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Tariff Reduction, Import Liberalization, and Consumer Welfare in RCEP Member States: Evidence from a Structural Model

Xin Zhou (Corresponding author)

Business School, Xinjiang University, Xinjiang 830046, China

E-mail: zhouxinmanagement@163.com

Hao Song

Business School, Beijing Normal University, Beijing 100091, China

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Abstract

This paper evaluates the welfare effects of tariff reductions and import liberalization under the Regional Comprehensive Economic Partnership. We build a structural trade model based on Eaton and Kortum (2002) and Caliendo and Parro (2015), and use exact-hat counterfactuals to quantify changes in real wages, price indices, trade shares, and consumer welfare across RCEP members and India. The counterfactual results show that China's unilateral tariff elimination raises domestic welfare, while bloc-wide tariff elimination generates broader welfare gains among member economies. Reductions in non-tariff barriers further amplify the effects of tariff liberalization. India's welfare changes little if it remains outside RCEP under tariff reductions alone, but it suffers welfare losses when members also reduce non-tariff barriers. By contrast, India's accession substantially increases its real wages and consumer welfare. Nash-equilibrium tariffs are close to zero for most bilateral pairs, suggesting that RCEP's tariff-reduction commitments are broadly consistent with members' welfare incentives. These findings support deeper tariff liberalization, trade facilitation, and phased accession arrangements for sensitive economies.

Keywords: RCEP, Tariff reduction, Consumer welfare, Counterfactual analysis, Nash equilibrium

JEL codes: F15; F13; C68; C72; D61

1. Introduction

The Regional Comprehensive Economic Partnership (RCEP) is one of the most important institutional developments in Asia-Pacific economic integration. Signed by the ten ASEAN economies together with China, Japan, the Republic of Korea, Australia, and New Zealand, the agreement establishes a large regional framework for tariff reduction, trade facilitation, rules of origin, services liberalization, investment cooperation, and regulatory coordination. Its most direct economic instrument is the phased reduction of import tariffs, with more than 90 percent of merchandise trade expected to move toward zero tariffs over the implementation period. At a time when global trade is increasingly affected by protectionism, supply-chain fragmentation, and geopolitical uncertainty, RCEP provides a rules-based mechanism for reducing trade costs and deepening regional production networks.

The central question is whether these tariff-reduction commitments generate measurable welfare gains for member economies. Lower tariffs may reduce consumer prices, expand the range of imported varieties, lower the cost of intermediate inputs, and raise real wages through general-equilibrium adjustment. At the same time, tariff liberalization may also reduce tariff revenue, change trade patterns, and redistribute gains across economies according to their initial trade structure, tariff schedules, and position in regional value chains. The welfare consequences are therefore not mechanically obvious. They must be evaluated within a framework that can simultaneously account for price-index changes, expenditure reallocation, trade creation, trade diversion, and tariff-revenue effects. This issue is especially important for China, the largest economy in the agreement, and for India, which withdrew from RCEP negotiations but remains economically connected to the region.

Existing discussions of RCEP often emphasize its institutional significance or use aggregate trade indicators to describe its potential effects. Such descriptive approaches are useful, but they cannot fully quantify how tariff shocks propagate through a multi-country economy. A tariff cut by one country affects not only its own import prices and consumer welfare, but also partner countries' export opportunities, relative wages, and trade shares. When trade in intermediate goods is considered, tariff reductions can further influence production costs across sectors and amplify welfare effects through input-output linkages. For this reason, a structural general-equilibrium model is needed to evaluate RCEP's welfare implications in a consistent quantitative framework.

This paper develops a structural trade model based on Eaton and Kortum (2002) and Caliendo and Parro (2015), and solves counterfactual equilibria using the exact-hat algebra approach of Dekle, Eaton, and Kortum (2007). The model links tariff reductions to changes in trade shares, wages, price indices, real wages, and consumer welfare. Using trade and tariff data for RCEP members and India, we conduct a set of policy counterfactuals: China's unilateral elimination of tariffs on RCEP partners; bloc-wide tariff elimination among RCEP members; RCEP liberalization with India remaining outside the agreement; joint reductions in tariff and non-tariff barriers; India's hypothetical accession to RCEP; and welfare-maximizing Nash-equilibrium tariffs among member economies. This design allows us to examine both the welfare effects of liberalization and the strategic incentives of

members to implement the agreement.

The results show that RCEP tariff liberalization is welfare-improving in most counterfactual scenarios. China's unilateral tariff elimination raises domestic consumer welfare and real wages, while also generating positive spillovers for several trading partners. When all RCEP members eliminate tariffs simultaneously, welfare gains become broader and larger because lower prices, expanded trade, and cheaper intermediate inputs reinforce one another. India's welfare changes little when it remains outside RCEP under tariff reductions alone, but it suffers losses once members also reduce non-tariff barriers and deepen trade facilitation. By contrast, India's accession to RCEP substantially increases its consumer welfare and real wages. The Nash-equilibrium tariff results further show that welfare-maximizing tariffs among RCEP members are generally close to zero, suggesting that the agreement's tariff-reduction commitments are broadly consistent with members' own welfare incentives.

This paper contributes to the literature in three ways. First, it provides a structural welfare evaluation of RCEP tariff liberalization rather than relying only on descriptive trade statistics or aggregate policy discussion. Second, it compares multiple counterfactual scenarios, including China's unilateral liberalization, bloc-wide tariff elimination, non-tariff barrier reductions, and India's possible accession. Third, it introduces a Nash-tariff exercise to examine whether RCEP's zero-tariff trajectory is compatible with member economies' strategic incentives. The remainder of the paper is organized as follows. Section 2 reviews the related literature. Section 3 describes RCEP's tariff-reduction commitments and institutional content. Section 4 presents the model and solution method. Section 5 reports the counterfactual results and Nash-tariff analysis. Section 6 concludes, and Section 7 discusses policy implications.

2. Literature Review

A large body of research examines how trade liberalization, tariff reductions, and regional trade agreements affect prices, real wages, trade flows, and welfare. This paper is closely related to four strands of literature: quantitative trade models and welfare measurement, tariff liberalization and consumer welfare, regional trade agreements and RCEP, and global value chains with input-output linkages.

The first strand provides the structural foundation for evaluating welfare effects in international trade. Anderson and van Wincoop (2003) establish the theoretical basis of structural gravity by emphasizing multilateral resistance, which becomes essential for counterfactual trade-policy analysis. Eaton and Kortum (2002) develop a multi-country Ricardian model with productivity heterogeneity and geographic trade costs, providing a tractable framework for quantifying the effects of trade barriers on prices, trade shares, and welfare. Melitz (2003) introduces firm heterogeneity and endogenous selection into exporting, showing that trade liberalization reallocates resources toward more productive firms. These studies provide the theoretical basis for linking lower trade costs to welfare improvements through price reductions, variety expansion, and productivity reallocation.

A more directly relevant group of papers develops quantitative tools for counterfactual

welfare analysis. Dekle, Eaton, and Kortum (2007) introduce the exact-hat algebra approach, which allows researchers to solve for counterfactual equilibria using observed trade shares and proportional changes rather than estimating all structural fundamentals. Arkolakis, Costinot, and Rodríguez-Clare (2012) show that, across a broad class of trade models, the aggregate welfare gains from trade can be summarized by domestic expenditure shares and trade elasticities. Costinot and Rodríguez-Clare (2014) further systematize structural gravity and quantitative trade models for policy counterfactuals. Caliendo and Parro (2015) extend the Eaton-Kortum model to a multi-sector setting with input-output linkages and apply it to NAFTA, showing that intermediate inputs and sectoral linkages are quantitatively important for welfare measurement. These studies justify the use of a structural general-equilibrium model and exact-hat counterfactuals in the present paper.

The second strand studies how tariff reductions affect consumer welfare through prices, wages, and household expenditure. Broda and Weinstein (2006) show that import-variety growth generates sizable consumer gains, suggesting that trade liberalization improves welfare not only by reducing prices but also by expanding available product varieties. Porto (2006), Nicita (2009), and Marchand (2012) develop household-level approaches to estimate the distributional effects of trade policy, emphasizing that tariff reductions affect welfare through both consumption prices and factor incomes. Atkin, Faber, and Gonzalez-Navarro (2018) further show that foreign retail entry can raise consumer welfare by lowering prices and expanding access to goods. This literature supports the paper's focus on consumer welfare rather than only aggregate GDP or trade volumes.

A related empirical literature highlights the production-side effects of import liberalization. Amiti and Konings (2007) show that lower input tariffs raise firm productivity in Indonesia, while Goldberg, Khandelwal, Pavcnik, and Topalova (2010) find that cheaper imported intermediate inputs expand firms' product scope in India. Handley and Limão (2017) show that trade-policy uncertainty affects trade flows, prices, and welfare through firm entry and investment decisions. These papers imply that tariff reductions may improve welfare not only through final consumption prices but also through cheaper intermediate inputs, productivity gains, and reduced uncertainty.

Recent evidence from trade-war episodes provides direct support for the "tariff-price-welfare" mechanism. Amiti, Redding, and Weinstein (2019) show that the 2018 U.S. tariffs were largely passed through to import prices, implying substantial costs for consumers and firms using imported goods. Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2020) quantify the welfare losses from the return to protectionism and find that import and retaliatory tariffs reduced trade and generated sizable consumer losses. Cavallo, Gopinath, Neiman, and Tang (2021) use border and retail price data to show that tariff pass-through at the border was high during recent U.S. trade-policy shocks. These findings reinforce the basic mechanism that tariff increases raise prices and reduce real income, while tariff reductions are expected to lower price indices and improve welfare.

The third strand evaluates regional trade agreements and mega-regional trade blocs. Petri and Plummer (2016) provide quantitative estimates of the economic effects of the Trans-Pacific

Partnership, showing that large regional agreements can generate substantial income and export gains. Petri and Plummer (2020) analyze how the U.S.-China trade war, COVID-19, CPTPP, and RCEP reshape East Asian trade blocs, emphasizing that RCEP strengthens East Asian interdependence. Park, Petri, and Plummer (2021) further examine RCEP, CPTPP, and the U.S.-China trade war in a CGE framework, showing that regional cooperation can partially offset protectionist shocks. Itakura (2022) uses a recursively dynamic CGE model and shows that RCEP's welfare effects are amplified when tariff reductions are combined with services liberalization, logistics improvements, and investment commitments.

More recent studies focus directly on RCEP. UNCTAD (2021) estimates that RCEP will generate both trade-creation and trade-diversion effects, increasing intra-regional exports while redirecting some trade from non-members to members. Estrades, Maliszewska, Osorio-Rodarte, and Seara e Pereira (2023) use a global CGE model combined with microsimulation to assess the economic and distributional impacts of RCEP, highlighting the importance of tariff and non-tariff measure reductions. Lin, Lv, Yang, and Li (2024) develop a structural model based on Caliendo and Parro to evaluate RCEP's welfare effects under different tariff-reduction schedules and India-accession counterfactuals. Jin, Jin, Sheng, Sun, and Yan (2025) analyze the dynamic trade and welfare effects of RCEP and emphasize the role of non-tariff barriers and financial frictions in amplifying welfare gains. Xu, Yang, and Mai (2025) examine deep trade agreements and compare the welfare effects of RCEP and CPTPP, stressing that legal enforceability and dispute-settlement provisions can generate additional welfare gains. These recent studies are especially relevant because they move beyond static tariff simulations and emphasize RCEP's dynamic, institutional, and non-tariff dimensions.

The fourth strand studies global value chains and input-output linkages. Hummels, Ishii, and Yi (2001) document the rise of vertical specialization, showing that imported inputs are increasingly used to produce exported goods. Yi (2003) shows that vertical specialization can generate nonlinear trade responses to tariff reductions. Johnson and Noguera (2012) construct value-added trade measures using input-output and bilateral trade data, demonstrating that gross trade flows can differ substantially from domestic value-added content. Antràs and Chor (2013) analyze how firms organize production along global value chains, while Baqaee and Farhi (2024) provide a flexible framework for studying trade barriers in international production networks. Grossman, Helpman, and Redding (2024) further show that unexpected input tariffs can disrupt firm-to-firm supply relationships and magnify welfare losses through supply-chain adjustment. This literature is important for RCEP because East Asian trade is deeply embedded in regional value chains, and tariff reductions on intermediate goods can propagate through production networks.

Compared with the existing literature, this paper contributes in three ways. First, it applies a structural trade model to quantify the welfare effects of RCEP tariff reductions for member economies and India. Second, it compares multiple policy-relevant counterfactual scenarios, including China's unilateral tariff elimination, RCEP-wide zero tariffs, reductions in non-tariff barriers, and India's hypothetical accession. Third, it computes welfare-maximizing Nash-equilibrium tariffs among RCEP members and examines whether these equilibrium

tariffs are consistent with RCEP's long-run zero-tariff commitments. In this sense, the paper links structural welfare analysis with the strategic incentives of member economies to implement regional trade liberalization.

3. Analysis of the Agreement's Content

The RCEP Agreement consists of 20 chapters and four market-access schedules. Its main text covers traditional areas such as trade in goods, trade in services, rules of origin, and foreign investment, as well as newer domains including electronic commerce. The agreement not only targets liberalization of merchandise trade but also accelerates the opening of service sectors. At the same time, it expedites the relaxation of foreign-ownership restrictions in related sectors such as legal and financial services.

With respect to merchandise-trade liberalization, the RCEP's provisions go well beyond earlier FTAs: from the time of signing, tariffs on more than 90 percent of goods are set at zero, while tariffs on remaining products are phased down to zero over a transition period of 10-15 years. In the area of trade facilitation, the agreement calls for the use of new technologies to speed up customs clearance, reduce clearance times, simplify inspection and quarantine procedures, and harmonize technical standards within the region, thereby further lowering trade costs.

RCEP is also highly inclusive. Taking into account differences among members in levels of development, economic systems, and resource endowments, the agreement safeguards liberalization while accommodating differentiated national requests—allowing some countries to apply transition periods of up to 20 years for tariff reductions on certain products. In addition, RCEP contains dedicated provisions to promote economic and technical cooperation among enterprises from different countries.

Regarding new entrants, the agreement stipulates that, 18 months after it enters into force, other economies may apply to accede. India may also rejoin RCEP in the capacity of a founding member. This demonstrates RCEP's commitment to balancing the interests of all parties and proactively expanding membership while advancing regional trade liberalization.

According to China's tariff-commitment schedules, the share of tariff lines at a base rate of zero is 8.45% for ASEAN members, Australia, Japan, the Republic of Korea, and New Zealand alike. In the first year after the agreement enters into force, the proportion of zero-tariff lines in China's import schedule exceeds 50% for ASEAN, Australia, and New Zealand—reaching 67.91%, 65.82%, and 66.14%, respectively. By the twentieth year after entry into force, the zero-tariff share for each partner exceeds 85%, with the ratios for ASEAN, Australia, and New Zealand approaching roughly 90%.

As shown in Table 1,China's zero-tariff lines expand more rapidly for ASEAN, Australia, and New Zealand, and more slowly for Japan and the Republic of Korea. For Japan (around year 6) and for the Republic of Korea (around year 1) there is little or no change; only by about the eleventh year after entry into force does the share of zero-tariff lines for both partners rise sharply. The underlying reason is that China's trade with ASEAN, Australia, and New Zealand is characterized by strong complementarity, whereas trade with Japan and the

Republic of Korea entails a degree of import competition. China still faces relative disadvantages vis-à-vis Japan and the Republic of Korea in high-tech sectors such as optical instruments, electronic communications, and automobile manufacturing. Sharp tariff cuts in the short run could therefore shock related domestic industries and hinder their development. By contrast, reducing tariffs on these sectors after roughly a decade can "force" faster domestic reform, align China with RCEP's high-standard rules on openness, improve resource allocation within the affected industries, and secure time and space to build international competitiveness.

Table 1. China's proportion of zero tariff items imported by RCEP members[1]

Country or region	Base rate (2014)	Year 1	6th year	11th year	Sixteenth year	21st year and beyond
the Republic of Korea	8.45	38.64	38.64	79.68	82.76	86.00
Japan	8.45	25.01	25.01	71.50	83.00	86.00
Australia	8.45	65.82	65.82	79.99	79.99	89.98
New Zealand	8.45	66.14	66.14	80.00	80.00	89.98
ASEAN	8.45	67.91	67.91	80.62	83.62	90.50

Source: Calculated based on the China tariff commitment table of the Regional Comprehensive Economic Partnership (RCEP).

Based on a simple (unweighted) average across tariff items in China's tariff-commitment schedules, the base rate for all partners is 9.76%. In the first year after RCEP enters into force, the average tariff rates applied to Japan and the Republic of Korea are relatively higher—8.34% and 7.38%, respectively—while those for the other partners are all below 4.00%. By the twenty-first year and thereafter, China's average import tariff rates toward ASEAN members, Australia, Japan, the Republic of Korea, and New Zealand fall to 1.09%, 1.15%, 2.19%, 2.08%, and 1.14%, respectively.

For ASEAN, Australia, and New Zealand, tariff reductions proceed smoothly, consistent with China's relatively high share of zero-tariff lines for these partners in the first year of implementation. Japan and the Republic of Korea start from higher average rates in year 1, but their averages converge toward those of other partners by year 21 and beyond. From year 11 onward, China's average import tariff on other RCEP members drops below 3%, effectively establishing near-free trade; after year 11, liberalization deepens further, in line with China's tariff-reduction commitments under RCEP.

A comprehensive assessment of current conditions indicates that RCEP members exhibit a high and rising degree of mutual trade dependence, and that the tariff-reduction commitments can further intensify intra-bloc trade. The reduction program spans many items, with broad coverage and deep cuts. After a 20-year phase-in, tariffs on most products will fall to zero—apart from certain sensitive items that retain higher duties—at which point the RCEP

[1] *Note:* "Benchmark tariff rate (2014)" refers to each Party's MFN applied tariff rate in effect on January 1, 2014; the same applies hereinafter.

members will constitute a genuine free-trade area.

4. Model Setup and Solution

This section employs a general equilibrium model to analyze the effects of RCEP members' tariff reductions on trade flows, real income, and welfare. At the same time, game-theoretic methods are combined with counterfactual analysis to explore the optimal Nash-equilibrium tariffs for each member country. The model setup is based on Eaton and Kortum (2002) and Caliendo and Parro (2015).

4.1 Model Setup

Suppose there are n countries, and consumers have CES utility functions. Each country employs only one factor of production, labor L, and produces a continuum of goods $j \in [0,\omega]$. The productivity of country i in producing variety j is denoted by $z_i(j)$. The unit input cost in country i is denoted by c_i. Assuming constant returns to scale, the unit cost of producing good j in country i is c_i/z_i^j. Under perfect competition, the domestic consumer price of good j in country i is therefore $p_{ii}(j)=c_i/z_i(j)$

International trade costs are represented by iceberg trade costs $\tau_{ni}>1$, meaning that for consumers in country n to consume one unit of good j imported from country i, τ_{ni} units must be shipped. To prevent arbitrage, assume that for any three countries i, k, n, $\tau_{ni}<\tau_{nk}\tau_{ki}$. Hence, the price of good j exported from country i to country n is:

$$p_{ni}(j)=\tau_{ni}c_i/z_i(j) \tag{1}$$

Further, if country n imposes an import tariff on goods from country i, the price of products exported from i to n is:

$$p_{ni}(j)=(1+t_{ni})\tau_{ni}c_i/z_i(j) \tag{2}$$

Under perfect competition, country n purchases good j at the lowest available price, and the price paid by country n for good j is:

$$p_n(j)=min\{p_{ni}(j);i=1,2...n\} \tag{3}$$

To capture cross-country heterogeneity in production efficiency and prices, we impose a distributional assumption on productivities. Following the literature, this paper adopts a Fréchet distribution：$F_i(z)=exp\{-T_iz^{-\theta}\}$，

Given the productivity distribution, we can derive the probability distribution for country i exporting good j:

$$\Pr(p_n(j)\leq p)=1-\exp\left\{-T_i(w_i(1+t_{ni})\tau_{in})^{-\theta}p^{\theta}\right\} \tag{4}$$

Similarly, given the productivity distribution, we can derive the distribution of the minimum price of good *j* in country *n*:

$$Pr(p_n(\omega)\leq p)=1-exp\{-\phi_n p^{\theta}\} \tag{5}$$

where $\phi_n=\sum_{i=1}^{N} T_i(c_i(1+t_{ni})\tau_{in})^{-\theta}$.

The probability that country *i* supplies a given product to country *n* is:

$$\pi_{ni}=\frac{T_i(c_i(1+t_{ni})\tau_{in})^{-\theta}}{\phi_n} \tag{6}$$

Under CES preferences, the consumer price index is:

$$P_n=E\left[p_n(\omega)^{1-\sigma}\right]^{\frac{1}{1-\sigma}}=\tilde{\gamma}\phi_n^{-\frac{1}{\theta}} \tag{7}$$

where $\tilde{\gamma}=\left[\Gamma(\frac{\theta-(\sigma-1)}{\theta})\right]^{\frac{1}{1-\sigma}}$.

Similarly, country *n*'s expenditure share on goods from country *i* is:

$$\pi_{ni}=\frac{T_i(c_i(1+t_{ni})\tau_{in})^{-\theta}}{\phi_n}.$$

Assuming production uses labor and intermediate inputs, with a labor share β, the unit cost is $c_i=w_i^{\beta}P_i^{1-\beta}$.

Under a Cobb-Douglas cost function, the composite intermediate-input price index is:

$$P_n=\tilde{\gamma}\left[\sum_{j=1}^{N} T_j(w_j^{\beta}P_j^{1-\beta}(1+t_{jn})\tau_{jn})^{-\theta}\right]^{-\frac{1}{\theta}} \tag{8}$$

Country *n*'s expenditure share on goods from country *i* is:

$$\pi_{in}=\frac{T_i\left[w_i^{\beta}P_i^{1-\beta}(1+t_{in})\tau_{in}\right]^{-\theta}}{\sum_{j=1}^{N} T_j\left[w_j^{\beta}P_j^{1-\beta}(1+t_{jn})\tau_{jn}\right]^{-\theta}} \tag{9}$$

The market-clearing condition is:

$$X_n=\frac{1}{\beta}w_nL_n+\sum_{i=1}^{N}\frac{t_{in}}{1+t_{in}}\pi_{in}X_n \tag{10}$$

The first term represents labor income, and the second term represents tariff revenue. Welfare is measured as the ratio of total income to the price index. At this point, the model fully

characterizes production, trade, consumption, and market clearing across countries under perfect competition.

4.2 Exact-Hat Algebra and Numerical Solution

Building on the preceding analysis of multi-country trade under perfect competition—which yielded each country's expenditure shares and market-clearing conditions at equilibrium—we confront the high dimensionality of parameters in multi-country models and the heavy computation required to solve for level variables. Accordingly, we adopt the "Exact-hat Algebra" method of Dekle et al. (2007) to compute equilibrium solutions for the relative changes in variables under policy shocks. The advantage of Exact-hat Algebra is that it reduces the number of parameters that must be estimated, thereby avoiding over-parameterization; at the same time, by focusing on relative changes in key variables, it identifies how policy shocks propagate through the economic system. Using this approach, we conduct counterfactual analyses for wages, real wages, total expenditure, the price index, expenditure shares, and welfare, obtaining the following results:

$$\hat{\pi}_{in}=\frac{\left[\hat{w}_i^{\beta}\hat{P}_i^{1-\beta}(\widehat{1+t_{in}})\hat{\tau}_{in}\right]^{-\theta}}{\sum_{j=1}^{N}\pi_{jn}\left[\hat{w}_j^{\beta}\hat{P}_j^{1-\beta}(\widehat{1+t_{jn}})\hat{\tau}_{jn}\right]^{-\theta}} \tag{11}$$

$$\hat{P}_n=\left\{\sum_{j=1}^{N}\pi_{jn}\left[\hat{w}_j^{\beta}\hat{P}_j^{1-\beta}(\widehat{1+t_{jn}})\tau_{jn}\right]^{-\theta}\right\}^{\frac{1}{-\theta}} \tag{12}$$

$$\hat{w}_i w_i L_i=\beta\sum_{n=1}^{N}\frac{1}{1+t_{in}}\pi_{in}^{'}\hat{X}_n X_n \tag{13}$$

$$\hat{X}_n=\frac{1}{\beta}\hat{w}_n w_n L_n+\sum_{j=1}^{N}\frac{t_{jn}^{'}}{1+t_{jn}^{'}}\pi_{jn}^{'}\hat{X}_n X_n \tag{14}$$

$$\widehat{rw}_n=\frac{\hat{w}_n}{\hat{P}_n} \tag{15}$$

$$\widehat{wel}_n=\frac{\hat{X}_n}{\hat{P}_n} \tag{16}$$

Taking equation (11) as an example, let $\hat{\pi}_{in}=\frac{\pi_{in}^{'}}{\pi_{in}}$ denote the proportional change in country n's expenditure share on goods from country i. Algebraic manipulation shows that $\hat{\pi}_{in}=\frac{\pi_{in}^{'}}{\pi_{in}}$ can be decomposed into a combination of proportional changes in wages, price indices, tariffs, and trade costs. This equilibrium condition is convenient for policy counterfactuals: when tariffs change while other key variables are held fixed, equation (11) implies that the proportional change in expenditure shares can be read directly from the proportional change in tariffs. Equations (11)-(14) jointly determine the relative change in expenditure shares; equations (11)-(15) jointly determine the relative change in real wages; and equations (11), (12), (13), (14) and (16) jointly determine the relative change in welfare.

This paper solves the model numerically. Given the other parameter settings, it suffices to determine equilibrium wages and the price index; from these, the key economic variables in equilibrium follow. The specific procedure is a guess-and-verify iteration: using Matlab, we assign initial values to wages and the price index and repeatedly iterate the system until convergence, i.e., until the iterates are sufficiently close to the equilibrium values. This yields the equilibrium wage and price index.

For counterfactual analysis, given the proportional change in a particular variable, we employ the Exact-hat Algebra method to carry out systematic computations and evaluate the corresponding trade-policy counterfactuals. As the foregoing equations indicate, changes in tariffs—both in levels and in the proportional change—affect the proportional changes in wages, total expenditure, expenditure shares, real wages, and welfare. Hence lowering or raising tariff rates systematically influences each country's economic variables. According to the model results, tariff reductions among RCEP members impact real wages, welfare, and related outcomes across countries.

5. Empirical Results and Analysis

This section reports the counterfactual results of RCEP tariff liberalization, non-tariff barrier reductions, India's potential accession, and Nash-equilibrium tariff choices. Before presenting the numerical results, we first describe the data sources, calibration strategy, and counterfactual design.

5.1 Data Sources, Calibration, and Counterfactual Design

The empirical analysis uses bilateral trade data, tariff data, and RCEP tariff-commitment information for RCEP member economies and India. Trade data are obtained from the UNCTAD database, and tariff data are collected from the World Bank's WITS database and RCEP tariff commitment schedules. The benchmark equilibrium is calibrated using observed bilateral trade shares and applied tariff rates. Tariff reductions are introduced as proportional changes in bilateral tariff wedges, while non-tariff barrier reductions are modeled as proportional reductions in iceberg trade costs.

Welfare and real wage changes are reported as counterfactual ratios relative to the benchmark equilibrium. A ratio greater than one indicates an improvement relative to the baseline, while a ratio below one indicates a decline. Percentage changes are calculated as (ratio − 1) × 100. For example, a welfare ratio of 1.0342 corresponds to a welfare increase of 3.42%. The model is solved using the exact-hat algebra approach, which allows counterfactual equilibria to be computed from observed trade shares, tariff changes, and structural parameters without recovering all underlying productivity and trade-cost fundamentals.

The counterfactual analysis considers five main scenarios. First, China unilaterally eliminates import tariffs on RCEP members while other economies keep their tariffs unchanged. Second, all RCEP members mutually eliminate tariffs within the bloc. Third, RCEP members eliminate tariffs while India remains outside the agreement and keeps its tariff policy unchanged. Fourth, RCEP members jointly reduce tariff and non-tariff barriers, allowing us to examine whether trade-facilitation measures amplify the welfare effects of tariff

liberalization. Fifth, India is assumed to accede to RCEP and eliminate tariffs on imports from RCEP members. In addition, we compute welfare-maximizing Nash-equilibrium tariffs among RCEP members to assess whether the agreement's tariff-reduction commitments are consistent with members' strategic incentives.

Because quantitative counterfactual exercises may be sensitive to parameter choice, estimation bias, and out-of-sample reliability, the interpretation of the results emphasizes proportional changes and cross-scenario comparisons rather than short-run point forecasts. This is consistent with the broader concern that quantitative estimates should account for bias correction and out-of-sample performance, as discussed by Guo (2021).

5.2 Effects of China's Zero Tariffs on Members' Real Wages and Welfare

Assume China first implements zero import tariffs on RCEP members, while other countries keep their tariffs unchanged. Using the Exact-hat Algebra method for counterfactual analysis, the results are reported in Table 2. Table 2 shows that, after China eliminates all import tariffs on RCEP members, consumer welfare and real wages both rise relative to the pre-liberalization baseline: welfare increases by 3.42% and real wages by 7.94%. From the expressions for welfare and real wages, China's tariff elimination lowers the domestic consumer price index, and the reduction in the price index outweighs the loss of tariff revenue. Overall, therefore, both welfare and wages increase. In addition, China's unilateral tariff elimination expands imports, broadens the range of consumer products, and further raises consumer welfare.

China's unilateral and comprehensive elimination of import tariffs on RCEP members not only has pronounced effects on domestic real income and welfare, but also induces trade creation and trade diversion. According to the welfare ratios in Table 2, countries such as Japan and the Republic of Korea have welfare ratios above 1.4, indicating that removing tariffs substantially lowers their export costs to China, boosts their exports, and thereby raises national welfare. As the largest economy in East Asia with a super-sized market, China's active pursuit of FTA cooperation benefits neighboring countries by enhancing product competitiveness and facilitating further expansion into international markets. Judging from the welfare ratios for Japan, the Republic of Korea, Australia, and New Zealand, China's full tariff elimination is welfare-improving for these partners.

Most ASEAN members experience welfare gains, although Brunei and Laos show slight declines or near-zero changes. Non-ASEAN RCEP partners such as Japan, the Republic of Korea, Australia, and New Zealand also experience welfare improvements.This pattern reflects the fact that tariffs between China and ASEAN countries are already low. When we consider tariffs alone, China's comprehensive elimination of tariffs on other RCEP members can induce trade substitution away from ASEAN and toward imports from Japan and the Republic of Korea. However, as noted earlier, RCEP involves not only tariff concessions but also reductions in non-tariff barriers. ASEAN members can still secure additional welfare gains by further improving trade facilitation, lowering trade costs, and enhancing the international competitiveness of their products.

Table 2. Welfare and Real Wage Changes after China's Unilateral Tariff Elimination on RCEP Members

Economy	$\widehat{wel_n}$	Welfare change (%)	$\widehat{rw_n}$	Real wage change (%)
China	1.0342	3.42	1.0794	7.94
Japan	1.4774	47.74	1.1893	18.93
the Republic of Korea	1.9358	93.58	1.3719	37.19
Australia	1.049	4.90	1.0497	4.97
New Zealand	1.0276	2.76	1.0353	3.53
Indonesia	1.0876	8.76	1.0372	3.72
Malaysia	1.2744	27.44	1.1373	13.73
Philippines	1.0658	6.58	1.0341	3.41
Thailand	1.208	20.80	1.1054	10.54
Singapore	1.3905	39.05	1.3905	39.05
Brunei	0.984	-1.60	0.9825	-1.75
Cambodia	1.1283	12.83	1.0581	5.81
Laos	0.9961	-0.39	1.0533	5.33
Myanmar	1.129	12.90	1.0683	6.83
Vietnam	1.4369	43.69	1.4277	42.77

5.3 Effects of RCEP-Wide Zero Tariffs on Members' Real Wages and Welfare

Table 3 reports the scenario in which all RCEP members simultaneously eliminate tariffs. As shown, comprehensive tariff elimination raises welfare and real wages across the membership: for every country, consumer welfare and real wages increase relative to the pre-liberalization baseline. With the exception of Australia and New Zealand—where welfare gains are below 10%—all other members experience welfare increases above 20%. This indicates that the RCEP agreement effectively removes tariff barriers to intraregional trade, allowing goods to circulate freely within the bloc, intensifying product-market competition, and boosting consumer welfare.

Table 3. Welfare and Real Wage Effects of RCEP-Wide Tariff Elimination

Economy	$\widehat{wel_n}$	Welfare change (%)	$\widehat{rw_n}$	Real wage change (%)
China	1.3891	38.91	1.4499	44.99
Japan	1.9194	91.94	2.0973	109.73
the Republic of Korea	3.341	234.10	4.3218	332.18
Australia	1.0785	7.85	1.0811	8.11
New Zealand	1.0937	9.37	1.1088	10.88
Indonesia	1.2016	20.16	1.3666	36.66
Malaysia	2.5554	155.54	6.8276	582.76
Philippines	1.1749	17.49	1.3295	32.95
Thailand	1.9531	95.31	2.9881	198.81
Singapore	2.4874	148.74	2.4874	148.74
Brunei	1.2559	25.59	1.257	25.70
Cambodia	4.1776	317.76	10.3424	934.24
Laos	3.1585	215.85	4.4834	348.34
Myanmar	1.7237	72.37	2.3436	134.36
Vietnam	2.6038	160.38	15.1269	1412.69

In terms of country-specific tariff schedules, RCEP is expected to: promote China's exports of agricultural goods, mechanical and electrical products, chemicals, and building materials; support ASEAN members' exports of textiles, paper products, chemicals, coffee, rubber, grain-oil-sugar-cotton, and related items; expand Japan's and the Republic of Korea's exports of optical instruments, chemicals, auto parts, and complete vehicles; and bolster Australia's and New Zealand's exports of meat and agricultural products. Eliminating tariffs not only stimulates exports and raises household incomes, but also expands the variety of consumer goods available and lowers import prices. Moreover, cheaper imported intermediates can foster firm innovation, accelerate technological upgrading, raise production efficiency, and reduce costs. Through these channels, wages rise while the consumer price index falls—jointly improving consumer welfare and real wages.

5.4 Effects of RCEP-Wide Zero Tariffs on India and on Members' Real Wages and Welfare

Table 4 reports welfare and real-wage ratios for the scenario in which RCEP members implement zero tariffs while India remains outside the agreement. The results indicate that India's consumer welfare and real wages change little: welfare rises by about 1% and real wages by 0.5% relative to the pre-liberalization baseline—essentially unchanged compared with the sizable gains in member countries. The underlying reasons are as follows. India has long run trade deficits with China and most ASEAN economies, with imports far exceeding exports. Although ASEAN and China have implemented RCEP, bilateral tariffs with India were already very low in many cases, so tariff elimination within RCEP generates only limited trade diversion away from India. In addition, India's tariff barriers help preserve tariff revenue and stabilize the domestic price index. Taken together, these factors leave India's welfare and real wages broadly stable.

Table 4. Welfare and Real Wage Effects When India Remains Outside RCEP

Economy	$\widehat{wel_n}$	Welfare change (%)	$\widehat{rw_n}$	Real wage change (%)
China	1.3844	38.44	1.4479	44.79
Japan	1.9136	91.36	2.094	109.40
the Republic of Korea	3.3229	232.29	4.3106	331.06
Australia	1.0815	8.15	1.0821	8.21
New Zealand	1.0938	9.38	1.1088	10.88
Indonesia	1.1811	18.11	1.3576	35.76
Malaysia	2.472	147.20	6.7254	572.54
Philippines	1.1729	17.29	1.3284	32.84
Thailand	1.9106	91.06	2.9619	196.19
Singapore	2.4315	143.15	2.4315	143.15
Brunei	1.2653	26.53	1.2648	26.48
Cambodia	4.1488	314.88	10.3008	930.08
Laos	3.1504	215.04	4.471	347.10
Myanmar	1.7076	70.76	2.3344	133.44
Vietnam	2.4701	147.01	14.6702	1367.02
India	1.0132	1.32	1.0046	0.46

Beyond welfare considerations, India's decision not to join RCEP is closely tied to domestic conditions. Compared with other countries, India has a very large population and significant

demographic dividends, implying a vast market. Yet manufacturing development has lagged behind the size of that market, leading India to import large volumes of industrial manufactures and to run persistent—and widening—trade deficits. Despite policy efforts to promote manufacturing, constraints such as limited resources, underdeveloped infrastructure, and gaps in core technologies have hindered the emergence of strong short-term competitiveness. To protect infant industries, India has adopted an import-substitution strategy, raising tariffs to reduce foreign competitive pressure.

Both China and India are populous economies, but China's manufacturing capabilities substantially exceed India's. As a result, India has long recorded a bilateral trade deficit with China; more than one-third of India's overall trade deficit is attributable to China. Were India to join RCEP, China's relatively low-priced and high-quality manufactures could exert considerable competitive pressure on India's nascent manufacturing sector—running counter to India's national strategy of protecting infant industries and fostering domestic manufacturing.

5.5 Assessing the Joint Effects of Tariff Elimination and Non-Tariff Barrier Reductions on India and RCEP Members

It should be noted that RCEP not only removes tariff barriers but also seeks to lower non-tariff barriers to trade and enhance trade facilitation. Existing studies indicate that zero-tariff arrangements between China and ASEAN have limited impact on trade volumes per se, whereas reductions in non-tariff barriers and improvements in trade facilitation can further expand intraregional trade. Accordingly, Table 5 conducts counterfactual analyses that jointly consider members' tariff elimination and reductions in non-tariff barriers, evaluating the effects on consumer welfare and real wages for each RCEP member and for India. The results show that, when both tariff and non-tariff barriers are taken into account, India's welfare and real wages decline: consumer welfare falls by 5.3%, and real wages by 2.2%. As economic cooperation among RCEP members deepens, India also faces potential risks of decoupling from regional value chains, which would plausibly depress its long-run welfare.

Table 5. Welfare and Real Wage Changes in RCEP Members with Tariff and Non-Tariff Barriers

Economy	$\widehat{wel}_n$	Welfare change (%)	$\widehat{rw}_n$	Real wage change (%)
China	1.3799	37.99	1.4461	44.61
Japan	1.9107	91.07	2.0927	109.27
the Republic of Korea	3.3146	231.46	4.3057	330.57
Australia	1.0733	7.33	1.0786	7.86
New Zealand	1.0911	9.11	1.1075	10.75
Indonesia	1.172	17.20	1.3534	35.34
Malaysia	2.4606	146.06	6.7066	570.66
Philippines	1.171	17.10	1.3273	32.73
Thailand	1.9012	90.12	2.9552	195.52
Singapore	2.3796	137.96	2.3796	137.96
Brunei	1.2415	24.15	1.2457	24.57
Cambodia	4.1456	314.56	10.2939	929.39
Laos	3.15	215.00	4.4705	347.05
Myanmar	1.7027	70.27	2.3299	132.99
Vietnam	2.4578	145.78	14.6314	1363.14
India	0.9472	-5.28	0.9784	-2.16

5.6 Effects on Real Wages and Welfare When India Joins RCEP

We next consider the counterfactual in which India accedes to RCEP. As shown in Table 6, India's accession raises domestic consumer welfare and wages. As a populous economy that imports large volumes of products from RCEP members each year, India would benefit from the elimination of import tariffs, which would substantially lower consumer prices, spur consumption upgrading, and improve welfare. Although accession is favorable from the standpoint of consumer welfare, India's principal concern is that once tariffs are fully eliminated, domestic products may be unable to stand out amid intense international competition, with imported goods capturing a larger share of the market. As in many historical cases of emerging economies, to shield infant industries from powerful foreign competitors during their formative phase, governments often resort to protection. The infant-industry literature, however, consistently argues that such protection should be time-bound and that the benefits of protection must exceed its costs. India could fully exploit the flexibility in RCEP's tariff schedules—phasing in zero tariffs over a horizon of, say, ten years for sensitive infant sectors. This approach would harness the agreement's advantages—trade creation, higher wages, and lower consumer price indices—while still providing temporary protection to domestic infant industries.

China offers a useful example: for certain imports from Japan, China's concessions reach zero tariffs only after a ten-year transition. Such phased liberalization allows China to benefit from lower-priced imports while gradually opening the domestic market and avoiding excessive short-run shocks to related industries.

Table 6. Consumer welfare and Wages: India Joins RCEP and Eliminates Import Tariffs

Economy	$\widehat{wel_n}$	Welfare change (%)	$\widehat{rw_n}$	Real wage change (%)
China	1.5616	56.16	1.6376	63.76
Japan	1.9157	91.57	2.0987	109.87
the Republic of Korea	3.3802	238.02	4.3929	339.29
Australia	1.1288	12.88	1.1361	13.61
New Zealand	1.1136	11.36	1.1309	13.09
Indonesia	1.5554	55.54	1.799	79.90
Malaysia	2.9187	191.87	7.9601	696.01
Philippines	1.1962	19.62	1.3564	35.64
Thailand	2.4915	149.15	3.8762	287.62
Singapore	2.8484	184.84	2.8484	184.84
Brunei	1.3208	32.08	1.3272	32.72
Cambodia	4.0873	308.73	10.1495	914.95
Laos	3.0094	200.94	4.271	327.10
Myanmar	1.8644	86.44	2.552	155.20
Vietnam	2.9367	193.67	17.4959	1649.59
India	2.3501	135.01	2.4808	148.08

While India's need to protect infant industries is understandable, it should not overlook the fact that RCEP covers 16 Asia-Pacific economies and nearly one-third of the world's population. A free-trade area of this scale from which India remains excluded entails nontrivial negative economic consequences. If India stays outside RCEP for an extended period—while members' tariffs fall to near zero and trade costs drop markedly—significant trade diversion would likely occur, with India ceding substantial market share in the Asia-Pacific and experiencing a worsening trade structure. Should the United States impose higher tariffs on Indian exports at the same time, India's external market access could be further constrained. By contrast, joining RCEP would meaningfully benefit India by optimizing its trade structure, advancing services trade, and securing preferential access to the vast Asia-Pacific market.

5.7 Nash-Equilibrium Tariffs under the Constraint of Welfare Maximization for RCEP Members

Finally, we consider a Nash equilibrium in which each RCEP member chooses tariffs to maximize its residents' welfare. Although the RCEP stipulates that over 90% of merchandise trade should reach zero tariffs within ten years—and the foregoing analysis shows that zero tariffs enhance national welfare relative to the status quo—an important question remains: might some members have incentives to deviate in implementation? In other words, zero tariffs may be collectively optimal for the bloc but not individually optimal for a given country. If repeated interactions reveal that zero is not each country's best response, implementation could be impeded, members could drift away from zero, and the construction of the free-trade area would stall. It is therefore necessary to identify Nash-equilibrium tariffs under the constraint of welfare maximization.

Formally, in an N-player game, each member t_i, i=1...15, selects a tariff strategy $t_i^* \in$

$arg \max_{t_i} W_i(t_i, t^*_{-i})$. where t_i denotes country i's tariff vector, t_{-i} denotes the tariff strategies of all other countries, and $W_i(\cdot)$ is country i's welfare. $W_i(t_i^*, t^*_{-i}) \geq W_i(t_i, t^*_{-i})\ \forall t_i$, we refer to t^*as the Nash equilibrium of the game.

In practice, we compute $\{t_i^*\}_{i=1...15}$ by iterating best responses: using Matlab, we solve for each country's welfare-maximizing tariff conditional on the current tariffs of all others, update the vector of tariffs, and repeat until convergence. The resulting stable tariff matrix constitutes the set of Nash-equilibrium tariffs for RCEP.

As shown in Table 7, the Nash-equilibrium tariffs for RCEP members are uniformly very low. In the full tariff matrix, 170 entries are below 1% and 200 entries are below 1.5%; that is, over 80% of equilibrium tariffs are under 1% and over 95% are under 1.5%, far below most countries' applied rates. By country, Singapore and Vietnam have Nash-equilibrium tariffs below 1% against all RCEP partners, and for most other members the vast majority of equilibrium tariffs are likewise under 1%.

Consider China, Japan, and the Republic of Korea as examples: China's Nash-equilibrium tariffs on Japan and the Republic of Korea are 1.47% and 1.16%, respectively; Japan's on China and the Republic of Korea are 0.69% and 0.75%; and the Republic of Korea's on China and Japan are 0.63% and 0.64%. These bilateral equilibrium rates are far below current tariff levels, indicating substantial scope for further reductions. Because the RCEP requires members—apart from a very limited set of sensitive products—to converge toward "zero tariffs," the equilibrium results suggest that the agreement's tariff-cut provisions are aligned with welfare-improving incentives. Taken together, the Nash-equilibrium outcomes provide a solid theoretical foundation for RCEP tariff reductions and point to stable gains in consumer welfare across member countries.

Table 7. Nash-equilibrium tariffs among RCEP Members under Welfare Maximization

	China	Japan	Korea	Australia	NZ	Indonesia	Malaysia	Philippines	Thailand	Singapore	Brunei	Cambodia	Laos	Myanmar	Vietnam
China	0.00	0.69	0.63	0.65	0.63	0.59	0.59	0.60	0.56	0.62	0.72	0.58	0.57	0.57	0.55
Japan	1.47	0.00	0.64	0.74	0.64	0.60	0.63	0.67	0.61	0.63	0.67	0.61	0.58	0.59	0.68
Korea	1.16	0.75	0.00	0.85	0.65	0.66	0.61	0.61	0.57	0.64	0.82	0.59	1.92	0.58	0.58
Australia	1.24	0.53	0.54	0.00	0.62	0.60	0.63	1.50	0.61	0.64	0.68	0.59	0.61	0.67	0.59
NZ	0.69	0.65	0.57	0.67	0.00	0.61	0.64	1.34	0.60	0.65	0.71	0.61	0.20	1.06	0.58
Indonesia	0.96	0.49	0.51	1.13	0.88	0.00	0.59	1.08	0.57	0.65	0.98	0.59	0.51	0.58	0.57
Malaysia	0.66	0.54	0.53	0.61	1.18	0.62	0.00	0.71	0.55	0.63	0.86	0.59	0.78	0.58	0.56
Philippines	1.11	0.49	0.52	2.07	1.38	0.66	0.60	0.00	0.54	0.65	1.41	0.59	0.77	0.59	0.58
Thailand	1.07	0.55	0.56	1.35	0.86	0.67	0.61	0.65	0.00	0.64	0.80	0.57	0.57	0.59	0.56
Singapore	1.47	0.59	0.54	1.40	0.68	0.61	0.68	0.65	0.57	0.00	0.66	0.59	0.62	0.57	0.57
Brunei	0.61	0.84	1.00	0.00	1.42	0.99	0.71	0.00	0.89	0.67	0.00	0.62	0.16	0.58	0.59
Cambodia	0.19	3.17	0.74	0.52	0.00	0.74	1.04	1.29	0.62	0.64	1.22	0.00	0.74	1.27	0.65
Laos	0.11	0.51	1.38	0.28	1.66	1.98	2.16	2.23	0.73	0.00	0.36	3.63	0.00	0.69	0.59
Myanmar	0.66	1.31	1.21	0.28	0.61	1.14	1.07	1.04	0.55	0.91	0.17	1.93	0.58	0.00	0.58
Vietnam	1.02	0.58	0.54	1.13	1.17	0.60	0.62	0.68	0.58	0.65	0.99	0.57	0.57	0.58	0.00

Moreover, since the Nash-equilibrium tariff profile represents the stable outcome of strategic interaction among members, it implies that reciprocal tariff reductions within the region are the correct path to improving consumer welfare. By contrast, mutual tariff hikes or withdrawal from regional FTAs run counter to national welfare objectives and damage partners' welfare as well. We also simulate Nash-equilibrium tariffs under India's accession to RCEP; with India included, more than 95% of equilibrium tariffs fall below 1%, further corroborating that RCEP membership raises consumer welfare for participating countries. These simulation results are reported in Table 8.

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Table 8. Nash-equilibrium tariffs of countries under India's accession to RCEP

	China	Japan	Korea	Australia	NZ	Indonesia	Malaysia	Philippines	Thailand	Singapore	Brunei	Cambodia	Laos	Myanmar	Vietnam	India
China	0.00	0.70	0.61	0.68	0.61	0.59	0.57	0.61	0.55	0.58	0.76	0.60	0.56	0.56	0.55	0.65
Japan	2.84	0.00	0.64	0.67	0.63	0.61	0.61	0.70	0.60	0.59	0.66	0.63	0.57	0.58	0.68	0.59
Korea	2.78	0.77	0.00	0.65	0.62	0.60	0.60	0.63	0.57	0.59	0.84	0.60	3.59	0.57	0.59	0.56
Australia	1.23	0.54	0.55	0.00	0.61	0.61	0.62	0.96	0.60	0.61	0.68	0.60	0.64	0.56	0.60	0.60
NZ	0.57	0.72	0.89	0.61	0.00	1.48	0.61	0.83	0.60	0.60	1.47	0.74	0.83	1.03	0.61	1.30
Indonesia	0.97	0.55	0.52	0.90	0.77	0.00	0.57	0.74	0.57	0.61	1.22	0.74	0.72	0.56	0.58	0.56
Malaysia	1.22	0.52	0.45	1.05	0.99	0.67	0.00	0.76	0.55	0.57	0.74	0.60	0.64	0.57	0.57	0.55
Philippines	0.93	0.69	0.64	0.64	0.88	0.63	0.58	0.00	0.54	0.55	1.13	0.73	0.89	0.57	0.60	0.85
Thailand	1.15	0.52	0.57	0.70	0.87	0.57	0.60	0.73	0.00	0.60	0.82	0.58	0.57	0.59	0.56	0.62
Singapore	1.20	0.67	0.57	0.74	0.68	0.63	0.66	0.68	0.57	0.00	0.68	0.62	0.61	0.56	0.58	0.59
Brunei	0.40	0.77	1.27	1.15	0.45	0.73	0.69	0.00	0.81	1.32	0.00	0.69	0.16	0.24	2.05	0.47
Cambodia	0.33	2.72	2.05	0.41	0.21	0.79	0.59	0.48	0.61	1.47	0.00	0.00	0.62	3.04	0.66	2.65
Laos	0.16	2.12	0.99	0.00	0.84	0.00	1.91	0.00	0.70	1.33	0.00	5.10	0.00	1.40	0.62	2.53
Myanmar	0.53	1.81	1.32	0.82	1.10	0.92	0.60	3.56	0.55	1.14	0.00	6.04	1.59	0.00	0.61	1.07
Vietnam	1.46	0.61	0.54	0.90	0.99	0.63	0.60	0.84	0.58	0.60	0.84	0.59	0.57	0.56	0.00	0.62
India	3.99	3.54	0.52	0.79	0.63	0.94	0.61	2.99	0.77	0.58	0.70	2.34	6.95	0.57	0.69	0.00

The conclusion of RCEP is the culmination of repeated strategic interaction among member states. Throughout multiple rounds of negotiations, each party carefully assessed whether its national interests aligned with RCEP. For China, with a well-developed manufacturing base, zero tariffs among members would not only facilitate further export expansion but also enable the effective use of neighboring countries' natural and labor resources to relocate margin industries and upgrade the domestic industrial structure. At the same time, accelerating the integration and reconfiguration of regional value chains can help offset risks arising from trade frictions with third countries. Moreover, China's relative weaknesses vis-à-vis Japan and the Republic of Korea in certain sectors—such as insufficient competitiveness and limited market openness—can be addressed through import competition.

Japan proposed the "flying-geese" development strategy as early as the last century, proactively building an Asia-Pacific value chain and strengthening its leadership role in East Asian economic cooperation. Although China's rapid growth has challenged Japan's regional leadership, Japan's high-tech industries still outperform those of most other members; membership in RCEP therefore remains aligned with its national interests. The Republic of Korea, as an export-oriented economy, has long been supportive of FTAs with neighboring countries. Joining RCEP helps the Republic of Korea further expand into Southeast Asian, Australian, and Indian markets; accordingly, the Republic of Korea has not only actively participated itself but has also worked to facilitate negotiations among other members.

Over the course of this century, ASEAN economies have enhanced their standing through regional integration and cooperation with major global economies. Deepening intra-ASEAN cooperation and preventing internal fragmentation serve the national interests of member states. Although many ASEAN countries lack competitiveness in services trade, they nonetheless seek to tighten regional cooperation to hedge against the economic losses caused by unilateral measures elsewhere, while leveraging comparative advantages in mineral resources and labor through trade and FDI with China, Japan, and the Republic of Korea. As advanced economies, Australia and New Zealand already maintain high levels of trade liberalization and remain competitive in manufactures, services, and parts of agriculture. RCEP membership expands their exports and income, lowers import costs, and raises welfare; given their already liberal regimes, tariffs vis-à-vis other RCEP members are low to begin with. At the regional level, members seek to stabilize intra-regional cooperation in the face of U.S. tariff hikes to ensure steady economic performance.

Taken together, lowering import tariffs through RCEP is consistent with members' national interests. All parties aim to build a free-trade area with low tariffs and trade costs, high levels of trade facilitation, unified economic and trade rules, strong intellectual-property protection, minimal investment restrictions, and stable regional supply chains embedded in a complete value chain. Although India has thus far declined to join—citing the protection of domestic manufacturing, mitigation of trade deficits, and employment concerns—over the longer run RCEP membership would help foster domestic industrial competition, broaden market access for services, and enhance consumer welfare.

6. Conclusions

This paper employs a structural general-equilibrium framework and Exact-hat counterfactuals to quantify how eliminating import tariffs among RCEP members and India affects consumer welfare and real wages. The principal conclusions are as follows.

First, when China unilaterally eliminates import tariffs on RCEP partners, domestic consumer welfare and real wages rise. Spillovers are positive for Japan, the Republic of Korea, Australia, and New Zealand, while effects across ASEAN members are heterogeneous. When tariff elimination is undertaken by all RCEP members simultaneously, welfare and real-wage gains are broad-based and, in aggregate, increase with the magnitude of tariff cuts.

Second, Nash-equilibrium tariffs under the constraint of welfare maximization are close to zero for virtually all bilateral pairs. More than 95 percent of equilibrium tariffs lie below 1.5 percent and over 80 percent below 1 percent. These outcomes indicate that RCEP's tariff-reduction commitments are aligned with members' welfare-improving incentives; the agreement does not induce departures from countries' privately optimal policies.

Third, if RCEP members eliminate tariffs while India remains outside the agreement, India's consumer welfare and real wages change little. When both tariff and non-tariff barriers are considered together, however, India experiences declines in welfare and real wages.

Fourth, if India accedes to RCEP and phases tariffs to zero on imports from members, its consumer welfare and real wages increase substantially.

Overall, the results provide a coherent theoretical and quantitative basis for RCEP's tariff-reduction agenda and support continued implementation—together with trade-facilitation reforms and phased schedules for sensitive sectors—as an effective strategy to enhance welfare within the region.

7. Policy Implications

7.1 Accelerate Implementation of RCEP Tariff-reduction Commitments and Encourage India's Accession

The empirical evidence indicates that the RCEP tariff-cut agenda effectively raises consumer welfare among members. Countries should therefore expedite implementation, build an Asia-Pacific market with unified trade rules, fewer barriers, and lower trade costs, further open domestic markets, expand imports, and facilitate cross-border circulation of goods to enhance national welfare. Strengthening economic and trade linkages among members can reduce production costs, lower prices, and increase market competition, thereby amplifying comparative advantages, promoting exports of each country's specialty products, intensifying cross-country industrial competition and restructuring, and improving the allocation of resources within the region. For most products, zero tariffs can be implemented immediately; for key and sensitive items, the pace of reductions should be accelerated to ensure that, within ten years, the world's largest "zero-tariff" free-trade area is formed. Negotiations with India should be intensified to encourage its entry into RCEP, thereby expanding membership and building the world's largest FTA.

7.2 Further Reduce Non-tariff Barriers and Raise China's Trade-facilitation Performance

Empirically, lowering both tariff and non-tariff barriers improves welfare. Across the Asia-Pacific, where many bilateral and plurilateral FTAs have already pushed tariffs to low levels, there is still considerable scope to reduce NTBs and streamline procedures. China should therefore deepen reforms that cut documentary and border-compliance costs and raise customs efficiency. Recent assessments also point to steady progress in domestic trade facilitation: a national trade-facilitation index compiled by Chinese and international partners reports an overall score of 87.25 in 2024, reflecting improvements in transparency, fees and charges, release and clearance, and cooperation among border agencies. Taken together, sustained reductions in NTBs, alongside tariff commitments, would lower trade costs, expand the set of imported varieties, strengthen import competition, and thereby enhance real wages and consumer welfare within the RCEP region.

7.3 Balance Tariff Concessions with Industrial Upgrading to Advance the Dual-circulation Paradigm

With protectionism on the rise and episodes of de-globalization recurring, countries are seeking effective responses. China's strategic answer is to accelerate the formation of a new development paradigm in which the domestic economic cycle plays the leading role and domestic and international cycles reinforce each other. To align short- and long-term welfare, China should balance tariff reductions under RCEP with regional industrial upgrading.

In relatively less advanced sectors—such as automobile manufacturing and optoelectronic equipment—tariff cuts on final goods can be phased in more slowly, while tariff cuts on related intermediate inputs are accelerated. This approach both avoids excessive short-run shocks to domestic firms from steep reductions in final-goods tariffs and, at the same time, deepens integration into regional supply chains, safeguards the supply of critical intermediates, and promotes industrial transformation and upgrading. In doing so, China can more rapidly build the dual-circulation framework and achieve the joint improvement of short- and long-term welfare.

China should also foster the stable development of Asia-Pacific value chains to raise regional welfare. RCEP includes both developed and developing economies that differ substantially in levels of development, technological capabilities, and resource endowments. Members should emphasize differentiated competition and deep integration, leveraging their comparative advantages to participate actively in regional chain building. By using the RCEP platform to strengthen value-chain linkages, reinforce regional supply chains, and mitigate the risk of ruptures, members can rely on a stable regional network to absorb shocks from the ongoing reshaping of global value chains—thus fully harnessing the Asia-Pacific "large market" and supporting sustained improvements in long-run welfare.

7.4 Proactively Join Additional Regional Economic Agreements to Expand China's "Trade Circle of Friends"

As Krugman noted decades ago, a world with a single FTA would maximize welfare gains from trade. In practice, however, vast differences in development levels, institutions, culture,

and geography make such global coordination exceedingly difficult. China should therefore anchor itself in the Asia-Pacific while actively pursuing regional economic agreements. Beyond RCEP, China ought to engage in serious consultations to accede to the CPTPP. Originating as the TPP—widely regarded as a high-standard, 21st-century FTA designed under U.S. leadership—the agreement was reconstituted as the CPTPP under Japan's stewardship after the United States withdrew during the Trump administration's wave of unilateral, de-globalizing policies.

After decades of reform and opening, both China's stage of development and the external environment call for a strategy of "rooted domestically, oriented globally": deepening internal reforms and advancing high-level external opening to support high-quality growth. Consistent with our empirical findings for RCEP members and India, participation in regional FTAs substantially raises domestic consumer welfare. China should seize the opportunity to join the CPTPP proactively—lowering tariffs, expanding imports, and improving consumer welfare—while using the CPTPP's openness and rule standards to catalyze further reforms of domestic economic institutions, government practices, and corporate behavior, and to advance the orderly opening of product and factor markets.

As China enters a new stage in which the domestic circulation plays the leading role and the domestic and international circulations reinforce one another, it is essential to build and improve regional value chains that link the domestic and global chains. Compared with global value chains, regional value chains better complement domestic chains and—given similarities in geography, history, culture, and institutions among neighboring economies—tend to be more resilient.

Relative to earlier FTAs, RCEP features deeper and broader tariff cuts as well as more fine-grained measures to reduce non-tariff barriers, thereby laying a solid foundation for improving regional value chains. Building on the agreement, China should fully leverage members' comparative advantages: cooperate with Southeast Asian economies in factor-intensive industries that rely on natural resources and labor, thereby harnessing their strengths to offset China's relative scarcity of certain resources and rising labor costs as the demographic dividend diminishes; and forge close partnerships with Japan, the Republic of Korea, Singapore, and other advanced economies in high-tech sectors to remedy domestic technological gaps.

Our analysis of Nash-equilibrium tariffs among RCEP members indicates substantial scope for reciprocal tariff reductions among China, Japan, and Republic of Korea. The trade creation generated by markedly lower tariffs on both intermediates and final goods can deepen trilateral cooperation in technology-intensive industries—such as automobile manufacturing, information-technology products, telecommunications, and optical instruments—thus reducing reliance on the United States and the European Union.

In short, by aligning cooperation with each country's comparative advantages, the Asia-Pacific can accelerate the optimization and improvement of supply-chain, industrial-chain, and value-chain integration; enhance the global competitiveness and stability of the region's value chains; and fully leverage the advantages of the free-trade agreement to

build and improve a robust regional value-chain architecture.

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Xin Zhou was responsible for study design, supervision, model construction, counterfactual analysis, and manuscript revision. Hao Song was responsible for data collection, model construction, counterfactual analysis, and manuscript drafting. All authors read and approved the final manuscript.

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Data availability statement

The data that support the findings of this study are available from public databases and official sources, including the UNCTAD database, the World Bank WITS database, and RCEP tariff commitment schedules. The processed data and model results are available from the corresponding author upon reasonable request.

Data sharing statement

No additional data are available.

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