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Renegotiating India-Japan Trade Agreement: A CGE-Based Assessment

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Abstract

India and Japan share a long-standing trade and economic partnership that predates their 2011 Comprehensive Economic Partnership Agreement (CEPA). Despite its wide coverage, bilateral trade has underperformed, with Indian exports stagnating and the benefits accruing unidirectionally to Japan. Analysis of tariff schedules reveals that while both countries liberalized extensively, high exclusions in several sectors by the countries have contributed to the agreement's limited utilization. Against this backdrop, this paper uses the GTAP database and the GTAP model to evaluate six alternative renegotiation scenarios for the CEPA. The results show that full liberalization maximizes gains but is politically unfeasible for India because of the inclusion of sensitive sectors. A mixed design, where India maintains its CEPA commitments for the agricultural sectors while liberalizing other sectors, and Japan reciprocates with full liberalization, emerges as the most balanced option. It delivers substantial welfare and GDP gains for both economies, stimulates India's employment and manufacturing, and strengthens Japan's industrial exports.

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1. Introduction

India and Japan share a long-standing trade and economic partnership that predates their formal free trade agreement (FTA). As early as the 1950s, Japan emerged as one of India's key trading partners, with cooperation expanding steadily across goods, investment, and technology. Over the decades, this relationship has deepened into a strategic economic partnership, reinforced by shared interests in Asia's growth and stability. The signing of the FTA, often referred to as the Comprehensive Economic Partnership Agreement (CEPA), in 2011, after four years' negotiation, marked a milestone in institutionalizing trade relations.

Two countries sign an FTA to reduce the tariff barriers. The reduction/elimination of tariffs across commodities helps the contracting parties to access the partners' markets. With improved market access, FTA partners achieve high levels of exports as well as imports. An enhanced level of exports creates jobs in domestic markets, increases the GDP, and helps achieve sustained economic growth. While with cheaper intermediate imports, a country may get export competitiveness for its end-user goods. This is how an FTA may become beneficial for the contracting parties. But the actual utilization rate of an FTA depends on several factors, including market access, the stringency of rules of origin, tariff margins, exporter knowledge, compliance costs, low trade volume, etc.[Kawai and Wignaraja (2009); Katsuhide and Shujiro (2009); Inama (2023)]

Seshadri (2016) finds that there is no dramatic growth of exports or imports from Japan due to the CEPA, and their trade engagement is still not as it was expected. At the same time, India is not happy with the low utilization rate of the India-Japan CEPA and wants to renegotiate the agreement with Japan1. The reason cited behind the modification is that these deals are lopsided, as Indian exports are not getting access to their FTA partners' markets, meaning the benefits of the CEPA have been one-sided. In this context, the Indian commerce minister may be cited saying, "They (Japan) have not allowed the (Indian) exports into their country. . . what it was 10 years ago, it is the same today with Japan. . . Japan's exports to India have meanwhile grown 200 per cent". This growing trade deficit with Japan has propelled India to revisit its trade pact to make it more balanced.

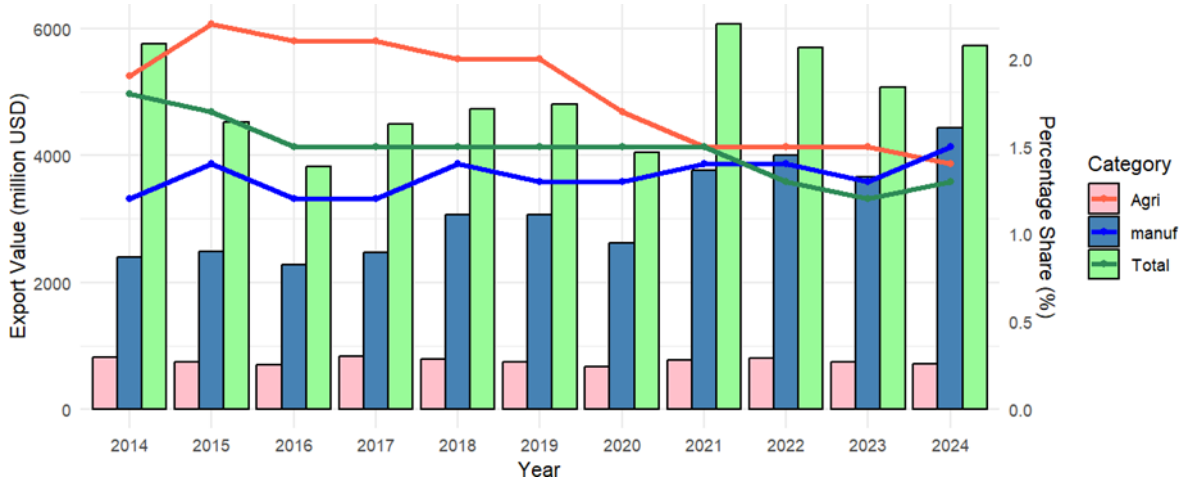
There may be many reasons behind the low utilization of an FTA. Among others, one prominent reason could be the narrow preferential margin (the difference between MFN tariffs and preferential tariffs), as suggested by Kawai and Wignaraja (2009). In this regard, Seshadri (2016) notes that around 75% of India's exports to Japan receive zero duty even on the MFN basis. This means that though India-Japan CEPA offers a comprehensive tariff liberalization, it does little in actuality. Since many tariff lines are already liberalized, in such a situation, it becomes a challenging job to proceed with the renegotiation of the CEPA. A clear and straight- forward answer to renegotiation might be the full FTA between the two, which will open the entire market for each other, but here is a catch. India does not want to open its agriculture and dairy market entirely due to several factors. In fact, India has protected these markets in bilateral and multilateral fora. This situation makes India-Japan CEPA renegotiation even more challenging.

Hence, the objective of this study is to find a bilateral renegotiation strategy that is helpful for both contracting parties. In other words, how India and Japan should move ahead under the CEPA to increase welfare and trade. For this purpose, several renegotiation options have been assessed using the Computable

General Equilibrium (CGE) analysis. The structure of the article is as follows: Section 2 analyses the bilateral merchandise trade between India and Japan to check the asymmetrical trade relation. Section 3 reviews the tariff concessions and their types at the disaggregated national tariff line for both countries. Section 4 provides the details of the data and methodology, while Section 5 will discuss the results. Section 6 will conclude.

2. Bilateral Trade Patterns

After 15 years of implementation of the CEPA, the trade engagement between the two countries still seems below the true potential. A disaggregated analysis shows that the bilateral trade has either gone down for some categories or remained stagnant for others in recent years. Figures 1 and 2 show the bilateral merchandise trade statistics (export and import, respectively) for 'Agriculture', 'Manufacturing', and 'Total' from the year 2014 to 2024. The bars show the absolute value of trade, while the lines show the share of



Japan's export/import in India's aggregate export/import.

Source: Author's depiction using WITS COMTRADE Data

Figure 1: India's exports to Japan and its percent share in India's aggregate exports

In absolute terms, for the 'total' category, India exported goods of value 5.75 billion USD to Japan in 2014, which dipped in the subsequent years, as can be seen in Figure 1. The statistics for the same category for the years 2023 and 2024 are a mere 5.08 and 5.73 billion USD, respectively, showing stagnation. The 'agricultural' exports of 814 million USD in 2014 have gone down to 714 million USD in 2024. The only category that has seen a rise in exports to Japan is the 'manufacturing', reaching a high of 4.4 billion USD in 2024 from 2.4 billion USD in 2014.

The same pattern is observed for the share of bilateral exports in India's aggregate exports in different categories. The share of 'total' exports to Japan in India's aggregate 'total' exports has gone down from 1.8% in 2014 to 1.3% in 2024, while 'agriculture' exports registered a slump from 1.9% to 1.4% for the same years. The 'manufacturing' export has gone up marginally from 1.2% in 2014 to 1.5% in 2024.

On the other hand, for the imports from Japan to India, the story is quite different. All three categories see a positive trend in both absolute values and percent shares, as evident in Figure 2.

The total imports from Japan to India rose from around 9.9 billion USD in 2014 to 19.9 billion USD in 2024. The manufacturing category also sees a significant growth in imports (9.1 to 16.5 billion USD). The agricultural import value has doubled from 2014 (142 million USD) to 2024 (236 million USD). The share of Japan's imports in India's aggregate imports has also risen over the same time period. The total and manufacturing imports see an uptick, while the agricultural imports' share remains stagnant.

Not just India's export to Japan has dipped, but it is also highly concentrated, showing a lack of diversification in the commodities exported. Table 1 shows the top five imported commodities from India to Japan, and their shares in total respective imports, for the years 2014 and 2024. This table shows the concentration/diversification of the Agriculture and Manufacturing import basket of Japan with respect to India only. The top five agri-commodities remain almost the same, while their share in total bilateral agri -imports from India goes down slightly from 67.5% in 2014 to 60.6% in 2024, over the period of ten years, showing a high concentration or low diversification of agri-commodities. On the other hand, the manufacturing commodities basket gets changed to a great extent, if not entirely, and their share also goes down significantly from 61.4% in 2014 to 35.4% in 2024. This shows Japan now imports more manufacturing commodities. This pattern is in line with the pattern observed and discussed above, that manufacturing exports have grown while agri-exports have gone down.

Year	Top-5 Agri Import Commodities	%Share in Agri Imports	Top-5 Manufacturing Import Commodities	%Share in Manufacturing Imports
2014	Frozen Shrimps and Prawns (030613); Soya-bean oil cake and other residues (230400); Fish (030499); Cashew nuts (080132); Vegetable saps and extract (130219)	67.50%	Petroleum oils (271011); Diamonds non-industrial (710239); Iron ores and concentrates (260111); Heterocyclic compounds (293329); Ferro-alloys (720230)	61.40%
2024	Fish (030499); Cashew nuts (080132); Soya-bean oil cake and other residues (230400); Frozen Shrimps and Prawns (030613); Fish Flours (230120)	60.60%	Vehicles spark-ignition (870322); Telephones for cellular networks (851712); Nucleic acids and their salts (293499); Diamonds non-industrial (710239); Aluminium unwrought (760110)	35.40%

Source: Author's calculations using WITS COMTRADE Data

Table 1: Japan's top-5 commodities and their shares

The above discussion shows an asymmetric bilateral trade relationship between India and Japan. Japan. This is also evident from the fact that India is not a priority export partner of Japan. According to the JETRO website, in 2014, India was the 19th export destination, while it was the 24th import partner. In 2024, India moved up the ladder to become one of the top 10 export partners of Japan, while it remained at the same position of 24th in terms of imports. This signifies that the bilateral trade relationship between the two has grown unidirectionally; in particular, the growth has been mostly in favour of Japan.

3. Tariff Commitments under the CEPA

From the above discussion, it has been established that the India-Japan trade relation is skewed in favour of Japan. Another perspective on asymmetric trade relations can be offered in terms of the CEPA utility, that the CEPA may not have been beneficial for India, while it may have worked for Japan. While the scope of this study is to find a better design for CEPA, a closer scrutiny of the tariff schedules committed under the CEPA by both countries is needed.

For this purpose, the text of the agreement is analysed. Tariff schedules of both countries

have been negotiated at the national tariff line, which is the HS-8 digit of commodity classification for India, while for Japan, it is the HS-9 digit classification. Though Japan's tariff commitment is at the HS-9 level, the tariff schedule uses the classification up to the HS-6 level. To get the disaggregated level commodities and their tariff types, the HS-6 digits have been mapped to the HS-9 digits using data from the website of Japan's Customs department 2.

Type of liberalization	No. of commodities	%Share of Total
B10	7161	63.5
A	2074	18.4
X	1528	13.6
B5	509	4.5
B7	3	0.0
Total	11275	100.0

Source: Author's depiction using text of the agreement

At a disaggregated level, India liberalizes 11275 commodities, while Japan does the same for 7769. Tables 2 and 3 give details of liberalized commodities and their respective liberalization category for India and Japan, respectively. In total, five types or categories of tariff liberalization have been observed in the tariff schedules of both countries. These types are 'A', 'B5', 'B7', 'B10', and 'X'. The meaning of these labels is as follows:

A: Tariffs for commodities under this category to be eliminated from the date of entry into force of the Agreement.

B5: Tariffs for commodities under this category to be reduced to zero in six equal annual installments.

B7: Tariffs for commodities under this category to be reduced to zero in eight equal annual installments.

B10: Tariffs for commodities under this category to be reduced to zero in eleven equal annual installments.

X: Tariffs for commodities under this category to be excluded from any reduction or elimination.

Table 2: Structure of India's Tariff Schedule

For India, the highest share of commodities is under category B10, while B7 category has been used for only three commodities. Around 13.6% of commodities have been excluded from the tariff reduction commitment, as evident from Table 2. Japan commits to liberalizing 83.5% of commodities with immediate effect (Table 3). This high share is coming from already zero- tariff commodities, as noted by Seshadri (2016). The excluded commodities' share is less than that of India's. In other words, the exclusion rate for India is 13.6%

Type of liberalization	No. of commodities	%Share of Total
A	6489	83.5
X	663	8.5
B10	531	6.8
B7	46	0.6
B15	40	0.5
Total	7769	100.0

Source: Author's depiction using text of the agreement and Japan Customs data

Table 3: Structure of Japan's Tariff Schedule

and for Japan, it is 8.5%.

At the aggregate level, these figures seem to be low, but to know the exact prevalence of these exclusions, a sectoral analysis of exclusions is warranted.

Tables 4 and 5 show the sectoral breakup of excluded commodities. India highly protects its dairy and agriculture markets. Out of 43 commodities negotiated, 32 are excluded from any commitment, making the exclusion rate 74.4% for India's dairy sector. Likewise, Cereals, Food Products, and Fish are the most protected sectors. Intermediate commodities like Chemicals, Stones and Glass, Metals, Minerals, and Wooden Products are most liberalized, while Rubber and Plastic, in intermediate inputs, is the most protected with an exclusion rate of around 45%. End-user goods like Machines and Electronics, Apparel goods are comparatively liberalized, while Automobile in this category is the protected one with around 41% exclusion rate. Hide and skin, and Pharmaceuticals are fully liberalized sectors under India's tariff commitments to Japan.

On the other hand, Japan protects its primary sectors, including Dairy, Cereals, Fish, and Food products. Dairy is the most protected sector with 94.3% exclusion rate. Japan adopts a liberal approach for most of its manufacturing industries. Intermediate goods like Chemicals, Metals, Minerals, Rubber and plastics are the liberalized ones. In short, Japan has provided its domestic market access to India mostly for the manufacturing sectors while protecting its agricultural market.

It has been observed earlier that the agricultural exports from India to Japan have gone down, while manufacturing exports have seen a positive sign. One possible reason behind this trend could be the excluded commodities under the tariff schedule of Japan. Since Japan has protected its agricultural market, India could not get access to it. At the same time, India also could not register a good rise in the manufacturing sector because of the different levels of economic development of the two countries. Japan is already an advanced or industrialized country, while India is a services-oriented country; hence, Japanese manufacturing market penetration by India is also a challenge. At the same time, India may be importing more Japanese manufacturing goods because of the lower market price.

In short, it can be said that agreement design or tariff schedule structure may be one of the factors behind the existing asymmetrical trade relationship between the two countries.

This warrants a renegotiation or a new approach for the India-Japan CEPA. The liberalization rates calculated here in Tables 4 and 5 will be used further in the next Section to find a better outcome for the CEPA.

Sector	Total Negotiated (n)	Excluded (X)	Exclusion rate (X/n)	Liberalization rate (100- X/n)
Dairy	43	32	74.4	25.6
Cereals	35	20	57.1	42.9
Food Products	525	244	46.5	53.5
Rubber and Plastic	585	265	45.3	54.7
Fish	142	63	44.4	55.6
Automobile and Parts	254	105	41.3	58.7
Vegetables, Fruits and Plants	523	174	33.3	66.7
Fuels	74	11	14.9	85.1
Machine and Electronics	1658	243	14.7	85.3
Chemicals	2020	282	14	86
Animal and Products	164	11	6.7	93.3
Footwear, Stones and Glass, Miscl	1063	53	5	95
Wooden Products	465	16	3.4	96.6
Minerals	239	3	1.3	98.7
Metals	1259	5	0.4	99.6
Textile and Clothing	1870	1	0.1	99.9
Hide and Skin	134	0	0	100
Pharmaceuticals	214	0	0	100
Projects	8	0	0	100
Total	11275	1528	13.6	86.4

Source: Author's depiction using text of the agreement

Sector	Total Negotiated (n)	Excluded (X)	Exclusion rate (X/n)	Liberalization rate (100- X/n)
Dairy	53	50	94.3	5.7
Cereals	31	19	61.3	38.7
Fish	173	88	50.9	49.1
Food Products	662	326	49.2	50.8
Animal and Products	135	33	24.4	75.6
Vegetables, Fruits and Plants	387	64	16.5	83.5
Hide and Skin	150	24	16.0	84.0
Footwear, Stones and Glass, Miscl	820	40	4.9	95.1
Wooden Products	322	7	2.2	97.8
Minerals	75	1	1.3	98.7
Chemicals	815	8	1.0	99.0
Textile and Clothing	1890	3	0.2	99.8
Automobile and Parts	147	0	0.0	100.0
Fuels	79	0	0.0	100.0
Machine and Electronics	910	0	0.0	100.0
Metals	819	0	0.0	100.0
Pharmaceuticals	53	0	0.0	100.0
Rubber and Plastic	248	0	0.0	100.0
Total	7769	663	8.5	91.5

Source: Author's depiction using text of the agreement and Japan Customs data

Table 5: Sectoral Structure of Japan's Tariff Schedule

4. Data and Methodology

To find a win-win situation for both countries, several simulations have been performed using the standard Global Trade Analysis Project (GTAP) model and GEMPACK software suite. The GTAP model, which is a computable general equilibrium (CGE) model, is a comparative- static, multi-region, and multi -sector model. The assumptions for this model include Perfect competition and Constant returns to scale. The bilateral trade is determined by the Armington assumption, which means that the imports are distinguished by their originating place as well. The GTAP model is based on the concept of a circular economy, meaning a change in one part will affect the other part. In the GTAP, a regional household represents a country; this household sells factor endowments to firms and receives income in lieu of this. Then, this household's income is spent according to the Cobb-Douglas function. Firms get revenue by selling their products in the domestic market and the foreign market, and they pay the returns to primary factors, import taxes, and domestic taxes. Each region is then linked to the other by international trade and investment flows. Since the firms use domestically produced and imported intermediate products, as determined by the Armington function, a shock or a change in any part of the economy will affect the whole world economy. Some regions and sectors will have a direct impact, while others will experience it due to the economies' inter-sectoral linkages. After the shock, the world economy will again reach an equilibrium where, for each region, the difference between savings and net investment will equal the trade balance, and as a whole, the total exports of the world economy will be equal to total imports.

The GTAP model assumes full employment conditions of factors, as its default standard closure, but in this exercise, the full employment condition for skilled and unskilled workers, as well as for capital, has been relaxed to make this model more realistic. In other words, the labor and capital supply have been made endogenous in the model. This closure has been called the unemployment closure in Burfisher (2021). All the experiments in this study use the Unemployment closure only. To shock the tariff rates, the variable tms (i,r,s), which means the tariff rate for product i from region r to region s, has been used.

Apart from these, HS commodities mentioned in the tariff schedules of Japan and India have been mapped to the GTAP sectors using a concordance. In this study, the latest GTAP v11B dataset created by Aguiar et al. (2022), which takes 2017 as the base year, has been used. In this GTAP dataset, there are a total of 160 regions and 65 sectors, which have been aggregated initially into 14 regions and 22 sectors, respectively. The aggregation of the countries and sectors has been presented in Tables 6 and 7. The five production factors are retained here as they are.

4.1 Scenarios

In total, six experiments have been performed to find the optimal design for the CEPA. These experiments have been detailed below.

- S1: This is the baseline scenario. This scenario represents the current status of the CEPA. Based on the sectoral liberalization rates calculated in Tables 4 and 5, this business-as-usual scenario is implemented.
- S2: This scenario is for the full bilateral FTA, meaning both countries provide full and free market access to each other. For this purpose, duties on each product from both sides are eliminated.
- S3: In this scenario, India maintains its offer list/liberalized commodity list, meaning whatever was negotiated in the CEPA in 2011 is maintained by India in terms of commodities and tariffs. While India does not do anything, Japan opens its entire market for India. Full market access to India is provided by Japan.
- S4: This scenario is the other way around of scenario S3, meaning Japan maintains its offer list but India provides full market access to Japan.

- S5: In this scenario, both countries adopt a varied design for the CEPA. India maintains CEPA commitments for the agricultural sectors (Animal Products, Fish, Dairy, Vegetables, Cereals, Food Products, mentioned in Table 7), but opens the manufacturing sectors to Japan with 100% liberalization or full market access. Japan, on the other hand, provides full market access of its agricultural market to India while maintaining the CEPA commitments for the rest of the sectors.
- **S6:** This scenario is a combination of S3 and S5. India adopts a varied design, as explained in the S5, meaning India maintains the CEPA commitments for its agricultural sectors but provides full market access to Japan for the manufacturing sectors. On the other hand, Japan does a 100% liberalization, providing full and free market access to India.

No.	Code	Comprising Regions
1	Japan	Japan
2	India	India
3	USA	United States of America.
4	Canada	Canada.
5	Mexico	Mexico.
6	Brazil	Brazil.
7	EU	Austria; Belgium; Bulgaria; Croatia; Cyprus; Czechia; Denmark; Estonia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Romania; Slovakia; Slovenia; Spain; Sweden.
8	UK	United Kingdom of Great Britain
9	Korea	Republic of Korea.
10	China	China.
11	SAfrica	South Africa.
12	Russia	Russian Federation.
13	ASEAN	Brunei Darussalam; Cambodia; Indonesia; Lao People's Democratic Republic; Malaysia; Philippines; Singapore; Thailand; Viet Nam.
14	RoW	Australia; New Zealand; Rest of Oceania; China, Hong Kong SAR; Mongolia; Taiwan Province of China; Rest of East Asia; Rest of Southeast Asia; Afghanistan; Bangladesh; Nepal; Pakistan; Sri Lanka; Rest of South Asia; Rest of North America; Argentina; Bolivia (Plurinational State o; Chile; Colombia; Ecuador; Paraguay; Peru; Uruguay; Venezuela (Bolivarian Republic; Rest of South America; Costa Rica; Guatemala; Honduras; Nicaragua; Panama; El Salvador; Rest of Central America; Dominican Republic; Haiti; Jamaica; Puerto Rico; Trinidad and Tobago; Caribbean; Switzerland; Norway; Rest of EFTA; Albania; Serbia; Belarus; Ukraine; Rest of Eastern Europe; Rest of Europe; Kazakhstan; Kyrgyzstan; Tajikistan; Uzbekistan; Rest of Former Soviet Union; Armenia; Azerbaijan; Georgia; Bahrain; Iran (Islamic Republic of); Iraq; Israel; Jordan; Kuwait; Lebanon; Oman; Palestine; Qatar; Saudi Arabia; Syrian Arab Republic; T rkiye; United Arab Emirates; Rest of Western Asia; Algeria; Egypt; Morocco; Tunisia; Rest of North Africa; Benin; Burkina Faso; Cameroon; C te d'Ivoire; Ghana; Guinea; Mali; Niger; Nigeria; Senegal; Togo; Rest of Western Africa; Central African Republic; Chad; Congo; Democratic Republic of the Con; Equatorial Guinea; Gabon; South-Central Africa; Comoros; Ethiopia; Kenya; Madagascar; Malawi; Mauritius; Mozambique; Rwanda; Sudan; United Republic of Tanzania; Uganda; Zambia; Zimbabwe; Rest of Eastern Africa; Botswana; Eswatini; Namibia; Rest of Southern African Custo; Rest of the World.

Table 6: Aggregation of Countries

No.	Code	Sector Description	Comprising Sectors
1	AnimalProd	Animals and their products	Bovine cattle, sheep and goats; Animal products nec; Bovine meat products; Meat products nec.
3	Dairy	Milk and Dairy Products	Raw milk; Dairy products.
5	Cereals	Cereals and Crops	Paddy rice; Wheat; Cereal grains nec; Crops nec; Sugar cane; Sugar beet; Vegetable oils and fats.
6	FoodProd	Food Products	Processed rice; Sugar; Food products nec; Beverages and tobacco products.
7	Minerals	Minerals and Products	Minerals nec; Mineral products nec.
9	Chemicals	Chemicals	Chemical products.
11	Rub Plast	Rubber and Plastics	Rubber and plastic products.
13	Wood Prod	Wood and Paper Products	Wood products; Paper products, publishing.
15	Metals	Metals and Products	Ferrous metals; Metals nec; Metal products.
17	Automobile	Automobile and Parts	Motor vehicles and parts; Transport equipment nec.
19	Utility	Oil and Utilities	Electricity; Gas manufacture, distribution; Water.
21	Fin Ins	Financial and Insurance	Financial services nec; Insurance.
22	Oth Serv	Other Services	Construction; Trade; Accommodation, Food and service; Warehousing and support activities; Real estate activities; Business services nec; Recreational and other service; Public Administration and defence; Education; Human health and social work; Dwellings.

Table 7: Aggregation of Sectors

5. Results and Discussion

In this Section, the results of the simulations mentioned above are discussed. Here, several key macroeconomic variables have been considered, including Welfare, Change in GDP, Aggregate exports, Bilateral exports, Sectoral output, and Factor demand for both India and Japan.

5.1 Welfare and GDP Change

Table 8 shows the welfare and change in GDP for both countries in different scenarios of FTA design. S1 is the baseline scenario, showing what both countries gain from the CEPA. While a full bilateral liberalization (S2) yields the largest aggregate gains, it is politically infeasible for India because it would require opening sensitive agricultural markets. S3 is a better scenario than S1 for both countries, but it may not be feasible to Japan as it does not get anything from India in reciprocation. Hence, S3 would not be preferred by Japan. S4, again, a good scenario in terms of both welfare and %change in GDP, as India gets 18 million USD more in welfare while Japan gains around 2.5 billion USD because of full and free market access in India. Since it is a full market scenario for India, it poses political constraints of opening the sensitive sectors. Hence, this scenario again may not be preferred by Indian negotiators.

Agg_Export	S1 (Base Value)	S2	S3	S4	S5	S6
1 AnimalProd	336.91	-0.03	0.01	-0.04	-0.03	-0.02
2 Fish	358.09	-0.04	-0.01	-0.03	-0.07	-0.08
3 Dairy	53.24	-0.02	0.02	-0.04	-0.02	-0.02
4 Vegetable	332.02	-0.01	0.00	-0.02	-0.03	-0.03
5 Cereals	182.21	0.23	0.01	0.22	-0.05	-0.05
6 FoodProd	4774.78	0.21	0.01	0.20	-0.01	-0.01
7 Minerals	9678.68	0.00	0.00	-0.01	0.00	0.00
8 Fuels	9285.96	0.15	0.00	0.15	0.15	0.15
9 Chemicals	67706.13	0.06	0.01	0.06	0.06	0.06
10 Pharma	7123.35	-0.01	0.01	-0.02	-0.01	-0.01
11 Rub_Plast	25926.29	0.21	0.01	0.21	0.21	0.21
12 Leather	289.19	0.01	0.03	-0.02	-0.01	0.01
13 Wood_Prod	6591.23	0.01	0.01	0.00	0.01	0.01
14 Tex_Apparel	8545.81	-0.01	0.01	-0.02	-0.01	-0.01
15 Metals	78577.3	-0.01	0.01	-0.02	-0.01	-0.01
16 Mach_Elctrnc	315707	0.05	0.01	0.04	0.05	0.05
17 Automobile	180585.2	0.22	0.01	0.22	0.22	0.22
18 Oth_Manuf	13708.42	0.01	0.01	0.00	0.01	0.01
19 Utility	19.47	0.00	0.00	0.00	0.00	0.00
20 Trans_Comm	14260.8	-0.01	0.00	-0.01	-0.01	-0.01
21 Fin_Ins	12589.06	-0.01	0.00	-0.01	-0.01	0.00
22 Oth_Serv	80201.12	-0.01	0.00	-0.01	-0.01	-0.01
Total	836832.3	0.08	0.01	0.07	0.08	0.08

Source: Author's calculations

Table 10: Aggregate Export of Japan

The scenario S5 gives lower welfare to India compared to S1 (the base scenario), hence it may not be preferred. Finally, the combined design embodied in S6, India, retains CEPA commitments for its sensitive agricultural sectors while offering full access for manufacturing, and Japan reciprocates with comprehensive liberalization, providing a practical and politically feasible pathway for both countries. In S6, both countries gain well in welfare. In fact, it is the second-best option after S2 (the full FTA scenario). In terms of GDP change also, S6 provides good gains to both countries.

5.2 Aggregate Exports

Table 9 shows aggregate export outcomes across sectors for India. It suggests that India's export response under renegotiation is modest but unevenly distributed across sectors. The simulated changes under alternative scenarios average around 0.04%, indicating that while welfare and GDP effects are visible, aggregate trade impacts remain small in percentage terms.

Exports of dairy register the highest proportional gains across scenarios, with increases of 0.85% under S2, S5, and S6, reflecting improved opportunities in the Japanese market for processed dairy products. Cereals and food products also gain moderately (up to 0.15% and 0.11%, respectively). By contrast, animal products and vegetables remain almost unchanged, while fish exports see only marginal growth.

Bilateral_Export	S1 (Base Value)	S2	S3	S4	S5	S6
1 AnimalProd	13.7	1.39	1.31	0.07	1.39	1.39
2 Fish	0.43	0.00	0.00	0.00	0.00	0.00
3 Dairy	0.75	209.33	209.33	0.00	209.33	209.33
4 Vegetable	97.47	0.08	0.02	0.07	0.08	0.08
5 Cereals	71.09	7.95	7.84	0.11	7.95	7.95
6 FoodProd	718.66	3.11	3.03	0.08	3.11	3.11
7 Minerals	346.02	0.08	0.00	0.07	0.08	0.08
8 Fuels	1586.74	0.11	0.00	0.11	0.11	0.11
9 Chemicals	668.09	0.12	0.00	0.12	0.12	0.12
10 Pharma	237.89	0.12	-0.01	0.13	0.11	0.11
11 Rub_Plast	37.66	0.13	0.00	0.13	0.13	0.13
12 Leather	210.08	8.94	8.81	0.12	0.11	8.93
13 Wood_Prod	7.6.0	0.13	0.00	0.13	0.13	0.13
14 Tex_Apparel	460.80	0.10	-0.01	0.11	0.10	0.10
15 Metals	443.82	0.11	-0.01	0.11	0.11	0.10
16 Mach_Elctrnc	357.63	0.12	-0.01	0.13	0.12	0.12
17 Automobile	211.28	0.17	-0.01	0.17	0.17	0.16
18 Oth_Manuf	438.62	0.13	0.01	0.12	0.12	0.13
19 Utility	0.09	0.00	0.00	0.00	0.00	0.00
20 Trans_Comm	877.32	0.10	0.00	0.10	0.09	0.09
21 Fin_Ins	80.35	0.10	0.00	0.10	0.10	0.10
22 Oth_Serv	1700.84	0.09	0.00	0.10	0.09	0.09
Total	8566.92	0.66	0.55	0.11	0.44	0.66

Source: Author's calculations

Table 11: Bilateral Exports of India to Japan

In manufacturing, which constitutes the bulk of India's export basket, the results are consistent and slightly stronger. Textiles and apparel gain up to 0.05% in S4, while machinery and electronics, and automobiles expand by 0.05-0.06% in most scenarios. Chemicals, pharmaceuticals, rubber and plastics, metals, and other manufactures also show uniform gains of around 0.04-0.05%. Leather and its products sector stands out as a winner as it gains the highest in most of the scenarios. In scenario S6, all the sectors, including services sectors perform well. In terms of total exports also, S6 gives consistent improvement.

For Japan, Agriculture and food products display a mixed picture (Table 10). Animal products, fish, dairy, and vegetables generally contract slightly across scenarios (declines of up to –0.08%). The main export gains for Japan lie in the manufacturing and industrial sectors, which dominate its trade structure. Automobiles expand strongly under all feasible liberalization pack- ages, 0.22% in S2, S4, S5, and S6. Rubber and plastics also rise by 0.21%, while machinery and electronics consistently gain 0.04-0.05%. Chemicals see smaller but steady increases of 0.06% across scenarios. Fuels also register a growth of 0.15% over the base scenario of S1. Overall, Japan gains in terms of total exports. The scenario S6 is also beneficial for Japan's exports, giving it a filip of 0.08%.

Hence, the scenario S6 also works well for the aggregate export of both countries

Bilateral_Export	S1 (Base Value)	S2	S3	S4	S5	S6
1 AnimalProd	0.16	0.00	0.00	0.00	0.00	0.00
2 Fish	1.65	9.09	0.00	9.09	0.00	0.00
3 Dairy	0.05	0.00	0.00	0.00	0.00	0.00
4 Vegetable	0.99	6.06	0.00	6.06	0.00	0.00
5 Cereals	0.67	79.1	0.00	79.10	0.00	0.00
6 FoodProd	10.75	97.12	0.00	97.12	0.00	0.00
7 Minerals	164.1	0.17	0.01	0.17	0.17	0.17
8 Fuels	261.51	5.86	0.00	5.86	5.86	5.86
9 Chemicals	1962.27	2.50	0.01	2.49	2.50	2.50
10 Pharma	38.54	0.00	0.03	-0.03	0.00	0.00
11 Rub Plast	340.60	16.79	0.01	16.77	16.79	16.79
12 Leather	1.07	0.00	0.00	0.00	0.00	0.00
13 Wood Prod	86.73	1.16	0.01	1.15	1.16	1.16
14 Tex Apparel	122.27	-0.02	0.02	-0.03	-0.02	-0.02
15 Metals	2116.65	0.00	0.01	-0.01	0.00	0.00
16 Mach Elctrnc	5018.09	3.61	0.02	3.60	3.61	3.62
17 Automobile	1271.89	32.79	0.01	32.77	32.79	32.79
18 Oth Manuf	279.43	1.25	0.01	1.23	1.24	1.25
19 Utility	0.23	0.00	0.00	0.00	0.00	0.00
20 Trans Comm	142.36	-0.01	0.01	-0.02	-0.01	-0.01
21 Fin Ins	110.23	-0.02	0.01	-0.03	-0.02	-0.02
22 Oth Serv	732.03	-0.02	0.01	-0.02	-0.02	-0.01
Total	12662.27	5.81	0.01	5.80	5.72	5.72

Source: Author's calculations

Table 11: Bilateral Exports of India to Japan

5.3 Bilateral Exports

India's bilateral export to Japan is strongest under S2 and S6 (0.66%), while more restrictive designs such as S4 and S5 deliver weaker gains of 0.11% and 0.44%, respectively, as evident in Table 11. Agriculture and food products see dramatic increases when Japan fully opens its market. Dairy exports explode under S2, S5, and S6 with gains of 209%. Though this big rise is coming from the low base of the dairy sector (0.75 million USD), this shows a clear-cut scope for dairy in the Japanese market. Cereals and food products rise by 7.9% and 3.1%, respectively. These results highlight that Japan's agricultural liberalization would significantly improve India's export opportunities in agri-food products.

Bilateral_Export	S1 (Base Value)	S2	S3	S4	S5	S6
1 AnimalProd	0.16	0.00	0.00	0.00	0.00	0.00
2 Fish	1.65	9.09	0.00	9.09	0.00	0.00
3 Dairy	0.05	0.00	0.00	0.00	0.00	0.00
4 Vegetable	0.99	6.06	0.00	6.06	0.00	0.00
5 Cereals	0.67	79.1	0.00	79.10	0.00	0.00
6 FoodProd	10.75	97.12	0.00	97.12	0.00	0.00
7 Minerals	164.1	0.17	0.01	0.17	0.17	0.17
8 Fuels	261.51	5.86	0.00	5.86	5.86	5.86
9 Chemicals	1962.27	2.50	0.01	2.49	2.50	2.50
10 Pharma	38.54	0.00	0.03	-0.03	0.00	0.00
11 Rub_Plast	340.60	16.79	0.01	16.77	16.79	16.79
12 Leather	1.07	0.00	0.00	0.00	0.00	0.00
13 Wood_Prod	86.73	1.16	0.01	1.15	1.16	1.16
14 Tex_Apparel	122.27	-0.02	0.02	-0.03	-0.02	-0.02
15 Metals	2116.65	0.00	0.01	-0.01	0.00	0.00
16 Mach_Elctrnc	5018.09	3.61	0.02	3.60	3.61	3.62
17 Automobile	1271.89	32.79	0.01	32.77	32.79	32.79
18 Oth Manuf	279.43	1.25	0.01	1.23	1.24	1.25
19 Utility	0.23	0.00	0.00	0.00	0.00	0.00
20 Trans Comm	142.36	-0.01	0.01	-0.02	-0.01	-0.01
21 Fin_Ins	110.23	-0.02	0.01	-0.03	-0.02	-0.02
22 Oth_Serv	732.03	-0.02	0.01	-0.02	-0.02	-0.01
Total	12662.27	5.81	0.01	5.80	5.72	5.72

Source: Author's calculations

Table 12: Bilateral Exports of Japan to India

Industrial and manufacturing exports also respond positively. Automobiles expand by 0.17%, while machinery and electronics (0.12%), also show a moderate increment. The intermediate inputs like rubber and plastics (0.13%), chemicals (0.12%), all post steady increase under several simulations. Leather products (8.9%) get a huge jump when Japan liberalizes its market fully. Even India's large services categories, transport/communication and other services (USD 1.7 billion), register incremental but consistent growth of around 0.09–0.10% under the preferred scenarios. S6 may be preferred here as well because it performs very well for India and comes at par with S2, a full FTA scenario.

According to Table 12, for Japan, the strongest beneficiaries are manufacturing sectors, which are Japan's traditional export strengths. Automobiles (USD 1.27 billion base) record striking increases under S2, S4, S5, and S6, with gains of 32.8%, translating into an additional USD 417 million in exports to India. Machinery and electronics (USD 5.02 billion base) expand by 3.6% (USD 181 million), while rubber and plastics (16.8%, USD 57 million) and chemicals (2.5%, USD 49 million) also show robust improvements. Other manufactures and wood products also post positive growth. Services and textiles, by contrast, show either marginal declines or negligible growth. Transport/communication, financial services, and other services experience small contractions (–0.01 to –0.03%), while textiles and apparel remain flat or slightly negative.

Though there is a small loss in a few sectors, the total bilateral exports to India see a positive growth of around 5.72% (or about USD 724 million) in scenario S6, which is close to S2, the unconstrained liberalization. This is why it may be a desirable option for Japan, too.

5.4 Sectoral Output

Table 13 shows India's aggregate sectoral output, valued at over USD 5 trillion in the base scenario, experiences modest but sectorally differentiated impacts under the renegotiation options. The strongest positive effects are concentrated in agriculture, processed food, and labor- intensive industries, while certain capital-and technology-intensive sectors see small contractions. Agricultural sectors such as cereals (0.011%), food products (0.016%), dairy (0.003%), and vegetables (0.004%) consistently expand under

Sectoral Output	S1 (Base Value)	S2	S3	S4	S5	S6
AnimalProd	30818.87	0.010	0.002	0.008	0.005	0.009
Fish	32331.47	0.002	0.001	0.001	0.001	0.002
Dairy	137391.3	0.003	0.002	0.002	0.002	0.003
Vegetable	176189.5	0.004	0.000	0.004	0.004	0.004
Cereals	134247.3	0.011	0.007	0.004	0.011	0.011
FoodProd	169052.9	0.015	0.011	0.003	0.016	0.016
Minerals	95620.58	0.009	-0.002	0.011	0.008	0.008
Fuels	296393.3	0.010	-0.002	0.012	0.009	0.009
Chemicals	169560.2	0.002	-0.005	0.007	0.000	0.000
Pharma	50462.43	0.027	-0.006	0.032	0.026	0.025
Rub_Plast	60806.2	-0.057	-0.002	-0.055	-0.060	-0.059
Leather	15954.57	0.143	0.112	0.031	0.022	0.141
Wood_Prod	45074.95	0.008	-0.002	0.010	0.006	0.007
Tex_Apparel	149306.8	0.014	-0.006	0.020	0.013	0.012
Metals	215495.8	-0.003	-0.005	0.002	-0.004	-0.005
Mach_Elctrnc	147032.8	-0.004	-0.006	0.001	-0.006	-0.006
Automobile	168962.5	-0.093	-0.001	-0.092	-0.094	-0.094
Oth_Manuf	69841.83	0.029	-0.007	0.036	0.028	0.027
Utility	255282	0.001	0.000	0.001	0.000	0.000
Trans_Comm	404937.2	0.007	-0.001	0.008	0.006	0.006
Fin_Ins	198042.1	0.004	0.000	0.003	0.001	0.003
Oth_Serv	1997627	0.008	0.000	0.007	0.006	0.007
Total	5020432	0.003	0.000	0.003	0.001	0.002

Source: Author's calculations

Table 13: Sectoral Output for India

scenarios S2 to S6, reflecting the gains from Japanese market access. Sector leather (0.14%) shows particularly strong expansion, aligning with India's export strengths and factor endowments. Other manufacturing and transport, and communication services also register output gains.

However, in scenario S6, some sectors experience modest output declines. Automobiles (–0.094%) and rubber/plastics (–0.059%) show the sharpest contractions, highlighting the competitive pressure from Japanese firms in these industries. Metals (–0.005%) and machinery/electronics (–0.006%) also register small declines, reflecting Japan's comparative advantage in these segments. But overall, total output expands by 0.002% on a large base of 5020 billion USD. Such an output increment will create jobs as well. Apart from that, this scenario is again close to S2.

Japan's aggregate sectoral output in Table 14, with a base value of nearly USD 9.7 trillion, shows broad-based expansion under the renegotiation scenarios, with the strongest effects under S2 and S6. The overall economy expands by 0.07% in S6, broadly comparable to S2, reflecting the robustness of Japan's manufacturing competitiveness and export orientation.

In S6, Agriculture and food also register moderate but positive increases. Output expands in animal products (0.054%), dairy (0.055%), and food products (0.048%), suggesting that Japan's agri-food industries gain from access to Indian demand despite India retaining its sensitive sector protections. Manufacturing sectors are the largest beneficiaries. Automobiles (0.156% in S6) record the highest output gains, consistent with Japan's global comparative advantage and the improved access to the Indian market. Other high-performing sectors include rubber and plastics (0.108%), chemicals (0.07%), machinery and electronics (0.06%), and metals (0.059%), all of which are critical to Japan's industrial base. These results highlight how a renegotiated agreement that protects India's agriculture but liberalizes manufacturing can significantly strengthen Japan's export-oriented sectors.

Sectoral Output	S1 (Base Value)	S2	S3	S4	S5	S6
AnimalProd	49961.2	0.054	0.008	0.046	0.053	0.054
Fish	13869.49	0.034	0.003	0.031	0.031	0.032
Dairy	35932.25	0.056	0.003	0.052	0.054	0.055
Vegetable	26809.63	0.018	0.003	0.015	0.017	0.017
Cereals	24380.53	0.028	-0.004	0.032	0.023	0.024
FoodProd	288551.6	0.052	0.002	0.050	0.047	0.048
Minerals	94994.15	0.060	0.008	0.052	0.059	0.060
Fuels	139887.6	0.070	0.007	0.063	0.068	0.070
Chemicals	238865.5	0.070	0.008	0.062	0.069	0.070
Pharma	69389.59	0.059	0.009	0.051	0.058	0.059
Rub_Plast	146269.6	0.108	0.008	0.100	0.107	0.108
Leather	3642.02	0.015	-0.027	0.042	0.051	0.016
Wood_Prod	147640.7	0.062	0.007	0.055	0.061	0.062
Tex_Apparel	38707.14	0.043	0.010	0.034	0.042	0.044
Metals	615053.8	0.059	0.009	0.050	0.057	0.059
Mach_Elctrnc	797080.3	0.060	0.010	0.050	0.058	0.060
Automobile	525131.9	0.155	0.008	0.148	0.154	0.156
Oth_Manuf	84443.34	0.058	0.009	0.049	0.056	0.058
Utility	283344.3	0.069	0.007	0.062	0.068	0.069
Trans_Comm	888596.1	0.064	0.007	0.058	0.063	0.064
Fin_Ins	309396.8	0.066	0.007	0.059	0.065	0.066
Oth_Serv	4881928	0.069	0.007	0.062	0.067	0.069
Total	9703875	0.071	0.007	0.064	0.069	0.071

Source: Author's calculations

Table 14: Sectoral Output for Japan

5.5 Factor Demand

For India, across scenarios, the most notable effects are observed in skilled labor and capital, both of which increase by 0.006% in S2 and S4, and by 0.005–0.006% in S6, Table 15. This indicates that a more liberalized arrangement, particularly when Japan opens its markets more widely, stimulates investment and demand for higher-skilled labor in India. Such a pattern is consistent with India's structural shift toward manufacturing and services under deeper trade integration. Unskilled labor demand rises by 0.005% in S2 and S6, and only marginally under S3 and S5, suggesting that scenarios involving wider manufacturing liberalization (like S6) are more employment-intensive. This is a politically important outcome, as employment generation is a key policy priority for India.

Factor Endowment	S1 (Base Value)	S2	S3	S4	S5	S6
Land	106739.9	0	0	0	0	0
UnSkLab	756001.8	0.005	0.001	0.004	0.003	0.005
SkLab	575378.4	0.006	0.000	0.006	0.004	0.006
Capital	1061193	0.006	0.000	0.006	0.004	0.005
NatRes	26521.86	0	0	0	0	0

Source: Author's calculations

Table 15: % Change in Factor Demand for India

Under the full FTA (S2), demand for unskilled labor, skilled labor, and capital all increase by around 0.069–0.070%, marking a substantial reallocation of resources in favor of liberalization, evident in Table 16. Even in the other scenarios (S4, S5), factor demand rises consistently by 0.062–0.068%, with only S3 showing a minimal effect (0.007%). Since land and Natural resources are fixed in the model, there is no change in them across the scenarios. This pattern suggests that Japan's welfare and GDP gains translate into broad-based expansion across labor and capital, with little discrimination between skill categories. The scenario S6 is almost close to the full FTA scenario S2, offering similar gains.

Taken together, the evidence from welfare, GDP, bilateral trade, sectoral output, and factor demand analysis points to Scenario 6 (S6) as the most balanced and politically feasible outcome of the CEPA renegotiation. Unlike the full FTA (S2), which maximizes welfare but requires India to liberalize its sensitive agricultural sectors, and is also practically unfeasible, S6 safeguards India's farm economy while still delivering meaningful gains for both India and Japan. Sectoral and factor market results also show that S6 stimulates Indian manufacturing and employment without disrupting land-intensive activities. This makes scenario S6 not only the most economically rewarding but also the most strategically sustainable agreement design for advancing the India–Japan CEPA.

6. Conclusion

India and Japan had signed a free trade agreement in the hope of better economic outcomes, but the expectation could not really materialize, especially for India. Due to a skewed trade relationship with Japan, India wants to renegotiate its trade pact. This study starts by commenting on the bilateral trade pattern of India and Japan. It further scrutinizes the tariff schedules committed by both countries. Using the sectoral calculated liberalization rates for both countries, a CGE analysis is done to find a better alternative to the current CEPA.

Though simulations highlight that the full comprehensive FTA would yield better results than all the experiments done, it is to be very unlikely because of several sensitive sectors. An FTA design where India protects the sensitive sectors while liberalizing the other sectors, while Japan offers full market access to India, would be a better scenario for both countries and would come second to the first-best scenario (S2), making it the second-best scenario for the India-Japan CEPA.

Apart from FTA design, India should consult with all stakeholders of the FTA, including exporters, customs, freight forwarders, etc., to make the renegotiated deal a customized deal for India. This way, India may get a chance to work around the pressing issues of several stakeholders. This exercise may increase the utilization rate of the FTA.

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