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Determinants of Chinese foreign direct investment in South Africa's energy sector: A BRICS context analysis

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Abstract

This paper investigates the key determinants of Chinese foreign direct investment (FDI) in South Africa's critical energy sector, a field characterised by substantial investment opportunities and a persistent supply crisis. Employing a mixed-methods approach, the study combines a quantitative panel data analysis of Chinese FDI determinants across BRICS+ countries (2002–2021) with a qualitative examination of major investment cases in South Africa's coal and renewable energy sectors. The econometric results confirm that Chinese FDI is driven by a complex mix of market-seeking, resource-seeking and efficiency-seeking motives. The case studies reveal a pragmatic "dual strategy" in South Africa, whereby strategic state-led investments in coal power coexist with market-oriented projects in renewable energy, aimed at exporting Chinese technology and services. The paper concludes that this dual strategy represents not a balanced approach to co-development but rather a flexible mechanism for advancing China's national geoeconomic interests – allowing it to secure resources while simultaneously capturing new markets for its multinational enterprises.

Keywords: *Chinese FDI; South Africa; energy sector; BRICS+; renewable energy*

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1. Introduction

The rapidly growing economies of Africa face a monumental challenge in meeting their energy demands, a crucial prerequisite for sustainable industrialisation and long-term development. Within this context, South Africa, despite being one of the continent's most developed countries, continues to grapple with persistent infrastructure challenges, particularly in the energy sector, that constrain its economic growth. In this landscape of urgent need, China has emerged as a major external actor, deploying vast capital resources through foreign direct investment (FDI) in South Africa's energy industry.

Chinese investments, however, follow a distinctly dualistic strategy: financing large-scale, traditional coal-fired power projects while simultaneously becoming a key player in the rapidly expanding renewable energy market. This duality presents a complex puzzle concerning the underlying drivers and strategic intentions behind China's infrastructure- and energy-focused capital flows, not only in relation to South Africa but also within the broader BRICS context. As the bloc's largest economy, China effectively shapes its strategic trajectory, using the platform to deepen economic cooperation and advance its global interests through trade and investment. Meanwhile, resource-rich BRICS members, including South Africa, view FDI as a critical instrument for modernising and diversifying their economies. From this perspective, South Africa's membership in BRICS provides a unique and powerful channel for attracting Chinese investment, particularly in strategic sectors such as energy.

The dynamics of these investments cannot, however, be fully understood without considering the broader context of China's evolving strategy towards the rapidly expanding BRICS+ grouping. Against this backdrop, the next section takes stock of the scholarly debate on the determinants of Chinese FDI, outlining where existing explanations converge and where important gaps remain.

2. Literature review

The academic literature has extensively examined Chinese capital flows to BRICS economies, paying particular attention to their determinants. These include market size, economic growth rates, infrastructure quality and macroeconomic stability (Kapoor and Tewari, 2010; Biyase and Rooderick, 2018). Early empirical work by Vijayakumar, Sridharan and Rao (2010) also confirmed the statistical significance of variables such as GDP, infrastructure quality and gross capital formation. These findings align with the broader logic of capital flows from the Global North to the Global South, where large, fast-growing markets with stable business environments are attractive destinations for investment (Bose and Kohli, 2018).

This general framework requires significant refinement, however, since China acts here not as a recipient but as the dominant source (about 76%) of all intra-BRICS investment (authors' calculations based on the IMF CDIS, 2024). Nevertheless, this figure represents only about 1.5% of China's total capital exports and reflects careful selection of investment targets rather than the general attractiveness of the relevant markets (De Conti and Diegues, 2022). Infrastructure projects also receive priority attention, as they tend to create a "multiplier effect" by stimulating domestic investment and productivity in recipient countries (Tsaurai, 2022). This focus aligns with China's Belt and Road Initiative (BRI) and leverages financial mechanisms such as the Asian Infrastructure Investment Bank to meet the consistently high demand for infrastructure development across BRICS economies (Seniuk, 2024). As a result, the study of the determinants and drivers of Chinese FDI, as well as the investment motivations of multinational enterprises, extends beyond China's traditional market priorities and preferences. It requires consideration not only of the geoeconomic but also of the geopolitical dimensions of China's strategy for infrastructure development across Eurasia and for reshaping the global order.

A growing body of literature has sought to explain the key determinants of Chinese foreign direct investment in South Africa, consistently highlighting a confluence of resource-seeking and market-seeking motives. Although many studies continue to analyse such investments through a resource-seeking lens, they consider the abundance of natural resources – particularly coal and strategic minerals – as a primary pull factor for Chinese capital. Studies by Udi, Bekun and Adedoyin (2020) and Tuman and Shirali (2017) empirically link these endowments to investment inflows, positioning South Africa's resource wealth as a cornerstone of its appeal. Complementing this resource-driven logic is South Africa's significant market size and its role as an industrialised regional hub, which attract market-seeking investments aimed at serving both the domestic and the wider sub-Saharan African markets (Sanfilippo, 2010; Udi, Bekun and Adedoyin, 2020).

Within this broader investment landscape, the energy sector has emerged as a particularly important arena for Chinese FDI. Academic discourse indicates a dual focus in China's energy investment strategy: on the one hand supporting traditional fossil fuel projects and, on the other, increasingly participating in the renewable energy sector (Shen, 2020). This dual approach reflects both a pragmatic response to South Africa's immediate energy needs and a strategic positioning within the global clean energy transition (Shen and Power, 2017). The growing emphasis on renewables is not merely a financial play; it also serves as a vehicle for exporting China's technological advances in solar and wind power (Lema et al., 2021).

Alongside this, another group of studies focuses on the role of Chinese FDI as a conduit for technology transfer and knowledge spillovers, particularly in high-tech sectors such as renewable energy. These scholars argue that such investments can enhance local technological capabilities and improve energy efficiency, provided that the host country possesses sufficient absorptive capacity to integrate and utilise new technologies effectively (Berhe, Huang and Wedajo, 2022; Hu, You and Esiyok, 2021). The effectiveness of this process, however, is largely mediated by the institutional and policy environment. A stable and favourable policy framework has been shown to strengthen FDI inflows and amplify their positive impact on economic growth (Zakari and Khan, 2021), whereas institutional fragmentation can significantly constrain the scalability and overall success of investment projects, particularly within the complex renewable energy market (Chiyemura et al., 2023). Building on these insights, a research strategy is developed that combines panel data modelling with case analysis to adjudicate between competing explanations.

3. Purpose and methodology of study

Building on this foundational overview, the objective of this study is to identify the key determinants of Chinese FDI in BRICS countries and apply them to the specific case of Chinese investments in South Africa, with a primary focus on the energy sector. This approach enables it to address a critical question: how does the duality of Chinese FDI in South Africa's energy sector reflect China's strategic adaptation within the BRICS framework? Specifically, the study examines whether these flows follow a pragmatic logic of advancing distinct geoeconomic interests –securing resources through coal projects while capturing new technology markets through renewables – rather than a uniform model of development cooperation, thereby linking the methodology to the broader trends described above.

To answer this question, the study employs a mixed-methods research design structured in two sequential stages. First, a quantitative analysis using a panel data regression model identifies the general determinants of Chinese FDI across BRICS countries. Second, a qualitative case study analysis of major investment projects in South Africa's energy sector illustrates and contextualises the mechanisms behind the quantitative findings.

This paper makes a threefold contribution to the literature. First, it moves beyond the binary "infrastructure-for-resources" debate by providing a strategic interpretation of Chinese FDI, demonstrating how state-led and market-oriented motives coexist within a single sector. Second, it empirically tests these determinants within the BRICS+ context, treating the bloc not merely as a political grouping but as a distinct geoeconomic space for Chinese capital expansion. Third, by reconciling quantitative panel data with qualitative case studies, it explains the apparent paradox whereby renewable energy variables appear statistically insignificant in aggregated data yet drive major recent investment deals.

The theoretical foundation of the quantitative model is Dunning's eclectic (OLI) paradigm, which organises the drivers of FDI into three categories: ownership (O), location (L), and internalisation (I) advantages. For the purposes of econometric modelling, the analysis focuses on the location (L) advantages of host countries, as these represent measurable "pull" factors that attract investment. These factors reflect four primary motivations for FDI: market-seeking, resource-seeking, efficiency-seeking and strategic-asset-seeking.

While the OLI paradigm was originally developed on the basis of Western multinational corporations, it remains a valuable analytical framework for studying Chinese FDI, provided that its distinctive characteristics are taken into account. The significant role of the Chinese state, state-owned enterprises (SOEs) and policy banks enhances the ownership (O) advantages of Chinese firms, particularly through access to preferential financing. Furthermore, Chinese investors often display a higher tolerance for institutional risk in host countries, mitigating it through bilateral government agreements – an approach that modifies their internalisation (I) advantages (Breslin, 2010; Bräutigam, 2011). These nuances underscore the need for qualitative analysis to complement the econometric model. The study's panel data model is specified in Equation 1:

$$sFDI_{it} = \beta_0 + \beta_1 X_{it-1} + \alpha_i + \mu_{it} \tag{1}$$

Where:

- $sFDI_{it}$ is the dependent variable, representing the stock of Chinese FDI in host country i in year t. Following established literature (Iqbal et al., 2019; Mumtaz and Smith, 2019), FDI stock rather than annual flows is employed. This is deliberate: stock data smooth out the high volatility of annual flows – often distorted by single large transactions – and better capture the long-term strategic commitment of investors, which lies at the core of our research question;

- β_0 is the constant term (intercept);.
- β_1 is the vector of coefficients to be estimated, indicating the magnitude and direction of the impact of independent variables on Chinese FDI stock;
- X_{it-1} is a vector of independent variables for country i at year $t-1$. A one-year lag is introduced to account for the time delay between observed economic conditions and subsequent investment decisions;
- α_i represents country-specific fixed effects;
- μ_{it} is the error term.

While the econometric model identifies statistically significant correlations, it cannot fully capture the strategic nuances of China's state-driven investment policy. To address this limitation, the quantitative findings are triangulated with a qualitative analysis of major Chinese investment projects in South Africa's energy sector. By examining representative cases in both coal-fired power generation and renewable energy development, this section demonstrates how the model's broad determinants operate in a real-world context. This mixed-methods approach enables a deeper exploration of the interplay between corporate motives and the geopolitical objectives embedded in China's investment strategy.

4. Trends in Chinese FDI in BRICS

As a preparatory step, the recent trajectory of Chinese FDI is mapped, drawing on official statistics from the Ministry of Commerce of the People's Republic of China (PRC) (MOFCOM) and data from the China Global Investment Tracker (CGIT) to provide a descriptive anchor for the model that follows. The most rapid rise in China's FDI stock in BRICS countries occurred in 2003–2008 (Figure 1), when the volume increased more than tenfold, driven by large deals in Russia's energy sector and the acquisition of a 20% stake in Standard Bank by the Industrial and Commercial Bank of China (ICBC) in South Africa. The share of BRICS in China's total FDI portfolio peaked in 2008 at almost 3%, but then steadily declined to 0.8% by 2023. The largest absolute increase in China's accumulated investment was observed in Russia in 2013–2015 (from USD 7.58 billion to USD 14.02 billion), but, after 2018, the FDI stock consistently decreased. Investments in Brazil, India and South Africa grew more moderately and have shown a trend towards stabilisation or a slight reduction in recent years.

Over the past 20 years, the total stock of Chinese investment in the four countries grew from about USD 160 million in 2003 to a peak of around USD 29 billion in 2018, after which it declined to USD 23.7 billion by 2023. By the end of 2023, Russia remained the largest recipient, with USD 10.7 billion (45% of the BRICS portfolio), but its share saw the sharpest decline after 2018 due to sanctions risks and economic stagnation. South Africa held second position (USD 5.8 billion, 25%), with the lion's share consisting of investments in the financial sector and mining. Brazil, with USD 3.9 billion (17%), saw relatively stable Chinese FDI inflows, supported by deals in the electricity and agribusiness sectors.

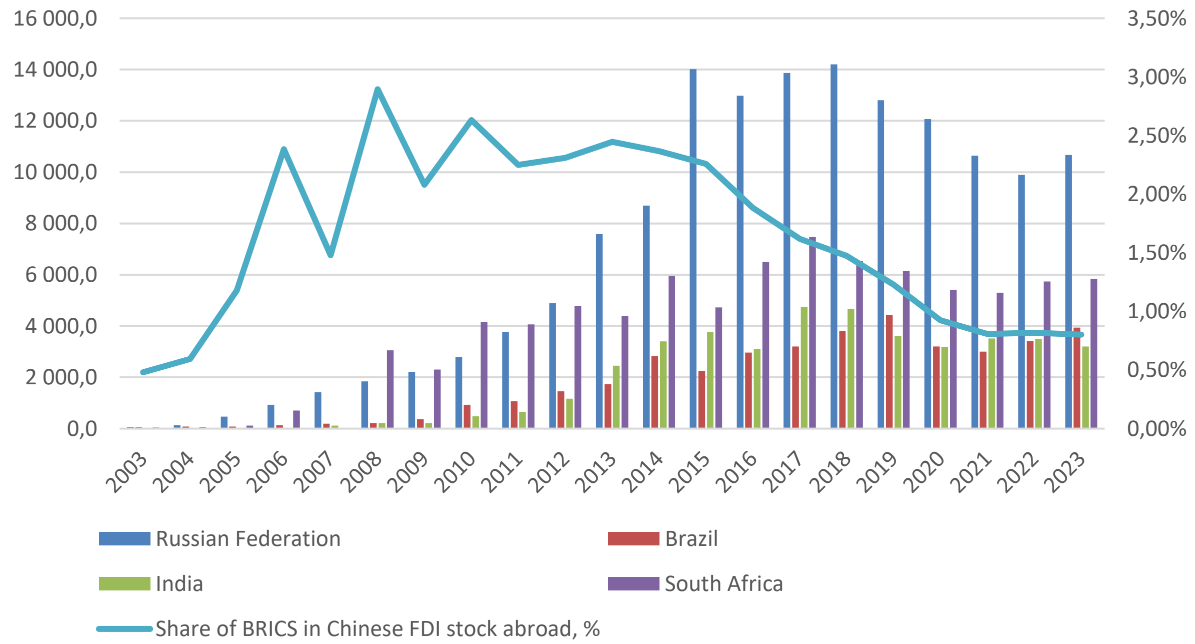

Figure 1: Dynamics of China's accumulated FDI stock in BRICS countries (USD million)
Source: Authors' compilation based on the Statistical Bulletin of China's Outward Foreign Direct Investment

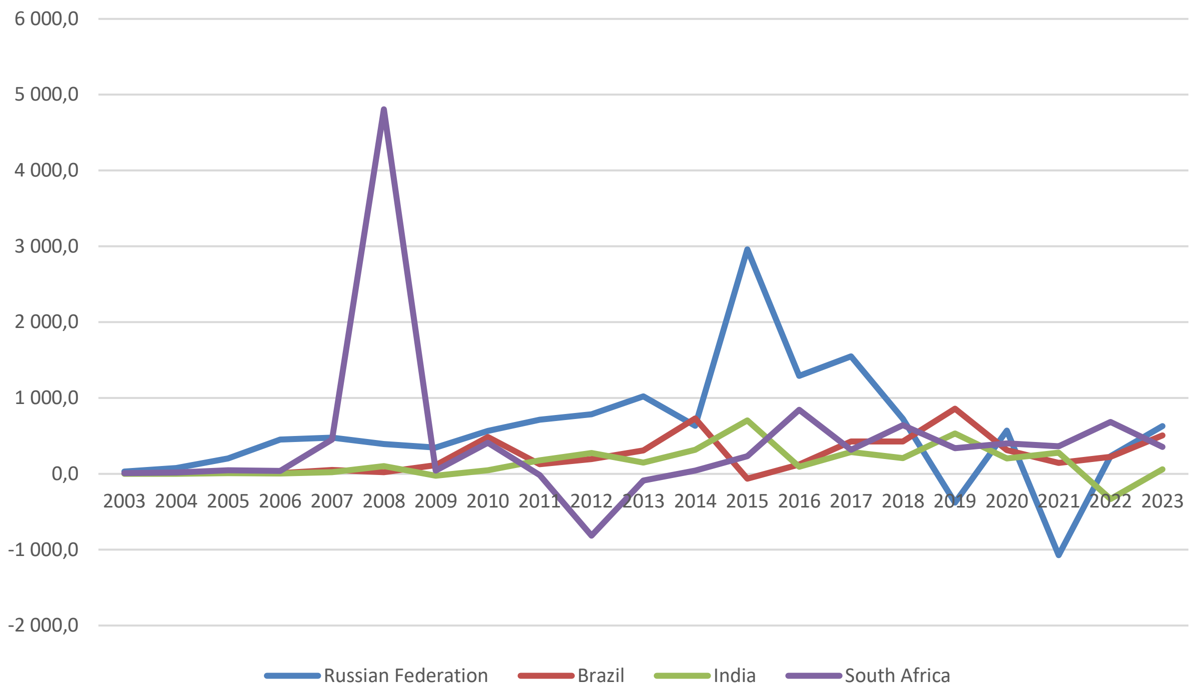

Figure 2: Dynamics of China's FDI flows in BRICS countries (USD million)
Source: Authors' compilation based on the Statistical Bulletin of China's Outward Foreign Direct Investment

India, which has accumulated USD 3.2 billion (13%) of Chinese FDI, has also maintained a relatively stable trajectory in recent years, driven by the growing interest of Chinese technology and manufacturing companies in the rapidly expanding Indian market.

Annual investment flows are characterised by high volatility (Figure 2). The largest single inflow was recorded in South Africa in 2008 (about USD 4.8 billion) at the time of the ICBC–Standard Bank deal. In Russia, the peak was observed in 2015, when about USD 3 billion was recorded due to CNPC and Chinese banks' participation in the Yamal LNG project. Brazil experienced a series of notable inflows in 2017–2019 (up to USD 0.9 billion per year) due to mergers and acquisitions M&A activity in the electricity distribution industry, whereas FDI flows to India fluctuated but remained generally positive, rarely exceeding USD 700 million. These fluctuations reflect the sensitivity of Chinese capital to external economic conditions and large-scale investment projects. In recent years (2019–2023), an unstable pattern is observed, with periods of both negative and positive investment flows. Negative flows – recorded, for example, in Russia in 2019 and 2021, and in India in 2009 – are typically driven not by new investment but by dividend payments, the repayment of intra-group loans, and the sale of individual assets.

The structure of these flows underscores the deal-driven nature of China's presence: without a few "anchor" M&A deals, annual inflows into each country rarely exceed USD 300–400 million, and year-to-year statistics can be radically altered by one or two large transactions. As a result, the aggregate portfolio grows in spurts, and its share of China's global FDI depends less on trends within BRICS and more on the pace of Chinese capital expansion in other regions.

Thus, Chinese investments in BRICS countries over the past two decades have demonstrated a heterogeneous pattern, with distinct periods of growth, stagnation and contraction. These dynamics are shaped by both the global economic environment and the specifics of China's economic and political interactions with each country. Examining these factors is necessary for a deeper understanding of the determinants of Chinese FDI in these countries.

Table 1 presents the sectoral distribution of Chinese foreign direct investment in the four BRICS states – Brazil, Russia, India and South Africa – based on aggregated data from the China Global Investment Tracker (American Enterprise Institute). The most notable feature of this structure is the extreme concentration of capital flows in the energy sector: it accounts for 57.3% of total monetary inflows, while its share by the number of projects is only 34.9%. This disproportion indicates the high capital intensity of energy deals (oil and gas fields, power-generation facilities and LNG projects), where each transaction is accompanied by significant financial investment.

Table 1: Sectoral distribution of China's FDI in Brazil, Russia, India and South Africa
Source: China Global Investment Tracker

Sector	*Share of flows (%)*	*Share of projects (%)*
Energy	57.3	34.9
Metallurgy	10.0	13.0
Transport	6.6	13.0
Financial sector	5.3	6.0
Real estate	4.4	9.9
Agriculture	4.3	5.3
Chemical industry	3.8	2.8
Consumer goods	2.4	4.9
Technology	2.1	5.6
Other	1.4	1.4
Tourism	0.7	0.7
Healthcare	0.6	0.4
Utilities	0.5	0.4
Logistics	0.3	0.7
Entertainment	0.3	1.1

The second position is held by metallurgy, accounting for 10% of flows and 13% of projects. While the transport sector has a comparable share of flows (6.6%), it exhibits higher project density (13%), indicating that transport involves more, but generally smaller, projects. The financial sector accounts for 5.3% of flows and 6% of projects, partly reflecting minority stake purchases in banks, such as ICBC's acquisition of its stake in Standard Bank.

Real estate, agriculture and the chemical industry occupy intermediate positions. Together, they account for 3.8–4.4% of flows and 2.8–9.9% of projects. Their comparatively high share of projects, alongside moderate investment volumes, suggests lower capital intensity and, in many cases, a pilot character. The consumer goods and technology categories have attracted less than 5% of total flows but account for 10.5% of projects, indicating a gradual expansion of China's presence in non-resource segments of BRICS economies.

Finally, sectors such as tourism, healthcare, utilities, logistics and entertainment represent narrow niches: each accounts for less than 1% of total flows and less than 1% of projects. This concentration confirms that China's strategic focus in BRICS countries remains on resource and infrastructure assets, while diversification into high-technology or service sectors is proceeding slowly and is highly targeted. Guided by these patterns, the next section formalises expectations within a fixed-effects framework.

5. Modelling determinants of Chinese FDI in BRICS

Our econometric analysis utilises a BRICS+ sample. The selection of this group is grounded in a specific geoeconomic logic that transcends the institutional heterogeneity of its members. While it is acknowledged that BRICS is not a formal treaty organisation with binding obligations, for China this grouping represents a coherent "strategic tier" for advancing its global alternative to Western-led development. Consequently, the rationale for this sample is not the similarity of recipient economies, but their shared function in China's foreign policy: serving as key nodes in the BRI and the Global Development Initiative. The inclusion of these diverse economies allows testing as to whether Chinese FDI follows a consistent strategic pattern across different institutional environments within China's priority geopolitical sphere.

It is important to note that the United Arab Emirates was excluded from the sample. The UAE's unique profile as a high-income economy with a highly developed financial infrastructure and an exceptionally favourable investment climate makes it an institutional outlier. Its inclusion would distort the model's focus on the determinants of Chinese FDI in the context of more typical developing economies, which face greater macroeconomic and institutional instability.

Description of variables

Table 2 outlines the variables used in the econometric model to identify what drives China's accumulated foreign direct investment stock (sFDI) in host countries. The dependent variable is the logarithm of FDI stock. This choice reflects the study's aim to analyse long-term investment strategies rather than short-term FDI flows. By focusing on FDI stock, the model captures the factors behind the sustained presence and consolidation of Chinese capital in partner countries.

The model's independent variables are grouped by OLI motives and adapted to the Chinese context. To test for market-seeking motives, GDP and GDP per capita are included. The efficiency-seeking motive is proxied by INCOMEdif (income ratio). Resource-seeking is captured by METALS, FUEL and ELECTRICITY, with the last of these reflecting China's strategic interest in green energy. The strategic-asset-seeking motive is represented by PATENT, which measures local technological competence. Finally, the institutional environment is assessed using the following indicators: POLIT (political stability), GOV (government effectiveness), CPI (inflation) and TRADEOPEN. This selection accounts for Chinese investors' selective sensitivity to institutional quality, as noted by Kolstad and Wiig (2012) and Shi et al. (2017).

Table 2: Description of variables in the model

	Variable	*Expected sign*	*Description of variables*	*Theoretical justification*	*Source*
Dependent variable	sFDI		Accumulated volume of foreign direct investment inflows into the host country's economy		MOFCOM
Independent variables	GDP	+	GDP of the host country in constant 2015 prices	Market-seeking	World Development Indicators
	GDPcap	+	GDP per capita in constant 2015 prices	Market-seeking	World Development Indicators
	METALS	+	Share of ores and metals exports in total merchandise exports	Resource-seeking	World Development Indicators
	FUEL	+	Share of fuel exports in total merchandise exports	Resource-seeking	World Development Indicators
	ELECTRICITY	+	Share of electricity produced from renewable sources	Strategic asset-seeking	World Development Indicators
	PATENT	+	Number of patents registered in the recipient country	Strategic asset-seeking	World Development Indicators
	INCOMEdif	+	Ratio of per capita disposable income between China and the host country	Efficiency-seeking	World Development Indicators
	TRADEOPEN	+	Trade openness: ratio of trade (exports + imports) to GDP	Macroeconomic environment	World Development Indicators, Trademap
	CPI	-	Consumer price index reflecting inflation level	Macroeconomic environment	World Development Indicators
	POLIT	+	Index of political stability and absence of violence/terrorism	Institutional environment	World Development Indicators, authors' calculations
	GOV	+	Government effectiveness score	Institutional environment	World Development Indicators

To ensure proper specification, several variables were transformed. The dependent variable sFDI, and the independent variables, GDP, GDPcap, METALS, FUEL, PATENT, and TRADEOPEN, are logarithmised to smooth their distributions and meet OLS assumptions. Variables with non-positive values (POLIT, GOV, INCOMEdif, CPI) were not transformed to avoid distorting their interpretation. Descriptive statistics (see Appendix 1) confirm that this transformation significantly reduced data dispersion. An analysis of the correlation matrix (see Appendix 2) revealed potential multicollinearity, notably between l_GDP and both l_GDPcap (0.6339) and l_FUEL (0.7286). Therefore, a formal variance inflation factor (VIF) test will be conducted.

5.1 Building and testing models

With the variables and hypotheses defined, the study proceeds to estimation and iterative model refinement. The initial fixed-effects model (Model 1) included the full set of theoretically justified variables (see Table 2). The number of observations for this and all subsequent models is 160.

A fixed-effects (FE) specification was selected over a random-effects (RE) specification because unobserved country-specific heterogeneity (such as historical political ties or specific regulatory environments) is likely correlated with the independent variables in the model. While the Welch test confirmed differing intercepts, the preference for FE is theoretically grounded in the need to control for omitted time-invariant characteristics. To address multicollinearity detected in the initial specification (with VIFs exceeding 10 for variables such as GDP per capita), a stepwise reduction strategy was used. Variables with the highest VIFs and the lowest theoretical contribution were sequentially excluded until the variance inflation factor for all remaining covariates fell below the conservative threshold of 5, ensuring stable coefficient estimates.

In subsequent specifications (Models 2–7), variables with the highest VIF values and the least significant coefficients were sequentially excluded. This process eliminated multicollinearity by Model 4 (where all VIFs were <5) while maintaining the model's high explanatory power.

All models employed robust Driscoll–Kraay standard errors (SCC) to ensure robustness to heteroskedasticity, autocorrelation and cross-sectional dependence. Diagnostic tests support the validity of these specifications. The Wooldridge test for autocorrelation does not reject the null hypothesis in any model ($p > 0.58$). The Pesaran CD test confirms cross-sectional dependence ($p < 0.0001$), justifying the use of SCC. The RESET test indicates an adequate functional form for all models at the 5% level ($p > 0.05$), except for Models 4 and 7. Finally, the Wald test reveals significant heteroskedasticity ($p < 0.0001$), further justifying the use of SCC.

Thus, gradual refinement of the model's variable structure yields more robust estimates. The coefficients begin to stabilise as early as Model 2, with the primary variables (l_GDP, l_METALS, l_FUEL, INCOMEdif and TRADEOPEN) remaining significant.

Table 3: Estimation results of the models for he BRICS+ group

Variable	*Model 1*	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*
l_GDP	6.270** (2.727)	5.968*** (0.651)	6.112*** (0.652)	6.112*** (0.655)	6.088*** (0.632)	5.998*** (0.578)	6.150*** (0.544)
l_GDPcap	-0.428 (4.032)						
l_METALS	0.598 (0.362)	0.605* (0.336)	0.630* (0.323)	0.636* (0.309)	0.621** (0.269)	0.629** (0.284)	0.664** (0.302)
l_FUEL	0.195** (0.088)	0.195** (0.090)	0.188* (0.090)	0.190** (0.088)	0.194** (0.088)	0.187** (0.084)	0.175* (0.101)
ELECTRICITY	0.051 (0.036)	0.052 (0.037)	0.050 (0.036)	0.051 (0.036)	0.052 (0.035)	0.058 (0.034)	
l_PATENT	0.103 (0.323)	0.103 (0.324)					
INCOMEdif	0.105* (0.057)	0.106* (0.058)	0.106* (0.057)	0.102* (0.052)	0.103* (0.052)	0.093* (0.053)	0.098* (0.053)
l_TRADEOPEN	1.640*** (0.366)	1.626*** (0.412)	1.644*** (0.422)	1.618*** (0.474)	1.571*** (0.415)	1.581*** (0.431)	1.795*** (0.415)
CPI	-0.006 (0.015)	-0.006 (0.015)	-0.007 (0.015)	-0.005 (0.017)			
POLIT	-0.042 (0.201)	-0.063 (0.256)	-0.075 (0.235)				
GOV	-0.426 (0.644)	-0.442 (0.529)	-0.437 (0.514)	-0.491 (0.366)	-0.469 (0.365)		
R^2 (within)	0.804	0.804	0.804	0.804	0.804	0.802	0.793
AIC	424.8	422.8	421.0	419.1	417.3	416.9	421.8
RESET (p)	0.251	0.154	0.278	0.048	0.074	0.068	0.012
Pesaran CD (p)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Wooldridge (p)	0.597	0.600	0.587	0.576	0.589	0.601	0.601
Wald (p)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
VIF max	28.3	25.7	5.1	5.0	4.5	4.5	4.5

Levels of significance:
*** – $p < 0.01$; ** – $p < 0.05$; * – $p < 0.10$

Based on all criteria, Model 6 was selected as the final model, with the specification given in Equation 2:

$$\begin{aligned}\ln(sFDI_{it}) &= 5.998^{***} + 0.629^{**} \cdot \ln(\mathrm{METALS}_{it-1}) + 0.187^{**} \cdot \ln(\mathrm{FUEL}_{it-1}) + 0.058 \cdot \mathrm{ELECTRICITY}_{it-1} + 0.093^{*} \\ &\cdot \mathrm{INCOMEdif}_{it-1} + 1.581^{***} \cdot \ln(\mathrm{TRADEOPEN}_{it-1}) + \alpha_i + \varepsilon_{it},\end{aligned} \quad (2)$$

where α_i is the country-specific fixed effect; and ε_{it} is the error term.

This specification represents a balanced option, combining high explanatory power ($R^2 = 0.800$), coefficient stability, and interpretable results. The key variables retained in the model are:

- l_GDP: size of the economy (market-seeking)
- l_METALS & l_FUEL: resource endowments (resource-seeking)
- ELECTRICITY: a proxy for investment in renewable energy, reflecting a strategic market-seeking motive aimed at exporting Chinese green technologies and establishing a long-term presence in the host country's power sector.
- INCOMEdif: relative costs (efficiency-seeking)
- l_TRADEOPEN: the level of economic openness

The model demonstrates the lowest AIC value (416.9) among all specifications, is free of multicollinearity (max VIF = 4.5), passes the RESET test at the 5% significance level (p = 0.068), and retains statistically significant coefficients for all included variables. Unlike Model 7, where the RESET test indicates specification errors, Model 6 maintains an adequate functional form while remaining sufficiently parsimonious.

6. Case study of Chinese FDI in South Africa's energy sector

While the panel estimates identify broad regularities, they cannot, on their own, reveal mechanisms; they are therefore complemented here with case studies from South Africa's energy sector. The sector has been in a precarious state for over fifteen years, historically dominated by the state-owned utility Eskom, which operated as a monopoly in generation, transmission and distribution (Eskom, 2025). A combination of underinvestment in new-capacity and poor maintenance of its ageing coal fleet led to a severe decline in power supply reliability (Energize, 2023). In response, the South African government initiated reforms to liberalise the market, most notably the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in 2011, designed to attract private investment (Energize, 2023).

Recent legislative reforms, such as the Electricity Regulation Amendment Act, are set to further dismantle Eskom's vertical monopoly by establishing an independent transmission system operator. This move creates a more competitive market in which generators can sell directly to consumers, offering significant opportunities for new investors (Wang, 2025). This reformed environment serves as a key "pull factor" for foreign capital seeking entry into one of Africa's largest energy markets.

As the continent's most industrialised nation, a BRICS member, and an early signatory to a 2015 memorandum on the BRI (DIRCO, 2023), South Africa has become a priority destination for Chinese investment. China's energy engagement in the country has followed two main tracks: a "resource track" focused on securing primary energy resources, and an "electrification track" aimed at supporting infrastructure development to expand the market presence of Chinese firms (Moses et al., 2024).

6.1 Beijing Jingmei (Haohua Energy) and Coal of Africa (2012)

In 2012, Haohua Energy International (HEI), a subsidiary of the state-owned Beijing Jingmei Group, announced an investment of USD 100 million to acquire a stake in Coal of Africa (CoAL), which was experiencing serious financial difficulties.

The primary motive was strategic access to resources. For CoAL, this investment was a lifeline, providing the capital needed to develop its projects, particularly the large Makhado coking coal deposit (Howe, 2014). For HEI, the deal secured a significant share in a company with substantial coal assets and, as CoAL's then CEO stated, "direct access to the world's largest coking coal market", meaning the Chinese market (*African Review of Business and Technology*, n.d.).

The deal allowed CoAL to stabilise its financial position, but it also marked a significant entry of Chinese state capital into South Africa's coal sector, which had previously been dominated by Western and local companies (Argus Media, 2013).

6.2 Qingdao Hengshun and the Makhado project (2015)

In December 2015, Qingdao Hengshun Zhongsheng Group, an industrial conglomerate listed on the Shenzhen Stock Exchange, signed a non-binding memorandum of understanding (MoU) to invest approximately USD 114 million in exchange for a 34% stake in Baobab Mining and Exploration, a subsidiary of CoAL that held the rights to the Makhado project. A key condition of the deal was that Hengshun be awarded the EPC contract to build the project, valued at approximately USD 400 million (Mining Technology, 2015).

This deal illustrates a more complex strategy. Hengshun was not simply seeking to acquire a stake in a resource asset, but also to secure a major construction contract. This "investment-for-EPC" model allows the Chinese company to profit from both the mine's long-term value and the immediate revenue from its construction. For Hengshun, which originally specialised in electric power equipment, this represented a step towards diversification and entry into foreign markets under the BRI framework, including the development of industrial parks and mining projects (Liu and Xie, 2016).

The deal was expected to be a decisive step towards launching the Makhado project, which was projected to deliver significant volumes of coking and thermal coal. However, the non-binding memorandum does not appear to have been converted into a final agreement. In subsequent reports from CoAL (later renamed MC Mining), the company continued to seek financing for Makhado, and the deal with Hengshun was no longer mentioned. Ultimately, in 2024, MC Mining was acquired by another Chinese firm, Kinetic Development Group, confirming continued Chinese interest in the project (McKay, 2024).

6.3 China Guodian (Longyuan Power) and the De Aar Wind Farms (2015)

China Longyuan Power Group, a subsidiary of China Guodian Corporation (now part of China Energy Investment Corporation), invested approximately ZAR 2.5 billion (around USD 380 million at the time) in the development, construction and operation of the De Aar Wind power projects (Phases I and II) in the Northern Cape province. With a total capacity of 244.5 MW, these wind farms became the largest in South Africa at the time of their commissioning in 2017 (Nedopil Wang, 2019).

This project was a landmark case of a Chinese SOE acting as a lead developer in a foreign market. The investor's motivation was to secure a long-term, stable revenue stream from electricity sales, establish a foothold in Africa's most promising renewable energy market, and showcase Chinese wind turbine technology and operational expertise. At the same time, the project generated significant local spillovers, countering criticisms of Chinese "enclave" operations. During construction, the project created over 700 jobs for the local community. Longyuan also implemented a long-term "technology transfer" strategy, sponsoring technical training for over 100 local engineering students and establishing a scholarship programme valued at approximately ZAR 4.5 million annually to support higher education for local youth (Xinhua, 2023).

6.4 PowerChina and the Damlaagte Solar PV Plant (2023)

In July 2023, the state-owned corporation PowerChina (Guizhou Engineering, operating under the Sinohydro brand) signed an EPC contract and an O&M agreement for the construction of the Damlaagte ground-mounted solar photovoltaic (PV) plant in South Africa (PowerChina, 2023).

The project's initial capacity was announced as 123 MW, and the contract was presented as the first large-scale ground-mounted PV project signed by a Chinese company in the country. The site is located in the Free State province, approximately 20 km west of Sasolburg, and is planned to connect to Eskom's Scafell substation via a 132 kV power line, as part of the overhead power line (OHPL) for Ilikwa and Damlaagte approved in the EIA documentation (PowerChina, 2023).

According to official announcements, the project aims to supply around 300 million kWh of 'green' electricity annually and help overcome South Africa's power deficit. South Africa is the largest and most power-deficient market in Africa, where the expansion of private and corporate demand for renewables (alongside the REIPPPP) creates a showcase for subsequent EPC/O&M contracts for Chinese companies. In 2023, PowerChina itself directly linked the Damlaagte project to strengthening its market presence and contributing to the country's "clean and green" transition (Hakeenah, 2023). Ultimately, for the company, this signifies a strengthening of its position in the South African energy market and the opening of new opportunities for penetration, particularly through the export of engineering services, scaling up supply chains for Chinese PV equipment, and providing standardised EPC solutions in a market with high readiness for new capacity additions (corporate PPAs/RESA deals).

Beyond energy supply, the project emphasises local economic integration in compliance with REIPPPP requirements. According to the project developer, the construction phase mobilised significant local employment, with a specific focus on sourcing labour from the nearby communities of Tumahole and Schonkenville (Mainstream Renewable Power, 2023). Unlike earlier models that relied on importing Chinese labour, this project reflects a maturing strategy in which Chinese contractors such as PowerChina increasingly rely on localised supply chains and skills transfer to align with Broad-Based Black Economic Empowerment standards.

7. Analysis and discussion

Taken together, the cases illuminate how market-, resource- and efficiency-seeking motives interact. These findings are now synthesised and their implications discussed. The econometric modelling reveals a complex motivational structure that shapes the distribution of China's FDI across BRICS+ countries. Model 6 shows that Chinese FDI is influenced simultaneously by multiple motives. South Africa's energy sector, with its diverse investment projects, serves as a microcosm illustrating these drivers in practice.

The high statistical significance of the l_GDP and l_TRADEOPEN variables underscores that the size and openness of an economy are key 'pull factors.' However, the resource-oriented nature of Chinese investment is even more pronounced in the data, confirmed by the significance of the coefficients for the l_METALS and l_FUEL variables. This pattern is reflected in early Chinese investments in South Africa's coal sector. For instance, the Haohua Energy deal to acquire a stake in Coal of Africa (2012) is a classic example of resource-seeking aimed at gaining strategic access to coking coal deposits. The more complex "investment-for-EPC-contract" model proposed by Qingdao Hengshun for the Makhado project (2015) illustrates how resource-seeking can be combined with market-seeking: the Chinese company sought not only access to resources but also a major construction contract, a characteristic of an approach dominated by large state-owned enterprises.

An interesting result is the significance of the INCOMEdif variable, which supports the presence of an efficiency-seeking motive. While this motive is traditionally associated with the relocation of labour-intensive manufacturing, in South Africa it can be interpreted more broadly. Securing EPC and O&M contracts – as in the case of PowerChina and the Damlaagte plant – can be understood as a form of efficiency-seeking by Chinese engineering and industrial companies that face overcapacity in their domestic market and are eager to export services and equipment.

The ELECTRICITY variable – a proxy for interest in renewable energy – yields telling results. The results indicate that this variable is not statistically significant in the final specification. It is interpreted here not as a lack of strategic interest but as a temporal lag between policy intent and capital accumulation. The econometric model, based on FDI stock (accumulated value), primarily reflects the historical dominance of coal-fired generation and the heavy-industry characteristics of the 2002–2021 period. In contrast, the qualitative case studies capture recent flows and forward-looking strategic shifts towards renewables that have accelerated only since 2021. Thus, a discrepancy exists: while past investment stock was overwhelmingly resource-driven (coal), the current strategic trajectory is increasingly technology-oriented (renewables), a trend that aggregated historical data has yet to fully capture.

That said, the qualitative analysis of the South African case studies demonstrates the current relevance of this investment direction. Large-scale, successful projects, such as the construction of the De Aar Wind Farms by China Longyuan Power and PowerChina's contract for the Damlaagte plant, show that renewable energy has already become a key strategic area for Chinese investment.

Returning to the study's key research question – whether Chinese FDI is an instrument of mutually beneficial co-development or a pragmatic mechanism for advancing the PRC's geoeconomic interests – this study finds that the results support the latter interpretation. South Africa's energy sector provides clear evidence in this regard. The "dual strategy" observed here is not a balance between two equal goals but rather a flexible tool for advancing China's national interests, adapted to specific conditions.

Investments in coal-fired generation enhance resource security and strengthen China's position in a partner country's critical infrastructure, reinforcing the importance of resource-seeking factors in the model. In contrast, investments in renewable energy expand markets for Chinese technology, EPC contracts and capital – rather than primarily contributing to South Africa's "green" transition.

Thus, both branches of this strategy serve a single purpose: advancing China's interests pragmatically. Although South Africa receives certain benefits (financing for much-needed capacity), the primary structure of these investments deepens dependence on Chinese capital and engineering solutions rather than promoting technological modernisation. This aligns with the conclusions of the study's econometric analysis, in which variables related to market size and resources (l_GDP, l_METALS, l_FUEL) proved dominant, while technological factors (l_PATENT) showed no consistent significance.

8. Conclusion

The central findings of the study and their policy and scholarly implications are summarised here. The study set out to identify the key determinants of Chinese FDI in BRICS countries, focusing on

South Africa's energy sector as a case study to address a critical question: is Chinese FDI a tool for mutual co-development or a pragmatic mechanism for advancing the PRC's geoeconomic interests? The mixed-methods analysis shows that the latter prevails. The findings reveal a pragmatic dual strategy in South Africa, where investments in traditional coal-fired power serve China's resource security interests, while investments in renewable energy create new markets for Chinese green technologies and engineering services. Both branches of this strategy, while providing certain benefits to the host country, primarily advance China's national interests. This conclusion is supported by both the econometric model, which highlights the dominance of market- and resource-seeking motives, and the qualitative analysis of specific investment deals.

Several limitations should be acknowledged. First, the econometric analysis relies on aggregated, country-level FDI data, which may not capture the nuances of firm-level decisions. Second, the data series for the model ends in 2021, potentially before the recent acceleration in green energy investments could be fully reflected as a statistically significant trend. Finally, while the focus on South Africa's energy sector provides deep insights, the findings may not be generalisable to other sectors or to other African countries with different institutional contexts.

These limitations open several avenues for future research. An updated quantitative analysis using post-2021 data would be valuable for testing the hypothesis that the renewable energy variable is now statistically significant. Furthermore, research should move beyond analysing the determinants of FDI to assessing its long-term impacts on host countries, particularly with regard to electricity tariffs, local employment and potential technological lock-in. A significant extension of this research, given the geostrategic context identified, would be to apply a gravity model to analyse FDI flows, complementing the OLI framework. Such a model could also incorporate the logic of 'win-win' expectations, testing the hypothesis that such outcomes are unlikely in asymmetrical relationships. This aligns with the critique that, within a classic neoliberal approach, the primary benefits accrue to the economically stronger actor (China) unless a geostrategic framework of developmentalism (Seniuk, 2025) is explicitly incorporated.

Moreover, future comparative studies (such as those comparing South Africa with a non-BRICS African country) should account for a critical specificity of the China–South Africa case: the interaction involves one country that has completed industrialisation (China) and one that has not (South Africa). This disparity, which is not captured in the broader BRICS analysis, fundamentally shapes the nature of investment cooperation and development potential.

Finally, a crucial direction for future research is to include a determinant that is central to FDI: the "fixed asset base". A deeper analysis should examine the objective need for fixed capital in South Africa's energy sector and the specific role Chinese FDI plays in restructuring it, moving beyond motivational analysis towards a more structural approach.

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Appendix 1: Descriptive statistics of variables

Descriptive statistics of variables before logarithmic transformation

Variable	*Mean*	*Median*	*Std. Dev.*	*Min.*	*Max.*
sFDI	3.11e+003	1.57e+003	4.22e+003	0.960	2.47e+004
GDP	8.07e+005	4.54e+005	6.69e+005	1.87e+004	2.78e+006
GDPcap	4.48e+003	4.02e+003	2.92e+003	253.00	1.02e+004
METALS	8.23	5.72	7.97	0.126	37.8
FUEL	18.7	11.6	19.2	8.44e-007	70.6
ELECTRICITY	3.11	1.21	4.90	-17.0	22.1
PATENT	1.60e+004	9.47e+003	1.57e+004	4.00	6.16e+004
INCOMEdif	2.78	1.40	4.09	-12.0	14.1
TRADEOPEN	45.0	46.3	10.6	22.1	71.7
CPI	9.70	7.08	7.82	-0.692	44.4
POLIT	-0.880	-0.869	0.544	-2.18	0.328
GOV	-0.277	-0.321	0.342	-1.07	0.608

Descriptive statistics of variables after logarithmic transformation

Variable	*Mean*	*Median*	*Std. Dev.*	*Min.*	*Max.*
l_sFDI	6.84	7.36	2.01	-0.0408	10.1
l_GDP	13.1	13.0	1.17	9.83	14.8
l_GDPcap	8.08	8.30	0.954	5.53	9.23
l_METALS	1.63	1.74	1.09	-2.07	3.63
l_FUEL	1.31	2.45	3.48	-14.0	4.26
ELECTRICITY	3.11	1.21	4.90	-17.0	22.1
l_PATENT	8.55	9.16	2.34	1.39	11.0
INCOMEdif	2.78	1.40	4.09	-12.0	14.1
l_TRADEOPEN	3.77	3.83	0.263	3.10	4.27
CPI	9.70	7.08	7.82	-0.692	44.4
POLIT	-0.880	-0.869	0.544	-2.18	0.328
GOV	-0.277	-0.321	0.342	-1.07	0.608

Appendix 2: Correlation matrix of variables

l_sFDI	*l_GDP*	*l_GDPcap*	*l_METALS*	*l_FUEL*	
1.0000	0.3516	0.3939	0.2028	0.1506	l_sFDI
	1.0000	0.6339	0.5241	0.7286	l_GDP
		1.0000	0.6343	0.6492	l_GDPcap
			1.0000	0.6700	l_METALS
				1.0000	l_FUEL

ELECTRICITY	*l_PATENT*	*INCOMEdif*	*l_TRADEOPEN*	*CPI*	
0.2207	0.3224	-0.0776	-0.0348	-0.0388	l_sFDI
0.4136	0.9384	-0.6312	-0.2224	-0.3062	l_GDP
0.1730	0.7434	-0.7797	-0.0758	-0.1405	l_GDPcap
0.3202	0.6279	-0.6320	0.0516	-0.3762	l_METALS
0.2430	0.7811	-0.7861	0.1791	-0.3822	l_FUEL
1.0000	0.2616	-0.2301	-0.3123	-0.2399	ELECTRICITY
	1.0000	-0.7526	-0.0307	-0.2496	l_PATENT
		1.0000	-0.1161	0.1988	INCOMEdif
			1.0000	0.1241	l_TRADEOPEN
				1.0000	CPI

POLIT	GOV	
0.1856	0.2287	l_sFDI
0.4061	0.4230	l_GDP
0.6150	0.2917	l_GDPcap
0.6768	0.6220	l_METALS
0.4420	0.4363	l_FUEL
0.2081	0.1217	ELECTRICITY
0.4569	0.4722	l_PATENT
-0.4304	-0.2900	INCOMEdif
-0.1325	0.0467	l_TRADEOPEN
-0.4825	-0.4645	CPI
1.0000	0.6637	POLIT
	1.0000	GOV