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Sodiq Arogundade & Biyase Mduduzi

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Impact Beyond Borders: Analyzing the Spatial Spillover of Chinese Investment on Poverty Alleviation in Africa

Sodiq Arogundade and Biyase Mduduzi

School of Economics, College of Business and Economics, University of Johannesburg, Johannesburg, South Africa

ABSTRACT

Amidst a significant global political shift and the Belt and Road Initiative, China's foreign direct investment (CFDI) in Africa has surged. Yet, its impact on poverty alleviation remains contested due to a neglect of spatial interdependence in prior research. This study examines the spatial spillovers of Chinese FDI on African poverty in a sample of 39 countries from 2003 to 2022. Through the use of spatial econometric models, the study concludes that (1) CFDIs from neighboring countries contribute positively and significantly to poverty alleviation; (2) human capital development from proximate countries significantly influences the CFDI–poverty reduction nexus of the host country; (3) estimates from the marginal effect demonstrates that African countries are increasingly interconnected, with poverty levels in one country being influenced by the determinants of poverty in neighboring countries; and (4) the empirical results provide strong evidence of significant spatial spillover effects of poverty in the region. The study recommends that African governments implement policies to enhance cross-border trade and investment cooperation to facilitate the diffusion of knowledge and technology from CFDI. Establishing or supporting regional clusters, such as special economic zones, coupled with robust local capacity-building initiatives embedded within FDI agreements, is also important.

KEYWORDS

Poverty alleviation; China FDI; third-country effect; spatial econometrics; human capital development; and Africa

Introduction

The Sustainable Development Goals (SDGs), adopted by the United Nations, comprise seventeen goals that developing countries must accomplish by 2030. Most of these objectives are linked. Achieving SDG 1 (the eradication of poverty), for example, is linked to other SDGs, including economic advancement (SDG 8), environment (SDG 13), health (SDG 3), water and sanitation (SDG 6), and access to clean energy (SDG 6).[1] As a result, economies that successfully achieve some objectives, like reducing poverty, may find it easier to accomplish other objectives. It is anticipated that 692 million people will live on less than $2.15 per day in 2024, which is why the target of eradicating extreme poverty by 2030 was set (World Bank, 2024). However, despite global efforts to eradicate poverty, Africa remains the hotspot for poverty. The number of people living in extreme poverty increased from 282.20 million in 1990 to about 464.18 million in 2024, as illustrated in Figure 1 (World Bank, 2024). According to World Bank estimates, the majority of

CONTACT Sodiq Arogundade arogundadesodiq8@gmail.com School of Economics, College of Business and Economics, University of Johannesburg, Auckland Park Kingsway Campus PO Box 524 Auckland Park, Johannesburg, South Africa.

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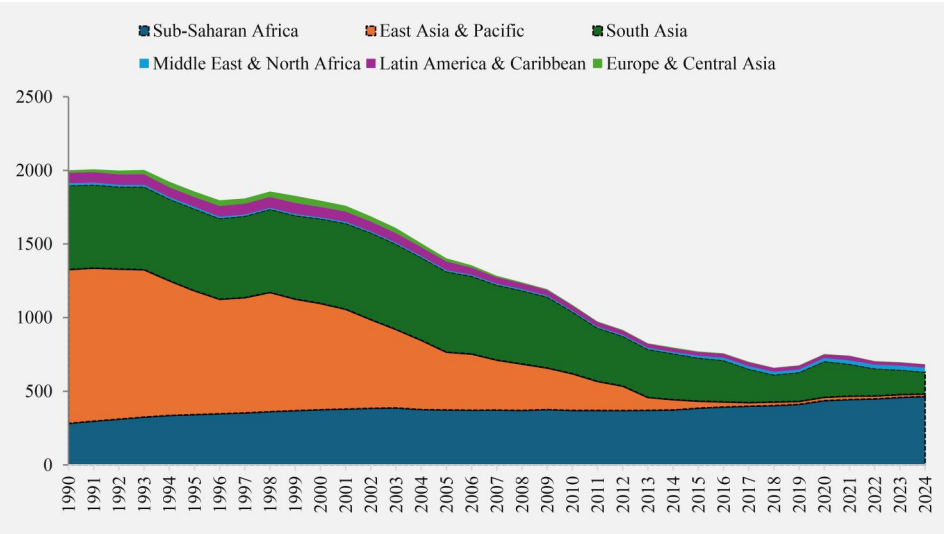


Figure 1. Number of extremely poor (millions) by region, 1980–2024.
Source: World Bank (2024).

the world's poor will reside in Africa by 2030, with over 90% of those living in extreme poverty residing there.

Foreign direct investment (FDI) is crucial to reaching these SDGs, and its significance cannot be overstated. This is due to its potential for knowledge and technology transfer, increased competitiveness, job creation, industrialization, global value addition, and tax revenue from foreign investors to the government (UNCTAD, 2021; United Nations, 2003). Due to the significance of FDI as a primary funding source, many developing economies, especially in Africa, have implemented policies to encourage FDI. 2017 saw at least 126 reforms and measures related to investment policy implemented by roughly 65 economies worldwide. The 2018 World Investment Report provides a detailed account of these reforms, which include creating new special economic zones (SEZs), liberalizing domestic markets, and streamlining administrative investment procedures. The FDI inflow in Africa has increased significantly due to these efforts; it averaged $60 billion in 1990 and reached $1.036 trillion in 2023 (UNCTAD, 2024).[2]

FDI flows to Africa emanate from various economies, including those in the US, Europe, China, and Brazil. However, China's investment in Africa has quadrupled due to the developed economies of the United States and Europe imposing limits on investment based on environmental protection and national security (Atitianti & Dai, 2022; UNCTAD, 2021). For African countries looking to boost economic growth, upgrade their infrastructure, and become more globally competitive, China has emerged as a desirable alternative (Zhang, 2022). Africa, a developing region with many great commercial opportunities, has steadily risen to become China's third-largest investment destination (Sylvaire et al., 2022). Since 2000, China has made substantial contributions to manufacturing, education, ICT, hydrocarbons, and precious metals, all of which advance the region's development (Atitianti & Dai, 2022; Cornia & Martorano, 2012). CFDI in Africa has increased dramatically, from $0.49 billion in 2003 to almost $40.9 billion in 2022 (CARI, 2024). After the US and Europe, China now ranks among the region's top investor economies thanks to its impressive growth (UNCTAD, 2024b; CARI, 2024).

The world is going through a significant political shift; China has been at the forefront of the Belt and Road Initiative (BRI) in the last decade. One Belt, One Road is a new concept that has been proposed and implemented (Zhang, 2016). The stability of the global economy benefits

from China's recent expansion of trade and economic relations with Africa. In recent years, Africa's economy has expanded rapidly, and the continent's overall image has seen significant change. Africa is a developing region with great business potential that has steadily grown to be China's third-largest foreign investment market (Mabeya, 2017; CARI, 2024).

The literature is replete with unremitting debate on the link between CFDI and economic outcomes. However, there is no consensus on the nature of the relationship. While studies like Sylvaire et al. (2024), Iddrisu et al. (2025), Ofori et al. (2023), Miao et al. (2020), and Arthur et al. (2024) demonstrate that CFDI improves Africa's economic performance, a countervailing perspective has highlighted potential downsides to Chinese investment, arguing that these investments exert a deleterious effect on local economic development. One concern raised in this literature is the potential for CFDI to crowd out domestic private investment, limiting the growth and competitiveness of local firms (Anyanwu & Kponnou, 2017; Megbowon et al., 2019).

Most of these studies used a two-country framework, which explains why there are contradicting results on the impact of CFDI. This framework assumes that a multinational enterprise's choice to invest in a country is unrelated to its choice to invest in proximate countries. In regional empirical research, neglecting the significance of spatial interdependence could lead to bias or inefficient estimates (Anselin, 2009). Hence, this study adds to the body of literature by investigating the impact of third-country effects and spatial interdependence on Chinese investors' locational choices on poverty in Africa.

Additionally, existing research highlights the critical role of human capital development as a key determinant of CFDI inflows. These studies demonstrated that regions or countries with a more skilled and educated workforce tend to attract greater levels of CFDI (Salike, 2016; Yang et al., 2022). Other studies have also emphasized on the importance of human capital in alleviating poverty, arguing that countries with skilled workforce tend to have a low level of poverty (Moyo et al., 2022; Wang et al., 2021).

Despite the importance of human capital development in attracting CFDI and alleviating poverty, Africa's current state is well short of what is needed. The potential productivity of the next generation, measured by the Human Capital Index (HCI) (displayed in Figure 2), indicates that Africa's HCI score is 0.4, whereas the average for the world is 0.57. This means that under the current conditions, children born in Africa today will only be 40% as productive as they may be as adults if they have full health and complete education. This affects the general well-being of individuals and families and the health of entire economies. The study adds to the existing literature by examining the role of human capital development on the nexus between CFDI and poverty reduction in Africa.

Additionally, extant literature highlights that multinational enterprises (MNEs) tend to cluster geographically in specific locations to leverage regional trade, linguistic, and cultural similarities. This clustering offers MNEs several strategic advantages, including reduced information and transaction costs and the benefits of economies of agglomeration and scale (De Propris & Driffield, 2006; Pholo Bala et al., 2017). By operating in close proximity, firms benefit from shared infrastructure, workforce expertise, and knowledge spillovers, which can collectively reduce costs and enhance efficiency. Additionally, agglomeration can reinforce regional attractiveness, drawing in more businesses and creating a cycle of sustained economic activity. In the context of Africa, Figure 3 provides a visual representation of China's FDI agglomeration across 39 selected countries between 2003 and 2022. The contour map shows a notable increase in CFDI concentration over this period, underscoring the evolving regional investment landscape. As evidenced by the spatial clusters on the map, FDI activity has become more concentrated, with Nigeria and South Africa emerging as central hubs for MNE activities on the continent. These countries serve as focal points due to their relatively advanced infrastructure, larger markets, and strategic locations, which attract a disproportionate share of FDI compared to their regional counterparts. The trend highlights the role of spatial agglomeration in reinforcing the

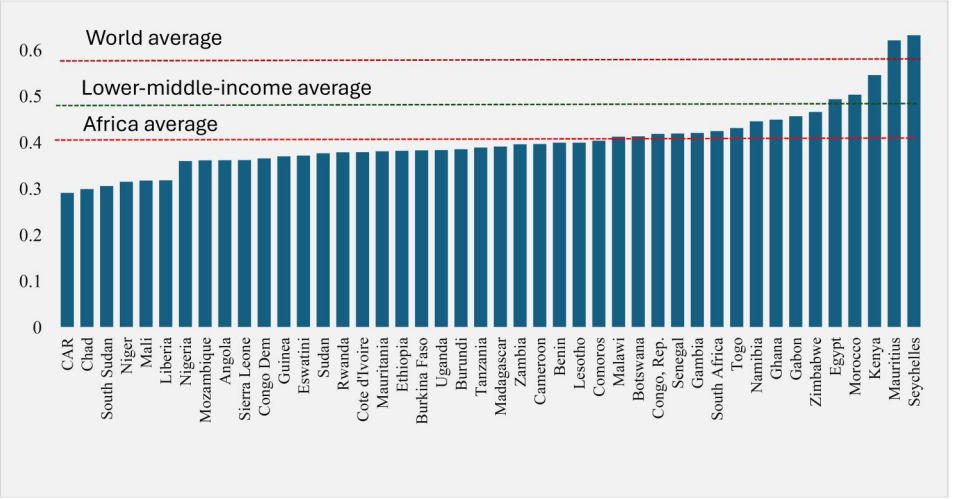


Figure 2. Africa is the region with the lowest HCI score.
Source: The World Bank (2024).

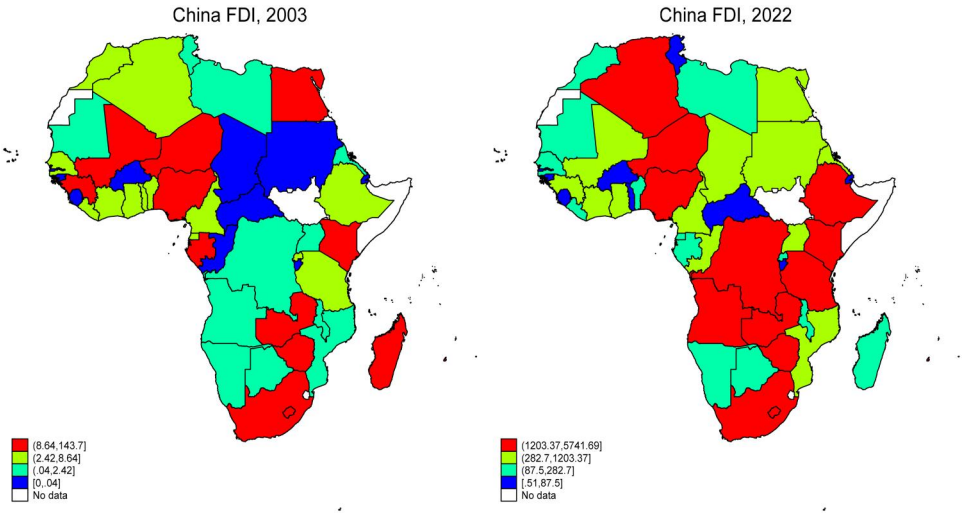


Figure 3. Does Chinese Investment in Africa Exhibit Agglomeration? (US$'mn).
Source: CARI (2024).

attractiveness of particular locations for investment, ultimately shaping the economic landscape. This provides impetus for including a spatial model in the nexus between CFDI and poverty in Africa.

The rest of the paper is structured as follows: the literature review is presented in Section 2. Section 3 discusses the approach and estimating techniques. The empirical estimation is presented and discussed in Section 4, and the main policy implications are provided in Section 5.

Literature review

The theoretical link between FDI inflows and poverty can be summarized through three channels: the growth of capital stocks, the spillover effect, and forward and backwards links (Calvo & Hernandez,

2006; Klein et al., 2001). The first channel is linked to capital accumulation; foreign investment from Multinational Corporations (MNCs) serves as a source of capital stock for developing countries, contributing to economic growth and development (Emako et al., 2023). Foreign direct investment (FDI), which entails a foreign investor acquiring a long-term stake in a business in another nation, offers a steady and substantial inflow of funds that can be utilized for a number of objectives, such as the development of infrastructure, the creation of jobs, and technological advancement, all of which eventually reduce poverty (Arogundade et al., 2022a; Quinonez et al., 2018). However, since MNCs are more capital-intensive and have more competitive power, they may displace local businesses and hence have a deteriorating impact on the host country (Agosin & Machado, 2005).

The second channel—forward and/or backwards linkages can influence poverty, according to Calvo and Hernandez (2006). Backwards linkage occurs when foreign firms purchase local suppliers' inputs, goods, or services. This can benefit local businesses by increasing their productivity, expanding their markets, and creating jobs, potentially leading to technological spillovers (Calvo & Hernandez, 2006; Klein et al., 2001). However, forward linkage happens when local firms or industries benefit from the presence or operations of foreign firms, such as through the transfer of technology, skills, or management practices (Görg & Greenaway, 2004; Liu et al., 2009).

The third channel through which MNCs contribute to the host country is by providing a vital source of government revenue. MNC operations generate various forms of tax income, including corporate income tax, value-added tax (VAT), and payroll taxes. These tax revenues provide governments with the financial resources necessary to fund essential developmental projects, such as infrastructure development, education, healthcare, and poverty reduction programs (UNCTAD, 2021; United Nations, 2003).

While a compelling theoretical case exists for a positive link between FDI, particularly Chinese investment and economic outcomes, empirical evidence remains mixed, with no clear consensus on the precise nature of this relationship. Nonetheless, several studies focusing on the African context provide support for a positive association. Using a sample of 48 African countries, Sylvaire et al. (2024) found a statistically significant and positive impact of CFDI on economic performance, primarily channeled through direct investment. These findings are echoed in other research highlighting a similar positive relationship. For example, Iddrisu et al. (2025) find that CFDI contributes positively to economic growth in their study of Sub-Saharan Africa, while Ofori et al. (2023) demonstrate a favorable link between CFDI and income inequality. Likewise, previous studies by Miao et al. (2020), Doku et al. (2017), Boakye-Gyasi and Li (2015), and Arthur et al. (2024) similarly support the notion that CFDI tends to enhance development and economic outcomes in African economies, suggesting that CFDI benefits African economic growth.

However, the positive view is not universally supported by empirical evidence. Other studies challenge the notion that CFDI consistently translates into improved economic outcomes in Africa. Research by Megbowon et al. (2019), for instance, suggests that CFDI in Africa does not exert a statistically significant impact on economic growth, highlighting potential limitations in the effectiveness of CFDI as a driver of economic progress. This perspective is further reinforced by the findings of Anyanwu and Kponnou (2017), who found negligible or even negative associations between CFDI and various measures of economic development across a sample of African countries. Similarly, Busse et al. (2016) contend that CFDI's impact on African economies is often ambiguous or conditional on other factors, suggesting that the purported benefits of CFDI may not be realized consistently or across all contexts.

These findings underscore the complex and context-dependent nature of the CFDI-economic outcome nexus in Africa, emphasizing the need for a more nuanced and critical examination of the factors that shape this relationship. Furthermore, we believe the reason for the contradictory results is that most of these studies used a two-country framework. This framework assumes that a multinational enterprise's choice to invest in a country is unrelated to its choice to invest in proximate countries. In regional empirical research, neglecting the significance of spatial interdependence could lead to bias or inefficient estimates (Anselin, 2009). Hence, this study adds to

the body of literature by investigating the impact of third-country effects and spatial interdependence on Chinese investors' locational choices on poverty in Africa.

Additionally, it has been shown that human capital development is one of the primary factors influencing FDI, especially Chinese investment in Africa. Salike (2016), for example, used panel data estimates for 31 Chinese regions between 2002 and 2013. The study concludes that the availability of human resources in terms of present (endowment) and future (demographic) supply is the most important factor for foreign investors to consider when making investment decisions. Using a panel vector autoregressive model, Yang et al. (2022) also conclude that human capital plays a significant role in driving international capital flow. Some studies have also emphasized the importance of human capital in poverty reduction in Africa. For example, Wang et al. (2021) used a PMG model and discovered that healthy human capital significantly influence poverty alleviation in SSA. A similar conclusion was reached by Moyo et al. (2022), who found that poverty levels decrease as human capital rises. This study also contributes to the literature by assessing the role of human capital on the nexus between CFDI and poverty in Africa.

Data and methods

Data

The study used balanced panel data covering 39 African countries from 2000 to 2022. The selection of countries and the study period is constrained by data availability (See Table A1 in the Appendix for more). The dependent variable, poverty, is measured through the human development index. This index considers achievement in three key areas: health, education and living standards (UNDP, 2013). Studies such as Djokoto and Wongnaa (2023), Fosah et al. (2023), and Nam and Ryu (2023) have used this index. The main explanatory variable is China's FDI inflow to Africa, measured using China's FDI (inward stock U.S. dollars). According to Nunnenkamp (2004) and Arogundade et al. (2022b), Iddrisu et al. (2025), Ofori et al. (2023), and Miao et al. (2020), using FDI stock lessens the possibility of endogeneity biases related to the welfare-FDI relationship. Furthermore, we established the robustness of our empirical analysis by using two alternative proxies for human capital. Specifically, we follow the footsteps of Mankiw et al. (1992) and Levine and Renelt (1992) by utilizing tertiary enrollment rates, which account for human capital investment and the human capital index modified by Barro and Lee (2013), which measures educational attainment. These variables have been utilized by Moyo et al. (2022), Wang et al. (2021), and Wang and Wong (2009). The choice of real GDP per capita (constant 2015 U.S. dollars), population growth (annual percentage change in population), institutional quality (average of the six dimensions of the institutional quality index)[3], and globalization are informed by previous empirical literature (and Arthur et al. 2024; Boakye-Gyasi & Li, 2015; Djokoto & Wongnaa, 2023; Doku et al., 2017; Iddrisu et al., 2025; Miao et al., 2020; Ofori et al., 2023).

Table 1. Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max	Data source
HDI	780	0.5233	0.1085	0.276	0.806	UNDP
China FDI (US$ mn)	780	581.616	1011.133	0	7472.77	CARI
Human capital						
Tertiary enrollment rate	522	12.481	11.393	0.384	54.21	WDI
Human capital index	663	1.834	.445	1.098	2.939	PWT
Control variables						
Institutional quality	780	−0.605	.556	−1.726	0.87	WGI
Globalization	780	50.381	8.645	27.051	71.932	KOF
Population growth (%)	780	2.435	.873	−.402	5.627	WDI
GDP Per capita ($US)	780	1965.667	1994.9	255.1	10956.945	WDI

NB: China Africa Research Initiative, World Bank World Development Indicator (WDI), World Governance Indicator, KOF Swiss Economic Institute, China Africa Research Initiative (CARI), Penn World Table (PWT).

Descriptive statistics of variables

Table 1 presents the summary statistics of the key variables employed in this study. The average value of China's FDI inflow to Africa from 2003 to 2022 is US$581.6 million among 39 countries. Comoros had a minimum value of US$0.1 in 2005, while South Africa had a maximum value of US$7.5 billion in 2017. The tertiary enrollment rate ranged from 0.384% to 54.21% of gross enrollment, with an average of 12.5%. Similarly, the average value of the Barro and Lee (2013) human capital index[4] is 1.83, with a minimum value of 1.098 and a maximum value of 2.939. The pairwise correlation in Table A2 of the Appendix shows the relative relationship between the regressors and the dependent variable. No explanatory variable in the table has a correlation coefficient more than 0.7, ruling out the possibility of considerable multicollinearity between the variables.

Methodology

In estimating the spatial impact of Chinese investment on poverty in Africa, this study began the empirical method with non-spatial baseline models such as the OLS, Driscoll and Kraay (1998) fixed effect, and the fixed effect instrumental variable regression model (FE-2SLS) (Arogundade et al., 2022a; Hu et al., 2021; Long et al., 2020). The advantage of these methods is that they can address cross-sectional dependence, endogeneity, and unobserved heterogeneity. However, the instruments used in estimating the FE-2SLS are chosen by exogeneity and instrument relevance conditions. The generic OLS equation is specified below:

$$HDI_{i,t} = \beta_0 + \beta_1 CFDI_{i,t} + \beta_2 HUC_{i,t} + \beta_3 X_{i,t} + \tau_t + \mu_{i,t} \tag{1}$$

The poverty model in Equation 1 is modified to include an interactive element ($CFDI_{i,t} * HUC_{i,t}$). This suggests assessing the impact of Chinese investment through a mediating variable, human capital. The intuition is that Chinese investment will improve the living conditions of Africans if $\beta_1 < 0$ and $\beta_3 > 0$. The modified model is specified thus:

$$HDI_{i,t} = \beta_0 + \beta_1 CFDI_{i,t} + \beta_2 HUC_{i,t} + \beta_3 (CFDI_{i,t} * HUC_{i,t}) + \beta_4 X_{i,t} + \tau_t + \mu_{i,t} \tag{2}$$

Where $HDI_{i,t}$ is the human development index in country i at period t ; $CFDI_{i,t}$ indicates the measures of Chinese investment in Africa, $HUC_{i,t}$ is human capital measures, $X_{i,t}$ is the explanatory variables, which include institutional quality, globalization, real GDP per capita, and population growth. τ_t is an unobserved fixed effect. $\mu_{i,t}$ is the error term.

According to Anselin (2009), Equation 2 could produce bias and inconsistent results due to spatial interdependence. Hence, this study integrates spatial characteristics into equations (3a) and (3b) to account for the role of geography. Spatial methods can enter a simple regression model in three ways: (1) as an autoregressive model, named spatial autoregressive (SAR) ($W_{ij}HDI_{j,t}$, (2) an additional independent variable, the spatial Durbin model (SDM) ($W_{ij}CFDI_{j,t}$) or (3) by applying spatial dependence to the errors, the spatial error model (SEM) ($E[\varepsilon_i \varepsilon_j] \neq 0$). In estimating the spatial model, we rely on the maximum likelihood estimator. As such, the Wald test and likelihood ratio test were used to determine the best model (SAR, SDM, and SEM) based on the data-generating process.

$$HDI_{i,t} = \beta_0 + \beta_1 X_{i,t} + \rho \sum_{j=i}^{N} W_{ij} HDI_{j,t} + \theta \sum_{j=i}^{N} W_{ij} CFDI_{j,t} + \omega \sum_{j=i}^{N} W_{ij} CFDI_{j,t} * HUC_{j,t} + \gamma_t + \lambda \sum_{j=i}^{N} \mu_{i,t} + \varepsilon_{i,t} \tag{3a}$$

$$\text{Where } \mu_{it} = \lambda \sum_{j=i}^{N} \mu_{i,t} + \varepsilon_{i,t} \tag{3b}$$

W_{ij} is a 39×39 positive-matrix describing how the sample units are configured and arranged. ρ denotes the degree to which the poverty of the host country is influenced by that of its neighbors. θ is a measure of Chinese investment from proximate countries on the poverty conditions of host countries. The elasticity of the joint impact of neighboring countries' human capital and Chinese investment is designated as ω. In Equation 3b, the error term is determined by the interaction of λ (spatial error parameter) and $\sum_{j=i}^{N} \mu_{i,t}$. $\varepsilon_{i,t}$ is the stochastic disturbance with normal distribution. The spatial model also addresses potential endogeneity since it relies on the maximum likelihood estimator.[5]

Regarding the spatial weight matrix (W), we used two matrices—contiguity and inverse distance. The contiguity matrix is specified below:

$$W_{ij} = \begin{cases} 1 \ \textit{if } i \textit{ and } j \textit{ share land and or maritime boundaries} \\ 0 \ \textit{otherwise} \end{cases} \tag{4}$$

However, the inverse distance weighting matrix involves assigning weights that decrease as the distance between units increases, and it is defined as follows.

$$W_y(d_{ij}) = \frac{1}{(d_{ij})} \forall \quad \mathrm{i} \neq j \tag{5}$$

The weighting relationship between any pair of countries (i and j) is denoted by $W_y(d_{ij})$. This weight matrix is a diagonal block, and each block denotes a year of observations. y ϵ[2000, 2020 …], for any specific year. The matrix is defined as:

$$W_{HDI} = \begin{bmatrix} 0 & W_y(d_{ij}) & W_y(d_{ik}) \\ W_y(d_{ji}) & 0 & W_y(d_{jk}) \\ W_y(d_{ki}) & W_y(d_{kj}) & 0 \end{bmatrix} \tag{6}$$

The distance between the spatial units (i and j) is denoted by d_{ij}. The diagonal elements of the matrix specified in equation 6 assumed the value of zero since no country can be its own neighbor. The W_{HDI} was normalized to ensure that the summation of each row is equal to one (Arogundade et al., 2022a, for more; Mahran, 2023).

Lastly, according to extant literature on spatial models, a unique interpretation of parameters is ideal. These studies highlight that results from the spatial estimates may be biased and inaccurate, necessitating the need to calculate the direct, indirect and overall impact of the estimates (See Anselin & Le Gallo, 2006; LeSage & Pace, 2009; Arogundade & Hassan, 2025 for more). The spatial spillover effect specification is as follows:

$$Y = (1 - \rho W)^{-1} + (1 - \rho W)^{-1} \ (X\beta + WX\theta\beth) + (1 - \rho W)^{-1}\varepsilon \tag{7}$$

According to LeSage and Pace (2009), in calculating the indirect effect, the mean estimate of the value in the non-diagonal line is calculated, while for the direct effect, the arithmetic mean of the values on the main diagonal matrix is used.

Empirical results: Non-spatial estimates

The non-spatial baseline results on how Chinese investments influence the poverty conditions of African countries are presented in Table 2. The empirical results of the FE-2SLS are relied on since the model is able to address heterogeneity and endogeneity issues. The results indicate that Chinese FDI enters the model with positive and statistically significant coefficients (0.020%, 0.048%, and 0.024%). This indicates the positive impact of China's influence on poverty reduction in Africa. This result is at par with the empirical outcome of Sylvaire et al. (2022), Atitianti and Dai (2022), Zhang (2022), and Iddrisu et al. (2025), who argued that through fostering economic growth, generating employment, and enhancing infrastructure, China's FDI has significantly

Table 2. Non-Spatial Model – impact of China FDI and poverty in Africa.

	Pool OLS			Driscoll and Kraay FE			FE-2SLS		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CFDI	0.0103***	0.0331***	0.0142***	0.0157***	0.0260***	0.0192***	0.0202***	0.0488***	0.0238***
	(0.00159)	(0.00504)	(0.00199)	(0.00230)	(0.00527)	(0.00165)	(0.00264)	(0.00933)	(0.00217)
INST	−0.0102	−0.0180***	0.00597	−0.0241***	−0.0235***	−0.0275***	−0.0239***	−0.0235***	−0.0278***
	(0.00738)	(0.00670)	(0.00714)	(0.00385)	(0.00458)	(0.00396)	(0.00524)	(0.00753)	(0.0056)
POPGR	−0.00897**	0.0103**	0.00276	0.00450	0.00730**	0.00626	0.00512	0.00905**	0.0077*
	(0.00449)	(0.00412)	(0.00443)	(0.00334)	(0.00314)	(0.00413)	(0.00352)	(0.00361)	(0.00435)
Kofgi	0.00767***	0.00747***	0.00515***	0.00904***	0.00792***	0.00750***	0.00819***	0.0063***	0.0065***
	(0.000636)	(0.000583)	(0.000654)	(0.000904)	(0.00114)	(0.000842)	(0.000936)	(0.00119)	(0.000882)
GDPC	0.138***	0.102***	0.118***	0.148***	0.168***	0.153***	0.128***	0.158***	0.134***
	(0.00533)	(0.00541)	(0.00545)	(0.0164)	(0.0103)	(0.0189)	(0.0157)	(0.0102)	(0.0180)
HC		0.229***			0.101***			0.165***	
		(0.0179)			(0.0277)			(0.0326)	
TER			0.00781***			0.00735***			0.00784***
			(0.000978)			(0.000459)			(0.000433)
CFDI*HUC		−0.0163***			−0.00787**			−0.0182***	
		(0.00279)			(0.00342)			(0.00441)	
CFDI*TER			−0.000565***			−0.000827***			−0.000886***
			(0.000141)			(0.000108)			(7.45e-05)
Constant	−2.078***	−2.246***	−1.900***	−2.284***	−2.542***	−2.295***			
	(0.0421)	(0.0449)	(0.0439)	(0.111)	(0.0868)	(0.136)			
Observations	741	663	741	741	663	741	702	624	702
R-squared	0.833	0.877	0.852	0.817	0.833	0.853	0.788	0.783	0.805
Prob > χ^2b	730.9	669.0	603.5	1646	8016	2243	855.4	980.6	912.4
No. of countries	39	39	39	39	39	39	39	39	39

Standard errors of Driscoll-Kraay are enclosed in parentheses.
***Denotes significance at 1%.
**At 5%, and * at 10%. For the instrumental regression, we used the lag of CFDI as an instrument.

contributed to the eradication of poverty throughout Africa. Investments in sectors such as construction, mining, manufacturing, financial services, scientific research, and technological services have increased employment prospects and raised household incomes, especially for low-income groups. Furthermore, China's participation in infrastructure projects such as energy plants, railroads, and roadways improves market accessibility, increases productivity, and lowers transportation costs—all of which have a positive impact on local businesses and communities.

The coefficient of institutional quality is negative and significant, suggesting that the quality of governance deteriorates the poverty conditions of African countries. We believe this is because of poor governance, lack of transparency, and weak rule of law, which leads to unequal distribution of wealth, mismanagement of resources, and limited access to basic services such as education, health, and infrastructure (Ekeocha et al., 2023). Furthermore, the coefficient of population growth enters the model with a positive and significant impact, indicating that A growing population increases the number of people in the workforce, which raises economic output and productivity and can result in greater wages and improved living conditions. Additionally, a larger population improves human capital, stimulating innovation and creativity that lead to infrastructure, healthcare, and education developments—all important aspects of human development. See Ochi (2023) and Arogundade et al. (2022b) for a similar empirical outcome.

Globalization enters the model with a positive impact, indicating that economic, political, and social dimensions of globalization improve poverty reduction in African countries. A plausible explanation for this empirical outcome is that increased access to global markets, external capital, international funding and partnerships, and trade can drive shared prosperity, create jobs, alleviate poverty, and facilitate technology and skills transfer. Similar results were obtained by Fosah et al. (2023) and Osinubi and Ojeyinka (2022). Furthermore, the positive and significant impact of economic growth on poverty reduction in the region aligns with the empirical outcome of Son and Kakwani (2004) and Arogundade et al. (2022b), which argue that an increase in economic activity through an increase in demand, productivity, and job creation is capable of alleviating poverty. Regardless of the measure of human capital used (human capital index and tertiary enrollment), its impact is positive and significant on poverty reduction. This is consistent with the study of Moyo et al. (2022) and Wang et al. (2021), which argue that investment in education and skills training enhances the earning potential and productivity of the individual. Similarly, by improving the quality of education, countries can equip their population with the skills and knowledge necessary to drive inclusive growth.

The coefficient of Chinese FDI interacted with human capital measures—human capital index and tertiary enrollment rate suggests a negative and significant impact on poverty reduction. This indicates that human capital improvement deteriorates China's FDI's impact on poverty reduction in the region. The result does not align with the extant literature, which suggests that improvement in human capital has a positive and significant effect on the nexus between FDI and poverty reduction (Bonga-Bonga & Phume, 2017; Dankyi et al., 2022).

Spatial preliminary test

In this section, we examined whether there is a spatial effect in the model as outlined in Equations 1 and 2. To determine this, we relied on the estimates of the residuals from the pooled regression.[6] The empirical outcomes of Moran's I (as displayed in Table 3) recommend acceptance of spatial interdependence in the models. Additionally, the results of Lagrange Multiplier and Robust Lagrange Multiplier (RLM) justify the presence of spatial lag dependency and spatial error, since the null hypothesis is rejected. Moreover, local and global autocorrelation tests were applied to determine the existence of spatial correlations in poverty conditions in selected African countries. The local autocorrelation test, which is based on Moran's I statistics, identifies local hot spots of poverty in the data. However, the global autocorrelation test determines the spatial

Table 3. Spatial preliminary test.

Test	(1) *CFDI*	(2) *CFDI ∗ HC*	(3) *CFDI ∗ TER*
Spatial Error:			
Moran's I	4.765***	8.998***	7.966***
Lagrange multiplier	7.501***	9.873***	17.149***
Robust Lagrange multiplier	9.025***	10.234***	22.257***
Spatial lag:			
Lagrange multiplier	13.378***	7.030***	4.234**
Robust Lagrange multiplier	5.902**	7.461***	9.343***

*Indicates significance at 10%.
**At 5%, and
***At 1%, with standard errors enclosed in parenthesis.
Source: Authors' computations.

interdependency of poverty (Moran's I, 1950). Given the results of the global autocorrelation (see Table A3 in the Appendix), it can be concluded that poverty in Africa exhibits spatial interconnectedness, since the p-value is statistically significant. Similarly, the local spatial autocorrelation test for each country is shown in the table, emphasizing the countries with the highest rates of poverty spillover on the continent.

Spatial impact of China's FDI on poverty in Africa—contiguity

Since the null hypotheses of the Wald and LR tests were rejected, we can say that the SDM is the best model for our data. The Hausman test thus indicates that the SDM-FE model is appropriate, so we presented it in Table 4. Ignoring spatial dependence in the model would have led to biased estimates, as the coefficient of the spatial lag of poverty is statistically significant and positive based on the contiguity proximity matrix given in equation 4. The statistical significance of the weighted poverty measure indicates that the poverty situation in the host country is significantly impacted by the poverty of its neighbors. The intuition of this result can be justified through the lens of the interconnectedness of economies and regions, where poverty in one area affects neighboring regions through migration, labor markets, and trade dynamics. For instance, when impoverished populations from a particular country or region migrate for better opportunities, they can strain resources and social services in neighboring areas, potentially leading to increased poverty.

Furthermore, the empirical results of the spatial weight of China FDI enter the model with a positive and significant impact, suggesting a spatial spillover of Chinese investment in Africa (i.e. Chinese firms in proximate countries improve the welfare conditions of the host country). An explanation for this spatial spillover is because (1) China's FDI is often concentrated in infrastructure, mining, and industrial sectors, which not only benefit the host country but also create opportunities for neighboring countries through improved connectivity and regional economic integration; and (2) Chinese FDI plays a crucial role in building regional supply chains, particularly in industries like agriculture, manufacturing, and natural resources. By establishing manufacturing hubs and industrial parks in one country, Chinese investments create demand for raw materials, labor, and intermediate goods from neighboring countries, stimulating cross-border trade. This integration strengthens the economic interdependence among African countries, allowing those not directly receiving significant FDI inflows to benefit through trade, employment, and skills development. Extant literature found similar outcomes (Arogundade et al., 2022b; Hu et al., 2021; Long et al., 2020).

Additionally, the significant and positive impact of the spatial lag of human capital measure (human capital index and tertiary enrollment) indicates a spatial spillover of human capital on poverty reduction in the region. The spatial spillover of human capital on poverty in Africa can be understood through the positive effects of improvements in education, skills, and health in

Table 4. Spatial impact of China FDI on poverty in Africa (spatial weight: contiguity).

	SAR	SDM					SEM
Variables	(1)	(1)	(1)	(1)	(1)	(1)	(1)
CFDI	0.00740***	0.00540***	0.00378***	0.00523***	0.0147***	0.0104***	0.00970***
	(0.00120)	(0.00126)	(0.00125)	(0.00127)	(0.00225)	(0.00135)	(0.00173)
INST	−0.0125*	−0.0150**	−0.0116	−0.0108	−0.0173**	−0.0118	0.00371
	(0.00754)	(0.00752)	(0.00790)	(0.00758)	(0.00760)	(0.00741)	(0.00842)
POPGR	0.00554**	0.00431	0.00145	0.00429	0.00179	0.00504*	0.00565*
	(0.00275)	(0.00275)	(0.00275)	(0.00276)	(0.00270)	(0.00271)	(0.00294)
Kofgi	0.00507***	0.00437***	0.00432***	0.00433***	0.00394***	0.00413***	0.00632***
	(0.000602)	(0.000617)	(0.000617)	(0.000613)	(0.000600)	(0.000597)	(0.000832)
GDPC	0.142***	0.149***	0.144***	0.144***	0.167***	0.145***	0.145***
	(0.0116)	(0.0117)	(0.0135)	(0.0117)	(0.0126)	(0.0114)	(0.0126)
HC			−0.0137		0.0638***		
			(0.0125)		(0.0164)		
CFDI*HC					−0.00654***		
					(0.00108)		
TER				2.54e-05		0.00439***	
				(0.000320)		(0.000803)	
CFDI*TER						−0.000573***	
						(9.59e-05)	
W * HDI	0.418***	0.306***	0.263***	0.305***	0.322***	0.365***	
	(0.0270)	(0.0365)	(0.0403)	(0.0364)	(0.0356)	(0.0277)	
W * CFDI		0.00890***	0.00598***	0.00729***			
		(0.00187)	(0.00192)	(0.00192)			
W * HC			0.121***				
			(0.0214)				
W * CFDI × HC					0.00548***		
					(0.000810)		
W * CFDI × TER						0.000174***	
						(3.95e-05)	
W * TER				0.00119***			
				(0.000387)			
Lambda (λ)							0.577***
							(0.0639)
Constant	0.0284***	0.0283***	0.0265***	0.0281***	0.0260***	0.0275***	0.0306***
	(0.000764)	(0.000759)	(0.000754)	(0.000754)	(0.000741)	(0.000738)	(0.000905)
No of obs.	780	780	780	780	780	780	780
Pseudo R2	0.127	0.272	0.200	0.288	0.333	0.231	0.827
Number of countries	39	39	39	39	39	39	39
Wald test Spatial term[a]	250.31***	271.84***	356.27***	275.19***	358.27***	229.75***	85.04***
Prob > χ^2[b]	4168***	4227***	4166***	4300***	4338***	4496***	351.7***
SEM Vs SDM[c]		7.91***					
SAR vs SDM (LR test)[d]		94.28***					

The standard errors are enclosed in parentheses, while *, **, and *** denote significance at 10%, 5%, and 1%, respectively. The Hausman test suggests a fixed effect model instead of a random effect model; the report is available upon request. For all regression estimates, the maximum-likelihood estimator is employed. a: the spatial terms' joint importance; b: the variables' joint significance. c: the spatial terms Wald test. d: test of the loglikelihood ratio.

one region on neighboring areas. When a region invests in building human capital—through education, vocational training, or healthcare—these benefits can extend beyond its borders. Over time, skilled labor can migrate to less developed regions, improving productivity and economic opportunities. The spatial analysis is extended to include an interactive element – China FDI and human capital. The results suggest that there is a significant spatial spillover of China's FDI and human capital interaction since the spatial lag coefficient is significant and positively signed.

Marginal effect estimation results

In this section, we examine the direct, indirect (spillover), and total effects of CFDI on poverty reduction in Africa, based on the spatial Durbin model with fixed effects (SDM-FE) presented in

Table 5. Marginal effect estimation results.

	Direct			Indirect		
Variables	(1)	(2)	(3)	(4)	(5)	(6)
CFDI	0.00677***	0.0057***	0.0063***	0.01329***	0.0083***	0.0108***
	(0.0012)	(0.0011)	(0.0012)	(0.0016)	(0.0017)	(0.0018)
HC		−0.0128***			0.1371***	
		(0.0097)			(0.0163)	
CFDI*HUC		−0.0090***			0.0052***	
		(0.0014)			(0.0010)	
TER			0.0002***			0.0016***
			(0.0003)			(0.0004)
CFDI*TER			−0.0005			−0.00003
			(0.0001)			(0.0001)
INST	−0.0130***	−0.0067***	−0.0084***	−0.0048***	−0.0018***	−0.0031***
	(0.0074)	(0.0071)	(0.0074)	(0.0028)	(0.0019)	(0.0027)
POPGR	0.0043***	0.0021***	0.0046***	0.0016***	0.0005***	0.0017***
	(0.0027)	(0.0026)	(0.0028)	(0.0010)	(0.0007)	(0.0010)
kofgi	0.0044***	0.0045***	0.0044***	0.0016***	0.0012***	0.0016***
	(0.0006)	(0.0005)	(0.0006)	(0.0003)	(0.0002)	(0.0003)
GDPC	0.1486***	0.1332***	0.1431***	0.0554***	0.0368***	0.0526***
	(0.0113)	(0.0112)	(0.0113)	(0.0095)	(0.0077)	(0.0091)
Observations	780	780	780	780	780	780
Number of Countries	39	39	39	39	39	39

STANDARD errors in parentheses,.
***Denotes significance at 1 %,.
**At 5 % and.
*At 10%.

Table 4, with cumulative marginal effects detailed in Table 5. The direct impact refers to the influence of a country's own explanatory variables—namely, China's FDI, human capital, the interaction between human capital and China's FDI, institutional quality, population growth, globalization, and economic growth—on poverty reduction within that same country. In contrast, the indirect or spillover effect captures how changes in these variables in neighboring countries affect poverty outcomes in a given host country. The total effect represents the sum of both the direct and indirect impacts, offering a comprehensive view of how regional interdependencies shape development outcomes. These estimates are particularly important as they highlight the regional transmission channels through which China's FDI and associated socio-economic factors influence poverty, not only within national borders but also across neighboring countries. This regional perspective is crucial for policy coordination under frameworks such as the African Continental Free Trade Area (AfCFTA), which emphasize cross-border investment and development spillovers.

Empirical results suggest that a 1% increase in China's FDI, tertiary enrollment rate, population growth, globalization, and economic growth in country *i* contributes to a reduction in poverty by 0.01%, 0.0043%, 0.0044%, 0.0149%, and 0.1486%, respectively, in that same country. Conversely, variables such as the human capital index, institutional quality, and the interaction terms of China's FDI with tertiary enrollment and human capital in country i appear to worsen poverty outcomes, with marginal effects of −0.012%, −0.013%, −0.001%, and −0.01%, respectively. These findings underscore the complexity of poverty dynamics in the region and highlight the need for targeted interventions that not only attract beneficial FDI but also ensure complementary improvements in institutional quality and human capital development to fully realize poverty reduction goals.

The indirect or spillover effect estimates, presented in columns (4) to (6) of Table 5, reveal a significant spatial spillover of poverty outcomes across African countries. These findings underscore the interconnected nature of socio-economic dynamics in the region, where changes in one country's macroeconomic or institutional environment can influence poverty outcomes in

neighboring states. Specifically, the results show that for every 1% increase in China's FDI to Africa, the human capital index, tertiary enrollment rate, the interaction between China's FDI and human capital index, population growth, globalization, and economic growth in country i, there is an associated reduction in poverty in neighboring country j by 0.01%, 0.137%, 0.002%, 0.01%, 0.002%, 0.002%, and 0.055%, respectively. These spillover effects suggest that enhancements in one country's economic fundamentals can generate positive externalities for others in the region through trade, investment flows, labor mobility, and shared infrastructure.

However, not all spillovers are positive. The estimates indicate that institutional quality in country *i* and the interaction of China's FDI with tertiary enrollment has negative spillover effects on country *j*, reducing its poverty alleviation outcomes by 0.004% and 0.001%, respectively. This could reflect the challenges of governance asymmetries or misaligned educational outcomes that limit the absorptive capacity of neighboring countries.

Given that a majority of the control variables in the indirect effect model are statistically significant, these findings reinforce the argument that poverty alleviation policies in Africa cannot be effectively designed or implemented in isolation. The presence of strong spatial interdependencies and cross-border effects implies that regional coordination and harmonization, particularly in investment policy, human capital development, and institutional reform, is crucial for amplifying poverty reduction efforts. This further strengthens the case for leveraging platforms like the AfCFTA and regional economic communities (RECs) to promote inclusive, coordinated, and spatially aware development strategies across the continent.

Intra-Africa spillover of China FDI on poverty

The cumulative marginal effect results presented in Table 6 indicate panel estimates without considering the cross-country spillover of China FDI. This section examines the spatial spillover effect of China's FDI impact on poverty at a country level in Africa (i.e. it examines the spillover impact of China's FDI from other neighboring countries on their poverty conditions). The results in Figure 4 indicate a significant spillover at the country level since China's FDI is significant in all estimations. We can conclude from the figure that Malawi, Burundi, Angola, Lesotho, and Morocco have the highest spatial spillover of Chinese investment from other neighboring countries. However, countries like Algeria, Senegal, Côte d'Ivoire, Ethiopia, and South Africa have the lowest spatial spillover of Chinese investment from neighboring countries. This result further lends credence to our empirical outcome in Tables 5 and 6: China's FDI in Africa has contributed significantly to poverty reduction across the continent, with noticeable intra-Africa spillover effects. As Chinese firms invest in sectors such as infrastructure, manufacturing, and mining, the benefits extend beyond the immediate location of investment, affecting surrounding regions and countries. These spillover effects manifest through enhanced regional trade, job creation, and improved access to critical infrastructure like roads, ports, and energy facilities.

Spatial impact of China's FDI on poverty in Africa—inverse distance

As presented in Table 6, the results indicate that the Spatial Durbin Model (SDM) offers the most appropriate specification for capturing the data-generating process of our study. This conclusion is supported by the rejection of the null hypotheses in both the Wald and Likelihood Ratio (LR) tests, thereby validating the superiority of the SDM over alternative spatial econometric models. To further refine the estimation approach, the Hausman test was employed to choose between fixed effects and random effects estimators, ensuring consistency in the presence of correlated individual effects. Utilizing the inverse distance spatial weight matrix, as defined in Equation 5, we observe that the coefficient of the spatial lag of poverty is both positive and statistically significant. This result affirms the presence of a spatial spillover effect, implying that

Table 6. Spatial impact of China FDI on poverty in Africa (spatial weight: inverse distance).

	SAR	SDM					SEM
VARIABLES	(1)	(1)	(1)	(1)	(1)	(1)	(1)
CFDI	0.00165	0.000559	0.00138	0.00194	0.0170***	0.00798***	0.00200
	(0.00124)	(0.00131)	(0.00130)	(0.00132)	(0.00212)	(0.00130)	(0.00135)
HC	−0.0560***	−0.0555***	−0.0466***	−0.00113***			
	(0.0128)	(0.0130)	(0.0133)	(0.000318)			
TER						0.00531***	
						(0.000748)	
INST	0.00711	0.00716	0.0104	0.0133*	0.0127*	0.0119*	0.0104
	(0.00780)	(0.00785)	(0.00774)	(0.00751)	(0.00734)	(0.00703)	(0.00758)
POPGR	0.00543**	0.00453*	0.00580**	0.00558**	0.00620**	0.00645**	0.00771***
	(0.00268)	(0.00270)	(0.00266)	(0.00269)	(0.00253)	(0.00251)	(0.00270)
Kofgi	0.00262***	0.00194***	0.00195***	0.00236***	0.000827	0.00143**	0.00264***
	(0.000629)	(0.000678)	(0.000665)	(0.000662)	(0.000642)	(0.000608)	(0.000688)
RGDPC	0.133***	0.132***	0.119***	0.121***	0.129***	0.128***	0.116***
	(0.0127)	(0.0127)	(0.0127)	(0.0113)	(0.0121)	(0.0106)	(0.0115)
Constant	0.0261***	0.0262***	0.0257***	0.0272***	0.0244***	0.0254***	0.0279***
	(0.000745)	(0.000747)	(0.000727)	(0.000729)	(0.000690)	(0.000679)	(0.000752)
HC*CFDI					−0.00975***		
					(0.00108)		
TER*CFDI						0.00120**	
						(0.000514)	
W * HDI	0.719***	0.581***	0.100*	0.316***	0.192*	0.373***	
	(0.0379)	(0.0676)	(0.124)	(0.0946)	(0.109)	(0.0717)	
W * HC			0.262***		0.161***		
			(0.0435)		(0.0382)		
W * TER				0.00528***		0.00253	
				(0.00141)		(0.00415)	
W * CFDI		0.00910***	0.0151***	0.00999***			
		(0.00326)	(0.00398)	(0.00354)			
W * HC * CFDI					0.00986***		
					(0.00207)		
W * TER * CFDI						0.00120**	
						(0.000514)	
Lambda (λ)							0.890***
							(0.0178)
Observations	663	663	663	741	663	741	741
Number of countries	39	39	39	39	39	39	39
Wald test Spatial term[a]	468.45***	399.88***	524.63***	416.35***	535.61***	442.16***	2627.42
Prob > χ^2[b]	4339	4280	4484	4615	5045	5426	202.7
SEM Vs SDM[c]		7.81***					
SAR vs SDM (LR test)[d]		90.28***					
Pseudo R2	0.7968	0.8080	0.7118	0.8085	0.7340	0.7867	0.8051

The standard errors are enclosed in parentheses, while *, **, and *** denote significance at 10%, 5%, and 1%, respectively. The Hausman test suggests a fixed effect model instead of a random effect model; the report is available upon request. For all regression estimates, the maximum-likelihood estimator is employed. a: the spatial terms' joint importance; b: the variables' joint significance. c: the spatial terms Wald test. d: test of the loglikelihood ratio.

poverty in a given country is not only influenced by its own internal conditions but also by poverty levels in neighboring countries—particularly those in closer geographical proximity.

Additionally, just like the contiguity matrix, the empirical results of the spatial weight of China's FDI enter the model with a significant and positive impact, suggesting a spatial spillover of Chinese investment in Africa (i.e. Chinese firms in proximate countries alleviate the poverty situation of the host country). Moreover, the significant and positive effect of the spatial lag of human capital measures (human capital index and tertiary enrollment) indicates a spatial spillover of human capital on poverty reduction in the region. The empirical analysis is extended to include an interactive element – China FDI and human capital. The results suggest a significant spatial spillover of China's FDI and human capital interaction since the spatial lag coefficient is significant and positively signed. The findings are consistent with those obtained using the baseline proximity matrix outlined in Equation 5. Overall, the control variables are

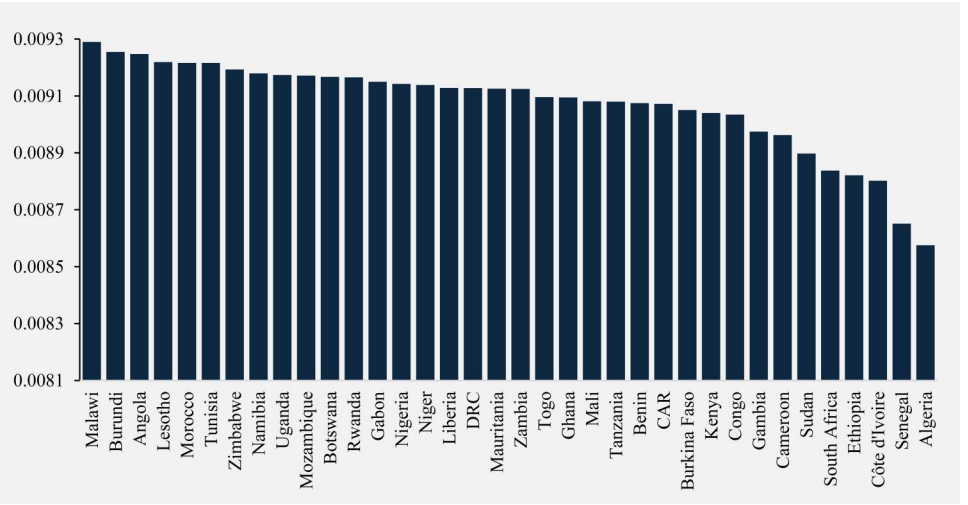


Figure 4. Spatial spillover impact of China FDI on Poverty among African countries.
Source: Author's estimate using equations 3 and 4 and the SDM-FE model.

statistically significant and exhibit the anticipated signs, reinforcing the robustness of the model.

Conclusion and policy prescriptions

Over the past decades, global politics have transformed considerably, positioning China as a leader with its BRI. In response to national security and environmental concerns, the US and European economies have imposed various investment restrictions, prompting China to focus its global investment efforts on African nations and other regions along the Belt and Road as emerging growth hubs. However, opinions differ on the relationship between poverty reduction in Africa and China's foreign direct investment (FDI). Some studies contend that the impact is favorable, but others argue that Chinese investment in Africa is insignificant because of limited absorptive capacity and capital repatriation. We believe that the majority of these studies neglected to account for the role of spatial interdependence or third-country effects, which is why there is contradicting evidence. This study contributes to the existing literature by examining the relevance of third-country effects in shaping the impact of Chinese investment in Africa

To fulfill the study's objectives, we employed the Spatial Durbin Model (SDM). Prior to integrating spatial dimensions into the analysis, a series of diagnostic tests were performed to verify the existence of spatial spillover effects. The results confirmed significant spatial dependence, indicating that omitting spatial interconnections would likely yield biased or misleading estimates. The empirical analysis produced several important insights. Chief among them is the finding that Chinese foreign direct investment (CFDI) generates positive spatial spillovers—whereby CFDI inflows into one country contribute to poverty reduction in neighboring countries. This underscores the regional significance of CFDI in enhancing socio-economic outcomes beyond national borders. Secondly, enhanced human capital in these neighboring countries further strengthens the link between CFDI and poverty reduction in the host country, indicating that investments in education, skills, and workforce quality amplify the poverty-reducing effects of CFDI. Thirdly, the result supports a strong spatial spillover effect, where poverty reduction benefits spread across borders within the region due to CFDI. Fourth, marginal effects show that poverty in one country is influenced by socioeconomic determinants in neighboring countries, particularly due to the influence of Chinese investments, underscoring the interconnectedness of regional economies.

These findings hold true across different measures of proximity, including geographical contiguity and inverse distance, confirming the robustness of the results.

Since there is evidence of spatial spillover of Chinese investment on poverty alleviation in Africa, the following policy recommendations are proposed: (1) it is important that African governments enhance cross-border trade and investment cooperation to facilitate the diffusion of FDI benefits across neighboring countries. This includes harmonizing regulations, reducing tariffs, and improving infrastructure, allowing for easier flow of goods, services, and knowledge across borders; (2) establish regional clusters around strategic sectors where China's FDI is concentrated, such as manufacturing, agriculture, and mining. This could be done by creating special economic zones (SEZs) and shared industrial parks. African countries can improve productivity and foster collaboration, promoting job creation and technology transfer that reach communities beyond the immediate investment location; (3) African policymakers should negotiate FDI agreements that encourage Chinese firms to engage in local capacity building and workforce development programs. This could involve skills training, apprenticeships, and technology-sharing agreements, ensuring that local firms can adopt and improve upon the technologies and practices brought in by Chinese investors; (4) investment in transport, communication, and energy infrastructure is critical to supporting spatial spillover. Improving infrastructure connectivity within and between African countries will increase the movement of goods and services, allowing more communities to benefit from FDI-driven economic activities; and (5) policymakers should incentivize Chinese firms to source materials and services locally as part of their corporate social responsibility and ESG offering. Building a strong network of local suppliers can create jobs and increase household incomes in neighboring regions, spreading the impact of FDI on poverty reduction across the region.

Notes

1. The UNIDO (2024) report suggests that SDG 9 has the highest correlation with other SDGs.
2. While there has been an improvement in the FDI trend to Africa, there is still much to be done in terms of attracting quality investment to region, since the region's share of global FDI remains infinitesimal at 2.11% in 2023.
3. Regulatory quality, political stability, government efficacy, voice and accountability, rule of law, and corruption control.
4. The average years of education from Barro and Lee, as well as an assumed rate of return to education based on global estimates from the Mincer equation, form the basis of this human capital index (Barro & Lee, 2013; Psacharopoulos, 1994).
5. For a detailed account of how the likelihood estimation solves this problem, see Elhorst (2014)
6. The result is presented in columns 1-3 of Table 2

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Sodiq Arogundade http://orcid.org/0000-0001-6913-6756
Biyase Mduduzi http://orcid.org/0000-0003-1857-3205

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Appendix

Table A1. List of countries.

Algeria	Comoros	Guinea	Morocco	Sudan
Angola	Congo, Democratic Republic of	Guinea-Bissau	Mozambique	Tanzania
Benin	Congo, Republic of	Kenya	Namibia	Togo
Botswana	Cote d'Ivoire	Lesotho	Niger	Tunisia
Burkina Faso	Djibouti	Liberia	Nigeria	Uganda
Burundi	Egypt	Madagascar	Rwanda	Zambia
Cabo Verde	Ethiopia	Malawi	Senegal	Zimbabwe
Cameroon	Gabon	Mali	Seychelles	
Central African Republic	Gambia	Mauritania	Sierra Leone	
Chad	Ghana	Mauritius	South Africa	

Table A2. Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) chinafdistock	1.000						
(2) schoolenrolment	0.258	1.000					
(3) hc	0.345	0.652	1.000				
(4) inst	−0.017	0.342	0.479	1.000			
(5) kofgi	0.292	0.756	0.682	0.554	1.000		
(6) populationgrowth	−0.143	−0.645	−0.628	−0.503	−0.658	1.000	
(7) gdppercapita	0.325	0.755	0.737	0.608	0.702	−0.683	1.000

Table A3. Moran's I_i Residual of Poverty Regression by Country*.

Countries	I_i	$Sd(I_i)$	$Z-stat$	$P-value$*
Algeria	−0.124	0.023	−5.351	0.000
Angola	0.005	0.018	0.328	0.743
Benin	0.013	0.049	0.304	0.761
Botswana	0.063	0.029	2.209	0.027
Burkina Faso	0.087	0.035	2.552	0.011
Burundi	0.114	0.057	2.019	0.044
Cameroon	−0.061	0.024	−2.492	0.013
Central African Re	0.030	0.019	1.674	0.094
Congo	−0.004	0.030	−0.076	0.939
Côte d'Ivoire	−0.036	0.036	−0.955	0.340
DRC	0.030	0.023	1.367	0.172
Egypt	−0.180	0.017	−10.800	0.000
Ethiopia	0.006	0.022	0.353	0.724
Gabon	−0.110	0.030	−3.603	0.000
Gambia	0.034	0.077	0.451	0.652
Ghana	−0.203	0.044	−4.529	0.000
Kenya	−0.140	0.028	−4.924	0.000
Lesotho	0.024	0.044	0.584	0.559
Liberia	0.036	0.034	1.096	0.273
Madagascar	−0.010	0.022	−0.378	0.705
Malawi	0.005	0.031	0.191	0.849
Mali	0.127	0.028	4.512	0.000
Mauritania	−0.041	0.029	−1.373	0.170
Mauritius	−0.222	0.024	−9.290	0.000
Morocco	−0.050	0.024	−2.015	0.044
Mozambique	0.006	0.033	0.226	0.821
Namibia	0.075	0.025	3.046	0.002
Niger	0.006	0.020	0.356	0.722
Nigeria	−0.049	0.026	−1.871	0.061
Rwanda	−0.123	0.058	−2.109	0.035
Senegal	−0.012	0.075	−0.142	0.887
South Africa	0.008	0.043	0.210	0.834
Sudan	−0.002	0.017	−0.062	0.950
Togo	−0.044	0.052	−0.813	0.416
Tunisia	−0.007	0.021	−0.293	0.770
Uganda	−0.062	0.032	−1.881	0.060
Tanzania	−0.027	0.028	−0.923	0.356
Zambia	−0.039	0.026	−1.464	0.143
Zimbabwe	0.003	0.030	0.139	0.889
Measures of global spatial autocorrelation				
	0.945	0.005	−10.918	0.000

*The probability level is a two-tail test. The LISA test of countries in the sample is estimated using the year 2022, which is the end of our study period.