory action in order to gain from a trade war. These gains would come from the trade diversion away from the warring countries/regions. Developing countries would benefit further from progressively and unilaterally reducing tariffs, pursuing regional trade agreements, and working within the WTO disciplines.

These global results suggest that India also needs to give high priority to undertaking similar but more India-specific research on strategic trade policy, including studying the impact of participation in plurilateral trade agreements.

The Regional Comprehensive Economic Partnership (RCEP) encompassing *ASEAN plus Six* is an obvious candidate, with ongoing plurilateral trade negotiations in which both India and China are members. The November 2018 RCEP Ministerial meeting in Singapore failed to meet its goal of substantially concluding the trade talks by 2018. What different role, if any, should India play in RCEP, taking into account the likely gains from joining RCEP, particularly against the strong headwinds of trade protection? These developments pose both challenges and opportunities for India, and understanding the costs and benefits of different policy actions motivates the type of policy research done in this paper of which India needs to do a lot more.

II. Policy choices for India facing the headwinds of protectionism

A trade war would impact India's GDP growth rate and trade flows through changes in the global supply and demand of goods and their associated price movements. In the face of a trade war, India could choose to remain passive and do nothing, or it could raise or lower tariffs. What are likely to be the impacts of these different actions? The RCEP is the most prominent trade agreement on the agenda for India in the face of these headwinds. What is likely to be the impact of India being a part of a successfully concluded RCEP?

This NCAER paper seeks to answer these questions by simulating the policy choices and their impact on India's GDP growth and trade. The simulations are done using the Global Trade Analysis Project (GTAP) Model and the GTAP Release 9 database. [5] The GTAP is a comparative static model containing bilateral trade information, transport, and

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[5] https://www.gtap.agecon.purdue.edu/models/current.asp. NCAER is the India data correspondent for the GTAP Model. It also works closely on its CGE modelling work with the Centre for Policy Studies (CoPS) at Victoria University, Melbourne, led by Professor Peter B. Dixon, one of the world's foremost CGE experts.

protection linkages for 57 production sectors across all countries and regions. The production sectors include 14 in agriculture, four in minerals, 24 in manufacturing, and 15 in services. The data is reported for 140 countries/regions.

Box-1 provides a mapping of the 32 sectors of the GTAP model used for this NCAER paper. These include three sectors in agricultural products, two mining sectors, 17 manufacturing sectors, and ten service sectors. **Box-2** provides the mapping of the 140 GTAP countries/regions into the 22 countries/regions used in the NCAER version of the GTAP model for this purpose.

We undertake two sets of illustrative policy impact simulations: first, India's options in a US-China trade war in which both warring countries raise tariffs on agriculture, mining and manufacturing sectors, and second, the impact on India of its joining the RCEP free-trade zone. These simulations are done through uniform tariff changes across agriculture, mining, and manufacturing. There are no tariffs on services, and hence these do not enter in any of the simulations.

A. How will India fare in a US-China trade war?

In the first trade-war **Simulation 1**, the US and China raise tariffs uniformly against each other to 20% in agriculture, mining and manufacturing sectors. In a second, follow-up simulation, both the US and China increase their tariffs on imports from India as well, but India does not react. In a third simulation, India also reacts and raises it tariffs against imports of agriculture, mining and manufacturing sectors from USA and China up to 20%. In a fourth simulation, India lowers its tariffs. These four simulations are designed to shed light on the impact of the following questions:

1) What is the likely impact on India's GDP and trade when the US and China enter into a bilateral trade war, raising their bilateral tariffs to 20% on trade in agriculture, mining and manufacturing sectors?
2) What if the US-China trade war spills over to India in this Scenario 2, restricting imports from India, which faces higher tariffs on agriculture, mining and manufacturing sectors up to 20%, but India does not react?[6]
3) What if in response to Scenario 2, India also raises its tariffs on agriculture, mining and manufacturing imports from the US and China up to 20%?[7]

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[6] On March 4, 2019, Washington announced that it was pulling the plug on GSP for India, which will affect, among others, auto components, industrial valves, and textile materials. President Trump's GSP notification letter to Congress notes that India "has not assured the United States that it will provide equitable and reasonable access to the markets of India." In October 2018, Trump referred to India, "which is the tariff king," calling the US Trade Representative to start negotiations immediately because they wanted to "keep your President happy."

[7] This is not too far-fetched. In June 2018, India apparently notified WTO of its decision to impose higher import tariffs on 30 US goods - including motorcycles and heavy machinery, and including 18 iron and steel items, as well as a large number of agro products. ""Our estimates place a combined $240 million loss for India on account of Mr. Trump's steel, aluminium tariffs, and we felt a reciprocal tariff of a similar amount on US imports would be fair," a senior Commerce Ministry official said. https://www.business-

4) What if in response to Scenario 2, India actually *reduces* its tariffs to 20% in sectors that have existing tariffs above 20% on imports from the US and China? These imports would be agriculture, food, beverages and tobacco, and motor vehicles.

B. How will India fare when it joins an Asia Regional Trade Agreement

Annex-2 provides details of India's tariffs in 2010-11 and 2014-15.[8] India's import tariffs on agricultural products are much higher than on non-agricultural products. Opening up India's markets to imports in agriculture of course remains a sensitive political and social issue. Nonetheless, since agriculture also remains a negotiating point for entry into trade agreements, in our hypothetical experiments we simulate two scenarios in which India joins a regional trade bloc by eliminating tariffs on mining and manufacturing sectors and agriculture. The following scenarios simulate India joining an Asian trade agreement:

5) India joins an Asian region including China, Japan, ASEAN, NIEs and ANZ, somewhat mimicking RCEP-like tariff elimination, but in the absence of a US-China trade war, i.e. before the situation envisaged by **Simulation 1** above.

6) India joins a free trade region as in **Simulation 5**, but alongside a US-China trade war as in **Simulation 1**.

III. Description of Simulations

The six simulations explored in this paper are described here in one place for ease of comparison and comprehension.

Simulation 1: The US and China increase tariffs against each other up to 20% on agriculture, mining and manufacturing sectors. None of the US-China bilaterally traded sectors currently has tariffs above 20%.

Simulation 2: The US and China raise tariffs against each other up to 20% on agriculture, mining and manufacturing sectors, and do the same against India. None of the bilaterally traded sectors with India currently have tariffs above 20%. India turns the other cheek, and does not react.

Simulation 3: The US and China raise tariffs against each other up to 20% on agriculture, mining and manufacturing sectors, and do the same against India. India responds by increasing its import tariffs on the corresponding sectors up to 20% against the US and China. India has existing tariffs above 20% on imports in agriculture, food, beverages & tobacco, and motor vehicles. These are assumed to remain at their existing rates.

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standard.com/article/economy-policy/india-s-retaliatory-tariffs-on-30-us-items-to-rake-in-additional-240-mn-118061700511_1.html.

[8] Table 3.4 in *Trade Policy Review*, India, WTO (2015).

Simulation 4: The US and China raise tariffs against each other up to 20% on agriculture, mining and manufacturing sectors, and do the same against India. India responds by *lowering* its above-20% import tariffs on corresponding sectors down to 20% against the US and China.

Simulation 5: The impact of India joining an RCEP-like free trade agreement where the bilateral tariffs of member countries are brought down to zero for agriculture, mining and manufacturing sectors.

Simulation 6: The impact of joining an RCEP-like free trade agreement in the presence of the US-China trade war as in Simulation 1.
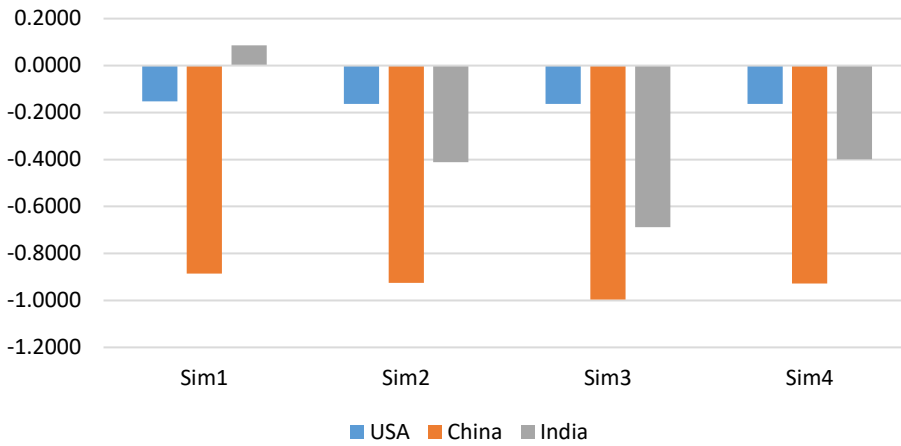
IV. Simulation Results

A. A US-China trade war and India

In a bilateral trade war, both the US and China stand to lose in terms of GDP, exports and imports in all the first four simulations (**Figures 1 to 3** and **Tables 1 to 3**). India gains in terms of GDP, exports and imports in the situation described by **Simulation 1**. However, when the US-China trade war applies also to India, which faces higher tariffs from both, India stands to lose in GDP, exports and imports in **Simulation 2**.

The losses increase further when India responds by increasing its tariffs on imports from the US and China, as in **Simulation 3**. The loss in India's GDP in **Simulation 3** increases by a multiple of 1.7 times compared with the GDP loss in **Simulation 2**, when it does not raise its tariffs. The losses are 3.4 times higher for exports and 1.6 times higher for imports in moving from **Simulation 2 to Simulation 3**. **Simulation 3** indicates that it would not be sensible for India to raise tariffs in a US-China trade war.

Simulation 4 portrays the scenario in which India is hit by higher tariffs because of the US-China trade war but India actually *reduces* its tariffs to 20% on products that have more than a 20% tariff. Though GDP, exports, and imports all still fall, the declines are the smallest among the three simulations (Scenarios 2, 3 and 4) that model India facing higher tariffs because of the US-China trade war. The sectors with tariffs higher than 20%, which would have their tariffs reduced, include agriculture, food, beverages & tobacco, and motor vehicles. It is probably for the reason of the limited number of items involved that the absolute results of **Simulation 4** are not significantly different from the ones in **Simulation 2**. Deeper tariff cuts that would cover more items could possibly provide even better results for a **Simulation 4** when India reduces its tariffs in a US-China trade war to take advantage of trade diversion.

Figure 1: Increase in GDP, , Simulations 1-4 (% Change from base)

Legend: USA, China, India

Figure 2: Increase in Exports, Simulations 1-4 (% change from base)

Legend: USA, China, India
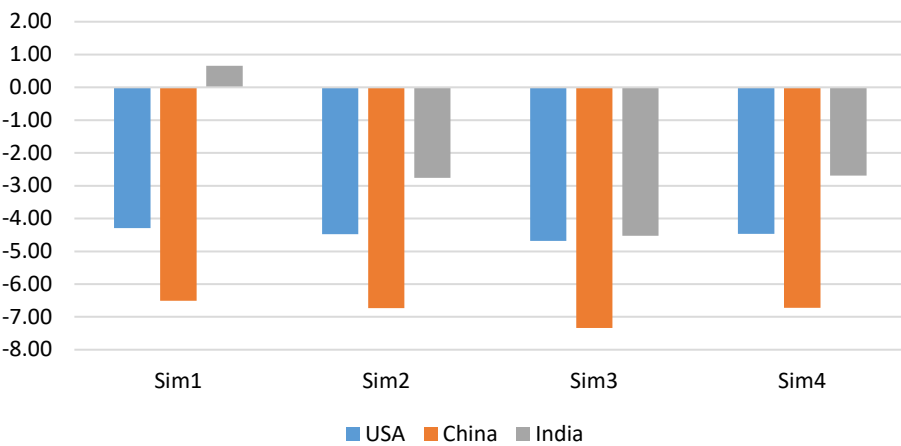
Figure 3: Change in Imports, Simulations 1-4 (% change from base)

Legend: USA, China, India
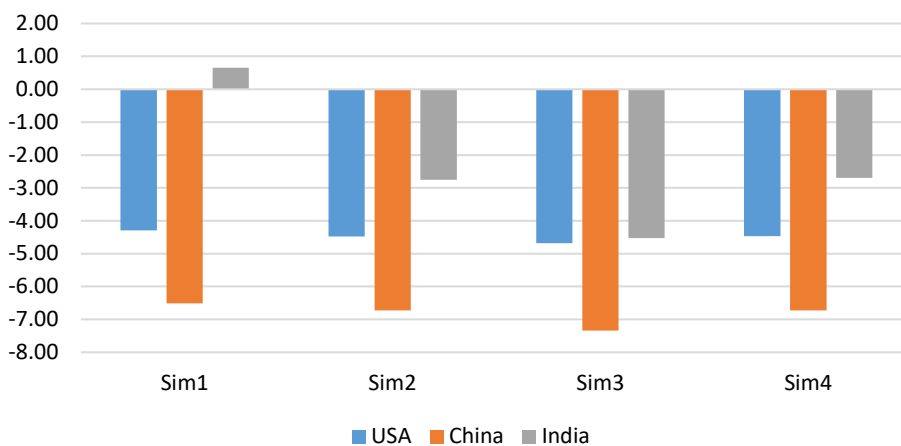
The overall GDP results indicate that it would be to India's benefit not to respond by increasing its tariffs even if the US and China impose the same tariffs on imports from India. Certainly, at the very least, the results indicate that a knee-jerk, tit-for-tat approach may not be the soundest one to pursue without greater examination. This finding is fully consistent with the global analysis cited earlier done for all developing countries by the World Bank Acting Chief Economist and NCAER non-resident Senior Fellow, Shantayanan Devarajan, and his co-authors.[9]

The US-China trade war in **Simulation 1** (in which no tariffs are imposed on India) boosts India's GDP, private consumption, and investment (**Table 4**). Beyond the impact on GDP, it is useful also to look at changes in private consumption and investment flows, i.e. in the composition of the GDP change. The increase or decrease in private consumption (as a proxy for welfare) may be more than that in GDP. The increase in GDP can be less than the increase in private consumption for several reasons. One reason that is relevant in these simulations is that the tariff changes under consideration cause the terms of trade to improve, allowing consumption to increase without the same increase in GDP because investment comes down. The reverse would be true if private consumption increases proportionally less than the GDP increase. Such changes in GDP and consumption can, of course, be negative as well. Another way to look at the simulations is whether the economy is investing in building new capital that would enable a higher and sustained rate of growth in the future. Such increases in investment relative to GDP are indicative of the economy becoming more ready for future growth. Of course, exploring the second round of the impact of additional capital in the economy can only be captured through a dynamic CGE model, which are not using.[10]

In the case of the US-China trade war in **Simulation 1,** the increase in investment relative to GDP (percent change in investment *minus* percent change in GDP), at 0.34%, is higher than the corresponding difference between the change in private consumption relative to GDP at 0.09%. Commensurately, when the US and China impose tariffs on imports from India in **Simulations 2, 3 and 4**, the damage to investment is relatively more than to consumption. **Simulation 4** minimises such damage for India, i.e. when it lowers its tariffs on imports of agriculture, food beverages & tobacco, and motor vehicles from the US and China.

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[9] Shantayanan Devarajan, Delfin S. Go, Csilla Lakatos, Sherman Robinson and Karen Thierfelder (2018), "Traders' Dilemma: Developing Countries' Response to Trade Disputes," Policy Research Working Paper 8640, World Bank: Washington DC.

[10] A proposal to support the building of a dynamic CGE model for India at NCAER in collaboration with CoPS in Australia is currently under review with the Asian Development Bank and with the Ministry of Commerce.

B. India joins an RCEP-like Free Trade Area

This discussion provides scenarios of the potential benefits for India from joining a large trading bloc, taken to be similar to RCEP. This turns out to be beneficial for all the countries/regions of the RCEP.

Simulation 5 is about joining an RCEP-like free trade zone when the US and China are not fighting a bilateral tariff war. **Simulation 5** shows that GDP, exports, and imports of all member countries increase, except for the exports of Japan (**Figures 4-6** and **Tables 5-7**). China and India turn out to be the two major gainers in terms of GDP and exports. Both these countries, perhaps China less so, have surplus unskilled labour resources and a wage rate advantage. China and Japan are the major gainers for imports. India's GDP increases by 0.88%, compared with 0.34% for China. India's exports grow by 11.5%, the highest rate among all ASEAN countries/regions. India's imports grow by 7.1%. India benefits from efficiency gains.

Simulation 6 is similar to **Simulation 5**, with the additional assumption of the US and China having gone to a trade war as depicted in **Simulation 1**. Recall that China was a major loser in its GDP (-0.89%) when it went to war with the US in **Simulation 1**. China's increase in GDP arising from RCEP formation is 0.34%. However, RCEP formation, when China is already in a tariff war with the US, does not offset its GDP loss arising from the tariff war: China's GDP in **Simulation 6** declines by 0.53%. GDP in all other RCEP countries/regions increases: China's GDP losses add to India's gains. India outsmarts China and shows the highest increase in GDP at 0.97%, higher than what it gains even under **Simulation 5**. India turns out to be a winner in exports, with an increase of 11.7%. China is a loser in imports.

India gains in terms of GDP, private consumption and investment under both **Simulations 5 and 6**. GDP increases by 0. 97% in Simulation 6, higher than the corresponding increase of 0.88% under **Simulation 5**. Private consumption and investment increase under **Simulation 5,** private consumption by 0.56% and investment by 0.77% (**Table 4**). The corresponding pattern of growth in GDP, private consumption and investment under **Simulation 6** remains similar to **Simulation 5**, though with greater intensity. **In Simulation 6,** Investment increases by 1.22% compared with GDP growth of 0.97% and consumption growth of 0.73%.

Figure 4: Increase in GDP, Simulations 5 & 6 (% change from base)
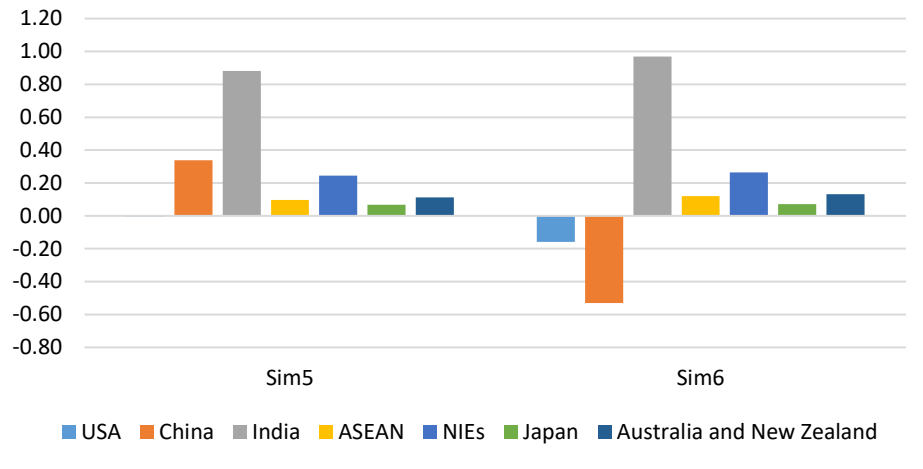
Figure 5: Increase in Exports, Simulations 5 & 6 (% change from base)
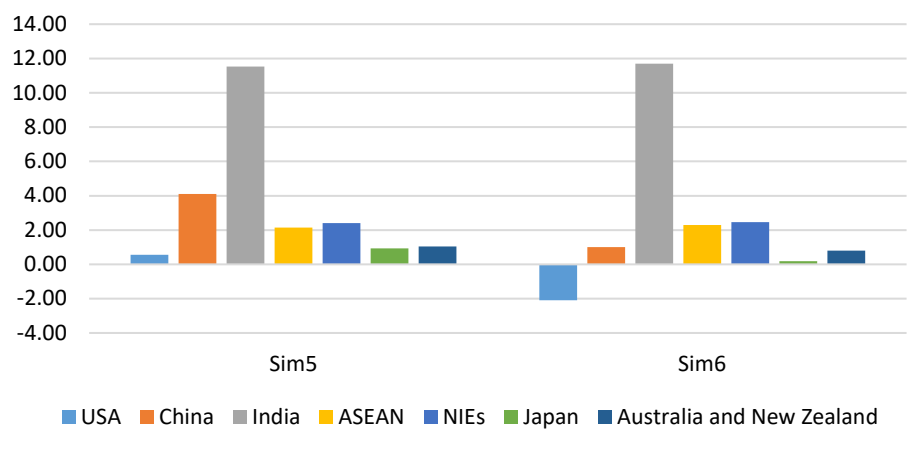
Figure 6: Increase in Imports, Simulations 5 & 6 (% change from base)

V. Conclusion

India needs to give high priority to undertaking quantitative, rigorous, computational, model-based research on strategic trade policy, including studying the impact of participation in plurilateral trade agreements. All large economies have such capaci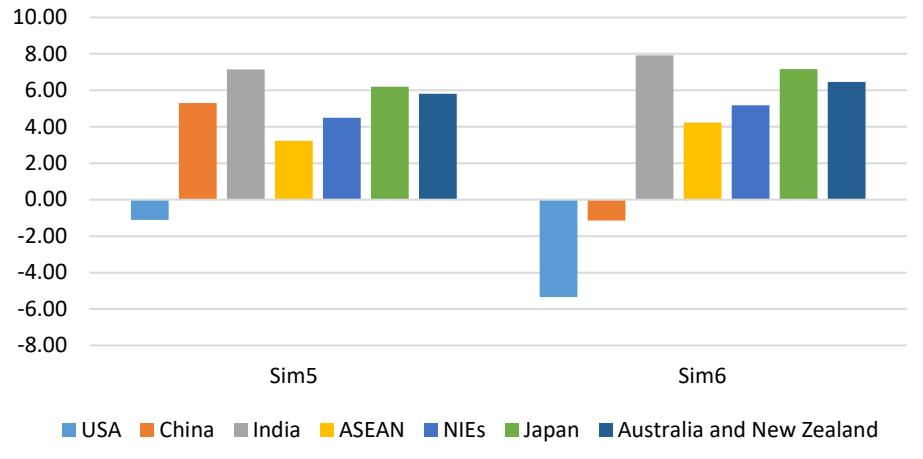ties in their research institutions and even in government. This NCAER paper was prepared for the High Level Advisory Group (HLAG) on Trade Policy chaired by Dr Surjit Bhalla.

Faced with growing protectionism globally and the possibility of a major US-China trade war and Indian exports facing higher tariffs, Indian policymakers are considering the impact of these developments and choosing between different policy responses. This NCAER background paper explores the impact of several broadly defined scenarios against 1) a base-case US-China trade-war scenario in which the tariffs facing India do not change; 2) India faces higher tariffs, but does nothing; 3) India retaliates by raising tariffs; and 4) India lowers tariffs for imports from the US and China. The paper also explores two further scenarios of an RCEP-like FTA of which India is a part 5) in the absence of a US-China trade war and 6) in the presence of one.

The following are some of the major findings of this work:

- In a bilateral US-China trade war, while both the US and China stand to lose in terms of GDP, exports and imports, India stands to gain.

- India stands to lose when the US-China trade war applies also to India, which faces higher tariffs from both. India's losses increase further when India responds by increasing its tariffs on imports from the US and China.

- A knee-jerk, tit-for-tat approach may not be the soundest one to pursue without greater examination. It may not be sensible for India to raise tariffs in a US-China trade war. In fact, reducing own tariffs could be a wiser step.

- A hypothetical RCEP-like free trade area, when the US and China are not fighting a bilateral tariff war, turns out to be beneficial for all member countries, particularly for India.

- India gains even more from joining the RCEP-like free trade area when the US and China are indulging in bilateral trade war.

Given the short, focused, and time-bound nature of the work of the HLAG, the paper was done quickly to provide quantitative assessments of the likely impact of several trade scenarios involving China, the US, India and an RCEP-like regional trade bloc. It is part of a growing exercise at NCAER to build on its existing work in CGE modelling so that trade policy and a range of other simulations in diverse policy areas can be modelled and used as guidance for policymaking.

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Box-1: Mapping of Model Sectors with GTAP Sectors

S. No	Sectors	Code	GTAP Model Sectors
1	Cereals	cereals	1.Paddy (pdr), 2.Wheat (wht), 3.Cereal grains nec (gro),
2	Oilseeds	oilseeds	5.Oil seeds (oilseeds)
3	Other Agriculture	othrAgri	4.Vegetables, fruit, nuts, 6.Sugar cane, sugar beet,7.lant-based fibres, 8.Crops nec, 9.Cattle,sheep,goats,horses 10.Animal products nec, 11.Raw milk 12.Wool, silk-worm cocoons, 13.Forestry 14. Fishing
4	Crude Oil and Minerals	cog	15. Coal, 16. Oil, 17. Gas,
5	Other Minerals	omn	18. Minerals, n.e.c
6	Food Beverage & Tobacco	fbt	19.Meat: Cattle,Sheep,Goats,Horse, 20.Meat products nec 21.Vegetable oils and fats, 22.Dairy products, 23.Processed rice, 24.Sugar, 25.Food products nec, 26.Beverages and tobacco products
7	Textiles	tex	27. Textiles (tex)
8	Wearing apparel	wap	28.Wearing apparel (wap)
9	Leather products	lea	29.Leather products (lea)
10	Wood products	lum	30.Wood products (lum)
11	Paper products, publishing	ppp	31.Paper products, publishing (ppp)
12	Petroleum, coal products	p_c	32.Petroleum, coal products (p_c)
13	Chemical,rubber,plastic prods	crp	33.Chemical,rubber,plastic prods (crp)
14	Mineral products nec	nmm	34.Mineral products nec (nmm)
15	Ferrous metals	i_s	35.Ferrous metals (i_s)
16	Metals nec	nfm	36.Metals nec (nfm)
17	Metal products	fmp	37.Metal products (fmp)
18	Motor vehicles and parts	mvh	38.Motor vehicles and parts (mvh)
19	Transport equipment nec	otn	39.Transport equipment nec (otn)
20	Electronic equipment	ele	40.Electronic equipment (ele)
21	Machinery and equipment nec	ome	41.Machinery and equipment, nec (ome)
22	Manufactures nec	omf	42. Manufactures,nec (omf)
23	Electricity, Gas & Water Supplies	egw	43. Electricity (ely), 44. Gas Manufacture, distribution (gdt), 45. Water (wtr)
24	Construction	cns	46. Construction (cns)
25	Trade	trd	47.trade (trd)
26	Transport, n.e.c	tpt	48. Transport, n.e.c (otp);
27	Sea Transport	wtp	49. Sea Transport (wtp);
28	Air Transport	atp	50. Air Transport
29	Communication	cmn	51. Communication (cmn)
30	Financial & Insurance services	fin	52.Financial Services nec (ofi), 53.Insurance (isr)
31	Business Services	obs	54. Business Services (obs)
32	Other Services	osr	55. Recreation and other services (ros); 56. PubAdmin/Defence/Educate (osg); 57. Dwelling (dwe)

Source: GTAP Version 9 database

Box-2: Mapping of Model Country/Regions with GTAP Regions

S. No	COUNTRY/REGION	CODE	GTAP REGION
1.	United State of America	USA	USA
2.	China	China	China
3.	India	India	India
4.	ASEAN	ASEAN	Cambodia(KHM), Indonesia(IDN), Lao PDR (LAO), Malaysia(MYS), Philippines (PHL), Singapore (SGP), Thailand (THA), Vietnam (VTN
5.	NIEs	NIEs	Hong Kong (HKG),South Korea (KOR) and Taiwan (TWN)
6.	Japan	Japan	Japan
7.	Australia and New Zealand	ANZ	Australia (AUS), New Zealand (NZL)
8.	Bangladesh	Bangladesh	Bangladesh
9.	Sri Lanka	Sri Lanka	Sri Lanka
10.	Pakistan	Pakistan	Pakistan
11	Other South & South-East Asia	OthS_SEAsia	Nepal (NPL), Rest of South Asia (XSA),Magnolia (MNG), Rest of East Asia (XEA), Brunei Darussalam (BRU)
12.	Canada		Canada (CAN)
13.	Mexico	MEX	Mexico(MEX)
14.	Brazil	BRA	Brazil
15.	America Other than North America	A_N	Argentina (ARG),Bolivia (BOL),Brazil(BRA),Chile (CHL),Colombia (COL),Ecuador (ECU), Paraguay (PRY),Peru(PER),Uruguay (URY),Venezuela (VEN),Rest of South America (XSM) Costa Rica(CRI),Guatemala (GTM),Honduras(HND),Nicaragua (NIC),Panama (pan) El Salvador (SLV),Rest of Central America (XCA), Caribbean (XCB), Dominique Republic (DOM), Jamaica (JAM), Puerto Rico (PRI), Trinidad and Tobago(TTO) and Caribbean (XCB)
16.	United Kingdom	UK	Great Britain (GBR)
17.	European Union -26	EU26	Austria (AUT),Belgium (BEL),Cyprus (CYP), Czech Republic (CZE),Denmark(DNK), Estonia (EST), Finland (FIN),France (FRA),Germany (DEU),Greece (GRC),Hungary(HUN), Ireland (IRL),Italy(ITA),Latvia (LVA),Lithuania (LTU),Luxembourg (LUX), Malta (MLT),Netherlands (NLD),Poland (POL),Portugal (PRT), Slovakia (SVK), Slovenia (SVN),Spain (ESP),Sweden (SWE), Bulgaria (BGR), Croatia (HRV), Romania (ROU)
18.	Rest of Europe	EUEFT	Switzerland (CHE), Norway (NOR), Rest of EFTA (XEF), Albania (ALB),Belarus, (BLR),Ukraine(UKR),Rest of Eastern Europe(XEE) Rest of Europe (XER)
19.	Middle East and North Africa	MENA	Bahrain (BHR), Iran Islamic Republic of (IRN), Israel (ISR), , Jordan (JOR) ,Kuwait (KWT) Oman (OMN), Qatar (QAT),Saudi Arabia (SAU), Turkey (TUR), United Arab Emirates(ARE) Rest of Western Asia (XWS),Egypt (EGY),

			Morocco (MAR), Tunisia (TUN) and Rest of North Africa (XNF)
20.	South Africa	Africa	South Africa (ZAF)
21.	Rest of Africa	RofAFRICA	Benin (BEN), Burkina Faso (BFA),Cameroon (cmr), Cote d'Ivoire (CIV), Ghana (GHA), Guinea(GIN), Nigeria (NGA), Senegal(SEN), Togo (TGO), Rest of West Africa (XWF), Rest of Central Africa (XCF), South Central Africa(XAC), Ethiopia (ETH), Kenya (KEN), Madagascar(MDG), Malawi (MWI), Mauritius (MUS), Mozambique (MOZ), Rwanda (RWA), Tanzania (TZA), Uganda (UGD), Zambia (ZMB), Zimbabwe (ZWE), Rest of Eastern Africa(XEC), Botswana (BWA), Namibia (NAM), Rest of South African Custom Union (XSC)
22.	Rest-of-World	ROW	Rest of Oceania (XOC), Russian Federation (RUS),Rest of North America (XNA), Kazakhstan (KAZ), Kyrgyzstan (KGZ),Rest of Former Soviet Union(XSU) Armenia (ARM), Azerbaijan (AZE), Georgia (GEO) and Rest of the World (XTW)

Source: GTAP Version 9 database

Table 1: Change in GDP (% change from base)

S No.	Country/Region	Sim1	Sim2	Sim3	Sim4	Sim5	Sim6
1	**USA**	-0.1517	-0.1628	-0.1634	-0.1628	-0.0044	-0.1575
2	**China**	**-0.8860**	**-0.9259**	**-0.9959**	**-0.9277**	**0.3387**	**-0.5293**
3	**India**	**0.0855**	**-0.4119**	**-0.6881**	**-0.3991**	**0.8819**	**0.9690**
4	**ASEAN**	0.0325	0.0361	0.0401	0.0361	**0.0973**	**0.1199**
5	**NIEs**	0.0336	0.0362	0.0381	0.0361	**0.2442**	**0.2643**
6	**Japan**	0.0076	0.0087	0.0090	0.0086	**0.0671**	**0.0714**
7	**Australia and New Zealand**	0.0222	0.0274	0.0295	0.0274	**0.1125**	**0.1314**
8	Bangladesh	0.1071	0.1313	0.1347	0.1314	-0.1668	-0.0322
9	Sri Lanka	0.0509	0.0670	0.0732	0.0667	-0.2545	-0.0603
10	Pakistan	0.0268	0.0290	0.0309	0.0290	-0.0758	-0.0374
11	Other South & South-East Asia	0.0036	0.0224	0.0205	0.0228	-0.0088	-0.0052
12	Canada	0.0406	0.0444	0.0464	0.0444	-0.0073	0.0327
13	Mexico	0.0378	0.0406	0.0419	0.0406	-0.0097	0.0281
14	Brazil	0.0431	0.0484	0.0503	0.0484	-0.0284	0.0142
15	America Other than N America	0.0430	0.0473	0.0494	0.0473	-0.0207	0.0220
16	United Kingdom	0.0138	0.0172	0.0193	0.0172	-0.0138	-0.0003
17	European Union -26	0.0103	0.0123	0.0138	0.0123	-0.0080	0.0020
18	Rest of Europe	0.0047	0.0050	0.0078	0.0050	-0.0048	-0.0006
19	Middle East and North Africa	0.0207	0.0229	0.0275	0.0229	-0.0135	0.0066
20	South Africa	0.0335	0.0399	0.0435	0.0399	-0.0223	0.0102
21	Rest of Africa	0.0289	0.0336	0.0380	0.0335	-0.0207	0.0074
22	Rest-of-World	0.0081	0.0055	0.0101	0.0056	0.0012	0.0091

Source: Authors' simulation based on the GTAP Model at NCAER.

Simulation 1: USA and China increase tariffs against each other up to 20% on mining and manufacturing sectors. Tariffs already above 20% remain stable at their existing rates.

Simulation 2: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. Tariffs already above 20% remain stable at their existing rates. India does not react.

Simulation 3: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. India responds by increasing its import tariffs on mining and manufacturing up to 20% against USA and China. Tariffs already above 20% are remain at their existing rates.

Simulation 4: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. India responds by lowering its above 20% import tariffs on mining and manufacturing down to 20% against USA and China. Tariffs already below above 20% remain at their existing rates.

Simulation 5: India, China, Japan, ASEAN- NIEs and ANZ eliminate bilateral tariffs on non-agricultural products – hypothetically mimics RCEP-like free trade bloc. USA and China have not yet gone to tariff war outlined in Simulation 1.

Simulation 6: India, China, Japan, ASEAN- NIEs and ANZ eliminate bilateral tariffs on non-agricultural products – hypothetically mimics RCEP-like free trade bloc. USA and China have gone to tariff war outlined in Simulation 1.

Table 2: Change in Exports (% change from base)

S No.	Country/Region	Sim1	Sim2	Sim3	Sim4	Sim5	Sim6
1	**USA**	**-2.6882**	**-3.0620**	**-3.1432**	**-3.0613**	**0.5664**	**-2.0900**
2	**China**	**-3.1027**	**-3.2224**	**-3.4609**	**-3.2176**	**4.0964**	**1.0083**
3	**India**	**0.0181**	**-1.1528**	**-3.9223**	**-1.0472**	**11.5259**	**11.6904**
4	**ASEAN**	0.1171	0.1307	0.1453	0.1310	**2.1516**	**2.3001**
5	**NIEs**	0.0440	0.0571	0.0803	0.0573	**2.3992**	**2.4580**
6	**Japan**	-0.8344	-0.9561	-0.9587	-0.9554	**0.9262**	**0.1835**
7	**Australia and New Zealand**	-0.2412	-0.3244	-0.3247	-0.3238	**1.0356**	**0.7954**
8	Bangladesh	-0.3294	-0.3361	-0.3201	-0.3357	0.8751	0.5159
9	Sri Lanka	-1.1068	-1.5607	-1.4100	-1.5539	1.1940	0.1347
10	Pakistan	0.0077	0.0879	0.1244	0.0918	0.0302	0.0167
11	Other South & South-East Asia	-0.2458	-0.3647	-0.3324	-0.3810	-0.3690	-0.6141
12	Canada	0.1931	0.2264	0.2139	0.2267	0.2713	0.4664
13	Mexico	-0.0134	-0.0274	-0.0393	-0.0274	0.2341	0.2243
14	Brazil	-1.0644	-1.1754	-1.2129	-1.1742	0.9197	-0.1551
15	America Other than N America	-0.0513	-0.0499	-0.0644	-0.0499	0.2496	0.1956
16	United Kingdom	-0.1457	-0.1209	-0.1120	-0.1206	0.0983	-0.0473
17	European Union -26	-0.2130	-0.2202	-0.2276	-0.2199	0.2046	-0.0090
18	Rest of Europe	-0.1402	-0.1733	-0.0545	-0.1725	-0.1196	-0.2656
19	Middle East and North Africa	0.0675	0.1084	0.1448	0.1084	-0.0533	0.0105
20	South Africa	0.0227	0.0181	0.0533	0.0185	-0.0194	-0.0073
21	Rest of Africa	0.0344	0.0553	0.0705	0.0529	-0.0439	-0.0128
22	Rest-of-World	-0.1178	-0.1213	-0.1226	-0.1214	0.1738	0.0519

Source: Authors' simulation based on the GTAP Model at NCAER

Simulation 1: USA and China increase tariffs against each other up to 20% on mining and manufacturing sectors. Tariffs already above 20% remain stable at their existing rates.

Simulation 2: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. Tariffs already above 20% remain stable at their existing rates. India does not react.

Simulation 3: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. India responds by increasing its import tariffs on mining and manufacturing up to 20% against USA and China. Tariffs already above 20% are remain at their existing rates.

Simulation 4: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. India responds by lowering its above 20% import tariffs on mining and manufacturing down to 20% against USA and China. Tariffs already below above 20% remain at their existing rates.

Simulation 5: India, China, Japan, ASEAN- NIEs and ANZ eliminate bilateral tariffs on non-agricultural products – hypothetically mimics RCEP-like free trade bloc. USA and China have not yet gone to tariff war outlined in Simulation 1.

Simulation 6: India, China, Japan, ASEAN- NIEs and ANZ eliminate bilateral tariffs on non-agricultural products – hypothetically mimics RCEP-like free trade bloc. USA and China have gone to tariff war outlined in Simulation 1.

Table 3: Change in Imports (% change from base)

S No.	Country/Region	Sim1	Sim2	Sim3	Sim4	Sim5	Sim6
1	**USA**	**-4.2968**	**-4.4774**	**-4.6784**	**-4.4701**	**-1.1155**	**-5.3473**
2	**China**	**-6.5116**	**-6.7274**	**-7.3415**	**-6.7256**	**5.3063**	**-1.1438**
3	**India**	**0.6583**	**-2.7579**	**-4.5232**	**-2.6913**	**7.1462**	**7.9225**
4	**ASEAN**	0.9537	1.0344	1.1549	1.0338	**3.2233**	**4.2320**
5	**NIEs**	0.6947	0.7671	0.8191	0.7670	**4.4897**	**5.1738**
6	**Japan**	1.0820	1.1732	1.2605	1.1722	**6.1935**	**7.1612**
7	**Australia and New Zealand**	0.6190	0.7552	0.8387	0.7527	**5.8149**	**6.4688**
8	Bangladesh	0.9914	1.4678	1.4639	1.4737	-1.2148	-0.2005
9	Sri Lanka	0.5706	1.0472	1.0832	1.0514	-0.8158	-0.0993
10	Pakistan	0.8292	1.0405	1.0710	1.0416	-1.3143	-0.4670
11	Other South & South-East Asia	0.5170	0.6634	0.7711	0.6568	-0.8645	-0.3625
12	Canada	1.4656	1.6222	1.6842	1.6206	-0.1553	1.3037
13	Mexico	2.6007	2.7026	2.7303	2.7018	0.0068	2.6445
14	Brazil	1.6114	1.7976	1.8610	1.7951	-1.1282	0.4574
15	America Other than N America	0.8964	1.0048	1.0500	1.0028	-0.4057	0.4831
16	United Kingdom	0.3416	0.4263	0.4799	0.4264	-0.3150	0.0193
17	European Union -26	0.2417	0.2928	0.3229	0.2927	-0.2568	-0.0197
18	Rest of Europe	0.0970	0.0780	0.2766	0.0783	-0.4738	-0.3918
19	Middle East and North Africa	0.3510	0.4674	0.5731	0.4686	-0.3120	0.0318
20	South Africa	0.5774	0.6917	0.8624	0.6917	-0.6929	-0.1368
21	Rest of Africa	0.3288	0.4141	0.4659	0.4122	-0.2694	0.0502
22	Rest-of-World	0.5274	0.5504	0.6553	0.5500	-0.5369	-0.0233

Source: Authors' simulation based on the GTAP Model at NCAER

Simulation 1: USA and China increase tariffs against each other up to 20% on mining and manufacturing sectors. Tariffs already above 20% remain stable at their existing rates.

Simulation 2: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. Tariffs already above 20% remain stable at their existing rates. India does not react.

Simulation 3: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. India responds by increasing its import tariffs on mining and manufacturing up to 20% against USA and China. Tariffs already above 20% are remain at their existing rates.

Simulation 4: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. India responds by lowering its above 20% import tariffs on mining and manufacturing down to 20% against USA and China. Tariffs already below above 20% remain at their existing rates.

Simulation 5: India, China, Japan, ASEAN- NIEs and ANZ eliminate bilateral tariffs on non-agricultural products – hypothetically mimics RCEP-like free trade bloc. USA and China have not yet gone to tariff war outlined in Simulation 1.

Simulation 6: India, China, Japan, ASEAN- NIEs and ANZ eliminate bilateral tariffs on non-agricultural products – hypothetically mimics RCEP-like free trade bloc. USA and China have gone to tariff war outlined in Simulation 1.

Table 4: Key Macro Results for India

(% change from base in real terms)

S No	Simulations	GDP Growth	Private Consumption	Investment	Relative to GDP	
					Consumption	Investment
1	Simulation 1	0.0855	0.1710	0.4261	0.0855	0.3406
2	Simulation 2	-0.4119	-0.8188	-1.0291	-0.4069	-0.6172
3	Simulation 3	-0.6881	-0.8496	-1.6205	-0.1615	-0.9324
4	Simulation 4	-0.3991	-0.8058	-1.0187	-0.4067	-0.6196
5	Simulation 5	0.8819	0.5601	0.7735	-0.3217	-0.1084
6	Simulation 6	0.9690	0.7280	1.2185	-0.2410	0.2495

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Simulation 1: USA and China increase tariffs against each other up to 20% on mining and manufacturing sectors. Tariffs already above 20% remain stable at their existing rates.

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Simulation 4: USA and China raise tariffs against each other up to 20% on mining and manufacturing sectors, as well as against India. India responds by lowering its above 20% import tariffs on mining and manufacturing down to 20% against USA and China. Tariffs already below above 20% remain at their existing rates.

Simulation 5: India, China, Japan, ASEAN- NIEs and ANZ eliminate bilateral tariffs on non-agricultural products – hypothetically mimics RCEP-like free trade bloc. USA and China have not yet gone to tariff war outlined in Simulation 1.

Simulation 6: India, China, Japan, ASEAN- NIEs and ANZ eliminate bilateral tariffs on non-agricultural products – hypothetically mimics RCEP-like free trade bloc. USA and China have gone to tariff war outlined in Simulation 1.

Annex-1: Technical Note on the GTAP Model

The present work addresses issues of a rapidly changing and increasingly protectionist global trading regime affecting India's growth and international trade. The analysis is based on illustrative simulations using the Global Trade Analysis Project (GTAP) Model.

The GTAP model is a multi-region, multi-sector computable general equilibrium (CGE) model (Hertel et al. 1997). The model is well grounded in economic theory. The model assumes perfect competition in all markets, constant returns to scale in all production and trade activities, profit-maximizing behaviour by firms, and utility-maximizing behaviour by households.

In the GTAP model, each region has a single representative household, known as the regional household, comprising private households and government. The income of the regional household is generated through factor payments and tax revenues net of subsidies. The regional household allocates expenditure to private household expenditure, government expenditure, and saving according to a Cobb-Douglas per capita utility function. Each component of final demand maintains a constant share of total regional income.

The private household buys commodity bundles to maximize utility, subject to its expenditure constraint. The private household spends its income on consumption of both domestic and imported commodities and pays taxes.[11] Taxes paid by the private household include commodity taxes for domestically produced and imported goods and income tax net of subsidies.

The government spends its income on domestic and imported commodities, and it collects taxes. Taxes consist of commodity taxes on domestically produced and imported commodities. Like the private household, government consumption is a constant elasticity of substitution (CES) composite of domestically produced and imported goods.

In the GTAP model, producers receive payments for selling goods and services both in the domestic market and to the rest of the world. Under the zero-profit assumption employed in the model, these revenues must be precisely exhausted by spending on domestic intermediate inputs, imported intermediate inputs, factor income, and taxes paid to the regional household.

The GTAP model postulates a nested production technology, with the assumption that every industry produces a single output, and constant returns to scale prevail in all markets. Industries have a Leontief production technology to produce their outputs. Industries maximize profits by choosing two broad categories of inputs, namely a composite of factors (value added) and a composite of intermediate inputs. The factor composite is a CES function of labour, capital, land, and natural resources. The intermediate composite is a Leontief function of material inputs, which are in turn a CES composite of domestically produced goods and imports. Imports come from all regions.

Consumers are affected by resource allocation in the economy. A more efficient allocation of resources adds to consumer welfare and to gains in GDP.

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[11] The choice between domestic and imported goods by private households depends on their preference function. The GTAP model assumes the preference function to be constant elasticity of substitution (CES) aggregates of domestic and imported goods, where the imported goods are also CES aggregates of imports from different regions.

Annex-2: Summary analysis of Indian tariffs, 2010-11 and 2014-15							
	2010-11 effective tariff (MFN)			2014-15 effective tariff (MFN)			Bound Tariff
	No. of lines (%)	Average (%)	Range (%)	No. of lines (%)	Average (%)	Range (%)	Range (%)
Total	**11,328**	**12.0**	**0-150**	**11,481**	**13.0**	**0-150**	**0-300**
HS 01-24	1,433	35.1	0-150	1,609	37.7	0-150	10-300
HS 25-97	9,895	8.6	0-70	9,872	9.0	0-100	0-150
By WTO definition							
Agricultural products	1,431	33.2	0-150	1,496	36.4	0-150	10-300
Animals and products thereof	106	30.8	5-100	124	30.4	5-100	35-150
Dairy products	32	34.4	30-60	33	34.2	30-60	40-150
Fruit, vegetables and plants	355	27.6	0-100	376	29.0	0-100	10-150
Coffee and tea	75	74.7	17.5-100	75	74.8	30-100	55-150
Cereals and preparations	137	30.4	0-90	142	40.9	0-150	35-150
Oils seeds, fats, oil and their products	196	18.5	0-100	208	33.2	0-100	15-300
Sugars and confectionary	38	33.4	10-60	41	35.4	10-60	45-150
Beverages, spirits and tobacco	123	78.7	7.5-150	126	77.5	5-150	35-150
Cotton	11	5.5	0-30	11	2.7	0-30	100-150
Other agricultural products, n.e.s.	358	25.1	0-70	360	25.2	0-70	25-150
Non-agricultural products	9,897	8.9	0-70	9,985	9.5	0-100	0-150
Fish and fishery products	176	29.5	5-30	287	29.6	0-30	35-150
Minerals and metals	1,912	7.1	0-10	1,920	7.4	0-15	0-40
Chemicals and photographic supplies	2,471	8.1	0-10	2,452	8.2	0-10	0-150
Wood, pulp, paper and furniture	495	9.2	0-10	500	9.2	0-10	25-40
Textiles	1,555	9.6	5-10	1,522	10.0	5-10	10-40
Clothing	397	10.0	10-10	396	10.0	10-10	35-110
Leather, rubber, footwear, travel goods	322	10.2	0-70[a]	329	10.3	0-70[a]	3-40
Non-electric machinery	1,094	7.1	0-10	1,094	7.0	0-10	0-40
Electric machinery	537	6.7	0-10	541	7.0	0-10	0-40
Transport equipment	244	21.5	0-60	244	32.1	0-100[c]	3-40
Non-agricultural products, n.e.s.	676	8.6	0-10	681	8.8	0-10	0-40
Petroleum	18	8.2	0-10	19	4.6	0-10	n.a.
By sector[d]							
Agriculture, forestry and fisheries	621	28.8	0-100	696	29.6	0-100	10-150
Mining	232	5.1	0-10	240	5.3	0-10	5-40
Manufacturing	10,474	11.1	0-150	10,544	12.1	0-150	0-300
Manufacturing excluding food processing	9,605	8.8	0-60	9,574	9.2	0-100	0-150
By stage of processing							
First stage of processing	1,261	22.5	0-100	1,372	23.5	0-100	5-150
Semi-processed products	4,339	8.6	0-60	4,337	9.0	0-60	0-150
Fully-processed products	5,728	12.2	0-150	5,772	13.6	0-150	0-300

n.a. Not applicable.
a Tariff lines with applied rates at 70% are unbound.
b Tariff lines with applied rates at 60% are unbound.
c Tariff lines with applied rates at 100% are unbound.
d ISIC Rev.2 classification. Electricity, gas and water is excluded (1 tariff line).
Note: Calculations exclude specific rates and include the ad valorem part of alternate rates.
Source: WTO calculations, based on data provided by the Indian authorities.