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The Impact of the Regional Comprehensive Economic Partnership (RCEP) on Intra-Industry Trade: An Empirical Analysis Using a Panel Vector Autoregressive Model*

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Abstract

Purpose – This study aims to examine the dynamic relationship between the variables impacted by the Regional Comprehensive Economic Partnership (RCEP) and the level of intra-industry trade among member states, with the ultimate objective of deducing the short- and long-term effects of RCEP on trade.

Design/methodology – This study focuses on tariffs, GDP growth rates, and the proportion of regional FDI to total FDI as research variables, and employs a panel vector autoregression model and GMM-style estimator to investigate the dynamic relationship between RCEP and intra-industry trade among member countries.

Findings – The study finds that the level of intra-industry trade between member states is positively impacted by both tariffs and intra-regional FDI. The impulse response graph shows that tariffs and FDI within the region can promote intra-industry trade among member countries, with a quick response. However, the contribution rates of tariffs and intra-regional FDI are not particularly high at approximately 1.5% and 1.4%, respectively. In contrast, the contribution rate of GDP growth can reach around 8.5%. This implies that the influence of economic growth rate on intra-regional trade in industries is not only long-term but also more powerful than that of tariffs and intra-regional FDI.

Originality/value – The originality of this study lies in providing a new approach to investigating the potential impact of RCEP while avoiding the limitations associated with the GTAP model. Additionally, this study addresses existing gaps within the research, further contributing to the research merit of the study.

Keywords: Dynamic Relationships, GMM-style Estimator, Intra-industry Trade, PVAR Model, RCEP

JEL Classifications: F13, F14

1. Introduction

In the 1960s, Verdoorn (1960), Balassa (1963), and Grubel (1967) first observed intra-industry trade in a new way to examine commodity trade patterns (Lloyd P.J. and H.H. Lee, 2002, p.1). Later, Grubel and Lloyd (1975) proposed a systematic intra-industry trade theory. This theory provided a theoretical basis for the intra-industry trade of homogeneous and heterogeneous products from the perspectives of imperfect competition, product differenti-

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ation, and economies of scale, and put forward the most widely used measurement method for intra-industry trade so far: the G-L index. This type of trade has become increasingly important in recent decades as globalization has led to a greater integration of economies and the growth of international trade (Ruffin, R. J., 1999). Intra-industry trade has several benefits compared to inter-industry trade. For example, it allows countries to specialize in areas of comparative advantage, and to take advantage of economies of scale (Ruffin, R. J., 1999). Intra-industry trade is also considered an important and constantly growing sector in modern international trade, with many researchers paying attention to this form of trade due to its significance in the changes of economics, and the export and import structure of separate countries (Bernatonytė, D., 2015). In conclusion, the significance of intra-industry trade lies in its contributions to economic growth and competitiveness, and its continuously increasing importance in modern international trade.

Examining the external conditions formed by regional economic integration, it hs been observed that successful integrations predominantly occur between countries that possess similar levels of economic development, congruent social and cultural dynamics, and proximity in geography, which are also the primary factors impacting intra-industry trade. In essence, nations with elevated levels of intra-industry trade are more likely to realize regional economic integration. The degree of intra-industry trade not only reflects the similarities in the economies and cultures of the two nations but also determines the levels of trade benefits and welfare, therefore serving as a significant reference for selecting specific partners for regional economic integration in practical applications (Pan, Q. and J. Han, 2006). Furthermore, since the extent of intra-industry trade and its added value indicates a nation's capability to swiftly adjust production in the face of a vast international market, elevating the level of intra-industry trade is crucial for developing nations to enhance competitiveness in foreign trade (Hine et al., 1999). Notably, improving the level of intra-industry trade in high-level industries has a substantial impact on improving the structure of a nation's exported goods (Balassa, 1984).

The Regional Comprehensive Economic Partnership (RCEP) is a novel trade agreement among countries in the Asia-Pacific region that represents a significant advancement in international trade. The Regional Comprehensive Economic Partnership (RCEP) agreement was signed by 15 nations, including China, Japan, South Korea, Australia, New Zealand, and the Association of Southeast Asian Nations (ASEAN), on November 15th, 2020. The agreement went into effect on January 1st, 2022, signifying its formal implementation. The agreement aims to deepen economic integration and foster regional cooperation among member countries. As stated in a report by the Brookings Institution, RCEP holds the potential to connect approximately 30% of the world's population and output, and generate substantial economic gains. Through the agreement, member countries will benefit from increased trade flows, reduced tariffs, and improved market access, thereby promoting economic growth and development in the region. The RCEP agreement is also expected to play a crucial role in shaping global economics and politics (Chaisse and Pomfre, 2019). The agreement will enhance the bargaining power of RCEP member countries in trade negotiations with other countries and regions, promote the development of regional supply chains and cross-border investment, and augment the competitiveness of the region. Certainly, RCEP also has its shortcomings, but despite these limitations, it will still serve as a significant driving force in promoting regional trade (Zreik, 2022). In conclusion, the emergence of the RCEP agreement is a noteworthy development in international trade with the potential to shape the economic and political landscape of the Asia-Pacific region. The agreement is anticipated to deepen economic integration and foster regional cooperation, contributing to the economic growth and development of member countries.

This study aims to examine the dynamic relationship between the variables impacted by the Regional Comprehensive Economic Partnership (RCEP) and the level of intra-industry trade among member states, with the ultimate objective of deducing the short-term and long-term effects of RCEP on trade. Given the far-reaching implications of RCEP, this analysis is of paramount importance and will contribute to a deeper understanding of the impact of this agreement on the intra-industry trade among its member states. The subsequent section of this study outlines the theoretical foundations of RCEP and intra-industry trade, and posits the corresponding theoretical hypotheses. The third section outlines the methodology employed. The fourth section presents the results of the empirical analysis. The final section presents the conclusion and relevant discussions.

2. Literature Review

The participation of countries in Regional Trade Agreements (RTAs) has a long history, preceding the establishment of the General Agreement on Tariffs and Trade (GATT) in 1947. The phenomenon of RTAs has garnered considerable attention from scholars and policymakers recently, due to the increasing prevalence of such agreements. The impact of RTAs on intraregional trade and the implications on the global economy has become an important area of investigation and analysis. Literature on the effects of RTAs (Regional Trade Agreements) on intraregional trade is mixed, with some studies offering evidence for positive outcomes, and others indicating insignificant or negative impacts. For instance, a study by Fernandez and Portes (1998) found that RTAs can lead to non-traditional benefits, such as increased market access and better infrastructure. A study by Freund and Ornelas (2010) also found that RTAs have been the most popular form of reciprocal trade liberalization, and have had a positive effect on trade. However, other studies have reached different conclusions. For instance, a study by Barnekow and Kulkarni (2017) determined that RTAs do not have a robust positive impact on welfare, and greater caution is needed in the creation of future RTAs. Given the mixed literature results, further research is necessary to fully understand the effects of RTAs on intraregional trade.

Regional Trade Agreements (RTAs) have garnered considerable scholarly attention within the realm of intra-industry commerce. The inception of intra-industry trade analysis, arising as a corollary to investigations into the commercial ramifications of European integration, has been inextricably linked to RTAs (Menon, J. and P. B. Dixon, 1996). Menon and Dixon (1996) scrutinized the repercussions of RTAs on the progression of intra-industry trade among eight Central and Eastern European nations between 1997 and 2019. Ruffin (1999) expounded upon the underpinnings of intra-industry trade theory and imports for economic well-being, utilizing the United States-Mexico trade rapport as an apt illustration. Antecedent scholars have endeavored to ascertain whether RTAs correlate with the augmentation of intra-industry trade by probing two queries: (i) has intra-industry trade experienced an upsurge after the establishment of the RTA, and (ii) does intra-industry trade hold greater prominence as opposed to extra-RTA commerce (Menon, J. and P. B. Dixon, 1995)? Ramakrishnan and Varma (2014) conducted a study on India's participation in various FTAs, and concluded that free trade agreements play a critical role in enhancing intra-industry trade. This is particularly important for improved integration into the global value chain, leading to increased competitiveness and job creation, particularly in developing countries, or those with similar industrial structures. In summation, RTAs have been the focal point of substantial investigation within the sphere of intra-industry trade, and the findings of these studies insinuate that RTAs may wield propitious influence on intra-industry trade. Additional inquiry is necessary to thoroughly comprehend the interrelation between RTAs and intra-industry trade.

As a modern, comprehensive, high-level, and mutually beneficial agreement, RCEP is expected to have significant effects on regional free trade and the economy following implementation (Lu, 2021).

Many studies have analyzed the impact of RCEP on trade from various perspectives. One study constructed RCEP manufacturing trade networks and conducted an analysis of core manufacturing industries to demonstrate the application of network-based policy effect evaluation in understanding the impact of RCEP (Zhu and Huang, 2023). Another paper set up three simulation scenarios and utilized GTAP10 to simulate the impact of RCEP on China's subdivided manufacturing industry, aiming to capitalize on the opportunities brought by RCEP to promote high-quality development in China's manufacturing industry (Ling and Lv, 2022). Liu and Chen (2014) and Wei and Yin (2022) both examined the influence of the Regional Comprehensive Economic Partnership (RCEP) from the perspective of reducing trade barriers. The former explored the impact of RCEP on regional economic integration levels, suggesting that RCEP member nations should aid the least developed countries in strengthening their capacities while employing coordinating institutions to monitor and intervene in factor prices, industrial development, and foreign capital inflows. The latter, focusing on the reduction of technical trade barriers, investigated the economic effects of RCEP, discovering that the implementation of zero tariffs within the RCEP region has a noticeable positive impact on the economic volume, welfare levels, and trade scale of member countries. Furthermore, this positive effect will gradually expand as technical trade barriers within the region are progressively lowered. Song and Kim (2022) analyzed the consequences of RCEP's tariff reduction on South Korea's agricultural trade. Ahmed et al. (2020) studied the potential impact of RCEP on trade liberalization among member countries, discovering that the RCEP agreement has positive effects on all member nations, with South Korea being one of the primary beneficiaries. Dong et al. (2023) investigated the impact of RCEP on the development of the global and regional electronics industry in China, concluding that it would significantly enhance the economic levels and social welfare of member countries, and promote economic and trade growth in various regions of China. Additionally, value chain activities, particularly complex value chain activities, would become more dynamic among RCEP member countries in the electronics industry. Circulation and cooperation within the industrial chain of the electronics sector in different regions of China have also increased considerably. Wang Xin-Yue et al. (2022) conducted theoretical and empirical analyses to examine the efficiency of South Korea's direct investment and influencing factors in countries in the Regional Comprehensive Economic Partnership (RCEP). They suggested new approaches for boosting trade and direct investment, and they thoroughly evaluated its efficiency in these nations, subsequently unveiling the investment trends. Through a comparative study of the key aspects and discrepancies impacting the potential for digital service trade exports between China and South Korea, Wen-Si Cheng

(2023) identified strategies for enhancing digital economic development between both nations under the RCEP framework. Additionally, by quantifying the trade facilitation levels and their effects within the RCEP countries, Li Cai et al. (2022) revealed the methods to amplify China's cross-border e-commerce export potential in their research.

Since the RCEP took effect on January 1st, 2022, only a year has elapsed. Consequently, the studies mentioned above employed the Global Trade Analysis Project (GTAP) model to simulate and predict the potential effects of RCEP under various conditions. Nevertheless, the GTAP model presents a myriad of limitations. For instance, it is based upon numerous oversimplified assumptions, such as perfect competition and constant returns to scale, which may inadequately capture the intricacies of real-world trade and economic interactions. Furthermore, interpreting the outcomes of the GTAP model can prove challenging, as the model generates a vast array of outputs with potentially complex interrelationships. This may render it arduous for researchers and policymakers to derive clear and actionable insights from the model's results (Adams, 2005). In addition, the GTAP model is inherently static, signifying that it disregards the dynamic evolution of economies over time. Such a constraint could impinge upon the model's predictive accuracy, particularly in the context of long-term trade agreements like RCEP. Moreover, the GTAP model's outcomes may be sensitive to certain parameter values, such as elasticities and policy parameters. Variations in these values can yield disparate results, potentially engendering uncertainty in the model's forecasts (Akahori et al., 2016). Hence, a notable merit of this research is the provision of an innovative vantage point for investigating the repercussions of RCEP. Feng et al. (2022) examined the potential and influencing factors of intra-industry trade between China and RCEP partner countries in the food industry. At present, there is a dearth of research on RCEP's influence on intra-industry trade among member countries. Thus, another merit of this study is the amelioration of the existing lacuna within this domain.

3. Methodology

3.1. Variables and Data Sources

To improve the deficiencies in existing research and fill the scholarly void, this study adopts a strategy of initially pinpointing the factors most substantially influenced by RCEP. Following this, an examination of the dynamic interrelations between these factors and intra-industry trade levels is conducted to investigate the short- and long-term implications of RCEP on intra-industry trade among member nations.

Research demonstrates that RCEP, or regional trade agreements, facilitate economic integration and attract foreign direct investment, thereby promoting economic growth (Cherif and Dreger, 2018). This is particularly evident in attracting foreign direct investment from within the region itself (Chaisse and Pomfret, 2019). Furthermore, the most discernible impact of most regional trade agreements is the reduction of tariffs. Consequently, this study selects tariffs, GDP growth rate, and the proportion of intra-regional FDI to total FDI as research variables, addressing the three dimensions of trade barriers, economic growth, and regional investment, respectively. As for the primary research subject of intra-industry trade, this study employs the Grubel and Lloyd (1975) index (GL index) to represent the level of intra-industry trade. The calculation formula is as follows.

$$GL_{ijk,t} = 1 - \frac{\left|\sum_{k=1}^{K}\sum_{j=1}^{J} X_{ijk,t} - \sum_{k=1}^{K}\sum_{j=1}^{J} M_{ijk,t}\right|}{\sum_{k=1}^{K}\sum_{j=1}^{J} X_{ijk,t} + \sum_{k=1}^{K}\sum_{j=1}^{J} M_{ijk,t}}$$

Where $X_{ijk,t}$ and $M_{ijk,t}$ represent the exports of products k from country i to country j, and the imports of products k from country j to country i in year t, respectively. The GL index ranges from 0 to 1, with higher values indicating a higher level of intra-industry trade between countries i and j. The summations are taken over all trading partners, denoted by J.

We employed the import and export of trade data from the UNCTAD database of RCEP member nations between 1995 and 2019 to compute the GL index. The subject nations of this study encompass South Korea, China, Japan, Australia, and New Zealand, as well as ASEAN countries including Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam, totaling eleven nations. Cambodia, Myanmar, Brunei, and Laos have been excluded due to a lack of comprehensive data, and their relatively small trade proportions. To mitigate the impact of the COVID-19 pandemic, this study exclusively incorporates data up to 2019. Specific information on the sources of the GL index and other variables is presented in Table 1

Table 1. Variables and Sources

Variable	Code	Description	Source
GL Index	GL	The total GL index between each country and the aggregate of the other ten member nations.	Computed based on trade data from the UNCTAD database
Tariff Rate	TR	The overall average tax rate of each country.	The World Bank Open Data
GDP Growth	GDPG	The GDP growth rate of each country.	The World Bank Open Data
Intra-Regional FDI	IRFDI	The proportion of each country's FDI within the RCEP member nations relative to its total FDI.	Asia Regional Integration Center

The summary statistics for each variable are displayed in Table 2. The mean GL index is very high at 89, indicating a significant level of intra-industry trade among RCEP member countries, on average. This suggests that regional integration and economic complementarities allow for substantial intra-industry exchange. The tariff rates have a relatively wide range from 0% to over 33%, with an average of around 5%. This indicates that there is still room to reduce tariffs further within RCEP to promote intra-industry trade. GDP growth rates show some variation, with an average of 4.6%. Higher and stable economic growth among RCEP members can likely contribute to increasing intra-industry trade. Intra-regional FDI as a proportion of total FDI has an average of around 45% and a wide distribution. This indicates that intra-RCEP investment linkages are already substantial, but could potentially be further strengthened.

Table 2. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GL Index	269	88.77908	8.830743	59.13628	99.93246
Tariff Rate	245	4.757265	4.154852	0	33.51
GDP Growth	275	4.606592	3.333884	-13.1267	14.5256
Intra-Regional FDI	154	44.92109	21.76844	5.48003	84.362

3.2. Model Specifications

The Vector Autoregressive (VAR) model was employed to gauge the dynamic inter-relations among common endogenous variables without imposing *a priori* constraints. This approach establishes a framework predicated on the statistical properties of the dataset. Each endogenous variable within the system is modeled as a function of the lagged values of all endogenous variables, elucidating the interplay among them. By examining the impulse response function of the system, the response to an arbitrary perturbation in one variable and the duration of this effect can be discerned. Holtz-Eakin et al. (1988) proposed a straight-forward methodology for estimating vector autoregressive equations utilizing panel data, accommodating the consideration of individual heterogeneity. Subsequently, Love and Zicchino (2006) refined the PVAR model into the ensuing formulation:

$$z_{it} = \Gamma_0 + \Gamma_1 z_{it-p} + \mu_i + \varepsilon_{it}$$

Herein, z_{it} embodies the endogenous variables of the system, with Γ signifying the regression coefficient. The lag order is expressed by p, and individual heterogeneity is captured by u_i. The random residuals are denoted by ε_{it}. Upon integrating the variables of this research, the model subsequently adopts the following configuration:

$$GL_{it} = \Gamma_0 + \sum_{j=1}^{p} \left[\Gamma_{1j} GL_{i,t-j} + \Gamma_{2j} TR_{i,t-j} + \Gamma_{3j} GDPG_{i,t-j} + \Gamma_{4j} IRFDI_{i,t-j}\right] + \mu_i + \varepsilon_{it}$$

In this equation, the coefficients to be estimated are denoted by Γ_0, Γ_{1j}, Γ_{2j}, Γ_{3j}, and Γ_{4j}. The number of lags included in the model is represented by p. The unobserved individual effect for unit i is expressed by μ_i. The error term for unit i at time t is denoted by ε_{it}. The present model possesses the capacity to effectively tackle plausible endogeneity concerns arising between the GL index and two variables, namely GDP growth rate and intra-regional FDI.

4. Empirical Results

4.1. Unit Root Test

Given the propensity for macroeconomic indicators to evince instability owing to temporal fluctuations, it is imperative to undertake an initial examination of the unit root for each variable, and subsequently ascertain the need for testing the co-integration relationship between variables. Given the presence of partial data gaps within the dataset and the relatively limited time *T*, this study employs the IPS unit root test. The IPS unit root test, introduced by Im, K. S. et al. (2003), represents an extension of the Levin, Lin, and Chu (LLC) test, tailored for employment with panel data that may exhibit cross-sectional dependence. The IPS test employs the generalized method of moments (GMM) estimator and incorporates a kernel function to estimate the weighting matrix, thereby accounting for cross-sectional dependence. The IPS unit root test offers the benefit of accounting for cross-sectional dependence, a common occurrence in panel data, leading to more accurate and reliable results when testing for unit roots. Furthermore, the IPS test has been demonstrated to possess superior size and power properties when compared to alternative panel unit root tests. As evidenced by the unit root test results presented in Table 3, none of the variables exhibit unit roots. As a result, co-integration testing is deemed unnecessary.

Table 3. Unit Root Test Results

Variable	Z Statistic	p-value
GL	-2.4407	0.0073
TR	-6.7984	0.0000
GDPG	-7.9122	0.0000
IRFDI	-5.1306	0.0000

Note: The null hypothesis of the IPS unit root test is H0: All panels contain unit roots. The test incorporates a time trend and eliminates the cross-sectional means during the examination process.

4.2. PVAR Model

To guarantee the validity of the model estimation outcomes, it is imperative to ascertain the optimal lag term for the PVAR model.

Table 4. Test results of MBIC, MAIC, and MQIC

Lag	MBIC	MAIC	MQIC
1	-152.1*	-39.0*	-84.9*
2	-115.8	-31.0	-65.4
3	-73.4	-16.8	-39.8
4	-37.5	-9.2	-20.7

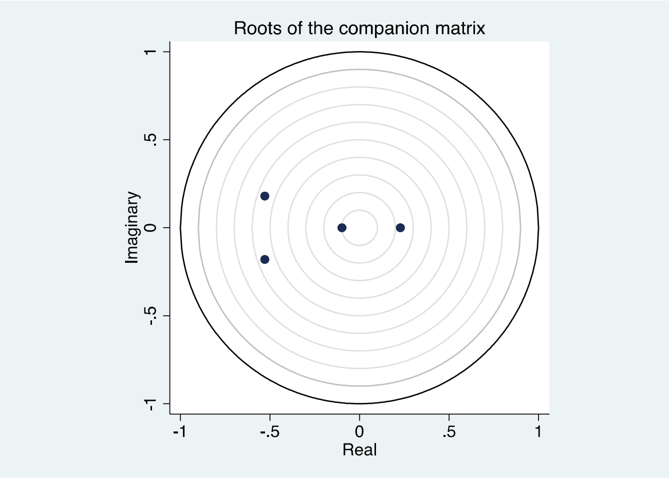
By the MBIC, MAIC, and MQIC criteria, the lag order corresponding to the minimum value is selected as the optimal lag order to minimize sample freedom loss. The outcomes are presented in Table 4. Out of the three model groups, the first-order lag of the model displays a superior fit, with a relatively stable residual sequence. Consequently, the first-order lag is included in the model for GMM estimation purposes in this study, and the estimation outcomes can be found in Table A of the Appendix for reference.

4.3. Testing the GMM Estimation of the PVAR Model

4.3.1. Model Stability Test

Before conducting impulse response analysis to investigate the dynamic relationships between variables, it is crucial to test the stability of the models to ensure their suitability for impulse response analysis. As depicted in Figure 1, all eigenvalues in the three models fall within the unit circle, signifying that the models are stable.

Fig. 1. Eigenvalue Test



Source: This figure was generated using StataSE 16.0 based on the data employed in this study.

4.3.2. Granger Causality Test

To ascertain the predictive ability of one variable on another and analyze the temporal causal relationship between variables, it is necessary to conduct a Granger causality test (Granger, 1969). Table 5 illustrates the outcomes of the Granger causality test performed on our data. Since we are only examining effects in one direction, the table only displays one-way results. As shown in Table 5, the p-values for all three variables are significant at or below the 5% level. Thus, we can conclude that there is Granger causality between these three variables and GL, with the three variables serving as Granger causes of GL.

Table 5. Panel VAR-Granger Causality Wald Test

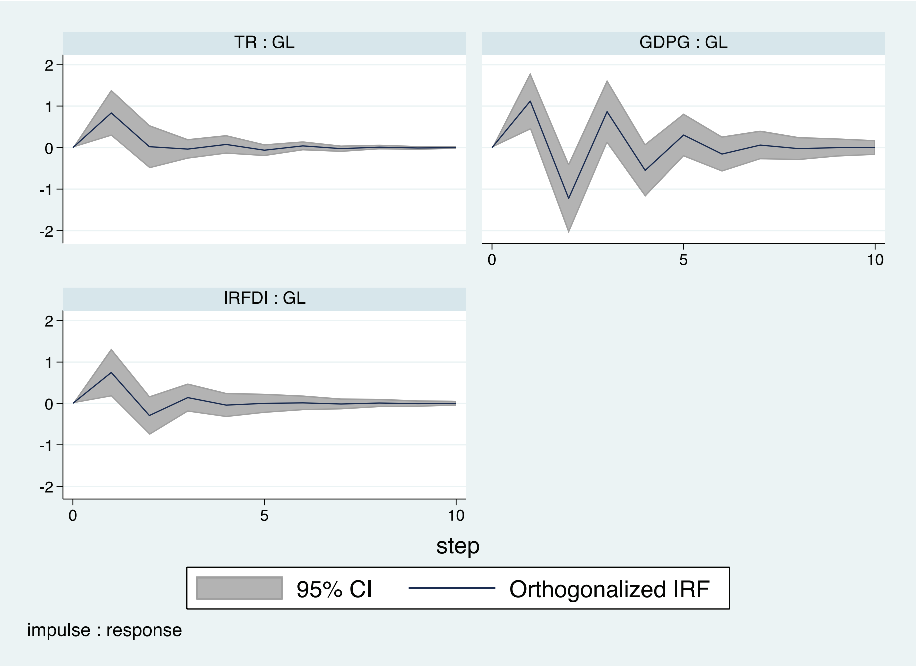
Equation	Excluded	chi2	df	Prob>chi2
GL	TR	8.362	1	0.004***
	GDPG	4.638	1	0.031**
	IRFDI	9.526	1	0.002***
	ALL	22.978	3	0.000***

Note: * p<.1, ** p<.05, *** p<.01. The null and alternative hypotheses for this test follow.
Ho: Excluded variable does not Granger-cause Equation variable.
Ha: Excluded variable Granger-causes Equation variable.

4.4. Impulse Response Analysis

The analysis of impulse response functions provides valuable insights into interconnections between variables, and the propagation of shocks over time. It enables researchers to identify dynamic interdependencies among variables in a multivariate time series setting, and understand the effects of shocks on the expected future values of the variables (Pesaran and Shin, 1998). These insights are particularly useful in economic research, where understanding the transmission mechanisms of economic shocks is crucial for policy-making and decision-making.

Fig. 2. Impulse Response Function (IRF)



Source: This figure was generated using StataSE 16.0 based on the results of the impulse response function.

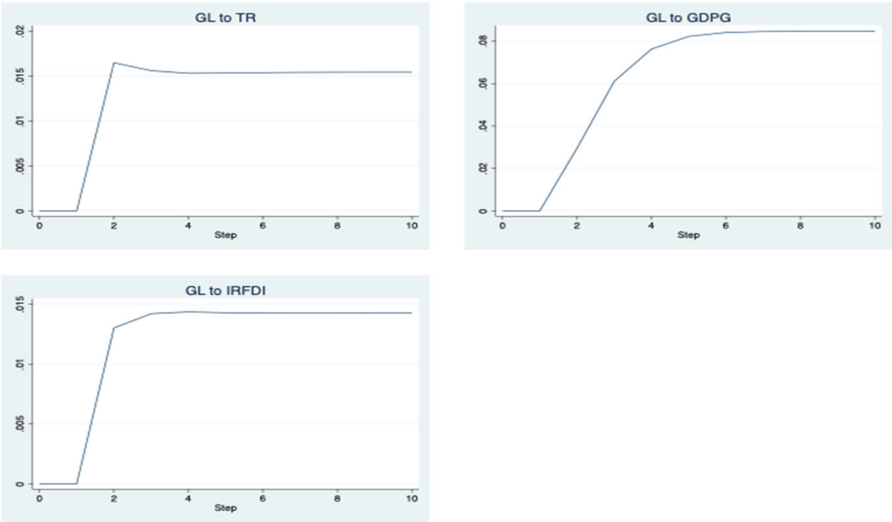
Figure 2 illustrates the impulse response graph (orthogonalized) of GL in response to a one-standard deviation shock to three variables: TR, GDPG, and IRFDI. As observed from the graph, GL's response to shocks from TR and IRFDI is almost identical, with a sharp increase in the first period, peaking in the same period. This suggests that tariffs and FDI within the region can promote intra-industry trade among member countries, with a quick response. This is consistent with existing research findings (Hamilton and Kniest, 1991; Fukao et al., 2003). The impact of the promotion effect initially increases and then decreases, with a short duration, gradually stabilizing from the third period. However, GL's response to GDPG shock is distinct from the previous two variables. After an initial increase, GL starts to decline in the second period, reaching its peak in that same period. This confirms the view that there is a positive relationship between economic growth and intra-industry trade (Leitão, 2012;

Rasekhi and Ramezani, 2017). It is noteworthy that the response remains significant in the third period, and gradually stabilizes from the seventh period. This indicates that the impact of economic growth rate on intra-industry trade among RCEP member countries is long-term.

4.5. Variance Decomposition

Performing variance decomposition following impulse response analysis offers a more comprehensive understanding of the dynamic relationships among variables within a model by quantifying the relative contributions of various shocks to the variables. This can be useful for empirical causal analysis and policy effectiveness analysis. According to the variance decomposition of Figure 3, it is evident that both the contribution rates of tariffs and intra-regional FDI are not particularly high at approximately 1.5% and 1.4%, respectively. In contrast, the contribution rate of GDP growth can reach around 8.5%. This implies that the influence of the economic growth rate on intra-regional trade in industries is not only long-term but also more powerful than that of tariffs and intra-regional FDI.

Fig. 3. Variance Decomposition of GL to TR, GDPG, and IRFDI



Source: This figure was generated using StataSE 16.0 based on the results of variance decomposition. Detailed data can be found in Appendix B.

5. Conclusion

5.1. Summary of Findings

The study finds that the level of intra-industry trade between member states is positively impacted by both tariffs and intra-regional FDI. The impulse response graph shows that the GL index's response to shocks from tariffs and intra-regional FDI is almost identical, with a sharp increase in the first period, peaking in the same period. This suggests that tariffs and FDI within the region can promote intra-industry trade among member countries, with a quick response. However, the contribution rates of tariffs and intra-regional FDI are not particularly high at approximately 1.5% and 1.4%, respectively. In contrast, the contribution rate of GDP growth can reach around 8.5%. This implies that the influence of economic growth rate on intra-regional trade in industries is not only long-term but also more powerful than that of tariffs and intra-regional FDI.

5.2. Implications for Policy

Considering the research findings, the ensuing policy recommendations are put forward. To begin, future tariff cuts under RCEP should be structured to concentrate on sectors demonstrating a substantial potential for intra-industry trade. By moderating the velocity of broad-based tariff reductions and zeroing in on specific industries, benefits can be optimized. Second, an emphasis should be placed on the promotion of technology transfer, skills enhancement, and infrastructure investment, particularly in less developed RCEP members to augment their capacities to engage in regional value chains and intra-industry trade complementarities. Third, it is suggested to facilitate the transition of labor-intensive industries from China to other RCEP members to fortify regional production networks and intra-industry trade linkages. Fourth, the establishment of shared standards and certification prerequisites within RCEP is recommended to curtail non-tariff barriers and streamline trade in analogous products among members. Lastly, RCEP should incorporate stipulations aimed at supporting small and medium enterprises (SMEs) and vulnerable demographics to ensure that the benefits derived from intra-industry trade are evenly distributed.

5.3. Limitations y and Directions for Future Research

At present, this study is subject to certain limitations. One potential constraint lies in the assumption of a linear relationship between the identified factors and intra-industry trade. However, it is possible that the situation is not always as straightforward as this assumption implies, as there may be non-linear or threshold effects that impact the relationship between these factors and intra-industry trade. Furthermore, the assumption that there is a stable relationship between these factors over time may not hold, as they may be influenced by policy changes, economic shocks, or other exogenous factors. Another limitation is the possibility of omitted variable bias, which could potentially affect the estimated relationship between the identified factors and intra-industry trade. It is also possible that other unobserved factors could impact the level of intra-industry trade among member countries.

Future research on the impact of RCEP on intra-industry trade can explore various directions. First, industry analysis could be conducted to examine the effects of RCEP on intra-industry trade in different sectors. This would enable the identification of sectors with the greatest growth potential and specific policies needed to promote intra-industry trade in these sectors. Second, the study could explore the impact of non-tariff barriers, such as standards, regulations, and licensing requirements, on intra-industry trade among RCEP member countries. This would provide a comprehensive understanding of the policy levers that could be used to promote trade. Thirdly, the role of global value chains in promoting intra-industry trade and regional integration among RCEP member countries can be investigated. The study of the role of value chains in promoting intra-industry trade will provide valuable information for strengthening regional economic integration policies. Lastly, a study could analyze the distributional effects of increasing intra-industry trade under the RCEP framework on income inequality and social welfare. This would help to ensure that the benefits of trade are widely shared and contribute to inclusive growth in the region. In summary, research in these areas would provide crucial insights for policymakers that seek to promote intra-industry trade and regional economic integration in the RCEP region.

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Appendices

Table A. GMM Estimation.

	Coefficient	Standard Error	z Statistic	p-value
GL				
L.GL	-0.1585	0.0764165	-2.07	0.0381
L.GDPG	0.4418	0.1527799	2.89	0.0038
L.IRFDI	0.0457	0.0212164	2.15	0.0313
L.TR	0.8938	0.2896036	3.09	0.0020
GDPG				
L. GL	-0.0101	0.0431159	-0.24	0.8140
L. GDPG	-0.5443	0.0673842	-8.08	0.0000
L. IRFDI	0.0078	0.0123091	0.63	0.5271
L. TR	0.4937	0.2273378	2.17	0.0299
IRFDI				
L. GL	0.9582	0.3868627	2.48	0.0133
L. GDPG	-2.4888	0.8026488	-3.10	0.0019
L. IRFDI	-0.4816	0.1010592	-4.77	0.0000
L. TR	-6.1674	1.883438	-3.27	0.0011
TR				
L. GL	0.0314	0.0410719	0.77	0.4439
L. GDPG	-0.1078	0.034665	-3.11	0.0019
L. IRFDI	0.0042	0.0065282	0.65	0.5189
L. TR	0.2561	0.1780435	1.44	0.1503
N		103		
Instruments		*l(1/3).(GL GDPG IRFDI TR)*		
Test of overidentifying restriction		Hansen's J chi2(32) = 38.466848 (p = 0.200)		

Table B. Forecast-error variance decomposition

Response variable and Forecast horizon	Impulse variable		
GL	GDPG	IRFDI	TR
0	0	0	0
1	0	0	0
2	0.0295114	0.0130225	0.0164966
3	0.0610904	0.0142138	0.0156187
4	0.0762931	0.0143614	0.0153243
5	0.0822366	0.0142905	0.0153479
6	0.0840745	0.0142601	0.0153957
7	0.0845309	0.0142556	0.015427
8	0.0846146	0.0142575	0.0154394
9	0.0846231	0.0142593	0.0154432
10	0.0846227	0.0142601	0.0154441