

## ANALYSING THE POVERTY REDUCTION EFFECT OF CHINA'S DIRECT INVESTMENT IN BELT AND ROAD COUNTRIES

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**Abstract:** This study investigates the poverty reduction effect of China's direct investment in countries along the Belt and Road Initiative (BRI). Using panel data from 63 countries over the period 2009 to 2019, we employ an econometric model and mediation analysis to examine the impact mechanisms. The findings reveal that China's Foreign Direct Investment (FDI) significantly reduces poverty by stimulating employment and improving infrastructure. Regional disparities are evident, with stronger effects in South and Southeast Asia. The study underscores the significance of targeted investments in infrastructure and job creation, offering actionable insights for policymakers and investors. The empirical results indicate that China's FDI can significantly reduce the poverty rate of poor families in countries along the Belt and Road, which greatly reduces the number of poor people in these countries and effectively promotes local economic development. In addition, the results contribute to the growing literature on the socioeconomic impacts of international investment and provide a foundation for further exploration into development strategies under the BRI framework.

Keywords: Belt and Road, poverty rate, direct investment, poverty reduction effect.

### Introduction

Poverty remains a critical global challenge, with approximately 10% of the world's population still living in extreme poverty (Mahembe & Odhiambo, 2018). While China has achieved remarkable success in eliminating absolute poverty domestically, its role in international poverty alleviation, particularly through initiatives like the Belt and Road Initiative (BRI) has garnered increasing attention. The BRI aims to enhance economic collaboration and investment in participating countries, which includes direct interventions to reduce poverty and improve living standards (M.-Y. Chin *et al.*, 2021).

In 2013, General Secretary Xi Jinping proposed the Silk Road Economic Belt and the 21st Century Maritime Silk Road initiatives (H. Chin *et al.*, 2015). Since then, China's cooperation with countries along the Belt and Road has deepened, accompanied by a shift in its investment philosophy. Notably, China has expanded its direct investments in these

countries and provided targeted assistance to local governments, thereby becoming a pivotal investor in the region (Huang, 2016; J. Li *et al.*, 2022).

There are numerous countries along the Belt and Road routes, each characterised by distinct customs, development conditions, historical backgrounds, and governance models (Callahan, 2016; Chaisse, 2018). Correspondingly, the manifestations and challenges of poverty in these regions are diverse and can be summarised into two primary aspects. First, the poverty levels vary significantly, with a large base of impoverished populations and generally high poverty rates (Shi *et al.*, 2022). According to national poverty rate data released by the World Bank, countries along the Belt and Road face substantial challenges in poverty governance. Specifically, Central and Eastern Europe stands out as a region with a relatively moderate poverty situation (Council, 2020). Second, the nature of poverty is becoming increasingly

diverse and complex, accompanied by a lack of effective and universally applicable poverty management programmes (Cosgrove & Curtis, 2021; Lister, 2021).

Considering this reality, achieving the United Nations' goal of "promoting global poverty reduction and improving global governance" as outlined in the 2030 Agenda for Sustainable Development (Scholz & Brandi, 2020; Ge *et al.*, 2024) remains a formidable challenge. Building upon a comprehensive review of relevant literature and theories, this study investigates the poverty reduction effects of China's direct investment in 63 countries along the BRI from 2009 to 2019. The focus is on uncovering the mechanisms through which investment influences poverty - primarily employment creation and infrastructure development while accounting for regional heterogeneity. Unlike prior studies, which often analyse either China's foreign investment or poverty alleviation independently, this study integrates the two, providing a unique perspective on their interplay.

The findings offer empirical evidence on the socioeconomic impacts of China's outward investment, especially in developing nations. Furthermore, this article identifies critical policy implications such as the need for targeted investments in job creation and infrastructure, highlighting actionable insights for policymakers and investors. Therefore, the study employs robust econometric methodologies, including mediation analysis and heterogeneity testing, ensuring reliable and reproducible results. Nevertheless, certain limitations such as data availability and regional disparities are acknowledged and addressed in the analysis.

This study encountered a few challenges during its implementation. The extended research period and the considerable number of countries along the Belt and Road posed significant difficulties in data collection. In some cases, data from certain countries were incomplete or entirely unavailable. To address this, the study

excluded countries with substantial data gaps and employed data-filling techniques to mitigate the impact of missing information.

Moreover, poverty is a multifaceted issue encompassing economic, political, cultural, and social dimensions. This complexity necessitated the careful selection of control variables to ensure the robustness of the analysis. The study specifically aimed to minimise issues such as variable duplication and omission, which could compromise the validity of the findings.

The remainder of this article is structured as follows: Section 2 reviews the relevant literature, Section 3 presents the theoretical framework, Section 4 outlines the research methodology and data, Section 5 discusses empirical findings, and Section 6 concludes with policy recommendations and directions for future research.

## Literature Review

The academic discourse on China's outward Foreign Direct Investment (FDI) and poverty alleviation is extensive yet fragmented, with limited studies combining the two themes. This section reviews existing research, identifies gaps, and positions the current study within the broader literature.

### *Research on China's Outward Foreign Direct Investment*

Research on China's FDI often focuses on investment risks, location selection, and effectiveness (Piperopoulos *et al.*, 2018; Yang *et al.*, 2018; Hussain *et al.*, 2020; Ahmed *et al.*, 2024). For instance, Tian *et al.* (2023) employed the Vertical and Horizontal Leveling Method and Entropy Weighting Method (VHSD-EM) model to assess investment risks along the Belt and Road (Tian & Tunio, 2023). The BRI helps reduce FDI risks and mitigates spillover effects among neighbouring countries, which could otherwise create high-risk areas for sustained investment. The influence of institutional environments and resource endowments on

investment decisions was investigated by S. Li *et al.* (2021) while Fu *et al.* (2021) highlighted the positive economic impacts of China's FDI in developing nations (Fu *et al.*, 2020).

Research on investment location choices primarily examines whether China's FDI is influenced by factors such as the institutional environment, level of integrity, tax policies, relations with China, resource endowments, information transparency, cultural distance, and other characteristics of countries along the Belt and Road (Chen *et al.*, 2019; Peng *et al.*, 2022; Khan *et al.*, 2023; Imran *et al.*, 2024).

Similarly, researchers have extensively examined whether the effects of investment positively influence the economic growth of countries along the Belt and Road. Accordingly, empirical analyses indicate that China's outward direct investment has the greatest impact on countries characterised by underdeveloped economies, weak governance capacities, and abundant natural resources (Fu *et al.*, 2020).

### **Research on China's Poverty Alleviation Cooperation**

Studies examining China's role in poverty reduction emphasise its aid-based and investment-driven approaches. Ju *et al.* (2015) discovered that China's aid projects significantly reduce poverty in recipient countries (Ju & Shao, 2015). Without any additional political and economic conditions, China's poverty reduction projects can help reduce the number of impoverished people in recipient countries and greatly promote their economic development level (Y. Zhang, 2020; W. Wang *et al.*, 2024). Research has demonstrated that there is an inverted U-shaped relationship between China's FDI in Africa and poverty reduction (Sylvaire *et al.*, 2022; X. Wang *et al.*, 2022). The inverted U-shaped relationship suggests that at the initial stages of Chinese FDI involvement, poverty reduction improves. However, the positive outcomes decrease after a certain threshold, potentially leading to adverse effects. This characteristic relationship raises intriguing

concerns regarding the optimal level of Chinese FDI that promotes inclusive development while mitigating social and economic disparities.

Limited studies have explored the interplay between China's FDI and poverty alleviation, with Zhang (2020) providing significant contributions to this emerging field (Y. Zhang, 2020). The study demonstrates that China's investments substantially impact poverty reduction in low-income countries. However, the effects vary considerably across regions and sectors. These variations can be attributed to different areas' unique socioeconomic conditions, governance structures, and absorptive capacities. For instance, investments in sub-Saharan Africa often yield higher poverty reduction outcomes due to the pressing need for infrastructure and basic development. At the same time, in more developed regions, the impacts are relatively marginal as they may already possess essential infrastructure (Imran *et al.*, n.d.). Moreover, FDI in sectors such as agriculture and manufacturing tends to have more direct poverty alleviation benefits than mining or telecommunications investments, which are less likely to address the immediate needs of impoverished populations (Imran *et al.*, 2019).

On the other hand, Zhang (2020) further identified a crucial threshold effect, whereby the poverty-reduction impacts of China's aid and investment are significantly greater in countries with lower per capita Gross Domestic Product (GDP). In such settings, FDI effectively addresses critical gaps by creating jobs, improving productivity, and boosting connectivity, leading to faster poverty reduction outcomes. However, in countries with higher per capita GDP, the marginal impact diminishes as Chinese FDI often flows to sectors that benefit wealthier segments of the population or address non-essential needs. Beyond these direct effects, Chinese FDI can foster valuable economic linkages such as technology transfer and market integration. However, these benefits often depend on the institutional strength and governance frameworks of recipient countries.

Poor governance, on the other hand, risks diluting or mismanaging the developmental potentials of investment. These findings highlight the complexity of the relationship between China’s FDI and poverty reduction, underscoring the need for nuanced analysis that examines local contexts, policy environments, and long-term outcomes. A more detailed understanding of these dynamics would help refine strategies to maximise the poverty-reduction benefits of Chinese FDI while addressing its limitations and externalities.

**Theoretical Framework and Research Hypotheses**

This study is grounded in the theory that FDI can reduce poverty by addressing key socioeconomic constraints in host countries. The theoretical framework highlights two primary mechanisms through which China’s FDI impacts poverty: Employment creation and infrastructure development.

**Employment Creation**

Employment is a fundamental driver of poverty alleviation, as it provides stable income and improves living standards. China’s outward FDI, particularly in labour-intensive industries, stimulates job creation in Belt and Road countries by establishing manufacturing plants and factories that absorb a significant portion of the local labour force and promoting skill development through vocational training programs and technology transfer. This initiative

has created numerous employment opportunities for disadvantaged groups in countries along the Belt and Road, enabling them to secure stable and sustainable incomes. Furthermore, it has improved per capita income levels and alleviated social tensions in these regions.

**Infrastructure Construction**

Insufficient infrastructure often impedes economic growth and poverty reduction efforts. Infrastructure investment by China under the BRI addresses critical gaps by constructing roads, bridges, railways, and communication networks, enhancing connectivity and improving access to markets, education, and healthcare services. Consequently, these improvements reduce transaction costs, increase productivity, and enable sustained economic development.

In recent years, China has demonstrated overcapacity and comparative advantages in infrastructure construction, aligning with the infrastructure deficiencies in many Belt and Road countries. This alignment provides a practical basis for China to invest in these regions. In the long term, China’s infrastructure investments are expected to attract international capital, reduce production costs, enhance efficiency, and expand local production capacity.

**Conceptual Model**

The theoretical framework is illustrated in Figure 1, which outlines the relationship between FDI, mediating factors (employment and infrastructure), and poverty reduction.

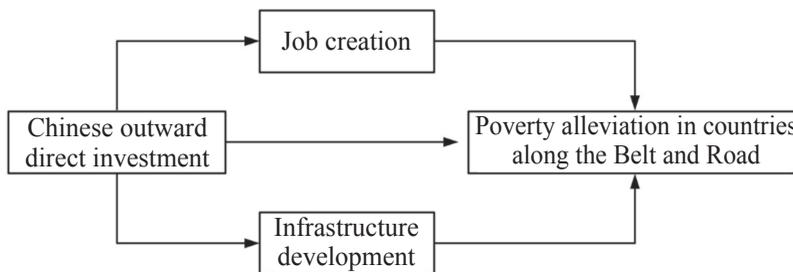


Figure 1: Analysis of the theoretical mechanism of China’s FDI on poverty reduction in countries along the Belt and Road

**Research Hypotheses**

Based on the theoretical framework, the following hypotheses are proposed:

- H1: China’s FDI significantly reduces poverty in Belt and Road countries.
- H2: Employment creation and infrastructure development mediate the relationship between China’s FDI and poverty reduction.

**Research Methodology**

This study adopts an empirical analysis approach to investigate the poverty reduction effects of China’s direct investment in 63 Belt and Road countries from 2009 to 2019. The methodology addresses three key objectives: Measuring the overall poverty reduction effect, identifying regional disparities, and exploring the impact mechanisms.

**Sample Selection**

The dataset includes 63 countries along the Belt and Road, grouped into six regions (Table 1): Northeast Asia, Southeast Asia, South Asia, Central Asia, West and North Asia, and Central and Eastern Europe. Countries with substantial data gaps were excluded and data-filling

techniques were employed where necessary. The 63 countries (or regions) along the route are further grouped into six major regions, as summarised in Table 1.

As provided in Table 1, the six regional groupings of the 63 countries along the Belt and Road are: Northeast Asia (2 countries), Southeast Asia (11), South Asia (7), West and North Asia (19), Central and Eastern Europe (19), and Central Asia (5).

**Model Construction**

The study uses a panel regression model to analyse the relationship between China’s FDI and poverty levels in host countries. The primary model is expressed as:

$$\begin{aligned} \text{LnPOV}_{it} = & \alpha_1 + \alpha_2 \text{LnOFDI}_{it} + \alpha_3 \text{AGGDP}_{it} \\ & + \alpha_4 \text{LnODA}_{it} + \alpha_5 \text{EDU}_{it} + \\ & \alpha_6 \text{URBAN}_{it} + \alpha_7 \text{DEATH}_{it} + \varepsilon_{it} \quad (1) \end{aligned}$$

In the above equation,  $\text{LnPOV}_{it}$  is the dependent variable, representing the poverty situation in the host country  $i$  at  $t$ . The core explanatory variable,  $\text{LnOFDI}_{it}$  represents China’s outward direct investment in the host country  $i$  at  $t$  time. Meanwhile, the control

Table 1: Regional grouping of belt and road countries and number of samples

Regional Group	Number of Samples	Country (Region)
Northeast Asia	2	Mongolia and the Russian Federation.
South East Asia	11	Singapore, Indonesia, Malaysia, Thailand, Vietnam, The Philippines, Cambodia, Myanmar, Laos, Brunei, and East Timor.
South Asia	7	India, Pakistan, Sri Lanka, Bangladesh, Nepal, Maldives, and Bhutan.
West Asia, North Asia	19	UAE, Kuwait, Turkey, Qatar, Oman, Lebanon, Saudi Arabia, Bahrain, Israel, Yemen, Egypt, Iran, Jordan, Syria, Iraq, Afghanistan, Azerbaijan, Georgia, and Armenia.
Central and Eastern Europe	19	Poland, Albania, Estonia, Lithuania, Slovenia, Bulgaria, Czech Republic, Hungary, North Macedonia, Serbia, Romania, Slovakia, Croatia, Latvia, Bosnia and Herzegovina, Montenegro, Ukraine, Belarus, and Moldova.
Central Asia	5	Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan, and Uzbekistan.

variables include  $AGGDP_{it}$  (industrial structure),  $LnODA_{it}$  (aid received),  $EDU_{it}$  (human capital level),  $URBAN_{it}$  (urbanisation level), and  $DEATH_{it}$  (healthcare level). These variables are incorporated into the model to comprehensively assess the poverty reduction effects of China's direct investment in Belt and Road countries. Finally,  $\varepsilon_{it}$ , the random error term satisfies the basic assumptions required for the model.

### ***Data Source and Variable Description***

This study employs panel data from 63 countries along the BRI for the period 2009 to 2019. The data and econometric model are carefully selected and justified to ensure a robust analysis of the poverty reduction effects of China's outward FDI. Data on GDP, education, urbanisation, healthcare, and other control variables are sourced from the World Bank's World Development Indicators (WDI) database (<https://databank.worldbank.org/source/world-development-indicators>). FDI data are extracted from China's Statistical Bulletin on Outward FDI (<https://fdi.mofcom.gov.cn>).

The data selection spans a decade, allowing for temporal analysis of FDI impacts while mitigating short-term fluctuations. However, countries with significant data gaps were excluded to maintain dataset integrity and missing values were addressed through standard imputation methods.

The dependent variable,  $LnPOV_{it}$  is measured using the actual per capita GDP of the host country. Per capita GDP is selected as it effectively eliminates the influence of population size on GDP, providing a more accurate reflection of living standards. Additionally, this indicator encompasses aspects of social equity and equality, making it closely related to poverty levels. The use of per capita GDP as a proxy for poverty is widely recognised in existing literature (Rashid & Intartaglia, 2017). Data for this variable span from 2009 to 2019 and is sourced from the World Bank's statistical database.

The core explanatory variable,  $LnOFDI_{it}$ , represents China's outward FDI stock in host countries. This study opts for investment stock over investment flow due to the dynamic nature of outward investment, where flow data often includes negative values, complicating logarithmic transformations. While investment stock is the primary indicator, flow data is used as a robustness check in subsequent analyses. Data for this variable is sourced from the Statistical Bulletin of China's Outward FDI for the period 2009 to 2019.

Five control variables are introduced to ensure a comprehensive analysis:  $AGGDP_{it}$  is measured by the proportion of agricultural value added to GDP,  $LnODA_{it}$  is measured by the net amount of aid received by the host country from international sources and  $EDU_{it}$  is measured by the total primary school enrollment rate in the host country. At the same time,  $URBAN_{it}$  is measured by the proportion of the urban population in the host country to the total population and  $DEATH_{it}$  is measured by the neonatal mortality rate in the host country. Data for these control variables is sourced from the World Bank's statistical database.

To examine the mechanisms through which China's outward FDI affects poverty reduction, two mediating variables are considered:  $EMP_{it}$ , represented by the unemployment rate in the host country and  $INFRA_{it}$  is represented by the number of mobile phone subscriptions per 100 people in the host country.

Data for these mediating variables is also sourced from the World Bank's statistical database. The main variable definitions and data sources are summarised in Table 2.

### ***Descriptive Statistical Analysis***

The descriptive statistics summarise the central tendencies and variations in the variables used in the model. Key statistical measures such as the mean, standard deviation, minimum, and maximum values were calculated for each variable to provide insights into their distributions and characteristics, as depicted in Table 3.

Table 2: Variable definitions and data sources

Variable Symbol	Variable Name	Variable Description	Indicator Attributes	Data Sources
LnPOV	Poverty status	Log of the actual per capita GDP of the host country	Positive indicators	The World Bank WDI
LnOFDI	FDI	Log of China’s outward FDI stock in the host country	Positive indicators	Statistical Bulletin of China’s FDI
AGGDP	Industrial structure	The added value of agriculture in the host country accounts for the promotion of GDP	Negative indicators	The World Bank WDI
LnODA	Assistance situation	The log of net other global aid received from host countries	Positive indicators	The World Bank WDI
EDU	Human capital level	The total enrollment rate of primary education in the host country	Positive indicators	The World Bank WDI
URBAN	Urbanisation level	The promotion of the urban population in the host country in the total population	Positive indicators	The World Bank WDI
DEATH	Medical and health level	Neonatal mortality rate in the host country	Negative indicators	The World Bank WDI
EMP	Level of employment	The promotion of the unemployed in the total labour force in the host country	Negative indicators	The World Bank WDI
LnINFRA	Infrastructure construction site	Logarithm of mobile phone subscriptions per 100 people in the host country	Positive indicators	The World Bank WDI

Table 3: Descriptive statistics

Variable	Mean Value	Standard Deviation	Least Value	Crest Value	
Explained variable: LnPOV	8.5425	1.5886	0.0000	11.3513	
Core explanatory variables: LnOFDI	9.4812	2.9774	0.0000	15.4763	
	AGGDP	0.0929	0.0822	0.0000	0.3811
	LnODA	2.2781	2.0992	-1.6741	6.4150
	EDU	0.8438	0.2650	0.0000	0.9989
Controlled variable	URBAN	0.5775	0.2120	0.1643	1.0000
	DEATH	0.1068	0.0969	0.0090	0.5050
	EMP	0.0760	0.0586	0.0011	0.3218
	LnINFRA	4.6542	0.4597	-0.0010	5.3596

The statistical results indicate that the maximum poverty level (measured as the log of per capita GDP) is 11.3513, the minimum is 0, and the mean is 8.5425. These figures highlight

the diversity in poverty levels across countries along the Belt and Road, reflecting significant wealth disparities. Similarly, the maximum value of China’s direct investment in these 63

countries is 15.4763, the minimum is 0, and the average is 9.4812. These results reveal an uneven distribution of China’s investments, influenced by substantial differences in the economic capacities of the host countries. However, this imbalance does not necessarily imply a strategic focus on China’s foreign investment patterns. The numerical distributions of the control and mediating variables, as presented in Table 3, further provide insights into the variability and characteristics of the data.

**Empirical Testing and Result Analysis**

This article employs the Ordinary Least Squares (OLS) regression method for model analysis, incorporating cross-sectional fixed effects to account for single fixed effects in the regression. To enhance the robustness of the panel data analysis, variables such as poverty status, outward FDI, and aid situation are transformed using natural logarithms.

**Full Sample Regression Analysis**

The full sample regression results indicate a positive linear relationship between the core explanatory variable, foreign investment, and the host country’s per capita GDP. Specifically, a 1% increase in China’s direct investment in Belt and Road countries corresponds to a 0.0322% increase in the host country’s per capita GDP. This positive correlation remains robust across the stepwise introduction of control variables in the regression and is statistically significant at the 1% level (Table 4).

The results indicate that China’s outward FDI has a significant poverty reduction effect on the host countries, serving as a strong driver of their economic development. The outward investment benefits large segments of the impoverished population, contributing to increases in per capita GDP and substantial improvements in living standards.

Table 4: Full sample regression

	Variable			LnPOV		
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
LnOFDI	0.0637*** (11.5037)	0.0496*** (9.2092)	0.0497*** (9.1868)	0.0498*** (9.1899)	0.0398*** (6.6831)	0.0322*** (5.2918)
AGGDP		-3.5943*** (-9.4801)	-3.5979*** (-9.4286)	-3.5831*** (-9.4102)	-3.2467*** (-8.3942)	-2.7192*** (-6.8569)
LnODA			0.0024 (0.2199)	0.0030 (0.2821)	0.0072 (0.6740)	0.0054 (0.5120)
EDU				0.0560 (0.6807)	0.0663 (0.8140)	0.0595 (0.7429)
URBAN					2.0189*** (3.8283)	1.1537** (2.0967)
DEATH						-2.1416 *** (-4.7079)
Individual fixation effect	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Constant term	7.9388 *** (150.3168)	8.4059 *** (120.4230)	8.3990 ** (109.6058)	8.3494 *** (78.9204)	7.2285 *** (23.2474)	7.9901 *** (23.0957)
Sample size	693	693	693	693	693	693
R-squared	0.9909	0.9920	0.9920	0.9920	0.9922	0.9925
F-test	1081.448	1216.365	1195.838	1176.718	1184.660	1207.091

Note: \*\*\*P < 0.01, \*\*P < 0.05, \*P < 0.1; values in parentheses represent t-statistics.

In a model incorporating core explanatory variables alongside five control variables, industrial structure, urbanisation level, and healthcare level correlate significantly with the host country’s per capita GDP. The proportion of agricultural value added to GDP in the industrial structure is negatively correlated with poverty reduction. This is due to insufficient agricultural investment, inadequate infrastructure, low production efficiency, and frequent natural disasters. Ultimately, this hinders the development of agriculture in Belt and Road countries, leaving many poor populations unaffected.

The deterioration of healthcare systems negatively impacts poverty reduction efforts. Furthermore, poor living conditions, outdated medical facilities, limited health infrastructure, and weak awareness of disease prevention often trap vulnerable populations in Belt and Road countries.

In contrast, urbanisation positively contributes to poverty reduction and alleviation. As urbanisation progresses, production factors

such as labour, capital, land, and technology are increasingly concentrated in cities. This leads to a more efficient allocation of resources and fosters local economic development.

The impact of aid and human capital levels on the per capita GDP of host countries is uncertain. Although their correlation coefficients are positive in the regression results, they do not significantly affect poverty reduction. This indicates that the impact of global aid on poverty reduction is considerably less significant than China’s outward FDI.

**Heterogeneity Analysis**

A heterogeneity analysis was conducted from the perspective of cultural distance to examine its role in the relationship between China’s outward investment and poverty reduction in host countries. The sample of 63 countries was divided into two groups: “culturally distant” and “culturally close”, with the presence of Confucius Institutes used as a proxy variable to measure cultural distance. The results revealed that the “culturally close” group passed the 1%

Table 5: Heterogeneity analysis of the impact of China’s outward FDI on poverty reduction

Variable	By Cultural Distance		By Geographic Distance		By Level of Economic Development		By Intercontinental Classification	
	Culturally Close	Culturally Distant	Close Distance	Far Distance	Developing Countries	Developed Countries	Asian Countries	Non-Asian Countries
LnOFDI	0.0440*** (6.3273)	0.0034 (0.2768)	0.0445*** (4.4079)	0.0248*** (3.3085)	0.02743*** (3.8243)	0.03376*** (4.0372)	0.0265*** (3.2939)	0.0426*** (4.7023)
Controlled variable	Control	Control	Control	Control	Control	Control	Control	Control
Individual fixation effect	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Constant term	6.9546*** (18.0245)	10.8556*** (13.4115)	7.2814*** (17.1880)	9.1543*** (16.1044)	7.8080*** (21.6996)	8.0581*** (4.5116)	8.0747*** (19.0295)	7.9008*** (13.1113)
Sample size	561	132	352	341	583	110	429	264
R-squared	0.9868	0.9969	0.9849	0.9954	0.9917	0.9692	0.9943	0.9654
F-test	673.919	2167.300	554.308	1843.365	1079.025	213.490	1521.464	225.396

Note: \*\*\*P < 0.01, \*\*P < 0.05, \*P < 0.1; values in parentheses represent t-statistics.

significance test while the “culturally distant” group exhibited a positive but statistically insignificant correlation (Table 5). This suggests that China’s outward FDI has a stronger impact on poverty reduction in countries with closer cultural ties to China.

Heterogeneity analysis was also conducted from the perspectives of geographic distance, economic development level, and intercontinental classification. Firstly, the 63 countries along the Belt and Road were categorised into “closer” and “farther” groups based on the straight-line distance from their capitals to China. The regression results for both groups were consistent with the full sample results and passed the 1% significance test.

Secondly, the countries were divided into “developing” and “developed” groups based on their economic development levels. The regression results indicated a positive correlation between China’s FDI and poverty reduction in both groups, with both passing the 1% significance test.

Finally, the countries were classified into “Asian” and “non-Asian” groups according to their intercontinental attribution. The regression results noted minimal difference between the two groups and both passed the 1% significance test.

These findings suggest that the poverty reduction effect of China’s FDI is not limited by geographic proximity or economic development level. Instead, it reflects China’s commitment to peaceful development and the goals of the BRI, fostering cooperation with all countries willing to reduce poverty, promote development, and integrate economic growth under the ethos of “knowing no distance and being a neighbour”.

### **Mediation Effect Test**

Previous research has established that China’s outward FDI positively impacts poverty reduction. However, further analysis is required to determine whether this effect operates through two specific channels: Employment creation and infrastructure construction. To explore these

mechanisms, a mediation effect testing model is constructed, leading to the development of the following econometric equation:

$$\text{LnPOV}_{it} = \beta_0 + \beta_1 \text{LnOFDI}_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad (2)$$

$$\text{EMP}_{it} = \gamma_0 + \gamma_1 \text{LnOFDI}_{it} + \gamma_2 X_{it} + \varepsilon_{it}, \quad (3)$$

$$\text{LnINFRA}_{it} = \delta_0 + \delta_1 \text{LnOFDI}_{it} + \delta_2 X_{it} + \varepsilon_{it} \quad (4)$$

$$\text{LnPOV}_{it} = \rho_0 + \rho_1 \text{LnOFDI}_{it} + \rho_2 \text{EMP}_{it} + \rho_3 \text{LnINFRA}_{it} + \rho_4 X_{it} + \varepsilon_{it} \quad (5)$$

The parameters in equation (2) are consistent with those in equation (1). In equations (3) to (5),  $\beta$ ,  $\gamma$ , and  $\delta$  represent parameters to be estimated.  $X_{it}$  denotes a set of control variables. This includes industrial structure, aid situation, human capital level, urbanisation level, and healthcare level, which are consistent with the benchmark model.  $\varepsilon_{it}$  is the random error term. The level of employment  $\text{EMP}_{it}$  is measured as the proportion of unemployed individuals in the host country relative to the total labour force while infrastructure construction  $\text{LnINFRA}_{it}$  is represented by the number of mobile phone subscriptions per 100 people. The testing steps for the mediating effect are as follows:

**Correlation Coefficient Testing:** First, the significance of the correlation coefficient  $\beta_1$  in equation (2) is tested. If  $\beta_1$  is significant, the mediating effect can be established. Otherwise, the masking effect may apply. The full-sample regression results in this study suggest that the empirical correlation coefficient  $\beta_1$  is significant, confirming the presence of a mediating effect.

**Regression for Employment and Infrastructure:** Next, regressions are conducted using  $\text{EMP}_{it}$  and  $\text{LnINFRA}_{it}$  as dependent variables, with  $\text{LnOFDI}_{it}$  as the explanatory variable. The significance of the coefficients  $\gamma_1$  and  $\delta_1$  in equations (3) and (4) is sequentially examined to determine whether China’s outward FDI affects employment creation and infrastructure development in the host country.

**Inclusion of Mediating Variables:** Then,  $\text{EMP}_{it}$ ,  $\text{LnINFRA}_{it}$ ,  $\text{LnOFDI}_{it}$  are included as explanatory variables in the regression model.

If  $\gamma_1$ ,  $\delta_1$ ,  $\rho_2$ , and  $\rho_3$  are all significant, then the indirect effect is established. If any of these coefficients are insignificant, further testing is required using the Bootstrap method.

**Direct and Indirect Effects Analysis:** Finally, if the third step confirms that  $\gamma_1$ ,  $\delta_1$ ,  $\rho_2$ , and  $\rho_3$  are all significant, the significance of  $\rho_1$  is assessed. If  $\rho_1$  is not significant, the model exhibits only a mediating effect. If  $\rho_1$  is significant, both direct and indirect effects are present. The sign of the correlation coefficient is then used to determine whether the effect is a partial mediating effect or a masking effect.

The mediation effect test results are presented in Table 6.

**Further Testing (Addressing Endogeneity Issues)**

China’s outward FDI ( $\text{LnOFDI}_{it}$ ) is not entirely exogenous, as the amount of investment may be influenced by the poverty situation of the host country ( $\text{LnPOV}_{it}$ ) or other political and economic factors. To address potential endogeneity issues that could affect the research

conclusions, this study employs Two-Stage Least Squares (2SLS) regression, using the first-order lag term of  $\text{LnOFDI}_{it}$  as an instrumental variable.

Using the first-order lag term as an instrumental variable satisfies two key requirements:

**Correlation Requirement:** The first-order lag term is correlated with the current investment amount due to “strategic inertia”, where past investment decisions influence present ones.

**Exogeneity Requirement:** The first-order lag term is related to the poverty situation and political and economic environment of the previous period but is uncorrelated with the current conditions. This ensures that bidirectional causality does not introduce endogeneity into the model.

These results are summarised in Table 7.

The regression results using the 2SLS estimation method indicate that China’s FDI remains significantly positive at the 1% level, indicating that endogeneity issues have minimal

Table 6: Mediation effect test results

Variable	LnPOV	EMP	LnPOV	LnINFRA	LnPOV	LnPOV
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
LnOFDI	0.0322*** (5.2918)	-0.0056*** (-7.4509)	0.0248*** (3.9625)	0.0250*** (2.4280)	0.0317*** (5.2291)	0.0239*** (3.8338)
EMP			-1.3071*** (-4.1020)			-1.3698*** (-4.3135)
LnINFRA					0.0594** (2.5477)	0.0662*** (2.8737)
Controlled variable	Control	Control	Control	Control	Control	Control
Individual solid effect	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Constant term	7.9901*** (23.0957)	0.1610*** (3.7506)	8.2006*** (23.7366)	2.8227*** (5.2549)	7.7248*** (21.4673)	7.9149*** (22.1341)
Sample size	693	693	693	693	693	693
R-squared	0.9925	0.9146	0.9927	0.7216	0.9925	0.9928
F-test	1207.091	98.273	1220.013	24.179	1200.158	1216.712

Note: \*\*\*P < 0.01, \*\*P < 0.05, \*P < 0.1; Values in parentheses represent t-statistics.

Table 7: Endogeneity test results

Variable	LnPOV
LnOFDI	0.0223*** (2.8119)
AGGDP	-3.3582*** (-7.5638)
LnODA	0.0006 (0.0522)
EDU	0.0432 (0.5745)
URBAN	0.7570 (1.2776)
DEATH	-0.7070 (-1.4009)
Constant term	8.2607*** (22.7430)
Sample capacity	630
R-squared	0.9935
F-test	1257.258

Note: \*\*\*P < 0.01, \*\*P < 0.05, \*P < 0.1; values in parentheses represent t-statistics.

impact on the conclusions. Thus, the finding that China's FDI has poverty reduction effects on countries along the Belt and Road remains robust after addressing potential endogeneity concerns.

Additionally, a robustness test was conducted to ensure the reliability of the empirical results. This involved replacing both the core explanatory variable and the dependent variable separately and controlling for corresponding variables in the OLS regression. Firstly, China's outward FDI stock replaced the core explanatory variable in the full sample regression model. Secondly, the dependent variable, per capita GDP was replaced with per capita national income in the full sample regression model. Consequently, stepwise regressions were performed on the modified models.

These robustness tests confirmed the stability of the findings, as provided in Table 8, further strengthening the validity of the conclusions.

The regression results indicate that the poverty reduction effect of China's outward FDI remains significant at the 1% level across all regression steps, with no change in the sign of the correlation coefficient. However, altering the measurement methods of the core explanatory variable and the dependent variable did not affect the relationship between China's outward FDI and poverty reduction in the host country. These findings are summarised in Table 9 and confirm the robustness of the final research conclusions.

### Discussion and Comparison

The empirical analysis reveals several key insights into the poverty reduction effects of China's direct investment in Belt and Road countries. A notable finding is the enhanced poverty reduction effect of China's FDI after implementing the BRI. This observation underscores the role of targeted policy frameworks in maximising the developmental benefits of FDI.

Table 8: Robustness test results for replacing core explanatory variables

Variable	LnPOV					
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
LnOFDI	0.0101*** (4.4373)	0.0094*** (4.5611)	0.0093*** (4.5271)	0.0094*** (4.5445)	0.0084*** (4.2167)	0.0087*** (4.5192)
AGGDP		-4.5055*** (-11.7881)	-4.5089*** (-11.7688)	-4.5044*** (-11.7502)	-3.6092*** (-9.2410)	-2.8137*** (-7.0655)
LnODA			-0.0018 (-0.1563)	-0.0010 (-0.0900)	0.0085 (0.7758)	0.0068 (0.6437)
EDU				0.0597 (0.06923)	0.0787 (0.9467)	0.0695 (0.8626)
URBAN					3.4167*** (7.0396)	1.8735** (3.5479)
DEATH						-2.8369*** (-6.4313)
Constant term	8.4808*** (551.9958)	8.9036*** (231.4515)	8.9081** (185.5824)	8.8553*** (98.3091)	6.7674*** (21.8982)	7.8971*** (22.7431)
Sample size	693	693	693	693	693	693
R-squared	0.9893	0.9912	0.9912	0.9912	0.9919	0.9924
F-test	919.861	1106.263	1087.552	1070.192	1136.728	1192.949

Note: \*\*\*P < 0.01, \*\*P < 0.05, \*P < 0.1; values in parentheses represent t-statistics.

Table 9: Results of the robustness test for replacing the dependent variable

Variable	LnPOV					
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
LnOFDI	0.0626*** (12.3784)	0.0526*** (10.3970)	0.0529*** (10.4144)	0.0530 *** (10.4249)	0.0412*** (7.4162)	0.0337*** (5.9558)
AGGDP		-2.5467*** (-7.1520)	-2.5276*** (-7.0750)	-2.5209*** (-7.0551)	-2.1219*** (-5.8874)	-1.6046*** (-4.3506)
LnODA			0.0070 (0.6995)	0.0080 (0.7895)	0.0129 (1.2965)	0.0111 (1.1377)
EDU				0.0772 (1.0004)	0.0894 (1.1787)	0.0828 (1.1114)
URBAN					2.3953*** (4.8742)	1.5470*** (3.0227)
DEATH						-2.0999*** (-4.9635)
Constant term	7.8779*** (163.2900)	8.2089*** (125.2169)	8.1882*** (113.8156)	8.1198*** (81.7847)	6.7899*** (23.4343)	7.5367*** (23.4234)
Sample size	693	693	693	693	693	693
R-squared	0.9846	0.9858	0.9858	0.9858	0.9863	0.9868
F-test	638.145	679.058	688.075	657.968	672.066	687.588

Note: \*\*\*P < 0.01, \*\*P < 0.05, \*P < 0.1; values in parentheses represent t-statistics.

### ***Overall Impact of China's FDI***

The regression results demonstrate a significant positive relationship between China's outward FDI and the per capita GDP of host countries, confirming its poverty reduction effects. Specifically, a 1% increase in China's FDI is associated with a measurable improvement in living standards. These findings align with Zhang (2019), who observed greater poverty reduction impacts in countries with lower per capita GDP (Y. Zhang, 2020). Similarly, the findings also agree with Maliszewska *et al.* (2019), who also observed that global income increased by 0.7% due to the BRI. Accordingly, millions of people were lifted from extreme poverty (Maliszewska & Van Der Mensbrugge, 2019) and the effect will be more pronounced in the long term (Xie *et al.*, 2023).

### ***Mechanisms of Impact***

Mediation analysis highlights two primary channels through which China's FDI reduces poverty. The findings indicate that FDI in labour-intensive industries significantly reduces unemployment, providing stable incomes to disadvantaged populations. This finding agrees with the study by Liu *et al.* (2024), who discovered that Chinese outward FDI has significantly affected youth unemployment in developing countries (Liu *et al.*, 2024).

Similarly, investments in infrastructure such as roads, communication networks, and energy systems have led to increased development. These enhancements improve connectivity and productivity, fostering economic growth. Consequently, these results support Ju *et al.* (2015), who identified similar mechanisms in China's poverty reduction projects.

### ***Regional Heterogeneity***

The analysis reveals regional disparities in the poverty reduction effects of FDI. South and Southeast Asia experience the most significant benefits, while the effects in Central and Eastern Europe are relatively moderate. Notably, these regional variations reflect differences

in economic structures, governance, and the absorption capacity of FDI. The findings are consistent with those of Zhang *et al.* (2024), who emphasised the significance of distance in investment locations in countries along the BRI (H. Zhang & De Beule, 2024).

The results suggest the need for targeted FDI in regions with significant poverty challenges, prioritising sectors that maximise employment and infrastructure benefits. Additionally, the findings emphasise the significance of cooperation between China and host countries to optimise FDI's developmental impacts.

### **Conclusions**

This article studies the poverty reduction effects of China's investment in countries along the Belt and Road by combining qualitative and quantitative methods. The analysis examines the mechanisms of impact, as well as the regional and temporal heterogeneity. It employs a mediation effect model to test these effects. The findings reveal that, over the past 20 years, poverty levels in Belt and Road countries have significantly improved, although notable disparities remain. Regions such as South Asia, Central Asia, and Southeast Asia face severe poverty. They are key areas for targeted poverty reduction efforts. In contrast, Central and Eastern Europe, West Asia, and the Middle East generally demonstrate better conditions, although some countries still grapple with significant poverty challenges.

China's investment in Belt and Road countries has grown steadily, with a marked acceleration since the launch of the BRI. Although traditional manufacturing dominates, investments are regionally concentrated in Southeast Asia and span diverse industries. In particular, regression analyses confirm that China's FDI has a significant poverty reduction effect, contributing to the total poverty reduction effect of all foreign investments in Belt and Road countries. This underscores the decisive role of China's investment in improving poverty conditions in these regions.

The study also highlights regional and temporal heterogeneity in the poverty reduction effects. China's investment has stronger effects in underdeveloped regions such as Southeast and South Asia. Meanwhile, the impacts are relatively weaker in Central Asia, West Asia, and the Middle East. Notably, the poverty reduction effect significantly increased after 2014, following the implementation of the BRI, suggesting enhanced social benefits from these targeted investments.

The analysis identifies capital formation, infrastructure development, trade promotion, and employment creation as the primary mechanisms through which China's investment reduces poverty. Among these, employment creation and infrastructure development exhibit the strongest mediating effects, indicating that investments targeting these areas are particularly impactful.

### ***Limitations***

Data availability posed a challenge. However, it presented an opportunity to adopt innovative solutions, particularly for Belt and Road countries with incomplete or missing information. Thus, by excluding countries with substantial data gaps and employing data imputation techniques where necessary, the study ensures the reliability of its findings. Furthermore, focusing on the period from 2009 to 2019 provides a robust foundation for understanding key trends during a pivotal decade. While it does not encompass longer-term impacts or recent global changes, this timeframe allows for a detailed analysis of the effects of China's FDI during a crucial phase of the BRI. These limitations highlight the need for future research to refine data collection, incorporate additional variables, and extend the temporal scope to better understand the poverty reduction effects of China's FDI in Belt and Road countries.

### ***Recommendations and Future Research***

Based on these findings, the study recommends prioritising job creation by channeling investments into industries and enterprises that

generate substantial employment opportunities while reducing production costs and improving efficiency. In addition, it emphasises the importance of talent development through cross-border human capital cooperation, leveraging Confucius Institutes to enhance labour literacy and vocational skills tailored to local economic and industrial conditions. Finally, the study advocates prioritising infrastructure development in foreign investments, particularly roads, railways, energy, and communications. Correspondingly, by shifting from scattered projects to interconnected networks, infrastructure development can transition from isolated improvements to a holistic transformation, fostering both regional connectivity and sustained economic growth.

Future studies will explore longer-term trends by extending the analysis beyond 2019 to capture the impacts of recent global economic changes such as the COVID-19 pandemic and geopolitical shifts. Additionally, more granular data will be used to analyse the sectoral and sub-regional impacts of China's FDI, offering deeper insights into its effects. Building on this, future research will examine other mediating mechanisms such as technological transfer and cultural exchange to provide a more comprehensive understanding of how investments drive poverty reduction.

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### **Conflict of Interest Statement**

The authors declare that they have no conflict of interest.

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