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The Influence of China's Outward FDI in RCEP Countries on Bilateral Trade: The Mediating Role of the Digital Economy

La influencia de la IED saliente de China en los países del RCEP sobre el comercio bilateral: el papel mediador de la economía digital

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Abstract

This study employs expanded trade gravity models to examine the impact of China's outward foreign direct investment (OFDI) in the Regional Comprehensive Economic Partnership (RCEP) member countries on bilateral trade. After measuring the digital economy levels of RCEP countries using principal component analysis, the mediation and moderation effect models are applied to examine the mechanisms of digital economy between OFDI and trade. The results indicate that China's OFDI significantly promotes exports, imports, and total trade with RCEP countries, with heterogeneous effects across income groups and product categories. Moreover, the digital economy does not exhibit a significant mediation effect in the relationship between OFDI and trade, but it demonstrates a significant negative moderation effect.

Keywords: Outward foreign direct investment; bilateral trade; digital economy; mediation effect; moderation effect.

Resumen

Este estudio emplea modelos gravitacionales de comercio ampliados para evaluar el impacto de la inversión extranjera directa saliente de China (OFDI) en los países miembros de la Asociación Económica Integral Regional (RCEP) sobre el comercio bilateral. Tras medir los niveles de economía digital de los países de la RCEP mediante un análisis de componentes principales, se aplican modelos de efectos de mediación y moderación para examinar los mecanismos

de la economía digital entre la OFDI y el comercio. Los resultados indican que la IED exterior de China promueve significativamente las exportaciones, importaciones y el comercio total con los países del RCEP, con efectos heterogéneos entre los grupos de ingresos y las categorías de productos. Además, la economía digital no presenta un efecto mediador significativo en la relación entre la OFDI y el comercio, pero sí muestra un efecto moderador negativo significativo.

Palabras clave: Inversión directa hacia el exterior; comercio bilateral; economía digital; efecto de mediación; efecto de moderación.

JEL Classification / Clasificación JEL: F14, F21, O33.

1. Introduction

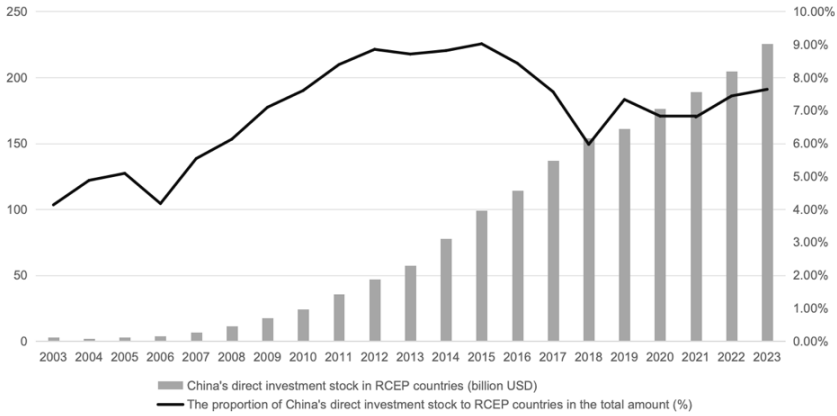
1.1. Outward FDI and trade cooperation between China and RCEP

In recent decades, driven by the continuous deepening of various regional trade agreements and the continuous expansion of cross-border investment, the level of economic integration in the Asia-Pacific region has significantly improved. In this context, RCEP was officially signed in 2020, entered into force in early 2022, and became fully effective for all 15 member states by mid-2023 (The State Council of the People's Republic of China, 2023). As the free trade agreement with the largest population coverage and economic volume in the world, RCEP is expected to further promote the reconstruction of value chains and the deepening of economic and trade cooperation within the region. Moreover, as China transitions from a recipient of foreign investments to a leading global investor, its OFDI has emerged as a critical element of its economic strategy, particularly in the Asia-Pacific region.

China's OFDI in RCEP countries has evolved over the past two decades, with its scale and share influenced by various economic and policy factors. This study collects data on China's OFDI stock to RCEP countries from 2003 to 2023, along with their proportion of China's total OFDI stock, as shown in Figure 1. The figure reveals a steady and rapid increase in China's OFDI stock in RCEP countries, but the share of investment experienced some fluctuations. Although the expansion of China's investment in other global regions has contributed to a decrease in RCEP's share, the region remains a significant destination for China's OFDI. The official implementation of the RCEP agreement may further stimulate China's investment in the region, making future trends worthy of close attention.

The varying levels of economic development within the RCEP lead to heterogeneous effects of China's OFDI across member economies. Therefore, this study adopts the World Bank's 2023 classification standard based on gross national income (GNI) per capita to divide RCEP countries into three groups, as shown in Table 1 (Gohar et al., 2024).

Figure 1. China's direct investment stock in RCEP countries and its proportion



Source: Statistical Bulletin on China's Outward Foreign Direct Investment.

Table 1. Classification of RCEP countries

Classification	Country
High-income group	Singapore, Australia, New Zealand, Japan, South Korea, Brunei Darussalam
Upper-middle-income group	Malaysia, Thailand, Indonesia
Lower-middle-income group	Vietnam, Philippines, Laos, Cambodia, Myanmar

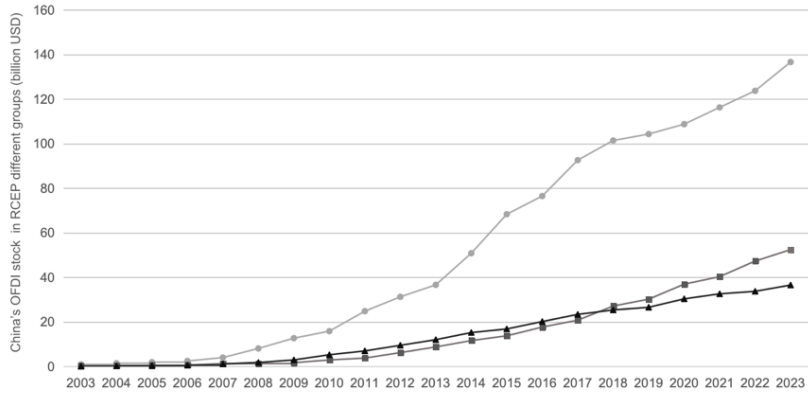
Source: World Bank income classification.

Figure 2 illustrates that China's investment stock in the RCEP region is mainly concentrated in high-income countries, with investment in upper-middle-income regions surpassing that in lower-middle-income regions since 2018.

In addition to investment cooperation with RCEP countries, China also maintains strong trade ties with the region (Luo & Shen, 2022). This trade partnership fosters economic growth, drives industrial upgrading, and enhances regional cooperation in key sectors, thereby contributing to shared prosperity across the RCEP region.

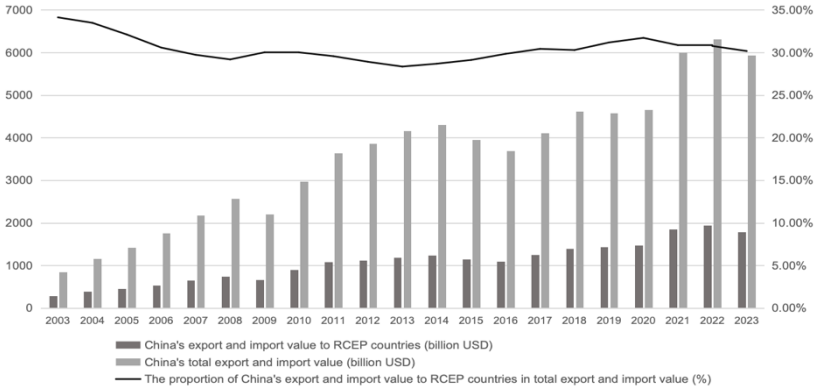
Figure 3 presents the trade cooperation between China and RCEP member countries. China's total import and export value with RCEP member countries has exhibited significant growth, rising from a relatively low level in 2003 to nearly 2 trillion USD in 2023. However, the proportion of China's trade with RCEP members in its total foreign trade has declined, highlighting substantial potential for further trade expansion with the RCEP region.

Figure 2. China's outward FDI stock across different RCEP income groups



Source: Statistical Bulletin on China's Outward Foreign Direct Investment.

Figure 3. Comparison of China's total trade value with RCEP countries



Source: UN Comtrade.

Trade value reflects the scale of trade but does not reveal the trade characteristics of different types of goods. Therefore, this study categorizes commodities between China and the RCEP region into three different groups based on the SITC, as shown in Table 2 (Hu & Ling, 2016).

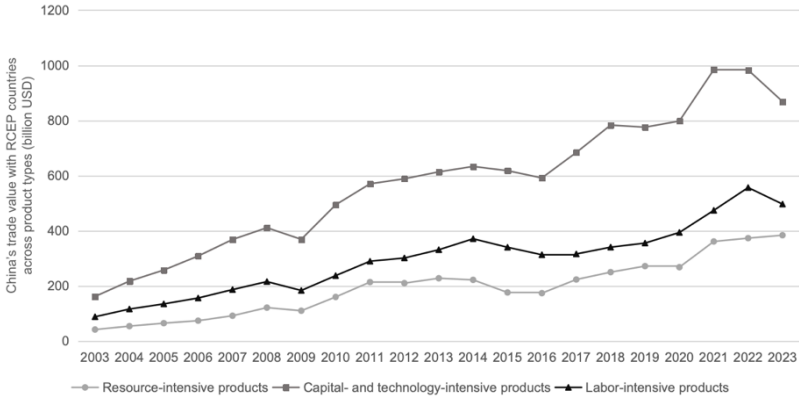
Figure 4 shows the China's trade value with other RCEP countries according to the SITC classification. Bilateral trade is primarily concentrated in capital- and technology-intensive products, while trade in resource-intensive and labor-intensive products has remained stable, exhibiting moderate growth over the same period.

Table 2. Classification of products

Section	Name	Classification
0	Food and live animals	Resource-intensive
1	Beverages and tobacco	Resource-intensive
2	Crude materials, inedible, except fuels	Resource-intensive
3	Mineral fuels, lubricants and related materials	Resource-intensive
4	Animal and vegetable oils, fats and waxes	Resource-intensive
5	Chemicals and related products, n.e.s	Capital- and technology-intensive
6	Manufactured goods classified chiefly by material	Labor-intensive
7	Machinery and transport equipment	Capital- and technology-intensive
8	Miscellaneous manufactured articles	Labor-intensive
9	Commodities and transactions not classified elsewhere in the SITC	-

Source: UNCTAD, SITC Rev.4 product classification.

Figure 4. China's trade value with RCEP countries across product categories



Source: UN Comtrade.

Based on the above background, this study aims to examine whether China's OFDI can influence the bilateral trade with other RCEP member countries, focusing on the long-term effects on the period before the agreement's full implementation in 2023. Given the differences in economic development levels and product structures among RCEP member countries, the impact of China's OFDI on bilateral trade exhibits significant heterogeneity. Therefore, this study examines the differentiated trade effects of China's investment in RCEP countries from two dimensions: national income levels and product categories. To comprehensively reflect the trade relationship between China and RCEP countries, this study divides trade variables into three dimensions: export value, import value, and total trade value.

1.2. Background of digital economy

Globalization is currently entering a qualitatively new stage of development, characterized by advancements in information and communication technologies (ICT), the proliferation of the Internet, and the expansion of mobile communications (Limna et al., 2022). The digital economy, characterized by data-driven production and the widespread application of information and communication technologies, has become an important driver of high-quality economic growth (Khan, 2024).

The Global Digital Economy Report 2025 released by the International Data Center Authority states that the global digital economy accounts for approximately 15% of global GDP in 2024, with a total size of around 16 trillion US dollars. However, within the RCEP region, the development levels of the digital economy are uneven. Countries such as Brunei, Indonesia, Laos, Myanmar, and Cambodia are at a relatively low level of digital economic development, primarily constrained by inadequate ICT infrastructure (Abd Rashid et al., 2025). In contrast, Japan, South Korea, and Singapore are at the forefront of the digital economy, with advanced digital technologies, robust digital infrastructure, and highly digitalized industries (Zhang et al., 2022). Nevertheless, the overall level of digital economic development in RCEP countries has shown an upward trend, indicating an increasing emphasis on the digital economy by member states (Wang et al., 2022). The implementation of the RCEP agreement has provided new opportunities for digital economic cooperation within the region, with vast potential for collaboration in areas such as digital trade, cross-border e-commerce, and digital infrastructure construction.

Given the increasing importance of technological upgrading in global trade, traditional explanations based solely on factor endowments may be insufficient. This study therefore incorporates the digital economy as both a mediating and moderating variable to better explain the OFDI–trade relationship. This research contributes to a better understanding of the new patterns of economic cooperation in the digital era.

2. Literature review

2.1. The impact of outward FDI on bilateral trade

The relationship between international investment and trade has been a focal point in economic research since the 1940s. Mundell (1957) argued that there existed a substitution effect between capital flows and commodity trade in the presence of trade barriers, based on factor endowment theory. Kojima (1978) proposed the marginal industry expansion theory, which suggested that investing countries transferring industries that had lost their comparative advantage to the host country would create trade. The OLI paradigm posited that firms engaged in OFDI when they simultaneously possess ownership-specific advantages, location-specific advantages, and internalization

advantages (Dunning, 1977). Firms combine ownership and location advantages to form cross-border production networks that expand trade.

Empirical studies across multiple decades and regions have explored the impact of OFDI on bilateral trade. The trade substitution effect of OFDI was first discussed. Early evidence emerged from Horst's (1972) analysis of U.S.-Canada economic relations and Adler and Stevens's (1974) examination of machinery and chemical industries. Subsequent research improved these findings: Belderbos and Sleuwaegen (1998) documented how Japanese electronics firms' European investments displaced exports, while Pain and Wakelin (1998) quantified that a 1% increase in U.S. FDI stock reduced exports by 0.25%. Bhasin and Kapoor (2021) found that OFDI of BRICS countries had a negative impact on their home country's exports.

Recent empirical studies have increasingly documented a complementary relationship between OFDI and bilateral trade, particularly evident in developing and emerging economies. China-specific studies by Qiu (2021) and Zhang et al. (2024) consistently found positive export effects from Chinese OFDI. This complementary dynamic extends to regional contexts. Hou et al. (2022) and Gao et al. (2022) revealed that Chinese OFDI in East and Southeast Asia substantially expanded export volumes, with Wong et al. (2023) identifying bidirectional causality between OFDI and exports within ASEAN countries. Zhao and Li (2023) found that China's OFDI had a positive impact on the bilateral trade with RCEP, and RCEP member countries' institutional quality promotes this impact.

Existing literature on the trade contingent effects of OFDI revealed diverse and context-specific outcomes. Hu and Ling (2016) observed that while OFDI boosted exports of capital-, technology-, and labor-intensive products, it constrained resource-intensive ones. Osabuohien-Irabor and Drapkin (2022) proved that in lower-income countries, the relationship between trade and OFDI was substitutable. But the trade and OFDI of economies in lower-middle-income countries, upper-middle-income countries, and high-income countries complemented each other. Similarly, Gohar et al. (2024) found that the exports of middle-income and upper-middle-income countries benefited from OFDI the most, while low-income countries and Latin America have weaker or even negative effects. Yu et al. (2025) demonstrated that China's OFDI only stimulated the import of private security companies rich in natural resources, while promoting the exports of most private security companies.

The literature on the impact of OFDI on bilateral trade is now comprehensive, and the effects are broadly categorized as substitution, complementary, and contingent effects. As a recently established 15-country agreement, RCEP offers significant potential for further exploration of the trade effects of OFDI within its framework. Based on the above literature, this study proposes three hypotheses:

H1: China's OFDI in RCEP member countries has a positive impact on bilateral trade, including export value, import value, and total trade value.
H2: The impact of China's OFDI on bilateral trade varies across RCEP member countries with different income levels.

H3: The impact of China's OFDI in RCEP countries on bilateral trade differs across product categories.

2.2. Mediating and moderating role of digital economy

This study aims to explore whether the digital economy acts as a mediator and a moderator in the relationship between OFDI and bilateral trade. In the fields of environmental, economic, and technological studies, Wang and Zhang (2022) and Yasmeen et al. (2023) have utilized digital economy as a mediating factor, while Meng and Wen (2024) and Nepal et al. (2024) have considered it as a moderating factor. However, these studies did not examine this relationship within the framework of international investment and trade. Currently, only Ning et al. (2025) have explored the role of foreign direct investment as a positive moderator in the process of cross-border e-commerce enhancing export elasticity, but their perspective differs from the direction this study intends to investigate.

Although research focusing on the interplay among transnational investment, the digital economy, and bilateral trade remains scarce, examining the pairwise relationships among these factors remains valuable. In the context of the relationship between foreign investment and the digital economy, existing literature has primarily concentrated on the impact of the digital economy on international investment, with only a few studies addressing the reverse influence of international investment on the development of the digital economy. Alibekova et al. (2020) pointed out the importance of foreign investment in promoting technological innovation, improving ICT infrastructure construction, and promoting digital transformation. Specifically, FDI facilitates technology transfer by introducing advanced technology and management experience, and enhance the competitiveness of local enterprises, and improve the digital economy in host countries (Botelho et al., 2022). FDI also provides electronic payment systems, encourages enterprises and consumers to adopt digital technology and services more widely, and promotes the popularization of the digital economy (Satyanand, 2021).

There is a large body of literature on the relationship between digital economy and international trade. Yuan et al. (2025) pointed out that the digital economy has significantly improved international trade competitiveness in Hunan Province of China. Digital technologies reduce transaction costs, enhance supply chain efficiencies, and open new market opportunities, particularly in e-commerce (Han & Li, 2025). Fan (2021) found that the digital economy development in importing countries can significantly reduce the loss of China's export efficiency and improve the efficiency of China's export trade. This indicates that digital transformation has played a positive role in maintaining the export business of enterprises, helping them overcome some challenges caused by the pandemic, such as supply chain disruptions and international trade restrictions (Cam Thuy et al., 2023). Regarding more specific elements, Chu and Guo (2019) demonstrated that for ASEAN exports to China, the internet had a stronger impact on trade performance than telephone and mobile services. For ASEAN imports from

China, both internet and mobile technologies boosted trade, while telephone services had a negative effect.

Based on existing research, the digital economy may influence the relationship between OFDI and bilateral trade through a dual-path mechanism. On one hand, OFDI can enhance trade efficiency by improving the host country's ICT infrastructure through technology spillovers, suggesting that the digital economy serves as an indirect transmission channel linking OFDI to trade outcomes. On the other hand, a higher level of digital economic development enables firms in host countries to participate more directly in digital trade, thereby reducing reliance on investment-driven trade linkages. Consequently, as the digital economy deepens, the marginal trade-promoting effect of OFDI may diminish. Therefore, this study proposes two hypotheses:

H4: The digital economy level of RCEP countries positively mediates the relationship between China's OFDI and bilateral trade.
H5: The digital economy level of RCEP countries negatively moderates the relationship between China's OFDI and bilateral trade.

3. Model building and variables statement

This study employs a quantitative analysis approach, utilizing the expanded trade gravity models to investigate the impact of China's OFDI in RCEP countries on bilateral trade, with particular attention to heterogeneity across income groups and product categories. Mediation and moderation models are further employed to assess the role of the digital economy. The analysis is based on secondary panel data from 2003 to 2023.

3.1. Empirical models

First, expanded trade gravity models are constructed to explore the relationship of OFDI and bilateral trade. There are three dependent variables: export value, import value, and the total trade value. Therefore, the three models are constructed as follows:

$$EX_{ijt} = \alpha_0 + \alpha_1 OFDI_{ijt} + \alpha_2 GDP_{jt} + \alpha_3 P_{jt} + \alpha_4 LPI_{jt} + \alpha_5 ER_{ijt} + \alpha_6 WGI_{jt} + \varepsilon_{ijt} \quad (1)$$

$$IM_{ijt} = \beta_0 + \beta_1 OFDI_{ijt} + \beta_2 GDP_{jt} + \beta_3 P_{jt} + \beta_4 LPI_{jt} + \beta_5 ER_{ijt} + \beta_6 WGI_{jt} + \varepsilon_{ijt} \quad (2)$$

$$T_{ijt} = \gamma_0 + \gamma_1 OFDI_{ijt} + \gamma_2 GDP_{jt} + \gamma_3 P_{jt} + \gamma_4 LPI_{jt} + \gamma_5 ER_{ijt} + \gamma_6 WGI_{jt} + \varepsilon_{ijt} \quad (3)$$

Where i denotes China, j denotes RCEP member countries, t denotes the time and ε denotes random error term. GDP denotes gross domestic product, P denotes population, LPI denotes logistics performance index, ER denotes exchange rate, and WGI denotes worldwide governance indicator.

Second, the subgroup analysis for different income groups and product categories employs the same gravity models as described above.

Third, to examine the mediating role of the digital economy, the regression equation for the mediation model is constructed on the basis of the baseline model as follows (Baron & Kenny, 1986):

$$DE_{jt} = \lambda_0 + \lambda_1 OFDI_{ijt} + \lambda_2 Control + \varepsilon_{ijt} \quad (4)$$

Where DE stands for RCEP member countries' digital economy and Control represents a set of control variables including GDP, population, logistics performance index, exchange rate, and worldwide governance indicators. The remaining indicators are consistent with those in the baseline models.

The result equations estimate the three types of dependent variables separately, as shown below:

$$EX_{ijt} = a_0 + a_1 OFDI_{ijt} + a_2 DE_{jt} + a_3 Control + \varepsilon_{ijt} \quad (5)$$
$$IM_{ijt} = b_0 + b_1 OFDI_{ijt} + b_2 DE_{jt} + b_3 Control + \varepsilon_{ijt} \quad (6)$$
$$T_{ijt} = c_0 + c_1 OFDI_{ijt} + c_2 DE_{jt} + c_3 Control + \varepsilon_{ijt} \quad (7)$$

The above indicators have the same meaning as the previous equation.

Fourth, to evaluate the moderating effect of the digital economy, interaction terms between DE and OFDI are included in the model. The equations are as follows:

$$EX_{ijt} = d_0 + d_1 OFDI_{ijt} + d_2 DE_{jt} + d_3 (OFDI_{ijt} \times DE_{jt}) + d_4 Control + \varepsilon_{ijt} \quad (8)$$
$$IM_{ijt} = e_0 + e_1 OFDI_{ijt} + e_2 DE_{jt} + e_3 (OFDI_{ijt} \times DE_{jt}) + e_4 Control + \varepsilon_{ijt} \quad (9)$$
$$T_{ijt} = f_0 + f_1 OFDI_{ijt} + f_2 DE_{jt} + f_3 (OFDI_{ijt} \times DE_{jt}) + f_4 Control + \varepsilon_{ijt} \quad (10)$$

OFDI and DE are standardized before constructing interaction terms, and all other variables remain the same as in the baseline models.

3.2. Variables and sources

Natural logarithmic transformation is applied to exports, imports, total trade value, OFDI stock, GDP, population, exchange rate and LPI to reduce heteroscedasticity and enhance interpretability. The Worldwide Governance Indicator (WGI) is the arithmetic mean of six indicators, each on a [-2.5, 2.5] scale. The index is approximately uniformly distributed, economically meaningful, includes negative values, and therefore is not log-transformed. Table 3 shows the details.

The mediating and moderating variable in this study is digital economy and abbreviated as DE. Currently, while significant progress has been made in

Table 3. Variable description

Category	Variable	Description	Unit	Source	Reference
Independent	Outward foreign direct investment (OFDI)	China's direct investment stock in RCEP countries	Billion USD	Statistical Bulletin on China's OFDI	Zhang et al. (2024); Yu et al. (2025)
Dependent	Export value (EX)	Bilateral trade data between China and RCEP countries	Billion USD	UN Comtrade	Gohar et al. (2024); Yu et al. (2025)
	Import value (IM)				
	Trade value (T)				
Control	Gross domestic product (GDP)	GDP of RCEP countries	Billion USD	World Bank	Gohar et al. (2024); Zhang et al. (2024)
	Population (P)	Population of RCEP countries	Million people	World Bank	Gao et al. (2022); Zhao and Li (2023)
	Logistics performance index (LPI)	Logistics performance of RCEP countries	-	World Bank	Bugarcic and Kleinert (2024)
	Exchange rate (ER)	The exchange rate of RCEP countries' currencies against the Chinese yuan	%	World Bank	Gohar et al. (2024); Zhang et al. (2024)
	Worldwide Governance Indicators (WGI)	Quality of national governance of RCEP countries. Arithmetic mean of six indicators: Voice and Accountability (VA), Political Stability and Absence of Violence (PV), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL), Control of Corruption (CC)	-	World Bank	Behera et al. (2020); Zhao and Li (2023)
Mediating and moderating	Digital economy (DE)	Digital economy level of every RCEP member country	-	World Bank, ITU and UNCTAD	Zhang et al. (2022); Wang et al. (2024)

Source: Own elaboration based on Statistical Bulletin on China's OFDI, World Bank, ITU, UN Comtrade and UNCTAD.

the measurement methods and indicator systems for the digital economy, no institution or literature has yet standardized the measurement approaches. As a result, challenges such as inconsistent indicator systems, difficulties in data acquisition, timeliness issues, and regional disparities persist. For this study, relevant indicators are collected based on existing literature, and principal component analysis (PCA) is employed to construct a digital economy indicator (Bai et al., 2024).

This study constructs an evaluation system for the digital economy development level by leveraging the methodologies employed by Zhang et al. (2022), Bai et al. (2024) and Wang et al. (2024). This study measures the digital economy development level of the RCEP member states in multiple dimensions - three primary indicators and nine secondary indicators. The period is from 2003 to 2023, and the selected indicators are shown in Table 4.

Table 4. Digital economy indicator selection

Variable	First level indicators	Second level indicators	Data sources
Digital economy (DE)	Digital infrastructure	A1: Fixed broadband subscription (per 100 people)	World Bank
		A2: Mobile cellular subscriptions (per 100 people)	World Bank
		A3: Secure Internet servers (per 1 million people)	World Bank
		A4: Individuals using the internet (% of population)	World Bank and ITU
	Digital elements	B1: Revenue from all telecommunication services	ITU
		B2: Payments of charges for the use of intellectual property	World Bank
	Digital transactions	C1: ICT goods exports as a share of total goods exports	UNCTAD
		C2: ICT services exports as a share of total services exports	UNCTAD
		C3: Digitally deliverable services exports as a share of total services trade	UNCTAD

Source: Own elaboration based on World Bank, ITU, UNCTAD.

After the interpolation of missing data, it is necessary to perform the Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test on the standardized data. The results indicate that the KMO value of the standardized data is 0.641, and the p-value for Bartlett's sphericity test is 0.000. This confirms that the data meets the required standards, making it appropriate to proceed with factor analysis (Šprajc et al., 2019).

Principal component extraction is conducted on the standardized data of the nine secondary indicators. The extraction criteria are based on eigenvalues greater than 1 or a cumulative contribution rate exceeding 85%, ensuring that the principal components provide a comprehensive summary of the data with minimal information loss (Finch, 2023). The output results are presented in Table 5.

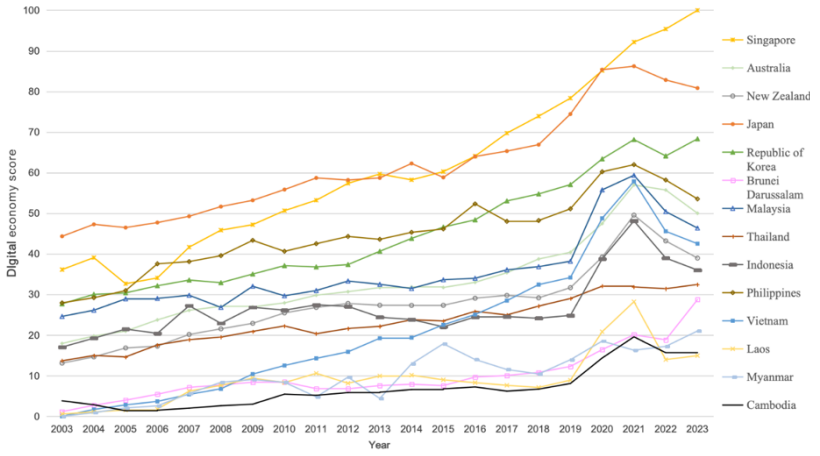
Table 5. Principal component analysis results

Component	Eigenvalue	Proportion	Cumulative
Comp1	3.94496	0.4383	0.4383
Comp2	1.70519	0.1895	0.6278
Comp3	1.06879	0.1188	0.7465
Comp4	0.840397	0.0934	0.8399
Comp5	0.621259	0.0690	0.9090
Comp6	0.4435137	0.0483	0.9573
Comp7	0.187543	0.0208	0.9781
Comp8	0.103977	0.0116	0.9897
Comp9	0.0927419	0.0103	1.0000

Source: Own elaboration using data from World Bank, ITU and UNCTAD.

From the table above, the eigenvalues of the first three components are greater than 1, with a cumulative variance contribution rate of 74.65%. Although the eigenvalue of the fourth component is slightly below 1, it raises the cumulative explained variance to nearly 84%, representing a substantial information gain. To retain as much information as possible, this study keeps four principal components. After determining the number of principal components, the scores for four principal components are calculated using Stata software.

Figure 5. Digital economy scores of RCEP countries



Source: Own elaboration using data from World Bank, ITU and UNCTAD.

Then the composite score is normalized to a 0-100 scale for comparative analysis. The results are shown in Figure 5. The digital economy development

within the RCEP region exhibits a pattern of "overall growth concurrent with structural disparities." Cross-nationally, more economically developed members generally achieve higher digital economy scores, revealing a significant digital divide. Temporally, from 2003 to 2020, all member states experienced rapid digital economic growth, marking a period of accelerated digitalization for the region. However, this trend diverged between 2020 and 2023 due to the COVID-19 pandemic, leading to a phase of moderate growth in some countries.

4. Empirical results

4.1. Panel diagnostic tests

First, the Pesaran CD test is employed to assess cross-sectional dependence. The results indicate the presence of cross-sectional correlation except imports of high-income group, imports and total trade of lower-middle-income group and exports of resource-intensive products. Accordingly, the fixed-effects model with Driscoll-Kraay standard errors should be applied in the empirical analysis (Hoechle, 2007).

Second, the Cross-Sectionally Augmented Dickey-Fuller (CADF) and the Cross-Sectionally Augmented Im-Pesaran-Shin (CIPS) tests are employed to examine unit roots. The results show that all variables become stationary at the 1% significance level after first differencing, thus the cointegration test can be conducted.

Third, this study chooses Westerlund to test cointegration. The results show that the P-values are significant at the 1% significance level, indicating that the data pass the cointegration test and can proceed to the next step.

Fourth, Hausman tests are performed for the four no cross-sectional dependence groups. The results indicate that the fixed-effects model is appropriate. However, for these four groups, the Wald test and Wooldridge test indicate the presence of autocorrelation and heteroskedasticity, and therefore Driscoll-Kraay standard errors are also used to correct for these issues (Mastac & Misa, 2025).

4.2. Regression results

Variables that have been log-transformed are prefixed with "ln". All analyses are performed using Stata software, and all subsequent models control for year and country fixed effects.

First, baseline regressions are estimated, and the results are presented in Table 6.

Table 6. Regression results of outward FDI on trade

Trade group	lnEX	lnIM	lnT
lnOFDI	0.1198**	0.2204***	0.1250***
lnGDP	0.9321***	3.0643***	1.6672***
lnP	1.0055**	-2.8461*	-0.2453
lnLPI	0.1771	-2.2606**	-0.8781**
lnER	0.0158	0.1233**	0.0648**
WGI	-0.0837	-0.3064	-0.1232
C	-6.6649***	-2.4134	-4.4814*
R^2	0.9004	0.7745	0.8943

Note: *** p<0.01, ** p<0.05, * p<0.1. (Significance levels are consistent across all tables.)
Source: Own elaboration using data from World Bank, Statistical Bulletin on China's OFDI and UN Comtrade.

The analysis results indicate that China's OFDI in RCEP has a significant positive impact on exports (lnEX), imports (lnIM), and total trade value (lnT) from China to RCEP member countries. Specifically, the coefficients of lnOFDI are 0.1198, 0.2204 and 0.1250, respectively, all of which are statistically significant at the 5% level. The elasticity of imports is greater than that of exports.

Second, the RCEP countries are categorized according to the World Bank's income classification to examine the impact of OFDI on trade across different income groups; the results are presented in Table 7. Furthermore, trade goods are classified by the SITC system to investigate the effects of OFDI on different product categories, with the results shown in Table 8.

Table 7. Regression results of outward FDI on trade across country groups

Countries	High-income			Upper-middle-income			Lower-middle-income		
Trade group	lnEX	lnIM	lnT	lnEX	lnIM	lnT	lnEX	lnIM	lnT
lnOFDI	0.02	0.18	0.15	0.09	-0.10	0.01	-0.10**	0.63**	0.13
lnGDP	-2.56***	-0.43	-1.66***	0.26	4.26**	2.10**	1.51*	3.34*	2.50*
lnP	7.15***	4.61*	6.59***	-1.37	-3.63	-2.51	-2.78	-12.47**	-7.26**
lnLPI	6.15***	-4.84**	1.48	0.16	-0.44*	0	-0.59	-3.41**	-1.73
lnER	-0.21	0.50	-0.07	-0.34 **	-0.75**	-0.42**	-0.09*	-0.04	-0.08
WGI	0.89**	0.24	0.49	-0.03 ***	-0.08	-0.01	0.24	-0.42	0.11
C	-9.08***	-0.73	-5.82***	6.83	-3.93 ***	2.72	4.84	34.52**	18.68
R^2	0.9116	0.7445	0.9023	0.9960	0.9862	0.9957	0.9811	0.9623	0.9865
Obs	126	63	105						

Source: Own elaboration using data from World Bank, Statistical Bulletin on China's OFDI and UN Comtrade.

The results indicate different impacts across country income groups: OFDI in high-income and upper-middle-income RCEP members shows no significant

trade effects. OFDI in lower-middle-income members significantly suppresses exports and boosts imports, resulting in no net significant impact on total trade.

Table 8. Regression results of outward FDI on trade across country product categories

Products	Resource-intensive			Capital- and technology-intensive			Labor-intensive		
Trade group	lnEX	lnIM	lnT	lnEX	lnIM	lnT	lnEX	lnIM	lnT
lnOFDI	0.08	0.103	0.102*	0.13***	0.85***	0.21**	0.12**	0.53***	0.22***
lnGDP	0.44	2.19***	1.98***	1.28***	0.19	0.86***	1.10***	4.19***	1.43***
lnP	4.00	1.04	1.86	-0.87	0.49	-0.59	1.88***	-5.59***	1.26*
lnLPI	-0.85	-0.98	-1.08	-0.36	-2.57	-1.34*	0.60	-0.23	0.34
lnER	0.06	0.08	0.061	-0.03	0.23	0.04*	0.02	0.25**	0.08*
WGI	-0.10	-0.04	-0.05	-0.09	0.89	0.14	-0.17	-1.16**	-0.30
C	-14.52 **	-13.06 ***	-13.93 ***	-2.70	0.54	0.29	-11.63 ***	-3.49	-10.47 ***
R^2	0.9730	0.7792	0.8180	0.8856	0.4804	0.7884	0.8881	0.7237	0.8741
Obs	294	294	294						

Source: Own elaboration using data from World Bank, Statistical Bulletin on China's OFDI and UN Comtrade.

The results indicate that China's investment in resource-intensive products exerts no significant effect on exports and imports with RCEP nations, but the total trade effect of OFDI is significant positive. The investment in capital- and technology- intensive and labor-intensive products exerts a significant positive effect on all these trade flows.

Third, this study employs a Bootstrap test for mediation effects, and Table 9 presents the results.

Table 9. Results of mediation effect tests

Trade group	lnEX			lnIM			lnT		
Estimate	Coef.	95% conf. interval		Coef.	95% conf. interval		Coef.	95% conf. interval	
		Lower	Upper		Lower	Upper		Lower	Upper
Indirect effect	0.017	-0.006	0.039	0.018	-0.007	0.044	0.015	-0.005	0.035
Direct effect	0.103*	0.004	0.210	0.202***	0.031	0.374	0.110***	0.025	0.195
Total effect	0.120**	0.008	0.232	0.220***	0.049	0.392	0.125***	0.038	0.212

Source: Own elaboration using data from World Bank, Statistical Bulletin on China's OFDI, UN Comtrade, ITU and UNCTAD.

The results indicate insignificant mediation effects, suggesting that the digital economy does not serve as a valid mediating pathway for the impact of China's OFDI within the RCEP region on bilateral trade.

Fourth, this study tests the digital economy's moderation effect by including interaction terms between OFDI and digital-economy indicators, and the results are shown in Table 10.

Table 10. Results of moderation effect tests

Trade group	lnEX		lnIM		lnT	
Model	1	2	1	2	1	2
lnOFDI	0.103**	-0.006	0.202**	-0.002	0.110***	-0.026
DE	-0.016***	0.012***	-0.018***	0.036***	-0.014***	0.021***
lnOFDI × DE	-	-0.246***	-	-0.461***	-	-0.307***
lnGDP	0.925***	0.857***	3.057***	2.929***	1.661***	1.576***
lnP	0.853	1.515***	-3.012**	-1.770*	-0.380	0.447
lnLPI	0.347	-0.012	-2.076***	-2.750***	-0.728**	-1.177***
lnER	-0.009	-0.025	0.096**	0.067	0.043*	0.023
WGI	-0.078	-0.072	-0.300	-0.289	-0.118	-0.111
C	-5.053***	-7.075***	-1.544	-5.338**	-3.245*	-5.774***
R^2	0.9807	0.9861	0.9582	0.9711	0.9812	0.9891

Source: Own elaboration using data from World Bank, Statistical Bulletin on China's OFDI, UN Comtrade, ITU and UNCTAD.

The results indicate that the level of digital economy in RCEP countries negatively moderates the impact of China's investment in these countries on bilateral trade, weakening the trade-promoting effects of OFDI.

4.3. Robustness tests

To verify the robustness of the baseline model results, this study employs an adjusted sample range to perform robustness check. Due to the impact of the 2008 financial crisis, China's trade with RCEP countries experienced a downward trend in 2008 and 2009. Similarly, due to policy factors in China during 2015, 2016 and 2017, there were fluctuations in trade values between China and RCEP countries. In addition, COVID-19 has also affected investment and trade in 2021, 2022 and 2023. Consequently, this study excludes these years and performs regression analyses to test the robustness of the findings. The results of the robustness test are presented in Table 11.

Table 11. Baseline model robustness test results

Trade group	lnEX	lnIM	lnT
lnOFDI	0.1459**	0.2540***	0.1700***
lnGDP	0.8171**	3.4987***	1.7537***
lnP	0.3352	-5.0586**	-1.4679
lnLPI	0.1767	-1.5245	-0.4833
lnER	-0.0047	0.0325	0.0227
WGI	0.0345*	-0.4303	-0.1377
C	-3.2424***	1.7650	-0.9462
R^2	0.9771	0.9644	0.9818

Source: Own elaboration using data from World Bank, Statistical Bulletin on China's OFDI and UN Comtrade.

The robustness test results indicate that China's OFDI in RCEP countries has a significant positive effect on China's exports, imports and total trade with these countries. This finding is consistent with the results previously discussed.

The robustness test of the mediation and moderation effects in this study is achieved by replacing the measurement method of the digital economy. The Network Readiness Index (NRI) has been selected due to its multidimensional, internationally applicable, and comprehensive evaluation advantages (Bánhidi & Dobos, 2024) . The results for the mediation effects (Table 12) and moderation effects (Table 13) demonstrate that the key findings are robust and not unduly influenced by this specific variable.

Table 12. Results of mediation effects robustness test

Trade group	lnEX			lnIM			lnT		
Estimate	Coef.	95% conf. interval		Coef.	95% conf. interval		Coef.	95% conf. interval	
		Lower	Upper		Lower	Upper		Lower	Upper
Indirect effect	0.021	-0.001	0.043	-0.011	-0.044	0.021	0.008	-0.013	0.029
Direct effect	0.092**	0.014	0.235	0.232***	0.059	0.404	0.117**	0.027	0.207
Total effect	0.120**	0.026	0.265	0.220***	0.052	0.388	0.125***	0.036	0.213

Source: Own elaboration using data from World Bank, Statistical Bulletin on China's OFDI, UN Comtrade, World Economic Forum and Portulans.

Table 13. Results of moderation effects robustness test

Trade group	lnEX		lnIM		lnT	
Model	1	2	1	2	1	2
lnOFDI	0.092*	0.029	0.232***	0.162*	0.117***	0.061
NRI	0.355**	0.296***	-0.143**	-0.209	0.100*	0.048
lnOFDI × NRI	-	-0.126***	-	-0.219***	-	-0.174***
lnGDP	0.693**	0.210	3.161***	2.621***	1.600***	1.170***
lnP	1.236*	2.312***	-2.939**	-1.737	-0.180	0.777
lnLPI	0.301	-0.217	-2.310***	-2.890***	-0.843***	-1.304***
lnER	0.010	-0.011	0.125***	0.102**	0.063***	0.044*
WGI	-0.067	-0.169	-0.313	-0.428	-0.118	-0.209
C	-7.060***	-6.954***	-2.044	-1.927	-4.340**	-4.246**
R^2	0.9797	0.9849	0.9568	0.9613	0.9800	0.9838

Source: Own elaboration using data from World Bank, Statistical Bulletin on China's OFDI, UN Comtrade, World Economic Forum and Portulans.

5. Discussion and conclusion

5.1. Discussion

First, the findings of baseline models indicate that China's direct investment in RCEP countries has a significant positive impact on exports, imports and total trade with the RCEP region. This result is consistent with Hypothesis 1 and demonstrates that OFDI has complementary trade effects. According to

Dunning's eclectic paradigm, these OLI advantages encourage firms to expand overseas production and distribution networks, creating a large amount of two-way trade in intermediate goods, components, and final products with RCEP member countries.

Second, the impact of China's OFDI on bilateral trade with RCEP member countries exhibits heterogeneity across country income levels and product categories, consistent with H2 and H3.

For high-income countries, OFDI has no significant influence on the value of exports, imports or total trade. China's investment in these economies is primarily strategic rather than trade-oriented (Yakubu et al., 2020). For upper-middle-income countries, OFDI also has no significant influence on trade value. In addition to resource seeking, investments in upper-middle-income areas are more market seeking, characterized by "local production, local sales" or "regional sales" (Kamal et al., 2019). For lower-middle-income countries, OFDI significantly increases China's imports but suppresses exports, reflecting a coexistence of substitution and complementary effects. Based on Mundell's theory, the transfer of production has led to local substitution of exports from China, while OFDI strengthens the upstream supply chain and generates imports flowing back to China.

For resource-intensive products, OFDI shows no significant impact on exports, imports, but promotes total trade value. The trade value of resource seeking OFDI is mainly reflected in the systematic enhancement of overall economic and trade relations, rather than directly driving immediate product flows (Wang, 2025). For capital- and technology- intensive products, OFDI has significant positive effects on all these trade values. OFDI through technology transfer, industrial chain integration, etc., has increased the import demand for capital and technology intermediates and key equipment, and also enhanced the export competitiveness of related products (Zhang et al., 2025). For labor-intensive products, OFDI has complementary trade effects. According to marginal industry transfer theory, China transfers labor-intensive production processes to RCEP countries through OFDI. This directly drives the exports of intermediate goods to the host country and increases imports from the host country through the return of finished products.

Third, the level of digital economy in RCEP countries does not play a significant mediating role in the effect of China's OFDI in RCEP countries on trade promotion, but it exhibits a significant negative moderating effect. The findings do not support H4 for that the digital economy in many RCEP member countries remains uneven and inadequately integrated with cross-border production and logistics networks. The findings support H5 for that the developed digitalization of the host country may lead to more direct digital trade between the local and other countries, partially replacing the "investment driven" trade that originally needed to be conducted through Chinese OFDI enterprises (Wu et al., 2025).

5.2. Conclusion

Employing an expanded trade gravity model with mediation and moderation effect models, this study finds that China's OFDI in RCEP member countries significantly boosts exports, imports, and total trade. However, the impact varies depending on the host country's income level and product category. Notably, the digital economy of RCEP plays a negative moderating role in this relationship but does not serve as a mediating factor.

Based on these findings, Chinese enterprises should adopt differentiated investment strategies for different countries and traded goods within RCEP (Wang, 2025). Governments should leverage the RCEP framework to maximize the trade-promoting potential of OFDI. In response to the challenges posed by the digital economy to the traditional "investment-driven trade" model, China should promote the transformation and upgrading of investment strategies and deeper cooperation with RCEP partners in digital trade rules, data governance, and cross-border e-commerce regulation to make the digital economy a new driving force for trade growth rather than a constraint.

This study contributes to the literature in three main ways. First, this study identifies the heterogeneous trade effects of OFDI across countries and product categories, providing a basis for optimizing Chinese investment in different regions and industries. Second, this study evaluates the mediating and moderating role of the digital economy, providing new theoretical insights into how the digital economy influences the OFDI-trade nexus. Third, in response to the lack of unified national level digital economy measurement standards in the current academic community, this study attempts to construct a digital economy evaluation system applicable to RCEP member countries, selecting indicators with available data and clear characteristics, and providing methods and references for subsequent quantitative comparisons of cross-border digital economies.

Nevertheless, this study has certain limitations. First, due to data constraints, the OFDI data used are aggregated and do not differentiate between industries such as manufacturing and services. Future research may explore industry heterogeneity using disaggregated data. Second, the sample period mainly covers the pre-RCEP stage, and subsequent research may compare the impact differences before and after the agreement's implementation using longer-term data. Third, given the study's focus on trade outcomes and the role of the digital economy, this research does not distinguish between different types or motives of China's OFDI. Future studies may extend this analysis by differentiating investment modes to examine their heterogeneous effects on China–RCEP bilateral trade.

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