

IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH: A COMPARATIVE EMPIRICAL ANALYSIS OF BRICS COUNTRIES

A Thesis

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Declaration

I, **Avisha** hereby declare that the thesis entitled, “**Impact of Foreign Direct Investment on Economic Growth: A Comparative Empirical Analysis of BRICS Countries**” submitted to Thapar Institute of Engineering and Technology (Deemed to be University), Patiala, in fulfilment of the requirements for the award of the degree of **DOCTOR OF PHILOSOPHY** in **ECONOMICS**, is a record of the original research work carried out by me under the guidance and supervision of **Dr. Ash Narayan Sah**, Associate Professor, School of Humanities and Social Sciences, Thapar Institute of Engineering and Technology. The matter embodied in this thesis has not been submitted in part or full to any other institute for the award of any degree.



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Certificate

This is to certify that the thesis entitled, “**Impact of Foreign Direct Investment on Economic Growth: A Comparative Empirical Analysis of BRICS Countries**” which is being submitted by Mrs. Avisha, in fulfilment of the requirements for the award of the degree of **DOCTOR OF PHILOSOPHY in ECONOMICS**, is a record of the candidate’s original research work carried out under my supervision and guidance. The matter embodied in this thesis has not been submitted in part or full to any other institute for the award of any degree. I also certify that she has complied with the Plagiarism Guidelines of the University.



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“Be grateful for challenges because... had there been no difficulties and no thorns in the way, then man would have been in his primitive state and no progress made in civilization and mental culture.” – B.R. Ambedkar

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Abstract

The increasing globalization of economies has led to a significant rise in cross-border capital flows, with Foreign Direct Investment (FDI) emerging as a crucial driver of economic growth. FDI not only provides financial resources but also facilitates technology transfer, enhances human capital development, and integrates host countries into global value chains. Developing economies, in particular, seek FDI to bridge investment gaps, boost industrialization, and stimulate economic modernization. The present study investigates the dynamic relationship between FDI inflows, economic growth, and key macroeconomic determinants in the BRICS nations: Brazil, Russia, India, China, and South Africa, over the period 1991 to 2020. The BRICS economies represent some of the world's most dynamic emerging markets, collectively contributing significantly to global GDP and trade. The primary objectives are to examine the impact of FDI on economic growth, identify and evaluate the factors influencing FDI inflows, and analyse the short- and long-term coupling effects between FDI and economic growth. The research aims to fill a significant gap in the literature by focusing on this crucial group of emerging economies, given their economic importance in the world economy in the coming decades. Using an extensive dataset sourced from World Bank Indicators, OECD Statistics, and the Penn World Table (Version 10.0), the study employs Method of Moments Quantile Regression (MMQR) and Wavelet Coherence (WTC) analysis to uncover nuanced insights. The study explicitly accounts for the heterogeneity among BRICS nations by employing the Method of Moments Quantile Regression (MMQR) with fixed effects, a technique recently introduced by Machado and Silva (2019) that effectively addresses cross-sectional dependence and unobserved heterogeneity. It further incorporates wavelet coherence analysis, an innovative approach in the field of economics, to explore short-term and long-term dynamics between FDI inflows and its determinants by mapping the patterns of temporal intersections of their relationship.

The results of cointegration highlight that there is a long-term relationship between FDI inflows and economic growth in BRICS economies. The MMQR results further reveal that GDP, Trade Openness (TO), Institutional Quality (INSQ), and Information and Communication Technology (ICT) positively and significantly influence FDI inflows, underscoring their importance as critical drivers. Conversely, Exchange Rate (EXR) volatility and Total Factor Productivity (TFP) exhibit a negative impact, indicating the necessity of stable exchange rate regimes and efficient resource utilization for attracting foreign investment. Wavelet Coherence

analysis further highlights the dynamic, time-frequency relationships between FDI and its determinants, revealing short-term coherence (4-8 years) is most pronounced across variables, particularly for GDP, TFP, TO, and ICT, indicating strong immediate interactions with FDI inflows. Medium-term coherence (8-16 years) shows varied relationships, with trade openness and institutional quality displaying intermittent associations. Long-term coherence (16-32 years) is generally weaker across variables, though GDP and TFP exhibit slightly more stable long-term impacts compared to exchange rate, human capital, institutional quality, trade openness, and ICT. This suggests that these factors' influence is more pronounced in the short run.

The findings emphasize the need for BRICS nations to sustain economic growth through structural reforms, enhance trade openness, improve institutional quality, stabilize exchange rates, and invest in ICT and human capital to foster sustainable FDI inflows. Policymakers should adopt measures to stabilize currency fluctuations and provide a conducive investment climate for foreign investors. Although this study focuses on the original BRICS nations, future research could expand the scope to include the recently added BRICS members, examine sector-specific FDI inflows, and explore industry-level dynamics to provide more targeted policy recommendations.

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List of Abbreviations

ADF	Augmented Dickey-Fuller
ARDL	Autoregressive Distributed Lag
CADF	Cross-sectional Augmented Dickey-Fuller
CD	Cross-sectional Dependence
CEEC	Central and Eastern European Countries
CGR	Compound Growth Rate
CIPS	Cross-sectional Im, Pesaran, and Shin
ECOWAS	Economic Community of West African States
EU	European Union
EXR	Exchange Rate
FDI	Foreign Direct Investment
FPI	Foreign Portfolio Investment
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HC	Human Capital
ICT	Information and Communication Technology
IMF	International Monetary Fund
INSQ	Institutional Quality
LM	Lagrange Multiplier
LCU	Local Currency Unit
MENA	Middle East and North Africa
MMQR	Method of Moments Quantile Regression
MNCs	Multinational Corporations
MNEs	Multinational Enterprises
NDB	New Development Bank
OIC	Organization of Islamic Cooperation
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
PP	Phillips-Perron

PPPs	Public-Private Partnerships
PSTR	Panel Smooth Transition Regression
SAARC	South Asian Association for Regional Cooperation
SADC	Southern African Development Community
SEZs	Special Economic Zones
SSA	Sub-Saharan Africa
TFP	Total Factor Productivity
TO	Trade Openness
UNCTAD	United Nations Centre for Trade and Development
USD	United States Dollar
VIF	Variation Inflating Factor
WTC	Wavelet Transform Coherence
WDI	World Development Indicators
WGI	World Governance Indicators

CHAPTER 1

INTRODUCTION

The Introduction lays the foundation for this study by exploring the role of Foreign Direct Investment (FDI) in shaping economic growth and development, particularly in BRICS economies. Section 1.1 discusses how globalization has increased cross-border investments, with FDI emerging as a crucial driver of economic expansion, technology transfer, and employment generation. Section 1.2 defines what constitutes FDI, distinguishing it from other forms of international capital flows like portfolio investments. Section 1.3 categorizes FDI into different types like horizontal, vertical, and conglomerate investments. Section 1.4 describes different methods of FDI inflows, such as greenfield investments and brownfield investments, explaining how multinational enterprises expand their presence in foreign economies. These sections collectively establish the conceptual and theoretical basis for the study, highlighting the mechanisms through which FDI influences economic performance.

Building on this foundation, Section 1.5 discusses the key research problem, focusing on the varying impact of FDI on economic growth in BRICS countries. Section 1.6 frames key research questions that guide the study, while Section 1.7 aligns with these questions, aiming to empirically assess the relationship between FDI, economic growth and other macro variables in BRICS countries over short-term and long-term periods. Section 1.8 presents the hypotheses to investigate the given relationships, while Section 1.9 outlines the dataset covering BRICS nations from 1991 to 2020 and the econometric techniques employed, including the method of moments quantile regression (MMQR) with fixed effects and wavelet coherence analysis. Next, Section 1.10 highlights the significance of the study. Finally, Section 1.11 provides an overview of the study's structure, detailing how subsequent chapters cover literature, methodology, empirical results, and policy recommendations. Together, these sections establish the research framework, justifying the need for an in-depth analysis of FDI and economic growth relationship in the BRICS countries.

1.1 Background

The rapid expansion of globalization in recent decades has fundamentally transformed the world economy, eliminating trade barriers and fostering deeper economic integration among nations. Globalization has facilitated the free movement of goods, services, technology, and

capital across borders, allowing countries to participate in international trade more efficiently (Louzi & Abadi, 2011; Sarker & Khan, 2020). This process has been driven by advancements in technology, transportation, and communication, alongside policy reforms that encourage trade liberalization (Luu, 2023). The removal of trade restrictions and tariffs has enabled both developed and developing countries to engage in cross-border investments, fuelling economic growth and development (Basu et al., 2003; Lipsey & Sjöholm, 2011; Oumarou & Maiga, 2019). Among the various components of globalization, international capital flows have emerged as a critical driver of economic progress and development (Athari et al., 2020). The capital flows consist of different forms of investments, including portfolio investments, foreign aid, remittances, and Foreign Direct Investment (FDI) inflows. Among these, FDI plays a vital role by bridging resource gaps and facilitating economic growth due to its long-term nature and direct control over business operations in the host country (Zhang, 2001; Tabassum & Ahmed, 2014; Silajdzic & Mehic, 2016). Unlike portfolio investments, which involve passive holdings of financial assets, FDI entails the establishment of enterprises, mergers, acquisitions, and joint ventures that enable foreign investors to exert significant influence over the management and operations of businesses in the host economy. These investments are not only financial inflows but also vehicles for technological and managerial expertise transfer, making them essential for economic development (Adhikary, 2011; Sundae, 2017).

FDI inflows are particularly crucial for developing countries, as they serve as a key driver of economic growth and industrial development (Lee & Tan, 2006; Iamsiraroj, 2016; Sarker & Khan, 2020). Many developing economies face resource constraints, limited technological capabilities, and insufficient infrastructure, all of which hinder their economic progress. Additionally, low domestic savings in these countries often restrict the availability of funds for investment, making external capital inflows through FDI even more essential (Chaudhry, 2014). In such cases, FDI acts as a catalyst for bridging investment gaps and enhancing productivity. By attracting foreign investors, developing nations gain access to much-needed capital, technological advancements, and managerial expertise, which collectively contribute to improving their global competitiveness (Akinmulegun, 2012; Alvarado et al., 2017). The strategic importance of FDI in developing countries is further reinforced by its ability to stimulate industrialization, modernize production processes, and enhance overall economic efficiency (Marcin, 2008; Maryam & Jehan, 2018). As a result, governments worldwide actively promote policies to attract FDI, including tax incentives, relaxed regulatory frameworks, and investment-friendly economic reforms.

One of the primary advantages of FDI is technology transfer, which is pivotal in enhancing productivity and innovation in host countries (Antràs & Yeaple, 2014). Multinational corporations (MNCs) bring advanced technologies, production techniques, and research and development (R&D) expertise to the local firms (Sarker & Khan, 2020). Through partnerships, licensing agreements, and supplier relationships, domestic companies benefit from exposure to cutting-edge technologies, allowing them to improve their efficiency and competitiveness (Bitzer & Kerekes, 2008; Jude, 2016). The diffusion of new technologies across different sectors fosters industrial diversification and accelerates economic modernization (Jude, 2016). Moreover, technology transfer contributes to capacity building, equipping the local workforce with technical skills and expertise necessary to sustain long-term economic growth (Salim et al., 2017). FDI inflows also bring knowledge spillovers, enhancing human capital development and innovation in host countries. When foreign firms enter a new market, they introduce new business practices, management strategies, and operational efficiencies that local firms can adopt (Tan et al., 2023). This indirect transfer of knowledge occurs through employee mobility, supplier-buyer interactions, and competitive pressures that drive local firms to enhance their capabilities (Chan et al., 2024). The enhanced skills and expertise among the employees contribute to the overall knowledge pool of the economy.

FDI also leads to increased job opportunities and employment generation, which is crucial for socio-economic development, especially in labour-intensive industries (Inekwe, 2013). Foreign investments create direct employment by establishing new enterprises and expanding production facilities, thereby absorbing a significant portion of the local workforce (Luu, 2023). Additionally, indirect employment is generated through supply chain linkages, as local businesses providing raw materials, logistics, and support services benefit from increased demand (Yimer, 2023). The expansion of job opportunities not only reduces unemployment rates but also improves living standards by increasing household incomes and consumer spending (Chakraborty, 2018). Furthermore, foreign firms often provide higher wages, better working conditions, and skill development programs, contributing to an overall improvement in labour market conditions (Mahembe & Odhiambo, 2016). Another key advantage of FDI is its role in integrating host countries into global value chains (GVCs), which enhances their participation in international trade (Taglioni & Winkler, 2016). GVCs refer to the interconnected production processes where different stages of manufacturing and services are spread across multiple countries (Kano et al., 2020). When foreign investors establish operations in a host country, they connect local firms to global production networks, enabling them to specialize in specific segments of the value chain. This integration enhances export

potential, improves trade balance, and fosters greater economic resilience by reducing reliance on a single sector (Baldwin & Lopez-Gonzalez, 2015).

Historically, many countries, especially developing countries, were cautious about foreign investments due to concerns over economic sovereignty and the potential exploitation of local resources. Protectionist policies, trade barriers, and restrictive investment regimes were prevalent in many parts of the world (Gries & Redlin, 2020). However, the globalization wave in the late 20th century prompted a shift in economic policies, with countries recognizing the transformative potential of FDI (Joshua et al., 2020). In response, nations began liberalizing their economies to attract foreign investments. Liberalization measures included the relaxation of regulatory frameworks, allowing foreign investors to own substantial stakes in domestic enterprises and repatriate profits more freely (Aluko et al., 2021). Many countries established Special Economic Zones (SEZs) that offered tax incentives, streamlined regulations, and world-class infrastructure to attract FDI. Bilateral Investment Treaties (BITs) and multilateral agreements further facilitated cross-border investments by providing legal protections and dispute resolution mechanisms for foreign investors. Governments also encouraged public-private partnerships (PPPs) to fund large-scale infrastructure projects, leveraging foreign expertise and capital (Iqbal et al., 2014; Chakraborty et al., 2017).

Over the years, BRICS nations have implemented significant policy reforms to liberalize their economies and attract FDI inflows. Recognizing the role of FDI in fostering economic growth, these countries have adopted various measures, such as easing regulatory restrictions, offering tax incentives, and improving the ease of doing business (Mahbubani & Varigonda, 2021). Each BRICS country has pursued unique strategies tailored to its economic structure and development goals, but all share a common objective of making their economies more investment-friendly. Figure 1.1 illustrates the trends in FDI inflows in BRICS countries from 1991 to 2023, highlighting the increasing significance of foreign investments in these economies. The graph presents the annual FDI inflows (in million USD) for Brazil, Russia, India, China, and South Africa, revealing key trends over the period. Among these nations, China has consistently attracted the highest FDI inflows, particularly after the early 2000s, due to its economic liberalization, manufacturing growth, and strong integration into global value chains (UNCTAD, 2024a). China recorded the highest FDI inflows in 2021, with a remarkable value of 344 billion USD. India, on the other hand, has experienced a steady rise in FDI, particularly after implementing major economic reforms in the early 2000s that improved investment policies and the ease of doing business (Madaan et al., 2018; Rao & Dhar, 2018). Beginning at a modest 73 million USD in 1991, India's FDI inflows surpassed 20 billion USD

in 2006 and continued growing, reaching 50.6 billion USD in 2019. The highest recorded inflow was 64.4 billion USD in 2020, highlighting India's attractiveness to foreign investors. However, FDI declined slightly in 2023 to 28.1 billion USD, reflecting adjustments in global investment strategies and possible domestic economic shifts (Junuguru & Singh, 2023). Despite this dip, India has demonstrated resilience in maintaining a strong FDI growth trajectory over the years (Singh & Hoque, 2024).

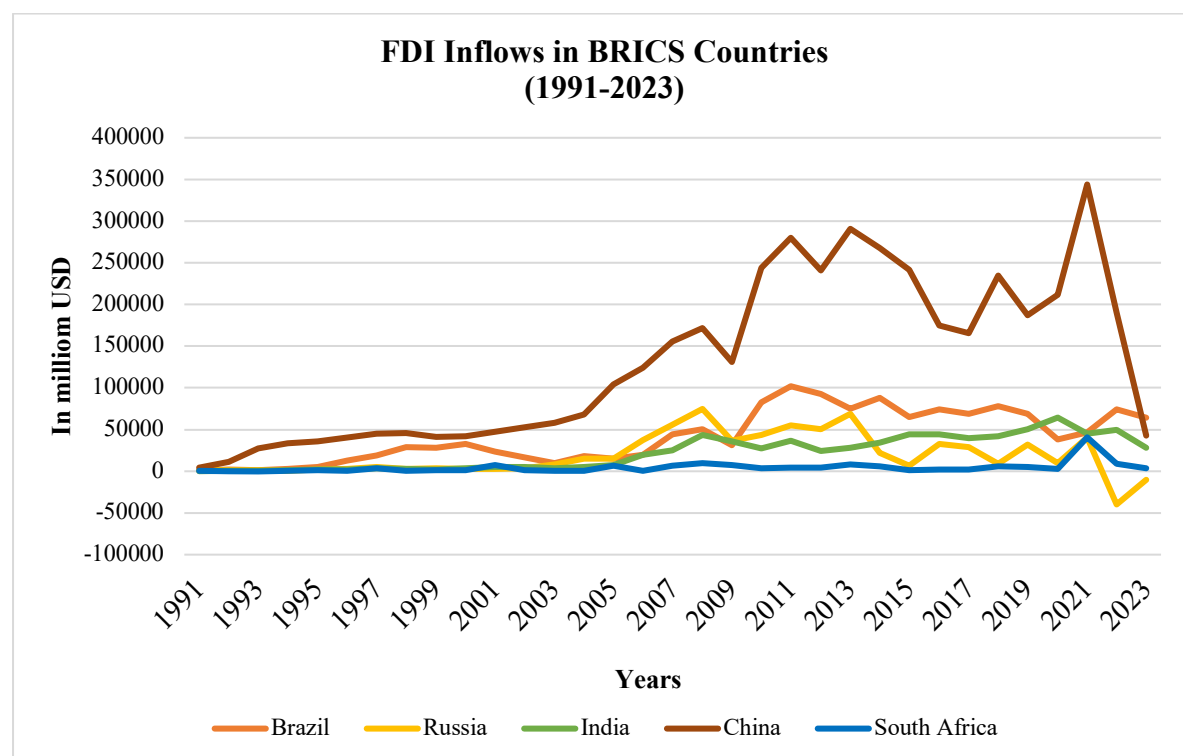


Figure 1.1 FDI Inflows in BRICS Countries
(Source: Compiled by the author)

Brazil, the largest economy in Latin America, experienced considerable fluctuations in FDI inflows. FDI rose from 15.46 billion USD in 2005 to its peak of 102.43 billion USD in 2011, driven by strong economic growth, resource wealth, and infrastructure investments tied to the 2014 FIFA World Cup and 2016 Olympics (Silva, 2018; Murgi, 2019). However, Brazil's FDI inflows were highly volatile thereafter, dropping significantly to 38.27 billion USD in 2020 due to political instability, economic recession, and reduced investor confidence, followed by a moderate recovery to 64.23 billion USD in 2023 (UNCTAD, 2024b). On the other hand, Russia's FDI inflows were relatively low until the early 2000s, but they surged to 55.9 billion USD in 2007 and peaked at 74.8 billion USD in 2008. However, in recent years, Russia displayed a notable decline in recent years, culminating in negative inflows of -39.80 billion

USD in 2022 and -10.05 billion USD in 2023. These negative values indicate capital flight, likely driven by geopolitical tensions, sanctions, and economic isolation following the recent war with Ukraine (UNCTAD, 2024b). Meanwhile, South Africa experienced relatively lower FDI inflows compared to other BRICS nations, with values ranging from 2.06 billion USD in 2017 to 9.24 billion USD in 2022, reflecting the country's struggle to attract consistent foreign investment (Matekenya & Moyo, 2023). These recent fluctuations, including a sharp decline in 2023, likely result from global economic uncertainties, geopolitical tensions, and pandemic-induced disruptions (Churakova & Smeet, 2024). This figure supports the discussion on globalization and FDI by demonstrating how BRICS nations, despite differences in their economic structures, have collectively embraced foreign investment as a driver of economic growth, industrial development, and technological advancement. The increasing FDI inflows over time underscore the effectiveness of policy reforms and economic liberalization in attracting global capital. Furthermore, the variation in FDI trends among BRICS members highlights the role of country-specific policies, governance structures, and macroeconomic conditions in shaping investment patterns.

1.2 Definition of FDI

A “foreign investor” refers to an individual, organization, corporation, government entity, or institution from one country that allocates capital to businesses, assets, or projects in another country to achieve strategic objectives or earn financial returns. Foreign investors are pivotal in shaping the dynamics of the global economy, fostering economic interconnectedness, and facilitating the transfer of resources, expertise, and technology across borders (Lagendijk & Hendriks, 2009). They contribute significantly to the economic growth, industrial development, and modernization of the host nation, making them key players in international trade and investment.

Foreign investments can be broadly categorized into two main types:

- 1. Foreign Direct Investment (FDI):** This involves a long-term interest and control in the business operations or assets of the host country.
- 2. Foreign Portfolio Investment (FPI):** This involves the purchase of financial assets like stocks, bonds, or mutual funds without significant influence over the business.

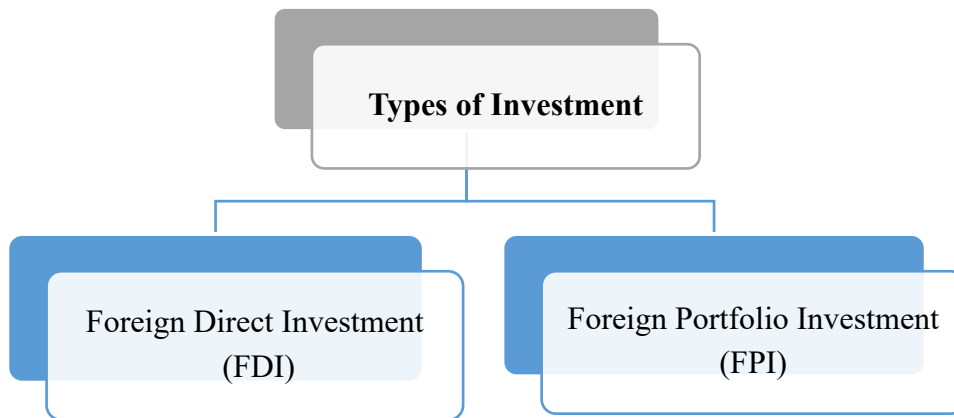


Figure 1.2 Types of Investment
(Source: Compiled by the author)

FDI may take various forms, including establishing a new subsidiary or branch, acquiring a significant stake in an existing company, or forming a merger or joint venture with a foreign enterprise. According to the Organisation of Economic Co-operation and Development (OECD), a minimum 10% ownership stake in a foreign enterprise qualifies as FDI, denoting a substantial degree of influence or control. The World Bank defines FDI as “investment made to acquire a lasting interest in or effective control over an enterprise operating outside of the economy of the investor.” Similarly, the United Nations Conference on Trade and Development (UNCTAD) describes FDI as an investment involving a long-term relationship between a foreign direct investor (or parent enterprise) and a foreign affiliate, highlighting the lasting control and influence over the operations of the investee entity.

In contrast to Foreign Portfolio Investment (FPI), which primarily involves short-term investments in financial markets such as stocks, bonds, or mutual funds, FDI is focused on creating enduring business activities. While FPI provides liquidity and short-term capital inflows, FDI is often linked to sustainable growth by introducing technology, expertise, and infrastructure development in the host nation.

In India, FDI can be undertaken through two primary routes:

1. **The Automatic Route:** This liberalized route allows foreign investors to invest without prior approval from governing authorities or the Reserve Bank of India (RBI). Investors are required to submit necessary documentation within 30 days of investment to the regional RBI office.

2. **The Government-Approved Route:** Foreign investors must obtain prior approval from government authorities For sectors not covered under the automatic route. This route is more regulated and involves additional scrutiny compared to the automatic route.

1.3 Types of FDI Inflows

Foreign Direct Investment (FDI) can be classified into various types based on distinct perspectives, including the nature of business operations, the motives of investors, and the asset-based approach (Gönel & Aksoy, 2016). This classification is critical for understanding the multifaceted dimensions of FDI and its implications for host and home countries.

1.3.1 Nature of Business

The classification of FDI by the nature of business focuses on the organizational and operational framework adopted by the investing firm. It comprises three main types: horizontal, vertical, and conglomerate FDI.

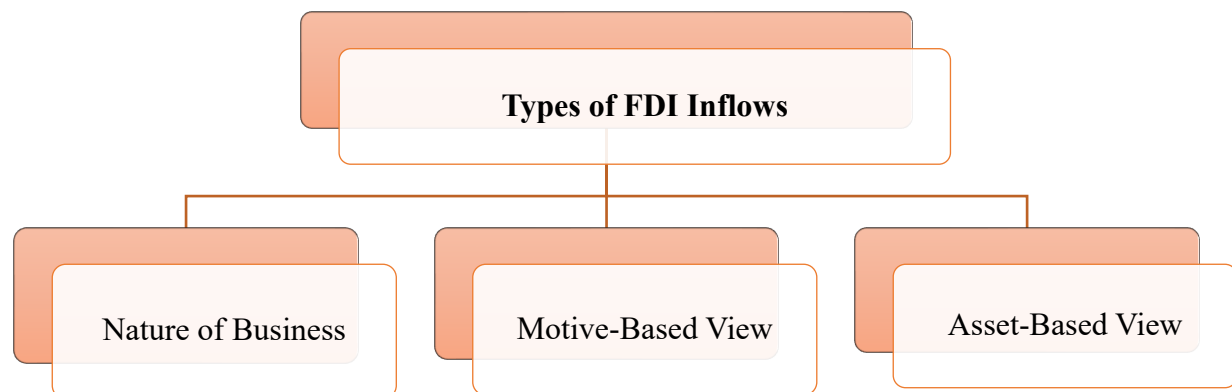


Figure 1.3 Types of FDI Inflows

(Source: Compiled by the author)

- a) **Horizontal FDI:** In this type, a firm invests in the same industry abroad as it operates domestically. Firms engage in horizontal FDI primarily to expand market presence, overcome trade barriers, and directly serve local consumers. By replicating their domestic activities abroad, companies can achieve better control over their operations and reduce dependency on exports. For instance, Coca-Cola’s establishment of bottling

plants in multiple countries exemplifies horizontal FDI. This strategy allows the company to reduce logistical costs, comply with local regulations, and adapt its products to regional consumer preferences. Horizontal FDI is common in industries with standardized products, such as consumer goods, beverages, and automobiles, and is often pursued to strengthen global market reach.

- b) **Vertical FDI:** Vertical FDI occurs when a firm expands into a different stage of the value chain in a foreign country. This type of FDI is divided into two subcategories. Upstream vertical FDI involves investments in earlier stages of production, such as sourcing raw materials or intermediate goods. For example, a car manufacturer setting up a tyre production facility abroad represents upstream vertical FDI aimed at securing a steady supply of essential components. Downstream vertical FDI occurs when firms invest in activities further along the value chain, such as marketing, sales, or distribution. A pharmaceutical company establishing a distribution network in a foreign country is a typical example of downstream FDI. Vertical FDI is driven by cost reduction, supply chain stability, and the desire to optimize global operations. Companies like Apple demonstrate vertical FDI by establishing manufacturing hubs in low-cost regions (upstream) while simultaneously building retail stores in developed markets (downstream).

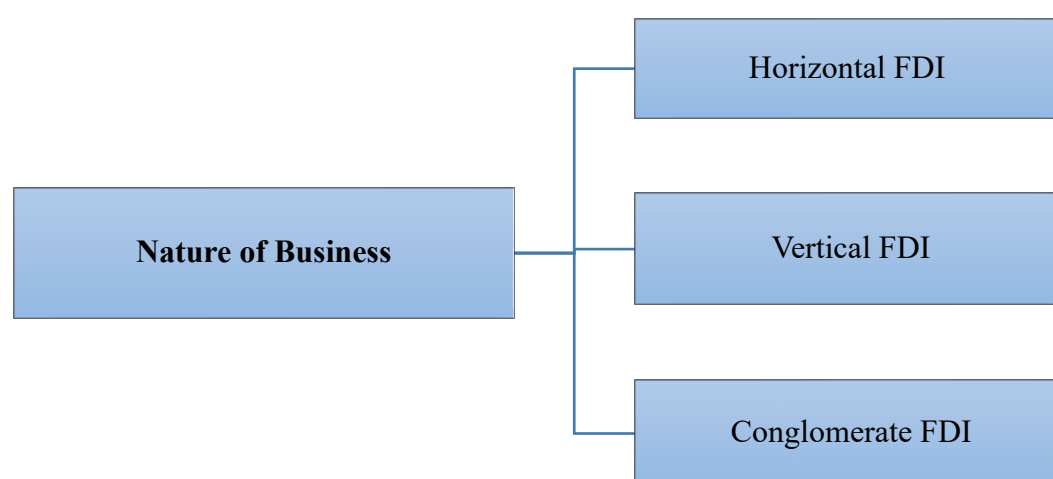


Figure 1.4 Nature of Business of FDI Inflows

(Source: Compiled by the author)

- a) **Conglomerate FDI:** Conglomerate FDI involves investment in an entirely unrelated industry, reflecting a firm's effort to diversify into new sectors. Unlike horizontal or vertical FDI, conglomerate FDI does not leverage existing expertise in a specific industry but requires firms to navigate unfamiliar markets and operational frameworks. This type of FDI is relatively rare and often pursued to spread risks or capitalize on new growth opportunities. For instance, the Tata Group's acquisition of Tetley Tea while already operating Tata Motors demonstrates a diversification strategy through conglomerate FDI. Similarly, a technology company investing in the hospitality sector abroad would illustrate this approach. However, conglomerate FDI poses challenges such as the need for specialized knowledge, cultural adaptation, and managing regulatory complexities in the new sector.

1.3.2 Motive-Based View

FDI can also be categorized based on the primary motives of the investing firm. This view highlights the strategic and operational objectives driving investment decisions. The four main types of FDI inflows under this classification are resource-seeking, market-seeking, efficiency-seeking, and strategic asset-seeking, each reflecting distinct operational priorities and goals.

- a) **Resource-Seeking FDI:** This type of investment is motivated by the need to access natural resources, raw materials, or other essential inputs that are scarce, expensive, or unavailable in the home country. Firms undertaking this type of investment aim to secure a reliable and cost-effective supply of resources necessary for their operations. For instance, Chinese investments in Africa's mining and oil sectors exemplify resource-seeking FDI, as they ensure a steady supply of raw materials to support China's industrial growth. Similar patterns can be seen in Japanese investments in Southeast Asia for resources like timber and minerals. The primary goal of resource-seeking FDI is to lower production costs, stabilize resource supplies, and reduce dependency on volatile global markets.
- b) **Market-Seeking FDI:** Market-seeking investments are driven by the desire to expand a firm's market presence and cater to growing or lucrative consumer bases in foreign countries. Firms often invest in new markets to bypass trade barriers, adapt products to local preferences, or directly serve consumers. McDonald's expansion into emerging economies such as India and Brazil demonstrates market-seeking FDI. These countries,

characterized by rising disposable incomes and expanding middle classes, provide significant opportunities for firms to capitalize on local demand. Similarly, automotive companies like Toyota and Volkswagen have entered markets such as China to secure their positions in the world's largest consumer markets. The motivations behind market-seeking FDI often include overcoming tariff restrictions, establishing a brand presence, and tapping into regional consumer preferences.

- c) **Efficiency-Seeking FDI:** Firms pursuing efficiency-seeking FDI aim to optimize operational costs by leveraging the cost advantages of host countries. Firms engaging in this type of FDI often establish production facilities in regions with lower labour costs, favourable tax regimes, or specialized skills. For example, multinational corporations like Nike and Adidas have set up manufacturing hubs in countries like Vietnam and Indonesia to benefit from inexpensive labour and economies of scale. Similarly, companies in Eastern Europe have attracted FDI due to their skilled yet cost-efficient workforces. Efficiency-seeking FDI allows firms to streamline their operations, enhance competitiveness, and serve multiple markets more efficiently.

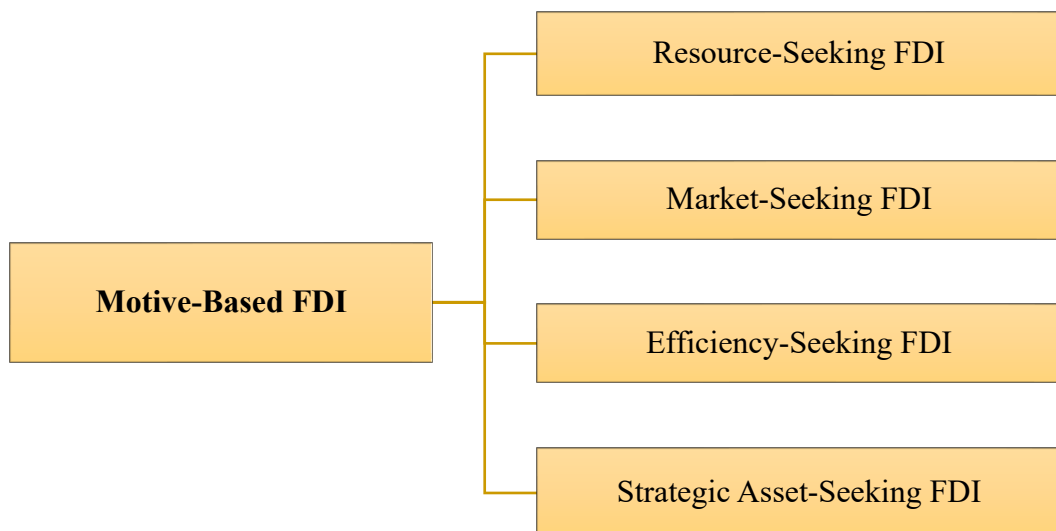


Figure 1.5 Motive-Based FDI Inflows

(Source: Compiled by the author)

- d) **Strategic Asset-Seeking FDI:** This type involves investments aimed at acquiring valuable assets such as advanced technology, intellectual property, established brands, or distribution networks. This type of FDI is often pursued to enhance a firm's long-term competitive advantage in global markets. For instance, Lenovo's acquisition of IBM's personal computer division is a prime example of strategic asset-seeking FDI, as it provided Lenovo access to advanced technology and an established brand reputation. Similarly, Tata Motors' acquisition of Jaguar Land Rover allowed the company to gain premium automotive technology and enter the high-end vehicle market. This type of FDI is typically driven by the need to strengthen market position, access high-value resources, and expand into niche or premium markets.

1.3.3 Asset-Based View

The asset-based classification of FDI examines investments concerning the asset orientation and objectives of the investing firm. It includes asset-augmenting and asset-acquiring FDI. Both approaches reflect distinct objectives and strategies employed by multinational corporations in expanding their operations globally.

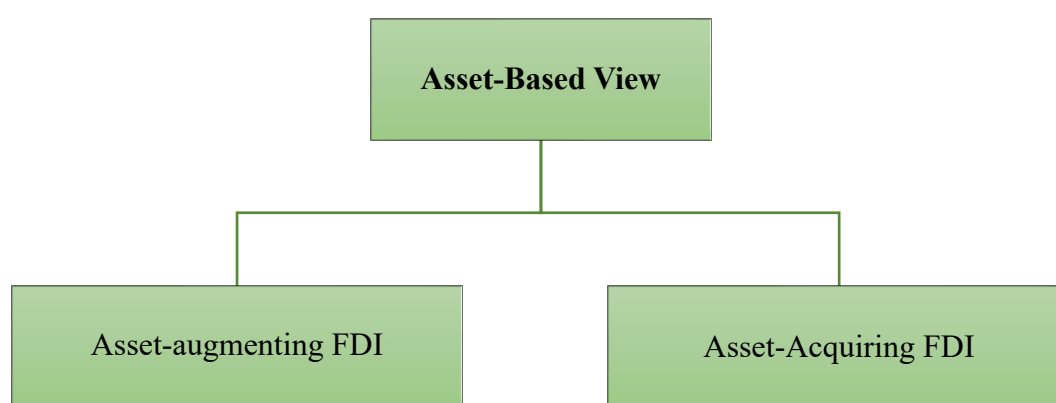


Figure 1.6 Asset-based FDI Inflows
(Source: Compiled by the author)

- a) **Asset-Augmenting FDI:** In this category, the investing firm aims to enhance its existing capabilities by accessing advanced infrastructure, skilled labour, or innovative research facilities in the host country. This type of FDI is often pursued to bolster innovation, improve operational efficiency, and strengthen a firm's competitive

position in global markets. Firms engaging in asset-augmenting FDI typically seek host countries with well-established ecosystems in specific industries, such as technology, pharmaceuticals, or advanced manufacturing. For example, a pharmaceutical company setting up a research and development (R&D) centre in Switzerland demonstrates asset-augmenting FDI. Switzerland's strong reputation for biotechnology and pharmaceutical research, coupled with its access to highly skilled labour and state-of-the-art facilities, makes it an attractive destination for R&D investments. Similarly, multinational corporations such as Google and Microsoft establish innovation hubs in countries like Israel to benefit from cutting-edge expertise in artificial intelligence and cybersecurity. The key driver of asset-augmenting FDI is the desire to enhance the firm's internal capabilities by leveraging the superior resources or knowledge available in the host country.

- b) **Asset-Acquiring FDI:** This type focuses on the direct acquisition of tangible or intangible assets in the host country. This includes factories, distribution networks, brands, intellectual property, and technological patents. Unlike asset-augmenting FDI, which aims to build on existing capabilities, asset-acquiring FDI is characterized by the immediate transfer of ownership and control over valuable resources. This type of FDI is often pursued through mergers and acquisitions, enabling firms to rapidly expand their market presence or gain access to proprietary technologies. For instance, Tata Motors' acquisition of Jaguar Land Rover is a prominent example of asset-acquiring FDI. Through this acquisition, Tata Motors gained ownership of premium automotive brands, advanced engineering capabilities, and an established global market presence. Similarly, Lenovo's acquisition of IBM's computer division reflects asset-acquiring FDI, as it allowed Lenovo to own a globally recognized brand and cutting-edge technological expertise. Such investments are often motivated by the need to enter high-value markets, diversify product portfolios, or gain competitive advantages in strategic sectors.

1.4 Methods of FDI Inflows

FDI inflows can be classified based on the method through which investment is done in the host country. The primary methods are Greenfield Investment and Brownfield Investment, each characterized by distinct approaches, objectives, and implications for the host country and the investing firm.

- a) **Greenfield Investment:** This investment refers to a type of FDI where a foreign firm establishes new operational facilities in a host country from the ground up. This includes building infrastructure such as factories, offices, or plants and recruiting a local workforce. Greenfield investments are typically undertaken in markets with favourable conditions for long-term growth, including political stability, skilled labour availability, and investment-friendly policies.

One of the main advantages of Greenfield investment is the degree of control it offers to the foreign investor over business operations and organizational structure. This method enables companies to implement their preferred production processes, quality standards, and corporate culture. Moreover, Greenfield investments often lead to significant economic benefits for the host country, such as job creation, technology transfer, and the development of supporting industries.

For example, Tesla's Gigafactory in Shanghai, China, represents a Greenfield investment. Tesla built the factory from scratch to cater to the growing demand for electric vehicles in the Chinese market, benefiting from local government incentives and proximity to a key market. Similarly, Samsung's manufacturing plant in Noida, India, reflects a Greenfield approach, contributing to local employment and infrastructure development.

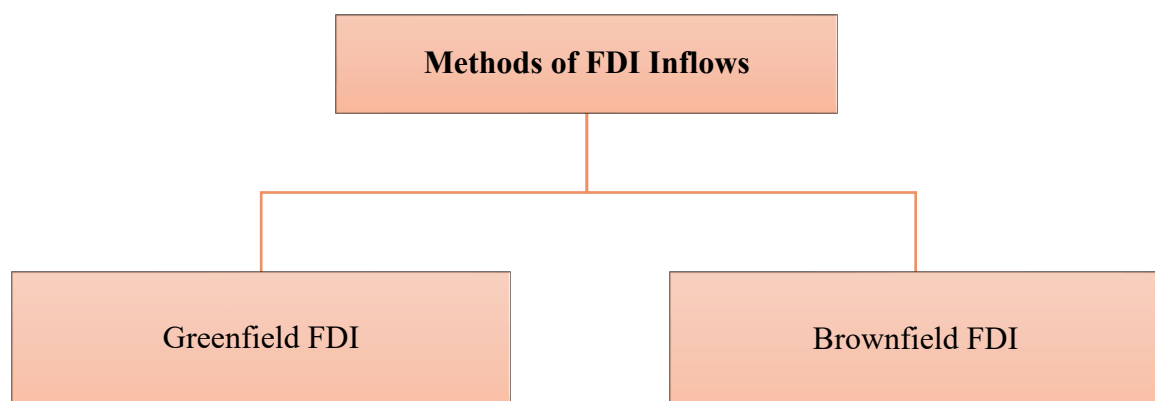


Figure 1.7 Methods of FDI Inflows
(Source: Compiled by the author)

- b) **Brownfield Investment:** This type of investment involves the acquisition or leasing of existing facilities in the host country. Instead of creating new infrastructure, the

investing firm utilizes and repurposes existing assets such as factories, office buildings, or production units. This approach is often faster and less capital-intensive compared to Greenfield investment, as it allows the firm to bypass lengthy construction and permitting processes.

Brownfield investments are particularly appealing in industries where acquiring an employed in sectors such as pharmaceuticals, automotive, and technology. However, one potential drawback is that the existing facilities may require significant modifications or upgrades to align with the investor's operational standards.

An example of Brownfield investment is Tata Steel's acquisition of Corus in the United Kingdom. Tata Steel gained access to advanced production facilities and an established market presence in Europe through this acquisition. Another example is Vodafone's acquisition of Hutchison Essar in India, which allowed Vodafone to enter the Indian telecommunications market by leveraging Hutchison Essar's infrastructure and customer base.

1.5 Statement of the Problem

Capital investment is a fundamental driver of economic growth and development, whether sourced domestically or through foreign investments. Among various forms of capital flows, FDI inflows have gained prominence due to their potential to stimulate productivity, innovation, and employment in host economies (Marcin, 2008; Maryam & Jehan, 2018). FDI plays a crucial role in the economic development process by facilitating technology transfer, improving managerial expertise, and integrating host economies into global markets (Arvin et al., 2021). However, the extent to which FDI contributes to economic growth remains debatable, as its impact is highly dependent on country-specific economic structures, institutional quality, and policy frameworks (Abdullah & Chowdhury, 2020).

A central challenge in evaluating the role of FDI is determining whether foreign capital inflows genuinely enhance economic growth in host countries or merely create temporary financial gains without long-term development benefits. While FDI is often associated with increased capital formation, its actual contribution to economic progress depends on various factors, such as the absorptive capacity of the host economy, the quality of domestic institutions, and other macroeconomic factors (Herzer & Donaubauer, 2018). In some cases, FDI has been linked to industrial expansion, technological advancements, and job creation, particularly in manufacturing and high-tech industries (Alvarado et al., 2017; Bruhn et al., 2020). However, in other instances, foreign capital has been concentrated in resource extraction or low-

productivity sectors, limiting its developmental impact. Furthermore, the risk of profit repatriation by multinational corporations and the potential crowding out of domestic investment raise concerns about the net benefits of FDI. These complexities necessitate a thorough investigation into the specific conditions under which FDI fosters sustainable economic growth rather than creating short-term financial dependencies.

In the case of BRICS economies, understanding how FDI serves as an instrument for economic growth and development is particularly important, given their diverse economic structures and distinct growth trajectories. The BRICS nations, Brazil, Russia, India, China, and South Africa, have emerged as influential players in the global economy, yet they exhibit significant differences in their levels of industrialization, policy orientations, and institutional frameworks (Cochrane & Zaidan, 2024). China, for instance, has successfully leveraged FDI to become a global manufacturing hub, benefiting from technology transfers and export-oriented industrial policies (Kechagia & Metaxas, 2022). India has also attracted substantial FDI in services and IT sectors, fuelling economic expansion (Maryam & Mittal, 2020). In contrast, Brazil and Russia have historically relied more on commodity-driven FDI, making them vulnerable to external shocks in global markets. South Africa, with its structural economic challenges, struggles to attract and retain FDI at levels comparable to its BRICS counterparts (Matekenya & Moyo, 2023). These variations highlight the need for a comprehensive understanding of how FDI impacts the overall economic growth and development within the BRICS group. Moreover, the long-term developmental impact of FDI in BRICS countries remains uncertain. While some economies have benefited from increased productivity and technology diffusion, others face challenges related to economic volatility, dependence on foreign firms, and sectoral imbalances. Analyzing these patterns will provide valuable insights into the mechanisms through which FDI can contribute to sustained economic development. Understanding the short-term and long-term relationships between FDI and economic growth in BRICS countries is essential for crafting policies that maximize the benefits of foreign investment while minimizing potential drawbacks.

This study aims to bridge this gap by analyzing the short- and long-term relationships between FDI and economic growth in BRICS countries. It also examines how various economic and institutional factors influence the effectiveness of FDI inflows. By addressing these issues, the research seeks to provide policy recommendations to help BRICS nations optimize FDI utilization to enhance economic resilience, foster innovation, and promote sustainable development. Given the growing importance of emerging economies in the global economic

landscape, the findings of this study will not only be relevant to BRICS countries but also offer valuable insights for other developing economies seeking to maximize the benefits of FDI.

1.6 Research Questions

The research questions for this study are formulated to systematically explore the intricate relationship between FDI inflows and economic growth in BRICS nations. These questions aim to address the theoretical and empirical gaps in understanding how FDI influences economic growth and development, considering the distinct characteristics of each BRICS country. The primary research questions are:

RQ1: What is the impact of foreign direct investment on economic growth in BRICS countries?

This question investigates the role of FDI as a catalyst for economic development, analyzing its contribution to the growth trajectories of BRICS nations.

RQ2: What are the key factors influencing foreign direct investment inflows in BRICS countries?

This question identifies and evaluates the determinants of FDI, including institutional quality, human capital, ICT infrastructure, GDP, trade openness, exchange rate stability, and total factor productivity.

RQ3: What are the short-term and long-term dynamics between foreign direct investment and economic growth in BRICS countries?

This question examines the temporal dynamics of the FDI-growth nexus, distinguishing between immediate and sustained impacts of FDI inflows on economic growth.

1.7 Objectives of the Study

Foreign direct investment (FDI) is a critical factor in shaping the modern process of global economic development. It is a key driver of technology transfer, infrastructure enhancement, and economic growth, particularly in emerging markets. The present research study, entitled *“Impact of Foreign Direct Investment on Economic Growth: A Comparative Empirical Analysis of BRICS Countries,”* aims to provide a comprehensive understanding of the intricate relationship between FDI inflows and economic growth within the BRICS nations. This study focuses on exploring the role of FDI in fostering economic development while also considering the distinct characteristics of each BRICS country. The primary objectives of the study are as follows:

- **Objective 1:** To examine the impact of foreign direct investment on economic growth in BRICS countries.
- **Objective 2:** To identify and evaluate the key factors influencing foreign direct investment in BRICS countries.
- **Objective 3:** To determine the short-term and long-term coupling effects between foreign direct investment and economic growth in BRICS countries.

1.8 Hypotheses of the Study

In alignment with the objectives of the study, the following hypotheses have been formulated to investigate the relationships between FDI inflows, economic growth, and other key macroeconomic variables in BRICS countries.

Table 1.1 Hypotheses of the study

H₁	There is a long-term relationship between FDI inflows and economic growth in BRICS countries.
H_{2a}	Gross Domestic Product (GDP) has a significant impact on FDI inflows in BRICS countries.
H_{2b}	Exchange Rate (EXR) has a significant impact on FDI inflows in BRICS countries.
H_{2c}	Human Capital (HC) has a significant impact on FDI inflows in BRICS countries.
H_{2d}	Information and Communication Technology (ICT) has a significant impact on FDI inflows in BRICS countries.
H_{2e}	Institutional Quality (INSQ) has a significant impact on FDI inflows in BRICS countries.
H_{2f}	Trade Openness (TO) has a significant impact on FDI inflows in BRICS countries.
H_{2g}	Total Factor Productivity (TFP) has a significant impact on FDI inflows in BRICS countries.
H_{3a}	There is short-term co-movement between FDI inflows and economic growth in BRICS countries.
H_{3b}	There is long-term co-movement between FDI inflows and economic growth in BRICS countries.

1.9 Data and Methodology

This study utilizes annual data collected from 1991 to 2020 for the original BRICS countries: Brazil, Russia, India, China, and South Africa. The dataset is compiled from various reliable secondary sources, including the World Bank, the UNCTAD Statistics, and the OECD Statistics. These sources provide comprehensive and standardized macroeconomic indicators, ensuring consistency and comparability across the BRICS economies. The study examines the relationship between FDI inflows and economic growth, along with other macroeconomic variables, including Exchange rate, Human Capital, Information and Communication Technology, Institutional Quality, Trade Openness, and Total Factor Productivity. For this purpose, the study employs Method of Moments Quantile Regression (MMQR) with fixed effects to account for heterogeneity among BRICS nations, as it allows for the estimation of effects across different quantiles of the economic distribution while controlling for country-specific characteristics. By applying MMQR with fixed effects, the study effectively captures the heterogeneous impact of various macro determinants on FDI inflows across different economic conditions and policy environments in the BRICS economies.

Furthermore, the study incorporates Wavelet Coherence Analysis to explore the short-term and long-term coupling effects between FDI and economic growth. Wavelet coherence is a powerful time-frequency analysis tool that examines of dynamic relationships between variables over different time horizons. By applying this method, the study identifies periods of strong or weak coherence between FDI inflows and economic growth, providing deeper insights into how these relationships evolve over time within BRICS nations. The combined approach of MMQR and wavelet coherence ensures a comprehensive empirical investigation, capturing both the distributional impact of FDI and its dynamic interactions with economic growth over the study period.

1.10 Significance of the Study

FDI inflows serve as a critical driver of global economic growth, enabling the flow of capital, transfer of technology, and integration into global trade networks. This study focuses on the BRICS nations: Brazil, Russia, India, China, and South Africa due to their growing prominence in shaping the global economic order. Despite being grouped under a common framework, these nations exhibit significant heterogeneity in their economic structures, levels of development, institutional quality, and policy frameworks governing FDI. This diversity reinforces the importance of examining how FDI influences economic growth within the BRICS bloc. The study is particularly significant as it investigates both the short-term and long-

term impact of FDI, with a specific emphasis on the role of absorptive capacity. Absorptive capacity, defined as a country's ability to integrate and utilize foreign investments effectively, is a crucial determinant of the developmental outcomes of FDI. This research evaluates critical factors influencing absorptive capacity, including institutional quality, human capital, exchange rate stability, ICT infrastructure, trade openness, and total factor productivity, to provide a comprehensive understanding of the conditions under which FDI contributes to sustainable economic growth.

By addressing the heterogeneity among the BRICS nations, the study highlights that the developmental impact of FDI is not uniform but contingent upon the interplay between external investments and domestic readiness. The findings aim to offer valuable insights into how BRICS countries can enhance their absorptive capacities to maximize the benefits of FDI. Furthermore, this research contributes to the broader discourse on how emerging economies can leverage FDI as a catalyst for inclusive growth and structural transformation, ensuring that FDI inflows translate into tangible and inclusive economic benefits for the diverse economies within the BRICS bloc. It also emphasizes the significance of devising targeted policies that align with the unique economic and institutional contexts of individual BRICS countries.

1.11 Organisation of the Thesis

This thesis is organized into six chapters, each carefully structured to contribute to a comprehensive understanding of the relationship between FDI inflows and economic growth in BRICS countries. The plan of the thesis is as follows:

Chapter 1: Introduction

The first chapter provides a detailed introduction to the study and establishes its relevance. It begins with a discussion on the significance of FDI as a critical driver of economic growth, particularly for emerging economies like BRICS nations. The chapter highlights the role of FDI in fostering technological spillovers, enhancing productivity, and stimulating overall economic development. Furthermore, it sets the stage for the research by articulating the objectives of the study, identifying the key research questions, and underlining the scope of the investigation. The chapter emphasizes the importance of comparative analysis in understanding the diverse experiences of BRICS nations with FDI and economic growth, offering a strong rationale for the study.

Chapter 2: Overview of BRICS

This chapter delves into the historical and institutional background of the BRICS group. It begins with an exploration of the formation of BRICS, tracing its evolution from its inception as a group of four nations (Brazil, Russia, India, and China) to its expansion with the inclusion of South Africa in 2010. The chapter then examines the significant development during the most recent BRICS summit, which saw the addition of five new member countries: Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE. This expansion signals the growing influence of BRICS on the global stage. In addition, this chapter provides a comparative analysis of BRICS with the G7 nations, highlighting key differences in economic structure, growth trajectories, and global influence. This comparison highlights the significant role of BRICS countries as an emerging force, challenging the dominance of traditional economic power blocs.

Chapter 3: Review of Literature

The third chapter comprehensively reviews the theoretical and empirical literature on FDI inflows and economic growth. It begins by discussing foundational theories of FDI, such as the Eclectic Paradigm, Internalization Theory, Product Life Cycle Theory, Transaction Cost Theory, and other growth theories, and their relevance in understanding the dynamics of FDI inflows. The chapter then explores empirical studies that examine the FDI-growth relationship, focusing on both positive and negative outcomes as observed in various contexts. A detailed discussion on how variables like exchange rate, trade openness, human capital, institutional quality, and technological progress mediate the impact of FDI is included. The chapter concludes by identifying the existing research gaps, such as the need for time-frequency analyses and a deeper examination of country-specific determinants, thus justifying the chosen methodology and framework for this study.

Chapter 4: Research Methods

This chapter outlines the methodological framework adopted to address the research questions. It describes the rationale for focusing on the BRICS nations and the use of panel data covering the period from 1991 to 2020. The chapter explains the selection of key variables, including FDI as the dependent variable and GDP, exchange rate (EXR), human capital (HC), information and communication technology (ICT), institutional quality (INSQ), trade openness (TO), and total factor productivity (TFP) as independent variables. Advanced econometric techniques, including the Method of Moments Quantile Regression (MMQR) with fixed effects and wavelet coherence analysis, are introduced. These methods allow for the exploration of

both the short-term and long-term relationships between FDI and its determinants while accounting for heterogeneity across the BRICS nations.

Chapter 5: Empirical Results

The fifth chapter presents and interprets the empirical findings of the study. It begins with a discussion of descriptive statistics and preliminary tests, such as normality, cross-sectional dependence, and unit root tests, to ensure the robustness of the analysis. The chapter then provides a detailed examination of the results obtained through MMQR with fixed effects, which captures the heterogeneous impact of explanatory variables across different quantiles of FDI. Additionally, the wavelet coherence analysis is used to explore the time-frequency relationship between FDI and its determinants, offering insights into the dynamic interplay over the study period. The findings are visualized through graphs and tables, providing clarity on the nature and strength of these relationships for the BRICS economies.

Chapter 6: Conclusion

The final chapter synthesizes the key insights gained from the study, presenting a cohesive conclusion on the impact of FDI on economic growth in BRICS nations. It discusses the policy implications of the findings, offering recommendations for enhancing the effectiveness of FDI in promoting sustainable economic growth. For instance, the role of institutional quality, trade openness, and technological advancement in optimizing the benefits of FDI is highlighted. The chapter also acknowledges the limitations of the study and suggests directions for future research. These include extending the analysis to newer BRICS members and exploring the role of sectoral distribution of FDI inflows in influencing economic growth and development.

1.12 Summary

Chapter 1 serves as an introduction to the study, emphasizing the role of FDI inflows in the global economy. It begins by exploring how globalization has fostered economic interconnection, leading to a growing need for external capital to drive growth, especially in developing economies. FDI is identified as a key driver of economic development, offering benefits such as technology transfer, industrial growth, and infrastructure enhancement. The chapter provides a detailed definition of FDI, distinguishing it from foreign portfolio investment (FPI), while highlighting its long-term involvement and control over host economies. It categorizes FDI into horizontal, vertical, and conglomerate types and outlines various methods of investment, including greenfield projects, mergers and acquisitions, and

joint ventures. The chapter also presents the objectives of the study, focusing on analyzing the role and determinants of FDI and its short-term and long-term impact on economic growth. Lastly, the organisation of the thesis is outlined, offering a roadmap of the subsequent chapters, which cover theoretical frameworks, empirical analyses, and policy implications, providing a structured approach to understanding the impact of FDI on the economic growth of BRICS economies.

CHAPTER 2

OVERVIEW OF BRICS

Chapter 2 of the thesis provides a comprehensive “Overview of BRICS,” exploring its formation, evolution, and economic significance. The chapter begins with an introduction and is then further divided into six distinct sections. Section 2.1 discusses the formation of BRIC as an economic group, emphasizing the initial vision of fostering cooperation among emerging economies. Section 2.2 discusses the inclusion of South Africa in 2010, which expanded the group into BRICS, making it more globally representative by bringing in the African continent. Section 2.3 highlights the significant 2024 expansion, where five new members were added to further enhance the bloc's influence on global economic policies and cooperation. Section 2.4 discusses the economic profile of BRICS countries. Further, Section 2.5 provides a comparative analysis between BRICS and the G7 nations, focusing on key economic indicators such as GDP and Purchasing Power Parity (PPP), demonstrating BRICS’ growing economic importance relative to the G7. Section 2.6 delves into the FDI flows within BRICS, analyzing trends and impacts on economic growth across member countries. Each section collectively enhances the understanding of BRICS’ expanding role in the global economy. Finally, Section 2.7 provides an overall summary of the chapter.

2.1 Formation of BRICS

The BRICS grouping, which includes Brazil, Russia, India, China, and South Africa, emerged as a significant coalition of emerging economies to enhance cooperation and influence on the global stage (Iqbal et al., 2023). The acronym “BRIC” was introduced by O'Neill (2001), an economist at Goldman Sachs, in a report titled *Building Better Global Economic BRICs*. The report predicted that these four nations would emerge as key drivers of global economic growth by the mid-21st century. At the time, these countries were notable for their rapid GDP growth, large populations, and growing influence on international trade and investment. Collectively, they were seen as potential challengers to the economic dominance of the traditional G7 economies (Waheeduzzaman, 2011). The BRIC countries formally initiated political dialogue in 2006 when their foreign ministers held the first official meeting on the sidelines of the United Nations General Assembly in New York. This marked the beginning of regular coordination and joint diplomatic engagement on various issues, including economic cooperation,

multilateralism, and development policy. A series of high-level meetings culminated in the first BRIC summit in Yekaterinburg, Russia, in June 2009, which solidified the bloc's commitment to mutual collaboration. During this summit, leaders emphasized the need for reform in global financial institutions such as the International Monetary Fund (IMF) and the World Bank, advocating for a greater voice for emerging economies in global economic governance (Schaefer & Poffenbarger, 2014).

The formation of BRIC represented not just an economic bloc but a geopolitical shift aimed at creating a multipolar world order (Chakraborty, 2018). This multilateral grouping initially focused on establishing frameworks for cooperation in trade, finance, and development, reflecting their shared experiences as emerging economies facing similar developmental challenges (Lagutina, 2019). A central aim of BRIC was to promote a reformed international monetary system and diversify currency reserves away from the US dollar. This was mainly done to challenge the disproportionate influence of Western economies in institutions such as the International Monetary Fund (IMF), the World Bank, and the United Nations Security Council (Stuenkel, 2017). The BRIC nations also emphasized principles of state sovereignty, non-intervention, and support for a more democratic international order.

2.2 The 2010 BRICS Summit: Inclusion of South Africa

The inclusion of South Africa in 2010 marked a significant turning point in the evolution of BRICS, transforming it from "BRIC" into "BRICS." This helped them expand their geographic and strategic influence to encompass the African continent (Thakur, 2018). South Africa's invitation to join the grouping was not only a recognition of its role as the most industrialized and economically diverse country in Africa but also a move to enhance BRICS' legitimacy as a representative of the broader Global South. With this expansion, BRICS became a transcontinental platform with members from Asia, Latin America, Europe, and Africa, representing over 40% of the world's population and accounting for approximately 25% of global GDP (Petropoulos, 2015).

The inclusion of South Africa was formalized during the 2010 BRICS Summit, held in Brasília, Brazil, on 15 April, 2010. This summit was the second official BRICS meeting where South Africa participated as a full member for the first time, thus officially transforming BRIC into BRICS. South Africa's membership symbolized a commitment to addressing the needs and interests of developing countries across diverse regions, particularly in terms of advocating for fairer trade practices, equitable access to resources, and sustainable development (Shubin, 2018). The inclusion of South Africa in BRICS also helped to accelerate institutional

development within the bloc (Nayyar, 2018). The most notable achievement during this period was the establishment of the New Development Bank (NDB) in 2014, headquartered in Shanghai, China. The NDB was designed to finance infrastructure and sustainable development projects in BRICS and other emerging economies, serving as an alternative to the World Bank and International Monetary Fund (IMF) (Kasahara, 2016). With an initial authorized capital of 100 billion USD, the NDB marked a significant step toward creating parallel financial institutions. These institutions were designed to cater to the specific developmental needs of emerging economies, reducing their reliance on traditional Western-dominated financial bodies like the World Bank and IMF (Nach & Ncwadi, 2024).

2.3 The 2024 Expansion: New Members

The 2024 expansion of BRICS represents a significant shift in the group's evolution, with the inclusion of Egypt, Ethiopia, Iran, Saudi Arabia, and the UAE joining the original member nations: Brazil, Russia, India, China, and South Africa. This expansion was formally announced during the 15th BRICS Summit, held in Johannesburg, South Africa, in August 2023. The decision to expand BRICS reflects the growing ambition of the bloc to extend its influence beyond the original five members. This will also enhance its collective geopolitical and economic power on the global stage.

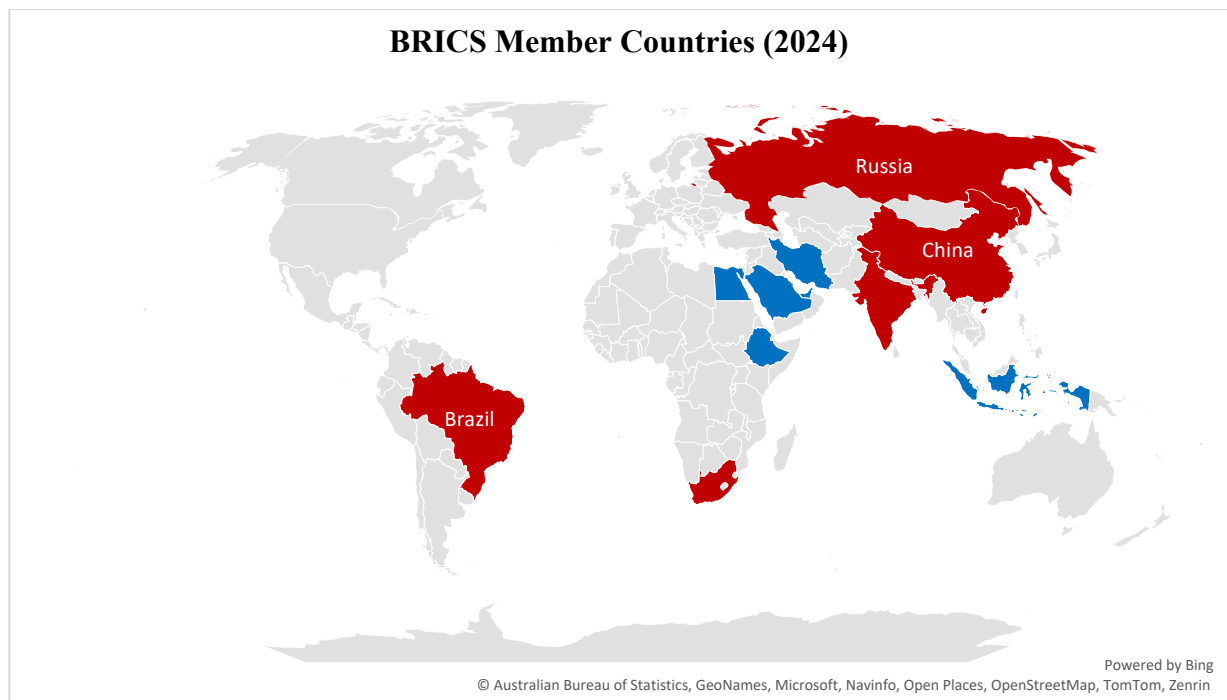
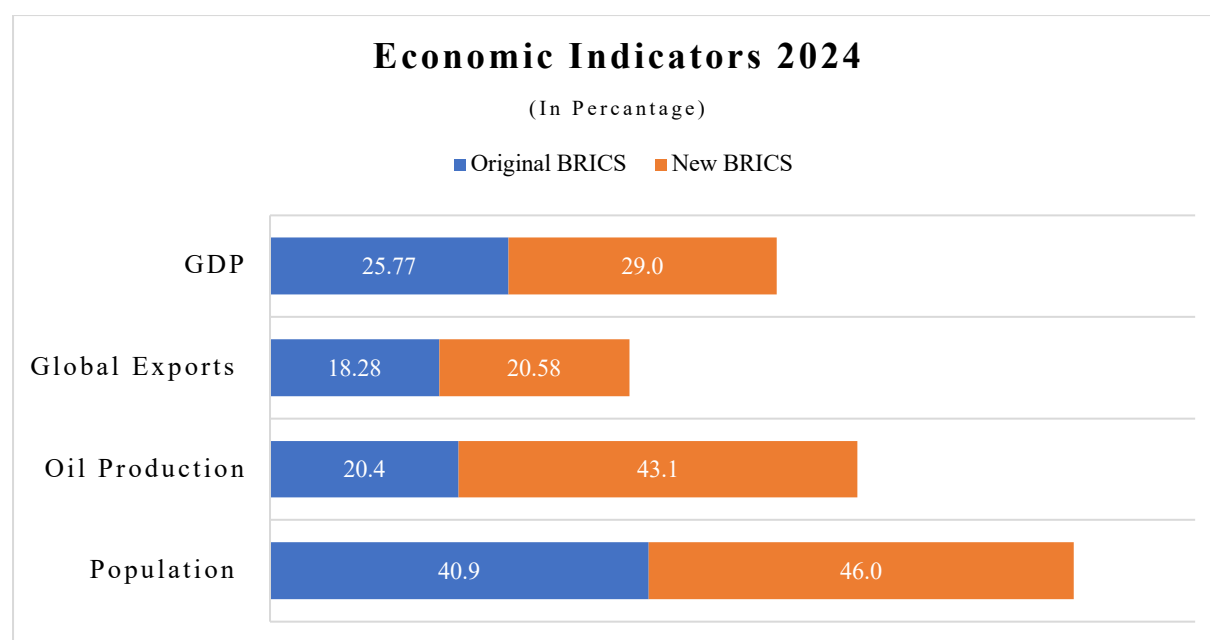


Figure 2.1 BRICS Member countries (2024)

(Source: Compiled by the author)

The addition of these five new members brings greater regional diversity, strategic resource wealth, and demographic strength (Cochrane & Zaidan, 2024). This further solidifies BRICS as a key player in shaping global governance and economic structures (Naim & Hasanah, 2024). Indonesia also joined the expanded BRICS group in January, 2025 and became the first southeast Asian country to be member of the bloc. The map in Figure 2.1 illustrates the BRICS member countries, with the original founding nations represented in red and the new member countries indicated in blue.

The expansion has yielded significant advantages across a range of economic indicators, as depicted in Figure 2.2. In terms of population, the new BRICS nations now account for 46.0% of the global population, compared to 40.9% of the original members. This demographic growth has provided the group with a larger labour force and consumer market, which is particularly beneficial for long-term economic development (Skaricic, 2023). Additionally, the inclusion of oil-rich nations like Saudi Arabia, Iran, and the UAE has substantially increased BRICS' global oil production share to 43.1%, up from 20.4%. This enhanced energy capacity positions BRICS as a dominant player in global energy markets, enabling it to exert greater influence over oil prices and supply chains (Lissovolik, 2024). It has further diversified the economic strengths of the group in terms of natural resources.



Note: GDP in USD, Global Exports in USD, Oil production in barrels/day, Population in millions.

Figure 2.2 Economic Indicators of Original vs New BRICS Nations (2024)
(Source: BRICS Investment Report, 2023)

The expanded group also slightly outpaces the original members in global exports, with 20.58% compared to 18.28%, signalling a broader trade influence. This increase strengthens BRICS' position in global trade negotiations. It also fosters inter-member trade relationships, which can lead to more stable and mutually beneficial economic ties (Kumar, 2023). Economically, the new BRICS bloc contributes 29.0% of global GDP, a marked increase from the 25.77% contributed by the original members. This increase in GDP strengthens BRICS' bargaining power in international forums and institutions, enabling member countries to advocate more effectively for their interests and those of the Global South. Overall, the expansion has positioned BRICS as a key player in shaping the future of the global economic landscape, leveraging its enhanced demographic and economic strengths to drive collaborative growth and influence (Nandy & Islam, 2024).

2.4 Economic Profile of BRICS Countries

The BRICS nations: Brazil, Russia, India, China, and South Africa constitute a significant share of the global economy, with diverse economic structures and varying growth trajectories. These nations collectively represent some of the largest emerging economies, each contributing uniquely to global trade, investment, and development. A comparative analysis of key economic indicators in Table 2.1 helps in understanding their economic standing and potential. China, with the highest population of approximately 1,410.71 million, is the largest economy among BRICS in terms of GDP per capita, which stands at 17,175.67 billion USD. India follows as the second-most populous country, with 1,438.07 million people, but its GDP per capita is significantly lower at 3,215.97 billion USD. Brazil and Russia have relatively smaller populations, with 211.14 million and 143.83 million, respectively, while South Africa is the least populous at 63.21 million. In terms of GDP per capita, Brazil (1,954.75 billion USD) and Russia (1,524.52 billion USD) exhibit moderate economic performance, whereas South Africa lags with only 363.31 billion USD, indicating disparities in economic development among BRICS nations. Next, Gross Domestic Savings, which reflects the ability of an economy to invest and grow, is the highest in China (44.4%). This highlights its strong capital formation and investment-driven economy. India and Russia also maintain substantial savings rates at 29.3% and 31.7%, respectively, while Brazil and South Africa report lower savings rates of 18.5% and 16.3% which suggests higher consumption patterns in these countries. Exchange rate stability is another critical factor influencing economic performance. While China (7.08) and Brazil (4.99) maintain relatively stable currencies, India (82.60) and Russia (85.16) have

higher exchange rates, impacting trade competitiveness. South Africa's exchange rate of 18.45 LCU per USD also indicates currency fluctuations affecting its economic environment.

Table 2.1 Economic Profile of BRICS Countries (2023)

Indicators (2023)	Brazil	China	India	Russia	South Africa
Population (in millions)	211.14	1,410.71	1,438.07	143.83	63.21
GDP per capita (in billion USD)	1,954.75	17,175.67	3,215.97	1,524.52	363.31
Gross Domestic Savings (% of GDP)	18.5	44.4	29.3	31.7	16.3
Exchange Rate (LCU per USD)	4.99	7.08	82.60	85.16	18.45
Trade Openness Index	35.82	37.30	42.05	49.15	53.11
FDI Inflows (in million USD)	46,439	344,075	44,728	40,450	19,286
Inflation Rate (in %)	4.6	0.2	5.6	6.7	6.1
Unemployment Rate (in %)	7.9	5.1	4.2	3.1	32.1
Ease of Doing Business Rank	124	32	62	29	84

(Source: World Development Indicators by World Bank, 2024)

Trade openness, which measures a country's integration into the global economy, varies significantly among BRICS nations. South Africa exhibits the highest trade openness index at 53.11, followed by Russia (49.15) and India (42.05), indicating their strong global trade linkages. Brazil (35.82) and China (37.30) have lower trade openness, suggesting a relatively protectionist stance or larger domestic market reliance. Further, FDI inflows reflect investor confidence and economic attractiveness. China leads the BRICS group with 344,075 million USD in FDI inflows, making it a key investment destination, while Brazil (46,439 million USD) and India (44,728 million USD) attract substantial foreign investments. Russia (40,450 million USD) and South Africa (19,286 million USD) lag, indicating different levels of investor appeal and regulatory environments.

Furthermore, macroeconomic stability is crucial for sustainable growth, and inflation is a key determinant. China maintains the lowest inflation rate at 0.2%, showcasing price stability, while India (5.6%), Russia (6.7%), and South Africa (6.1%) experience moderate inflation. Brazil, with 4.6% inflation, falls within a manageable range. However, unemployment rates present significant challenges. South Africa faces a high unemployment rate of 32.1%, reflecting deep-rooted labour market issues. Brazil (7.9%), China (5.1%), and India (4.2%) maintain moderate unemployment levels, while Russia records the lowest at 3.1%, suggesting a relatively stable labour market. The Ease of Doing Business ranking, a crucial measure of a country's regulatory environment, varies significantly among BRICS members. Russia ranks the highest at 29, followed by China (32) and India (62), indicating relatively favourable conditions for businesses. Brazil (124) and South Africa (84) have weaker business environments, potentially due to bureaucratic hurdles and regulatory complexities. Overall, BRICS economies display diverse economic profiles, with China leading in GDP per capita, FDI inflows, and savings, while India shows promising trade openness and investment potential. Russia maintains macroeconomic stability, whereas Brazil and South Africa face challenges in economic competitiveness and unemployment.

2.5 BRICS vs G7 Nations

The G7 (Group of Seven) nations represent some of the world's most advanced economies, comprising Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. These countries have historically played a pivotal role in shaping global economic policies, often advocating for free trade, financial stability, and democratic governance (Mielniczuk, 2013). The G7 has traditionally been dominant in terms of economic output and influence over international financial institutions like the IMF and the World Bank. However, over recent decades, the rise of the BRICS group has introduced a significant shift in the global economic landscape. The inclusion of several emerging economies in 2024, such as Egypt, Ethiopia, Saudi Arabia, the UAE, and Iran, further solidifies BRICS' importance as a global economic bloc. The BRICS nations now represent a powerful alternative to the G7, not only by combining their economic strengths but also by advocating for a more multipolar world order (Mahbubani & Varigonda, 2021). Their focus is often on reforms in global governance to better reflect the interests of developing countries, particularly from the Global South.

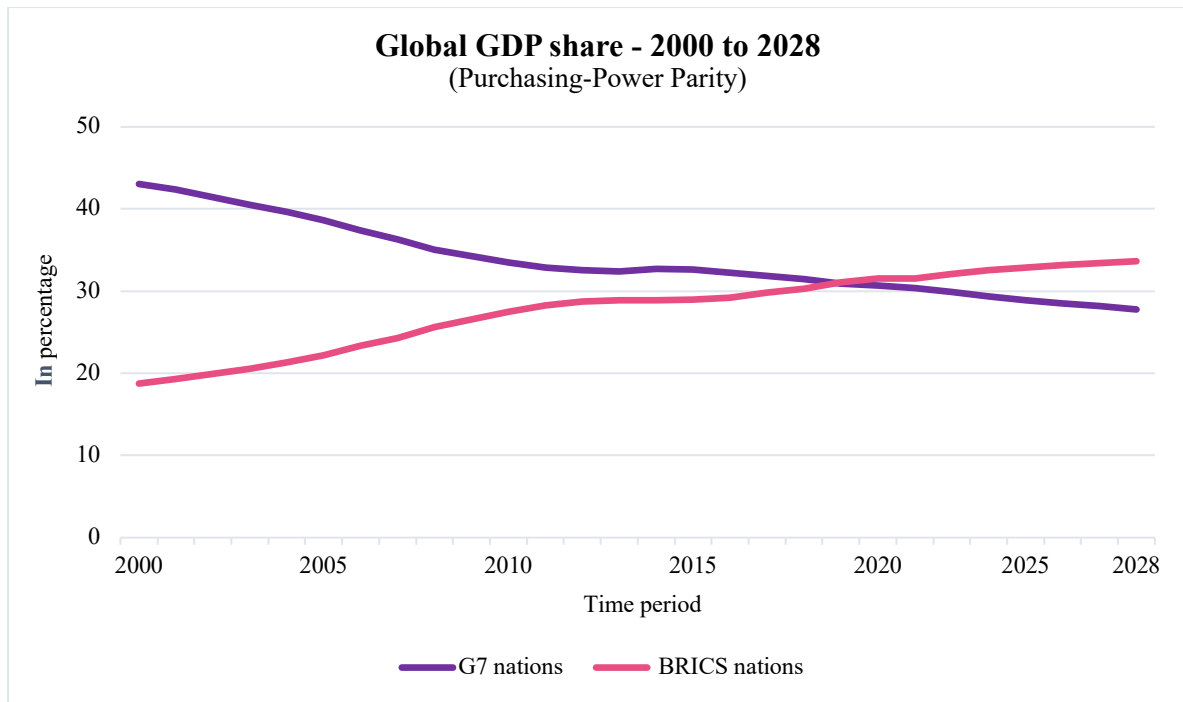


Figure 2.3 Global GDP Growth Comparison between G7 and BRICS Nations
(Source: World Economic Outlook published in April, 2023)

Figure 2.3 illustrates the distribution of global GDP using PPP from 2000 to 2028 for both BRICS and G7 countries. The data reveals a steady decrease in the share of G7 countries, while the BRICS nations have demonstrated a consistent increase in their share of global GDP since the onset of this century and have surpassed the G7 countries since 2020. The future projections for 2023–2028 indicate a rise in the GDP growth share of BRICS nations, while a declining trend is expected for the G7 countries. This is why the BRICS nations are currently attracting global investors. These countries are characterized by fast-paced economic expansion and extensive land areas, making them the preferred destination for investors. By the mid-21st century, the combined economies of the BRICS countries are anticipated to become the largest in the world (Lissovolik, 2024).

Further, Figure 2.4 illustrates the total population of BRICS and G7 nations. In 2024, the combined population of BRICS countries stands at approximately 3.5 billion, whereas the G7 nations account for only about 776 million people. This demographic advantage gives the BRICS group significant leverage, particularly due to major contributors like China and India. With their vast populations, these nations form a large consumer base, which enhances their economic influence on the global stage (Desbordes & Wei, 2017).

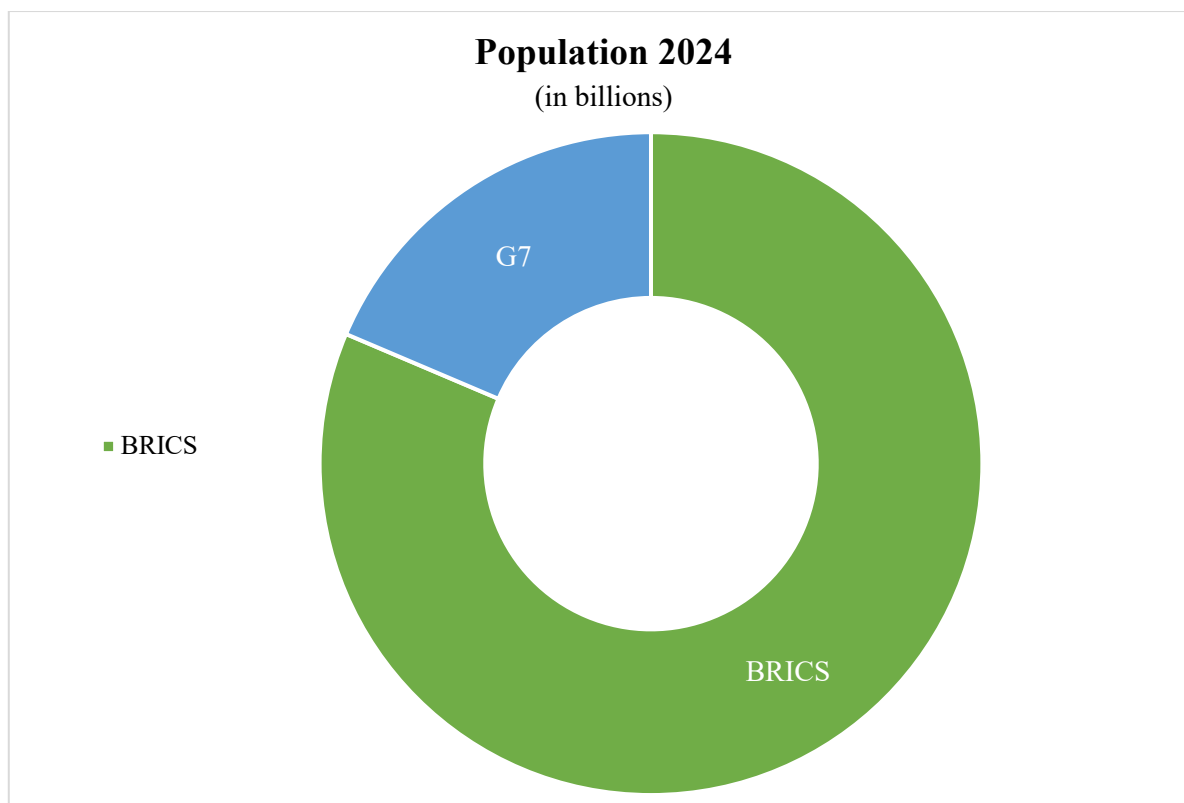


Figure 2.4 Total Population Comparison between G7 and BRICS Nations
(Source: World Bank Indicators by World Bank, 2024)

Furthermore, Table 2.1 compares the GDP measured in trillion USD for 2023 for BRICS and G7 nations. The total GDP PPP for BRICS stands at 73.1 trillion USD, far exceeding the G7's total of 52.4 trillion USD. This significant gap highlights the rising economic power of BRICS, particularly driven by the dominance of China and India. China alone contributes 33.0 trillion USD in GDP, which is over 60% of the total BRICS GDP. This makes it the largest economy within BRICS and globally. India follows with a significant 13.0 trillion USD, further demonstrating the growing influence of emerging markets within the global economy.

In contrast, the aggregate GDP PPP of G7 economies is lower than that of BRICS economies. The United States leads the group with \$26.9 trillion USD, followed by Japan (6.5 trillion USD) and Germany (5.6 trillion USD). The other G7 nations, while still substantial contributors to the global economy, lag behind these larger players. For instance, the UK and France each account for 3.9 trillion USD, while Canada contributes 2.4 trillion USD. Among the BRICS members, the expansion to include oil-rich nations such as Saudi Arabia (2.0 trillion USD) and the UAE (8.0 trillion USD) enhances the bloc's energy and resource dominance. This makes BRICS not only a significant force in terms of GDP but also a key player in global energy

markets. Additionally, other new members like Ethiopia (3.4 trillion USD) and Egypt (2.1 trillion USD) further diversify BRICS' economic capabilities.

Table 2.2 Comparative GDP Analysis for BRICS and G7 Countries

Country	Member Group	GDP PPP, 2023 (in trillion USD)
Brazil	BRICS	4.0
China	BRICS	33.0
India	BRICS	13.0
Russia	BRICS	5.0
South Africa	BRICS	1.0
Egypt	BRICS	2.1
Ethiopia	BRICS	3.4
Iran	BRICS	1.6
Saudi Arabia	BRICS	2.0
UAE	BRICS	8.0
Canada	G7	2.4
France	G7	3.9
Germany	G7	5.6
Italy	G7	3.2
Japan	G7	6.5
UK	G7	3.9
USA	G7	26.9
BRICS Total		73.1
G7 Total		52.4

(Source: World Economic Outlook published in July, 2024)

In summary, the BRICS nations, with their collective GDP exceeding that of the G7, are increasingly positioning themselves as global economic players (Kamin & Langhammer, 2024). Their rise is driven by large populations, significant natural resources, and growing industrial and technological capabilities (Bracht & Nguyen, 2017). This shift reflects a broader realignment in global economic power, with the BRICS bloc becoming a central player in shaping future global economic governance (Nandy & Islam, 2024).

2.6 FDI Inflows in BRICS Countries

BRICS nations have evolved dynamically over the past two decades, emerging as key players in the global economy and attracting substantial FDI inflows. Since their formation, these economies have become increasingly integrated into global markets, benefiting from significant FDI inflows that have helped drive their economic growth. The past two decades in particular have seen a surge in FDI into BRICS countries. This reflects their expanding economic potential, large domestic markets, and strategic importance in global trade (Kechagia & Metaxas, 2022).

Over time, BRICS countries have shifted from being primarily recipients of investment driven by their natural resources and cheap labour to becoming hubs for innovation, technology, and manufacturing (Asongu et al., 2018). This shift is further complemented by the large and growing consumer markets within these nations, making them appealing to multinational corporations looking to expand their operations. Moreover, as these economies strengthened their financial systems and improved governance structures, they offered more stable environments for foreign investors. Consequently, the cumulative effect of these developments has led to a marked increase in FDI inflows, helping these countries achieve sustained economic growth and deeper integration into the global economy.

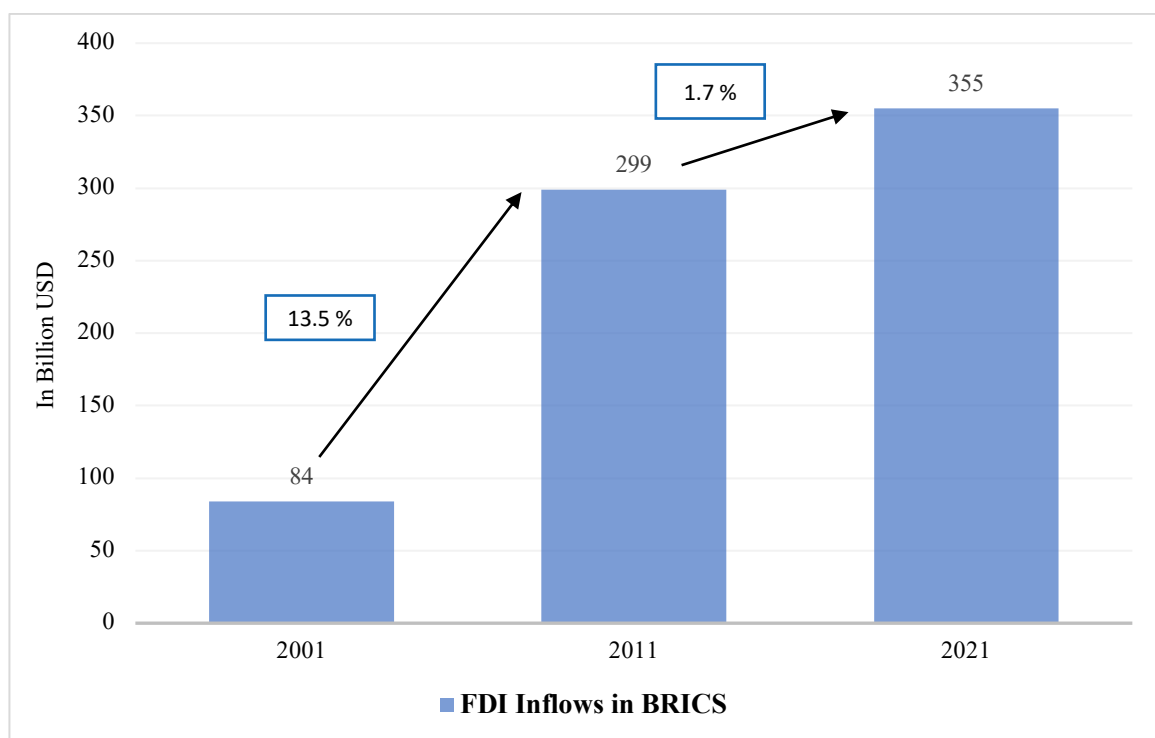


Figure 2.5 Compound Growth Rate of FDI in BRICS countries (2001-2021)

(Source: UNTCAD FDI/MNE Database)

The FDI inflows in BRICS nations have demonstrated significant growth between 2001 and 2021, as illustrated in Figure 2.5. In 2001, BRICS collectively attracted 84 billion USD in FDI. By 2011, this figure had escalated to 299 billion USD, marking a notable 13.5% increase. However, the growth rate decelerated in the following decade, with FDI inflows rising to 355 billion USD by 2021, reflecting a more modest increase of 1.7%. Despite experiencing slower and fluctuating growth between 2011 and 2021, the BRICS nations outperformed the global average in terms of FDI inflows. Additionally, their collective share of global FDI increased during this period, highlighting their growing importance as key investment destinations.

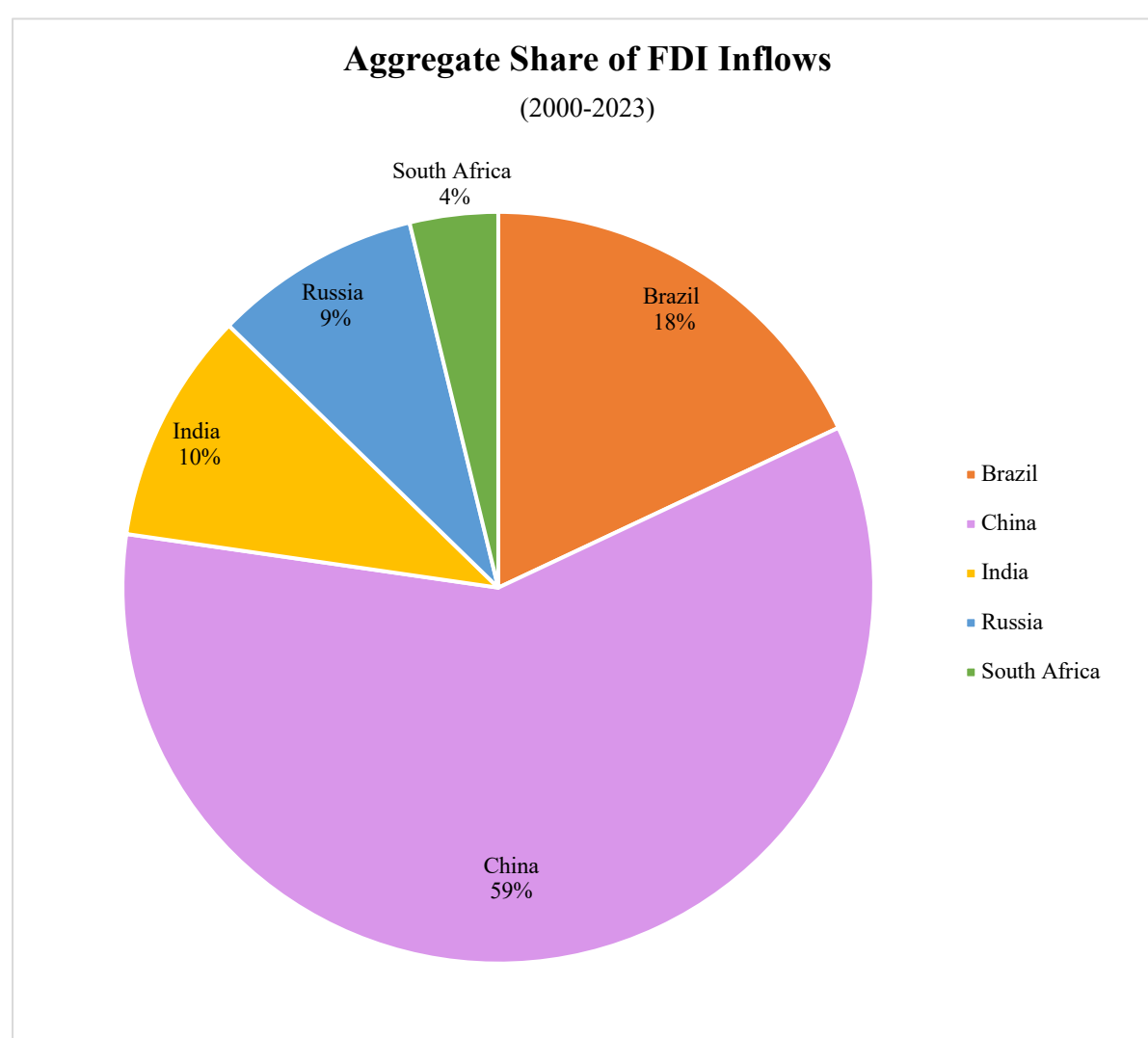


Figure 2.6 Aggregate Share of FDI Inflows in BRICS countries (2000-2023)
(Source: World Bank Indicators by World Bank, 2024)

Further, the pie chart in Figure 2.6 presents the aggregate share of FDI inflows among the BRICS countries from 2000 to 2023. China dominates with 59% of total FDI inflows among

the group members. This significant share is a reflection of its rapid economic growth, large-scale industrialization, and strategic efforts to integrate into global supply chains (Kroeber, 2020; Chattopadhyay et al., 2022). Next, China is followed by Brazil, which accounts for 18% of total FDI received by BRICS countries. This is due to the presence of rich natural resources, particularly in agriculture, energy, and mining, which have attracted substantial foreign capital flows from advanced nations (Gupta & Singh, 2016). The country has the world's largest rainforest, spread over 500 million square kilometers, and is rich in mineral reserves, making it a prime destination for foreign investors, particularly those seeking opportunities in resource-based industries (Amal, 2016).

Over the last two decades, India and Russia have attracted nearly equal amounts of FDI, with India accounting for 10% and Russia 9% of the total FDI inflows among BRICS nations. Due to several key factors, India has emerged as a highly attractive destination for MNCs. Its large and rapidly expanding consumer market, coupled with a growing middle class, offers significant potential for businesses seeking to tap into new markets (Maryam & Mittal, 2020). Additionally, India's favourable economic reforms, which include liberalized foreign investment policies and ease of doing business initiatives, have created an investor-friendly environment (Pal, 2023). The booming service sector, particularly in areas like information technology and telecommunications, has further boosted investor confidence. On the other hand, Russia's share of FDI inflows can be attributed primarily to its vast reserves of natural resources, including oil, gas, and precious metals, which are critical to the global economy (Cieřlik & Gurshev, 2023). The country's resource-rich landscape has long been a draw for foreign investors, particularly in the energy and mining sectors. Moreover, Russia's highly skilled labour force enhances its attractiveness, particularly for industries that require specialized technical expertise (Domínguez-Jiménez & Poitiers, 2020). These factors, combined with the strategic importance of Russia in global energy markets, have ensured a steady flow of foreign investments into the country despite economic and geopolitical challenges. Finally, South Africa accounts for 4% of total FDI inflows within BRICS. Despite its relatively smaller economy, South Africa has served as the gateway to Africa for foreign investors, offering a stable financial market and abundant mineral resources. However, structural challenges such as slow economic growth and political instability have limited its share of FDI compared to the other BRICS members (Mazenda & Masiya, 2021). This distribution of FDI inflows reflects the diverse economic characteristics of each BRICS nation and the distinct factors driving foreign investment within the group.

2.7 Summary

The second chapter provides a comprehensive analysis of the evolution of BRICS and its growing prominence in the global economy. The chapter traces how BRICS has grown from a group of emerging economies into a powerful bloc, expanding its influence through the inclusion of new members and cementing its role in global governance. It further discusses the diverse economic profiles of the BRICS countries. It also highlights the increasing competition between BRICS and established groups like the G7, illustrating how BRICS nations have leveraged their economic potential, natural resources, and strategic importance to attract substantial FDI inflows. The chapter presents FDI trends within BRICS, showing how these economies, despite internal challenges, continue to draw global investors. Overall, this chapter helps to understand how BRICS has emerged as a powerful entity, reshaping international investment flows.

CHAPTER 3

REVIEW OF LITERATURE

A comprehensive review of literature is a crucial element in any academic study as it provides the theoretical and empirical foundation upon which the research is built. It enables researchers to gain a deep understanding of the existing body of knowledge, identify trends, and highlight key debates in the field. By critically evaluating past studies, a literature review helps to align the current research within the broader academic framework, identifying gaps in existing knowledge and highlighting areas that require further exploration. This process helps ensure that the research builds on earlier work while also showing the originality and importance of the study in its field. In the context of this research project, the literature review focuses on investigating the relationship between FDI and economic growth, particularly within the BRICS nations. It also assesses how different factors, such as trade openness, institutional quality, human capital, and factor productivity, intersect with FDI to influence economic trajectories.

Chapter 3, therefore, systematically covers the major theoretical frameworks and empirical studies related to FDI and economic growth. Section 3.1 explores the foundational theories of FDI, which explain the motivations behind international investments and how they affect host economies. Section 3.2 focuses on growth theories, illustrating the role of FDI as a driver of long-term economic development. In Section 3.3, the empirical literature is critically assessed, offering insights into how FDI has been measured and its impact analyzed in both developed and emerging economies, with a specific focus on the BRICS countries. Section 3.4 identifies gaps in the existing literature, pinpointing the need for further research on the unique context of BRICS nations. Section 3.5 outlines the conceptual framework that guides this study, highlighting the relationship between FDI and various economic variables that are crucial for understanding growth patterns in BRICS. The chapter concludes with Section 3.6, summarizing the key takeaways from the literature and setting the stage for the empirical analysis that follows.

3.1 Theories of FDI

Numerous competing and complementary theories of FDI have been proposed by various researchers over the period of time. However, no particular theory explains the causes of flow

of investment abroad by multinational corporations (MNCs) owing to their different nature, type and origin. In order to have a broader knowledge regarding the investment inflows, we trace the evolution of the theories of FDI inflows over the past few decades. The theories and conceptual framework regarding FDI began to evolve during 1960's due to increase in volume of flow of investment worldwide during this period. This section explores the theoretical background of FDI in detail. The theories provide an explanation to a variety of questions like why, when and how FDI takes place abroad or what determines the investment flows from home country to host country.

3.1.1 Motivation Theory of FDI

The motivation theory of FDI, as articulated by MacDougall (1960) and Kemp (1962), provides a foundational framework for understanding the economic rationale behind firms' decisions to invest abroad. This theory posits that FDI occurs due to differences in the marginal productivity of capital between the capital-exporting and capital-importing countries. Specifically, when the marginal productivity of capital is higher in the host country, firms are incentivized to invest abroad, seeking to maximize returns. FDI promotes the more efficient global allocation of resources by transferring capital from countries with an abundance of it to those with a scarcity. The theory further highlights the welfare implications of FDI, emphasizing that the inflow of foreign capital to the host country not only enhances production capabilities but also generates employment, improves resource utilization, and potentially elevates income levels, thereby contributing to overall economic development. This theory underscores the mutually beneficial effects of FDI for both the investor and the recipient country.

3.1.2 Transaction Cost Theory of FDI

The theory was initially introduced by Coase (1937) and later refined by Williamson (1981). It focuses on the costs associated with trading and managing exchanges of goods and services. These transaction costs include expenses such as communication charges, legal fees, operational costs, and bureaucratic expenses. The theory asserts that a firm's primary objective is to minimize these costs, both in external exchanges with the market and in managing internal operations. As firms grow in size, transaction costs tend to decrease due to economies of scale. High transaction costs, however, can negatively impact a firm's decisions related to production, distribution, property rights, and exchanges. Consequently, multinational firms are inclined to invest in locations that offer lower operational and decision-making costs, as these environments are more conducive to efficient transactions and resource management.

3.1.3 Industrial Organization Hypothesis

Hymer (1960, 1972) developed the industrial organization hypothesis which explains the strategic motivations of multinational corporations (MNCs) to invest abroad based on the structure and dynamics of industries. This theory asserts that FDI is driven by the existence of market imperfections, which create opportunities for firms to exploit their competitive advantages in foreign markets. Such imperfections include barriers to entry, imperfect competition, and unequal access to resources. Firms that engage in FDI typically possess firm-specific advantages such as proprietary technology, advanced managerial expertise, economies of scale, or strong brand recognition that allow them to overcome the disadvantages of operating in a foreign country. By leveraging these advantages, MNCs can effectively compete with local firms, whose access to local market knowledge may otherwise provide them with a competitive edge. This approach highlights that FDI is not only about capital movement but also about transferring firm-specific capabilities that enhance the firm's global competitive position.

3.1.4 Product Life Cycle Theory

The product life cycle theory by Vernon (1966) is based on the experience of U.S. manufacturing companies after the Second World War. The theory explains a firm's transition from an exporting company to an investing one. The theory demonstrates how firms engage in FDI as products move through different stages of their life cycle: introduction, growth, maturity, and decline. According to this theory, in the early stages of a product's life cycle, production tends to remain in the home country, where innovation, technological development, and skilled labour are concentrated. As the product matures and becomes standardized, production shifts to lower-cost foreign locations to take advantage of reduced labour and production costs. This shift is driven by competitive pressures and the need to maintain profitability in increasingly saturated markets. During the maturity phase, firms often engage in FDI to establish production facilities in foreign markets, thereby reducing costs and accessing new consumer bases. Finally, in the decline phase, production may further relocate to developing countries where costs are lowest, or the firm may exit certain markets entirely. This theory underscores the dynamic nature of FDI, linking it directly to the evolution of products and the changing needs of firms as they move from innovation to cost-efficiency strategies.

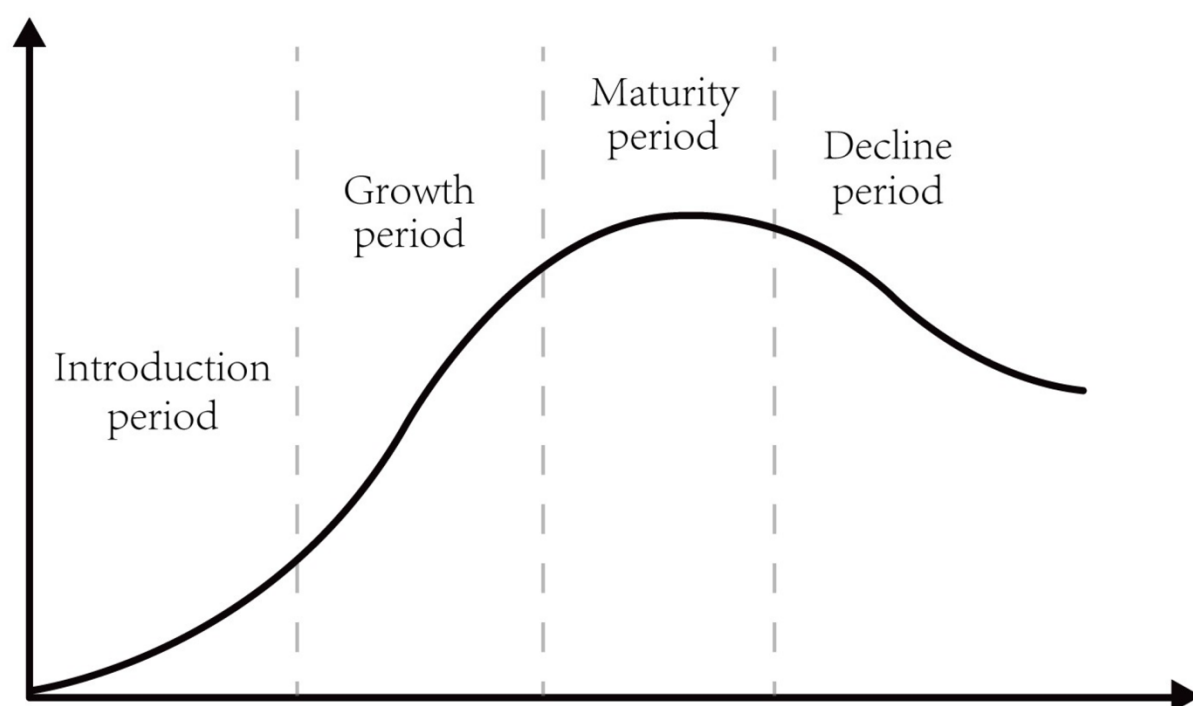


Figure 3.1 Stages of Product Life Cycle

(Source: Li et al., 2023)

3.1.5 Internalization Theory of FDI

The Internalization theory of FDI, developed by Buckley and Casson (1976), explains why firms prefer to engage in FDI rather than licensing, exporting, or entering into joint ventures. This theory posits that firms internalize operations to maintain control over their proprietary assets, such as technology, knowledge, or managerial expertise, thereby avoiding the inefficiencies and costs associated with external market transactions. In imperfect markets, engaging with external entities through contracts or partnerships can lead to issues such as transaction costs, risks of intellectual property leakage, or difficulties in monitoring quality and performance. Internalizing operations allows firms to bypass these market imperfections and ensure that their competitive advantages are protected and effectively utilized. FDI becomes the preferred strategy when the benefits of controlling production, distribution, and other operations internally outweigh the costs of establishing and managing foreign subsidiaries. Thus, internalization enables firms to maintain better control over their global value chain, reduce uncertainty, and enhance profitability by coordinating activities across borders in a more efficient manner.

3.1.6 Location-specific Theory of FDI

Hood and Young (1979) stated that different countries have different real wage cost which act as an important determinant of the locational choice of FDI. The multinational firms prefers to relocate themselves in countries with abundant raw material and cheap labour force. Other locational factors include infrastructure, market size, financial incentives, favourable regulatory environments, and proximity to key markets. According to this theory, the decision to engage in FDI is driven by the desire to access these location-specific benefits, which cannot be fully realized through exporting or licensing. For example, a firm may invest in a country with abundant natural resources to reduce production costs or in a region with high consumer demand to strengthen its market presence. The theory highlights that the attractiveness of a particular location depends on how well its advantages align with the firm's goals, resources, and strategies. Thus, FDI occurs when firms identify specific geographic regions that provide the best conditions for enhancing their productivity, profitability, and global competitiveness.

3.1.7 Eclectic Theory of FDI

Dunning (1977, 1979 and 1988) integrated the previously existing theories of investment and developed a new paradigm called the Eclectic theory of investment or the OLI Paradigm. It is regarded as one of the most comprehensive frameworks for understanding why MNCs engage in FDI. The theory combines three key factors: Ownership, Location, and Internalization (OLI) to explain the conditions under which firms decide to invest abroad.

- i. **Ownership Advantage:** This refers to the firm-specific assets or capabilities that give a company a competitive edge over local firms in foreign markets. These could include proprietary technology, brand reputation, managerial expertise, or economies of scale. Without such ownership advantages, a firm would struggle to compete effectively in a foreign country.
- ii. **Location Advantage:** This factor focuses on the specific benefits a foreign location offers, which motivate a firm to invest there rather than exporting from its home base or licensing its technology. These location-specific advantages could be related to access to natural resources, cheap labour, proximity to markets, infrastructure, or favourable government policies. The firm chooses a location that optimizes its operations, reduces costs, or allows it to overcome trade barriers.
- iii. **Internalization Advantage:** The internalization aspect addresses why firms prefer to undertake FDI rather than relying on market-based mechanisms such as licensing or

franchising. By internalizing operations, firms can avoid transaction costs associated with dealing with external partners, such as contract enforcement, protecting intellectual property, or ensuring quality control. Internalization allows MNCs to maintain control over their proprietary assets and ensure that their competitive advantages are fully realized in foreign markets.

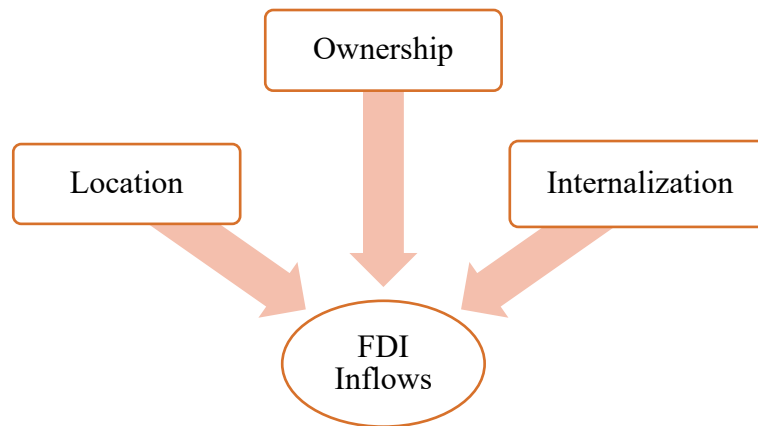


Figure 3.2 OLI Framework
(Source: Compiled by the author)

3.1.8 Currency-based Theory of FDI

The Currency-based theory of FDI, initially proposed by Aliber (1970), emphasizes the role of exchange rate differences in driving FDI flows. The theory postulates that countries with weaker currencies, compared to stronger or dominant currencies, tend to attract larger amounts of FDI. This is because firms from countries with stronger currencies can capitalize on exchange rate differences, making investments in foreign assets more affordable. The theory suggests that MNCs are motivated to invest abroad when the market capitalization rates of host countries, as influenced by their weaker currencies, present opportunities for higher returns. Froot and Stein (1989) further expanded this theory, arguing that exchange rate differences in integrated global markets drive increased FDI flows. Firms from countries with appreciating currencies are more likely to invest abroad to take advantage of lower asset costs due to their increased purchasing power. Additionally, exchange rate volatility can motivate firms to diversify operations across multiple countries to hedge against currency risks, thereby stabilizing earnings. In this way, currency strength, exchange rate differences, and volatility

are key determinants of FDI patterns, influencing both the timing and location of foreign investments.

3.2 Theories of Growth

Neoclassical growth theories offer foundational explanations for how economies achieve long-term growth, primarily through capital accumulation, labour expansion, and technological progress. These theories emphasize the role of market equilibrium and diminishing returns to capital, while highlighting the importance of technological advancements in sustaining growth. Two prominent models within this tradition are the Solow-Swan model and the endogenous growth model, which present distinct mechanisms for understanding the drivers of economic growth.

3.2.1 Solow-Swan Model of Economic Growth

The Solow-Swan model, developed by Solow (1956) and Swan (1956), is a neoclassical framework that explains growth through capital accumulation, labour, and exogenous technological progress. The model suggests that economies experience diminishing returns to capital, meaning that over time, each additional unit of capital contributes less to output. Eventually, an economy reaches a steady state where further capital accumulation no longer increases per capita growth. In this state, technological progress becomes the key driver of sustained growth, as it improves productivity and shifts the production frontier upward. FDI plays a crucial role in boosting capital accumulation, particularly in developing countries where capital is scarce. FDI provides essential financial resources, helping nations move toward a higher steady-state output. More importantly, FDI often brings new technologies, which are essential for maintaining long-term growth according to the model's emphasis on technological progress.

3.2.2 Endogenous Growth Model

The endogenous growth model, developed by economists such as Lucas (1988) and Romer (1994) shifts the focus from external factors to internal mechanisms of growth. It argues that growth is driven by factors such as human capital development, innovation, and knowledge, which can generate increasing returns. Unlike the Solow-Swan model, it does not assume diminishing returns to capital, as investments in human capital and technology continually foster innovation and productivity improvements. Here, technological progress is endogenously determined by economic activities like research and development (R&D) and

educational investments, making long-term growth possible without relying on external technological shocks. Within this framework, FDI plays an instrumental role by facilitating technology transfer, enhancing human capital, and boosting innovation in the host country. By introducing advanced technologies and managerial expertise, FDI can accelerate the internal processes of growth, making it a key contributor to sustained economic expansion. Thus, FDI not only supplements capital but also enhances the endogenous factors that drive long-term growth.

3.3 Empirical Literature

Investment is a critical driver of economic growth, contributing to both productivity enhancement and capital accumulation (Akinmulegun, 2012; Iqbal et al., 2018; Wahab, 2020; Hlapi et al., 2023). In developing countries, FDI plays an especially pivotal role by injecting capital, fostering technological transfer, improving managerial expertise, and providing access to global markets (Borensztein et al., 1998; Alfaro et al., 2004; Harrison & Rodríguez-Clare, 2010; Paul & Feliciano-Cestero, 2021). FDI not only enhances the competitiveness of local firms but also broadens export opportunities and supports infrastructure development, ultimately contributing to long-term economic stability (De Mello, 1997; Forte & Moura, 2013; Kumari et al., 2023). Nair-Reichert and Weinhold (2001) explored the relationship between FDI and economic growth using cross-country panel data from 1970 to 1999, finding a strong positive correlation between FDI inflows and economic growth, particularly in developing nations. Their study emphasizes that FDI contributes not only to immediate capital accumulation but also to long-term productivity gains. Similarly, Zhang (2001) focused on the East Asian and Latin American nations, analyzing data from 11 economies between 1980 and 1999 using cointegration. The results highlighted that FDI plays a crucial role in driving economic growth by facilitating both direct capital investment and technology transfer, thereby enhancing the productive capacity of host countries. In another study, Makki and Somwaru (2004) investigated the role of FDI in advancing economic growth across 66 developing countries over a period of three decades. They found a strong positive relationship between FDI inflows, trade, and economic growth, reinforcing the significance of FDI in promoting development.

Mold (2003) examined FDI's impact in the context of the Single Market Programme in Europe, focusing on data from 1986 to 2000. The study found that FDI positively influenced growth, particularly in countries undergoing market liberalization. This study underscores the role of FDI as a key mechanism for development, particularly in transitioning economies. Chowdhury

and Mavrotas (2006) used time-series data to investigate the causality between FDI and economic growth in three developing countries, namely Chile, Malaysia, and Thailand from 1969–2000. Their results show a bidirectional relationship, indicating that while FDI promotes growth, economic growth also attracts more FDI, suggesting a complex and reciprocal relationship.

Further supporting the positive role of FDI, Wen (2007) examined regional market conditions in China and their effect on the FDI-growth nexus, using data from 1990 to 2005. The study concluded that FDI inflows significantly contribute to regional development by enhancing market conditions and industrial growth. Kök and Acikgoz Ersoy (2009) studied the determinants of FDI for a panel of 24 developing countries, analyzing data from 1976 to 2006 with the help of Fully-modified OLS (FMOLS) and Seemingly Unrelated Regression (SUR). They concluded that FDI inflows are associated with increased GDP growth rates, further emphasizing FDI's critical role in economic development. Similarly, Türkcan and Yetkiner (2010) analyzed the relationship between FDI and growth in 23 OECD countries, using a panel dataset from 1975 to 2004 with the help of Generalized Method of Moments (GMM). The results revealed a strong positive correlation between the two, thus highlighting the importance of FDI as a vital component of economic expansion even in developed economies.

Likewise, Iqbal et al. (2014) examined the role of FDI in promoting GDP growth in Pakistan from 1983 to 2012, affirming its growth-enhancing impact, particularly within developing economies. In another study, Raza and Karim (2018) explored the effects of systemic banking and currency crises on the FDI-growth nexus in China from 1982 to 2014, confirming the significant influence of FDI on economic expansion. Owusu-Nantwi and Erickson (2019) echoed these findings in their research on South America, emphasizing the importance of FDI in advancing economic development between 1990 and 2017.

Further, Ahmed and Ibrahim (2019) analyzed FDI inflows and outflows in developed and developing countries from 1980 to 2017. They concluded that while FDI inflows significantly enhance economic growth, the effects are particularly pronounced in developing nations. Soe (2020) focused on Myanmar, highlighting the positive impact of inward FDI on economic growth between 2010 and 2018, aligning with the 'market-size hypothesis' that expanding economies attract more FDI. Onaran and Selim (2020) explored the FDI-GDP dynamic in Turkey from 1990 to 2018, suggesting that changes in FDI are a key driver of GDP growth, revealing a unidirectional causality from FDI to economic expansion. In another major study, Wahab (2020) examined the FDI-growth nexus in Nigeria's services sector from 1990 to 2018,

concluding that FDI inflows play a critical role in stimulating economic growth, supporting the argument that foreign investment is integral to economic development in the country.

Nguyen (2020) showed a statistically significant positive influence of FDI on Vietnam's economic growth from 2000–2018 using OLS regression. This finding aligns with broader consensus in the literature that FDI is a crucial factor in driving economic development, particularly in emerging markets (Türkcan & Yetkiner, 2010; Wahab, 2020). Gu and Prah (2020) argued that the adoption of International Financial Reporting Standards (IFRS) boosts FDI inflows using annual data from 1996 to 2018 in 12 African countries. This increase in FDI flows subsequently stimulates economic growth. Their study emphasizes that FDI not only brings financial capital but also improves regulatory frameworks, which are key to building a skilled workforce. This view is further supported by Tanoe (2021), who highlighted that FDI contributes significantly to the sustainability of economic growth in Sub-Saharan Africa (SSA), where it serves as a critical source of investment in infrastructure and development. This is particularly important for regions that struggle to attract domestic investment, as FDI can provide the necessary financial resources to support growth initiatives.

Continuing the discussion, Parajuli (2021) showed that FDI plays a key role in enhancing productivity in Nepal from 1991 to 2019 using Ordinary Least Square (OLS) model. This study emphasizes that FDI is not only essential for capital formation but also contributes to technological and productivity advancements in the long-run. The results from Parajuli (2021) complement those from Joshua et al. (2020), who studied the FDI-growth nexus in 200 countries from 1990–2018 using GMM estimation. The study found that creating a favourable business climate is crucial for attracting FDI, which then promotes economic growth. Similarly, Halizam et al. (2021) suggested that Malaysia's economic growth has been significantly driven by its ability to attract FDI through strategic policy measures with the help of Autoregressive Distributed Lag (ARDL) model from using annual data from 1970 to 2018.

Joshua et al. (2023) expand on these earlier findings by demonstrating that FDI exerts a strong positive impact on South Africa's economic growth between 1970 to 2018, reinforcing the notion that foreign investment is critical for capital formation and overall economic expansion. The study by Izadi and Madirimov (2023) further supports this, asserting that FDI is indispensable for emerging economies as it fosters capital formation and stimulates broader economic growth. The study used a sample of 78 Eurasian countries, showing a significant and positive effect of FDI on sustainable development, as measured by the Sustainable Development Goals (SDG) index. Likewise, Sahoo and Sethi (2023) highlighted the

importance of FDI as a vital source of capital for selected South Asian countries (Bangladesh, Bhutan, India, Pakistan, and Sri Lanka) over the time period 1990–2017 employing full modified ordinary least square (FMOLS) and dynamic ordinary least squares (DOLS) methods. These emerging economies often face capital shortages. The study argued that FDI fills these investment gaps while facilitating the transfer of advanced technologies and managerial expertise, thereby improving productivity.

The relationship between FDI and economic growth has been extensively studied, with many researchers highlighting the potential benefits of FDI. However, a significant body of literature suggests that FDI may have a negative or insignificant impact on economic growth, particularly in developing countries. Saltz (1992) conducted an empirical analysis of the relationship between inward FDI flows and economic growth, focusing on a panel of 75 developing countries during the decade from 1970 to 1980. The findings indicated a negative correlation between FDI levels and economic growth, suggesting that foreign investments may not have the anticipated positive effects on the economies of these nations. In a similar study, Balasubramanyam et al. (1996) explored the effects of FDI on economic growth in a sample of 46 developing countries. The results indicated a lack of evidence supporting FDI-led growth in countries that adopted an export-based strategy. However, they did find evidence of a positive relationship between FDI and economic growth in nations that implemented an import substitution strategy, highlighting the importance of economic context in determining the outcomes of foreign investments. In a comprehensive review, Lipsey (2002) assessed various empirical studies concerning the FDI-growth relationship and concluded that there is no reliable connection between the volume of inward FDI stocks or flows relative to GDP and economic growth. This review underscores the inconsistency in findings across different studies, suggesting that the expected benefits of FDI may not be universally applicable.

Further, Carkovic and Levine (2002) conducted an empirical investigation of the FDI inflow-growth relationship for a panel of 72 countries from 1960 to 1995. Their analysis revealed that FDI inflows did not significantly impact economic growth in either developed or developing economies, further contributing to the discourse on the limited efficacy of FDI as a growth driver. Similarly, Lyroudi et al. (2004) investigated the impact of FDI on economic growth in transition economies and concluded that there was no significant relationship between the two variables. Their research highlighted the complexities of the FDI-growth nexus in these specific contexts, indicating that foreign investments did not translate into meaningful economic benefits. Herzer and Klasen (2008) supported these findings by studying 28 developing countries from 1970 to 2003, concluding that FDI did not significantly promote

growth. Similarly, Nath (2009), in his study of 13 transition economies in Central and Eastern Europe and the Baltic region from 1991 to 2005, observed a weak or insignificant impact of FDI on economic growth. Louzi and Abadi (2011) reached comparable results in their analysis of Jordan from 1997 to 2006, suggesting FDI had limited influence on growth in that period. In another major study, Pradhan (2011) noted that while there is a bidirectional causality between FDI and economic growth for seven SAARC countries over the period 1980–2010, the impact of FDI on growth is not consistently positive. The study indicated that FDI could sometimes lead to adverse effects on economic growth, particularly when it exacerbates income inequality or fails to create substantial employment opportunities. This notion was supported by Khan et al. (2012) who examined the spillover effects of FDI on economic growth in Pakistan from 2001–2010. Their findings suggested an insignificant impact of FDI on the economy, as the country faced a declining trend in FDI inflows. The empirical results indicated a weak positive correlation between FDI and economic growth, leading the authors to conclude that the relationship is not strong enough to warrant significant economic benefits. Furthermore, Herzer (2012), using heterogeneous panel co-integration techniques, examined the effects of FDI on 44 developing economies and identified a negative relationship between FDI and growth, attributing the variance to country-specific differences. Inekwe (2013) examined the relationship between FDI and economic growth in Nigeria, finding that while there is a theoretical expectation of a positive impact, the empirical evidence indicated an insignificant relationship between FDI and economic growth. The study suggested that the expected benefits of FDI were not realized in the Nigerian context, primarily due to structural issues within the economy. Similarly, Velnampy et al. (2014) found that there is no significant impact of FDI on economic growth in Sri Lanka from 1990 to 2011. Their analysis revealed that only 4.3% of the variance in economic growth could be explained by FDI, indicating a weak relationship between the two variables. The study concluded that while there is a long-run equilibrium relationship between FDI and economic growth, the overall impact of FDI remains minimal in the Sri Lankan context.

Similarly, Belloumi (2014) investigated the relationship between trade, FDI, and economic growth in Tunisia from 1970 to 2008. The study employed an autoregressive distributed lag (ARDL) model and concluded that FDI had no significant causality on economic growth and vice versa, suggesting that the anticipated benefits of FDI were not fully realized in the Tunisian context. Next, Badr and Ayed (2015) investigated the relationship between FDI and economic growth in North African countries from 1961 to 2012. Their analysis revealed that while FDI is influenced by various economic determinants, it has a non-significant effect on

GDP growth. This finding suggests that the anticipated benefits of FDI may not materialise in the North African context, emphasizing the need for a more nuanced understanding of the factors influencing economic growth.

Iddrisu et al. (2015) examined the impact of FDI on the agricultural sector in Ghana with data over the period 1980–2013 using Johansen cointegration test. The study found inconclusive evidence regarding the positive effects of FDI on growth, suggesting that the relationship remains ambiguous. Chen (2015) studied the effects of coastal FDI on inland provinces in China using provincial-level panel dataset. The findings revealed a negative impact on economic growth, suggesting that FDI might not always yield the expected benefits for all regions. In West Africa, Anyanwu and Yameogo (2015) employed GMM and OLS methodologies to assess FDI and economic growth across the region from 1970 to 2010, identifying a negative correlation between the two variables. Mahembe and Odhiambo (2016) expanded the analysis to low-income Southern African Development Community (SADC) countries using annual data from 1980 to 2012, finding no significant growth effect from FDI. Similar results were reported by Elboiashi (2015) for selected sample of developing countries from 1970 to 2005 using GMM estimation technique. Alvarado et al. (2017) analyzed FDI's role across various income groups in 19 Latin American countries and concluded that FDI was not a strong vehicle for growth and development, except in high-income nations. Most recently, Asafo-Agyei and Kodongo (2022) examined the effects of incoming FDI flows on economic growth in sub-Saharan African nations. Their findings indicated that for FDI to effectively drive economic growth, these countries need a certain level of absorptive capacity to leverage FDI's growth-enhancing benefits.

Thus, the studies suggest that the impact of FDI inflows on economic growth is not uniform and largely depends on specific domestic conditions or the absorptive capacity of the host country (Duarte et al., 2014; Silajdzic & Mehic, 2016; Ben Mim et al., 2022). This refers to host country's ability to utilize and integrate foreign capital for productive purposes effectively (Marcin, 2008; Anwar & Nguyen, 2010). The benefits of FDI can only translate into overall economic growth when the host country possesses the necessary capability to absorb and capitalize on these inflows efficiently (Asafo-Agyei & Kodongo, 2022). The study has identified various factors that significantly affect the absorptive capacity of a nation, shaping the extent to which FDI can contribute to economic development. It is important to note that the positive impact of FDI is not a given; it may vary widely depending on factors such as the political and macroeconomic stability of the host country, as well as its institutional capability, infrastructure, and quality of available workforce (Kok & Acikgoz Ersoy, 2009; Iwai &

Thompson, 2012; Owusu-Nantwi, 2019; Rakhmatullayeva et al., 2020; Aziz, 2022). For instance, a stable exchange rate is essential, as fluctuations can create uncertainty for foreign investors, making it more challenging to conduct long-term business operations (Jehan & Hamid, 2017; Alshubiri, 2022). Countries that demonstrate political stability and robust economic policies are more likely to attract and retain inward FDI (Jude & Levieuge, 2017). Another key factor influencing the absorptive capacity is human capital. A well-developed education system and a skilled workforce enable a country to better absorb advanced technologies and managerial practices brought in by foreign investors (Akpan et al., 2014; Li, 2023). This, in turn, enhances productivity and fosters long-term growth (Cleeve et al., 2015). The presence of strong institutional frameworks is equally important. Nations with transparent governance, property rights protection, and lower corruption levels tend to create a more favourable business environment, thereby attracting higher levels of foreign capital (Daude & Stein, 2007; Hayat, 2019; Adegboye et al., 2020).

In addition to these factors, effective information and communication technology (ICT) infrastructure to facilitate knowledge transfer and foster innovation is crucial (Maryam & Jehan, 2018; Liu & Wang, 2024). Countries with well-established ICT systems can more effectively integrate into global value chains, which increases the likelihood of deriving growth benefits from FDI (Belloumi & Touati, 2022). Trade openness is also critical, as it allows for greater market access and encourages export-oriented investments (Cantah et al., 2018; Rakshit, 2022). Finally, total factor productivity (TFP), which measures the efficiency of all production inputs, determines how effectively a country can utilize FDI for sustainable growth (Herzer, 2011; Abdullah & Chowdhury, 2020). These variables collectively illustrate that the impact of FDI on economic growth is far from uniform, and a nation's absorptive capacity is crucial in realizing its full potential.

3.3.1 Exchange rate

The stability of the exchange rate plays a pivotal role in determining the attractiveness of FDI inflows in a country (Mensah et al., 2017). Exchange rate fluctuations can create significant risks for foreign investors, affecting the profitability of their investments in the host country (Dash, 2004; Lily et al., 2014; Alshubiri, 2022). A stable exchange rate reduces uncertainty, allowing foreign firms to plan long-term investments without fear of abrupt changes that could undermine their returns (Lajevardi & Chowdhury, 2024). Numerous studies highlight that countries with stable and predictable exchange rate regimes are more likely to attract sustained FDI inflows, as they provide a more favourable environment for business operations and

financial transactions (Abbott et al., 2012; Dal Bianco & Loan, 2017; Tan et al., 2021). Moreover, exchange rate stability ensures smoother international trade and investment flows, which is crucial for integrating foreign capital into the domestic economy, ultimately contributing to economic growth (Aman et al., 2017; Morina et al., 2020).

Empirical studies have consistently demonstrated the significant impact of exchange rates on FDI inflows. For instance, Yol and Teng (2009) studied the impact of exchange rate on FDI flows in Malaysia using annual data from 1975–2006. The study reported that an increase in local currency value attracted more FDI, reinforcing the notion that exchange rate stability encourages investment. Tarawalie (2010) employed a bivariate Granger causality test to analyze the relationship between real exchange rates and economic growth in Sierra Leone, showing a positive correlation between exchange rate stability and economic growth, which further facilitated FDI inflows. Nyarko et al. (2011) studied the effects of exchange rate regimes on FDI inflows in Ghana from 1970 to 2008 using the Error Correction model. The results showed that exchange rate volatility negatively impacted FDI inflows, particularly after a structural break in 1994, emphasizing the critical role of stable exchange rates. Similarly, Helhel and Kalayci (2012) emphasized that flexible exchange rates have not fully insulated domestic economies from external shocks, which continue to create volatility, posing risks for foreign investors.

Further, Otieno (2013) analyzed the relationship between regional integration and FDI in East African countries, revealing that an increase in the real effective exchange rate would lead to an increase in FDI flow. This finding underscores the importance of exchange rate stability in attracting foreign investments, as depreciation of the real exchange rate can make investments cheaper for foreign investors (Abbott et al., 2012; Lily et al., 2014). Aziz & Mishra (2016) also confirmed these findings in 16 Arab economies, arguing that a strong currency signals better economic conditions, thus attracting foreign investors. Jehan and Hamid (2017) examined the role of financial development in mediating the effects of exchange rate volatility on capital inflows, including FDI in developing countries from 1980–2013, using dynamic GMM estimation. Their findings suggested that financial development could mitigate the adverse effects of exchange rate volatility, thereby enhancing the attractiveness of a country for foreign investors. In a meta-analysis, Moraghen et al. (2019) examined the heterogeneity in the effects of exchange rates on FDI, revealing that the exchange rate volatility is relatively lower in countries with higher trade openness. Likewise, Meftah and Nassour (2019) analyzed the relationship between macroeconomic variables and FDI inflows in Turkey from

1974–2017, employing a cointegration approach. The results revealed a bi-directional relationship between exchange rates and FDI, suggesting that while FDI can influence exchange rates, the latter also significantly affects FDI inflows, albeit with a marginal impact on economic growth. Further, Thai Hung (2020) analyzed stock market volatility and exchange rate movements in Gulf Arab countries (Kuwait, Qatar, Saudi Arabia, and the UAE) using a Markov-state switching model from 2000-2018, revealing that exchange rate fluctuations significantly affect investor confidence and, consequently, FDI inflows. Gupta and Ahmed (2020) further explored the determinants of foreign portfolio flows to the Indian debt market using monthly data from 2002 (January) to 2016 (December), emphasizing that a stable exchange rate is crucial for attracting foreign investments as it signals economic stability.

Morina et al. (2020) conducted a study on the effect of exchange rate volatility on economic growth in 14 Central and Eastern European (CEE) countries, employing a dynamic panel data methodology for the period 2002–2018. The findings indicated that exchange rate fluctuations negatively impacted economic growth, emphasizing the need for stable exchange rates to foster a conducive environment for FDI flows. Similarly, Megasari and Saleh (2021) explored the determinants of FDI inflows in Organization of Islamic Cooperation (OIC) countries from 2005-2018 using a fixed effects model (FEM). The results highlighted that while a stronger exchange rate could attract investment, the relationship was not statistically significant across all countries, pointing to a complex dynamic between exchange rates and FDI in these countries. In the context of Nigeria, Batat and Ahmadu (2021) examined the nexus between FDI and economic growth over the period from 1986 to 2018 using the Autoregressive Distributed Lag (ARDL) model, emphasizing that exchange rate fluctuations exert considerable effects on FDI flows and allocation within the country. Thus, factors such as exchange rate stability, volatility, and the overall economic environment play crucial roles in shaping the relationship between FDI and economic growth.

3.3.2 Human Capital

Human capital, which refers to the education, skills, and expertise of a country's workforce, is another vital determinant of the absorptive capacity of FDI flows. Studies indicate that countries with a well-educated and skilled labour force are better equipped to utilize and maximize the benefits of FDI, particularly in sectors requiring advanced technical skills and knowledge (Noorbakhsh et al., 2001; Duarte et al., 2014; Anetor, 2020). The presence of highly

qualified human capital allows for the effective transfer of technology and managerial expertise from foreign investors to the domestic economy, fostering innovation and productivity improvements (Cleeve et al., 2015). Moreover, human capital is critical for industries that rely on specialized skills, further enhancing the positive impact of FDI on economic growth (Blomstrom & Kokko, 2003; Kar, 2013; Padhi, 2024).

Numerous empirical studies have underscored the significance of human capital in mediating the relationship between FDI and economic growth. For example, Liu et al. (2001) examined the impact of FDI on labour productivity in the Chinese electronics industry, finding that human capital development was essential for maximizing the productivity benefits associated with FDI. Miyamoto (2003) highlighted the importance of human capital formation in developing countries, suggesting that collaboration among various stakeholders, including multinational enterprises and educational institutions, is vital. This will enhance human capital and, consequently, FDI inflows. This early work sets the foundation for understanding how human capital supports FDI attraction and economic development. Li and Liu (2005) investigated the impact of FDI flows on economic growth for a panel of 84 countries from 1970 to 1999 using single and simultaneous equation modelling. The findings of the study pointed out that FDI not only directly promotes economic growth by itself but also indirectly does so via its strong positive impact on human capital. This aligns with the later findings of Chowdhury and Mavrotas (2006), who conducted a comprehensive analysis of FDI and economic growth, emphasizing that countries with better education systems and skilled labour forces experience greater FDI inflows, which subsequently lead to improved economic performance.

Building on these insights, Suliman and Mollick (2009) utilized panel data for 29 sub-Saharan African countries from 1980 to 2003 to demonstrate that the quality of human capital, particularly in developing nations, is a critical determinant of FDI inflows. This is because foreign investors prefer locations with a well-educated workforce (Miyamoto, 2003; Cleeve et al., 2015). Further exploring this relationship, Zhao and Zhang (2010) examined FDI and industrial productivity in China from 2001–2006. Their empirical analysis demonstrated that FDI not only brings capital but also enhances local labour skills through training and competition, thereby increasing overall productivity. This finding reinforces the notion that FDI can have a dual impact, enhancing both financial and human capital resources. Iwai and Thompson (2012) contributed further to the literature with a study that utilized panel data from developing countries to analyze the relationship between labour quality and FDI. Their findings

indicate that a higher quality of labour, characterized by better education and skills, positively affects FDI inflows. This underscores the argument that foreign investors are more likely to invest in countries where the workforce can meet the demands of advanced technologies and management practices.

Additionally, Bhaumik and Dimova (2013) added another layer to this discussion by providing evidence that a country's stock of human capital is one of the most important determinants of its inward FDI flow. They argue that FDI can also augment a recipient country's human resources, creating a mutually beneficial relationship between foreign investments and local skill development. This reciprocal relationship is critical for fostering an environment conducive to sustained economic growth. Akpan et al. (2014) conducted a comparative analysis of BRICS and MINT countries, revealing that the absorptive capacity of human capital is essential for translating FDI into sustainable economic growth. Their findings suggest that without adequate investment in human capital, the benefits of FDI may not materialize effectively. This emphasizes the need for countries to enhance their educational and skill development frameworks. Likewise, Inglesi-Lotz et al. (2015) explored this relationship in BRICS countries from 1981–2011 using the bootstrap panel Granger causality approach. The results found that human capital plays a crucial role in mediating the link between FDI and economic growth, highlighting the need for investment in education and skills development to leverage foreign investments fully.

More recent studies have reinforced these findings. For instance, Petrović-Randelović et al. (2020) analyzed the Western Balkan countries between 2008 and 2016, employing net FDI inflows as a percentage of GDP as a proxy for FDI. Their empirical findings confirmed that human capital development positively influences FDI, indicating that countries with better-educated populations are more successful in attracting foreign investments. Similarly, Khafidzin (2021) employed a panel data analysis in ASEAN-8 countries from 2010–2019 to show that nations with a higher level of skilled labour appeal more to foreign investors, thereby enhancing FDI inflows. The study highlights that an increase in human resources directly correlates with a more attractive investment climate, which is crucial for FDI attraction. Gandou and Sonmez (2022) conducted a panel study on 14 Economic Community of West African States (ECOWAS) countries from 1991–2015, demonstrating that human capital is integral to promoting economic growth through FDI. Their research further cements the argument that human capital is essential for reaping the full benefits of foreign investment. Li (2023) examined the restraining effect of human capital mismatch on economic growth using

the provincial panel data of China from 2006 to 2019, suggesting that the alignment of human capital with market needs is crucial for maximizing the benefits of FDI. The study emphasizes that human capital accumulation must strategically align with economic development goals to foster growth. Hence, countries prioritizing human capital development are better positioned to attract foreign investments, which catalyses economic advancement.

3.3.3 Information and Communication Technology

ICT infrastructure is a key factor in not only attracting FDI flows but also enhancing its overall effectiveness. A well-developed ICT framework facilitates efficient communication, innovation, and access to global markets, making it a critical component for countries aiming to integrate FDI into their economies (Tallon & Kraemer, 2000; Dimelis & Papaioannou, 2010; Soomro et al., 2022). ICT enables smoother business operations, enhances connectivity, and supports the rapid exchange of information, which is essential for modern business practices (Nayak & Sahoo, 2023). It plays a crucial role in increasing productivity, improving governance, and facilitating the diffusion of knowledge, all of which enhance the overall impact of FDI on economic growth (Cleeve, 2012; Yin & Choi, 2022). The empirical literature demonstrates that countries with advanced ICT infrastructure are more likely to attract FDI, particularly in technology-driven industries (Belloumi & Touati, 2022). For instance, Quibria et al. (2003) examined the determinants of the digital divide in Asia, emphasizing that countries with better ICT infrastructure experienced higher levels of FDI inflows. Their study set the stage for subsequent research on the link between ICT and FDI by highlighting the importance of technology investments for economic development. In the same year, Balamoune-Lutz (2003) explored the effects of ICT diffusion in developing countries, demonstrating its significant positive impact on GDP growth and the attraction of FDI. Building on this early work, Azari and Pick (2005) studied the socioeconomic influences on technological sectors in the United States, reinforcing the idea that regions with better ICT infrastructure attract more FDI. Similarly, Addison et al. (2006) identified new global determinants of FDI flows to developing countries, underscoring the role of ICT and democratization in attracting foreign investments. Dimelis and Papaioannou (2009) conducted a comparative analysis of FDI and ICT effects on productivity growth in a sample of 42 developing and developed countries from 1993–2001. Their findings indicated that while both FDI and ICT positively influence productivity growth, the impact is significantly stronger in countries with higher levels of

human capital and technological readiness, suggesting that the benefits of FDI are maximized in environments with robust ICT infrastructure.

Several other studies have delved deeper into the relationship between FDI, ICT, and economic growth. Varamini et al. (2012) examined the effects of human capital and ICT on FDI attraction, showing that countries with advanced ICT capabilities were more successful in drawing foreign investments. Cleeve (2012) explored political and institutional impediments to FDI inflows in 40 Sub-Saharan African countries, pointing to inadequate ICT infrastructure as a significant barrier. In another study, Iwai and Thompson (2012) found that higher levels of human capital and ICT development in developing countries attracted more FDI, which was essential for effectively utilizing foreign investments. Wang (2012) analyzed the role of openness and productivity in developing countries in Asia and Latin America and the Caribbean (LAC) from 1980 to 2000. The study concluded that countries with advanced ICT infrastructure experienced greater productivity growth and, in turn, higher FDI inflows. Ciloglu and Jikia (2013) then shifted the focus to Georgia, revealing how governance infrastructure, enhanced by ICT systems, plays a critical role in attracting FDI by improving transparency.

Ayenagbo (2015) studied the role of ICT in promoting economic growth in developing countries, concluding that countries with better ICT infrastructure not only attracted higher FDI inflows but also saw significant economic growth. The study further emphasized ICT as a key factor in improving the absorptive capacity of economies to benefit from foreign investments. Elimam (2017) reviewed the determinants of FDI inflows in Saudi Arabia, arguing that robust ICT infrastructure is necessary to maximize the productivity benefits of FDI. Similarly, Maryam and Jehan (2018) focused on technology diffusion in a panel of 91 developing countries from 1960–2015 using two-step GMM estimation, showing how advanced ICT capabilities drive productivity improvements and economic growth by attracting FDI.

Further, Toader et al. (2018) explored the role of ICT in enhancing FDI's effectiveness in EU countries for a period of two decades (2000–2018) using panel data estimation, highlighting its critical role in facilitating knowledge transfer and innovation. Stanley et al. (2018) conducted a meta-regression analysis, concluding that while ICT generally has a positive impact on economic growth, the benefits are contingent upon infrastructure development and human capital. More recently, Sarker and Khan (2020) examined the nexus between FDI, ICT, and economic growth in Bangladesh using annual data from 1972–2017 with the help of the augmented ARDL bounds testing approach. The results reinforced the idea that investments in ICT infrastructure are vital for maximizing FDI benefits.

Further, Ofori and Asongu (2021) demonstrated the joint effects of ICT diffusion and FDI on inclusive growth in Sub-Saharan Africa using dataset from 1980 to 2019 and employing the GMM estimation. The study highlighted that both ICT and FDI induce economic growth and advocated for policies that promote both ICT development and FDI attraction. Similarly, Sinha and Sengupta (2022) studied the interrelationship between economic growth, FDI inflows, and ICT expansion in a panel of 30 Asia-Pacific developing countries over the period of 2001–2017. The results highlighted the positive and significant impact of both FDI flows and ICT infrastructure on the economic growth in developing economies. In another major study, Luu (2023) examined the relationship between FDI and domestic entrepreneurship in 17 Asian countries from 2006 to 2018 using the three-stage least squares estimation method. The study concluded that ICT is essential for establishing new businesses and maximizing FDI spillovers into domestic entrepreneurship. Similarly, Bello et al. (2023) explored similar themes in Sub-Saharan Africa based on panel data covering the period 2005–2020, identifying ICT diffusion thresholds necessary for FDI to positively impact inclusive growth. Iqbal et al. (2023) examined the role of ICT in FDI and economic growth in a group of 53 Belt and Road Initiative (BRI) economies from 1990–2020, highlighting that advanced ICT infrastructure enhances the positive effects of FDI on economic growth. Arbia (2023) supported this view in Morocco using data from 1990 to 2021, showing how improvements in ICT infrastructure positively influence FDI inflows and subsequently foster economic growth with the help of the ARDL model. Likewise, Hammed and Ademosu (2023) conducted a study on the BRICS nations from 1990–2021, emphasizing that ICT infrastructure plays a pivotal role in enhancing FDI inflows, which in turn drive economic growth. David (2024) examined the impact of ICT on the growth of sixteen SADC countries from 2000 to 2017 using the panel data. The study employed panel vector autoregression (PVAR) and generalized method of moments (GMM) and found out that the relationship is statistically significant. Finally, Liu and Wang (2024) analyzed the relationship between ICT infrastructure and economic growth in 144 countries utilizing a panel dataset from 2003 to 2016, confirming that robust ICT development drives economic growth by attracting FDI inflows. Together, these studies highlight that the development of ICT infrastructure significantly bolsters a country's ability to attract FDI and realize its potential for economic growth.

3.3.4 Institutional Quality

Institutional quality, which encompasses governance structures, legal frameworks, and the enforcement of property rights, is a key determinant of a country's capacity to effectively absorb incoming FDI (Daude & Stein, 2007; Bailey, 2018; Islam et al., 2020). Countries with strong institutions are more likely to attract foreign investors, as they offer a stable and transparent environment that reduces risks related to corruption, regulatory unpredictability, and expropriation (Azam & Ahmad, 2013; Adegboye et al., 2020). They also facilitate efficient resource allocation, promote entrepreneurship, and support the rule of law, all of which are essential for maximizing the benefits of FDI (Buchanan et al., 2012; Sabir et al., 2019; Contractor et al., 2020). Empirical studies suggest that institutional quality significantly influences the extent to which FDI contributes to economic growth, as it ensures that foreign investments are protected and that business operations can proceed without undue interference (Busse & Groizard, 2008). Mody et al. (2003) explored the role of host-country transparency and governance in driving FDI flows. Using a gravity model and data covering multiple countries, they found that countries with transparent legal frameworks and strong governance structures are more attractive to foreign investors. Building on this, Daude and Stein (2007) conducted a comprehensive analysis of institutional quality and FDI using fixed-effects regression models. Their results demonstrated that countries with better institutional quality experience higher FDI inflows, as strong institutions reduce risks associated with corruption and regulatory uncertainty, thereby enhancing the investment climate.

In another study, Busse and Hefeker (2007) examined the effects of political risk and institutional quality on FDI inflows for 83 developing countries from 1984 to 2003. Their empirical analysis highlighted that improvements in institutional quality, particularly in property rights protection and regulatory efficiency, significantly boost FDI. Political stability emerged as a critical factor in attracting foreign investment, as noted by Biglaiser and Staats (2010), who found that U.S. corporations prefer to invest in countries that uphold human rights and the rule of law.

Jude and Levieuge (2017) continued this line of research, investigating the growth effects of FDI in developing economies while emphasizing the role of institutional quality. Their panel data analysis across 94 developing countries from 1990 to 2012 found that countries with stronger institutions can better leverage FDI for economic growth. This conclusion aligns with that of Brahim and Rachdi (2014), who analyzed 19 MENA countries between the period 1984 to 2011 using the Panel Smooth Transition Regression (PSTR) model. The study found that institutional quality plays a critical role in determining FDI inflows, especially in developing

economies. Vergil and Teyyare (2017) similarly explored the relationship between institutional quality and economic growth across nine countries (Argentina, Mexico, Brazil, Thailand, Malaysia, Philippines, Indonesia, South Korea, and Turkey) from 1984 to 2010 using panel data regression. Their analysis showed that higher institutional quality significantly contributes to economic growth, especially during financial crises, demonstrating that robust institutions can mitigate adverse economic impacts.

Peres et al. (2018) supported these conclusions by examining the impact of institutional quality on FDI inflows in both developed and developing countries. They found that improving institutional frameworks and creating a favourable macroeconomic environment significantly increased FDI inflows. Athari and Adaoglu (2019) investigated how institutional quality influences capital flows across various stages of economic development using a sample of 135 countries. Applying the system GMM approach, they found that both public and private institutional quality positively impact capital inflows in efficiency-driven and innovation-driven economies. In a comprehensive study, Sabir et al. (2019) analyzed the relationship between institutional quality and FDI across developed and developing countries from 1996 to 2016. Their findings confirmed that institutional quality positively impacts FDI, with developed countries benefiting more from governance indicators like political stability, rule of law, and government effectiveness. Owusu-Nantwi (2019) added to this body of work by examining the role of institutional quality in FDI inflows in South America between 2000 and 2017, using two-stage least squares (2SLS) and fixed effect ordinary least squares regression. Their study found that better governance and regulatory frameworks significantly boost FDI, further emphasizing the importance of institutional reforms.

Dorożyński et al. (2020) investigated the impact of institutional quality on FDI inflows in 17 Central and Eastern European (CEEC) countries from 2007 to 2017, concluding that countries with effective legal systems and low corruption experienced greater FDI inflows. This study highlighted the importance of improving institutional frameworks to enhance a country's attractiveness to investors. Adegboye et al. (2020) focused on Sub-Saharan Africa (SSA), exploring the relationship between institutional quality, FDI, and economic development using panel data from 2000 to 2018. Their findings demonstrated that institutional quality, especially political stability and the absence of corruption, significantly influences FDI inflows and contributes to economic growth.

Tran et al. (2021) expanded the focus to 48 Asian countries, finding that institutional quality plays a significant role in economic development and FDI inflows. Their panel data regression analysis from 2005–2018 showed that countries with stronger institutions not only experience

more FDI but also foster sustainable economic growth through better governance and institutional frameworks. Osabuohien-Irabor and Drapkin (2022) contributed to this growing body of research by examining the effects of outward FDI and institutional quality on economic growth across a panel dataset of 141 countries from 2003–2019 using the GMM methodology. Their findings showed that a 10% improvement in institutional quality in home country leads to a 5.12% increase in economic growth, reinforcing the positive correlation between institutional quality and economic performance. Most recently, Gasimov (2023) analyzed the relationship between institutional quality and economic growth in non-EU post-Soviet countries, focusing on the role of energy abundance. The study revealed that while institutional quality generally promotes economic growth, energy abundance can negatively affect this relationship, underscoring the complexity of the institutional quality-growth nexus and the need for tailored policy approaches. Therefore, to foster a favourable environment for foreign investment and fully realize the potential benefits of FDI, policymakers must concentrate on improving institutional quality.

3.3.5 Trade Openness

Trade openness refers to the degree to which a country is integrated into the global economy through its trade policies and practices (Jalil & Rauf, 2021). Empirical literature consistently shows that countries with open trade regimes are more attractive to foreign investors, as they provide access to larger markets and enable firms to benefit from economies of scale (Wang et al., 2004; Adhikary, 2011; Haque et al., 2022). Trade openness also facilitates the transfer of goods, services, and technologies between countries, which can enhance the productivity of domestic industries and increase the overall impact of FDI (McGrattan & Prescott, 2009; Liargovas & Skandalis, 2012; Rakshit, 2022). Countries that pursue open trade policies are better positioned to integrate foreign capital into their economies and drive economic growth through increased competition, innovation, and access to global supply chains (Agosin & Machado, 2007; Belloumi, 2014; Rathnayaka Mudiyansele et al., 2021).

Adhikary (2011) explored the linkage between FDI, trade openness, capital formation, and economic growth in Bangladesh using a time series analysis from 1980 to 2008. The findings revealed that trade openness positively impacts FDI inflows, which in turn drive economic growth (Sekkat & Veganzones-Varoudakis, 2007). This study emphasized the crucial role trade openness plays in enhancing overall economic performance, setting the stage for subsequent research on the relationship between trade policies and foreign investments. Similarly, Rahman

(2011) analyzed the relationship between foreign investment and international trade in Bangladesh, building on earlier studies by emphasizing that trade openness is a significant determinant of FDI inflows.

Liargovas and Skandalis (2012) expanded this perspective by analyzing 36 developing economies from 1990 to 2008. Their findings provided direct evidence of a long-term relationship between FDI inflows and trade openness, strengthening the notion that open trade policies are essential for attracting foreign investment and driving economic growth across multiple regions. Belloumi (2014) shifted the focus to Tunisia, examining the relationship between trade, FDI, and economic growth through an autoregressive distributed lag (ARDL) model from 1970–2008. The study concluded that both trade openness and FDI have significant positive effects on economic growth, suggesting that policies promoting trade liberalization are vital for maximizing the benefits of FDI. Hye and Lau (2015) extended this analysis to India, employing a Granger causality approach to investigate the relationship between trade openness and economic growth. Their findings align with previous studies, showing that trade openness positively impacts economic growth, primarily through enhanced FDI inflows.

In the context of Sub-Saharan Africa, Saibu and Akinbobola (2014) explored globalization, FDI, and economic growth, using panel data from 1990 to 2012 for 11 countries. The study found that trade openness significantly influenced FDI inflows, further contributing to economic growth, reinforcing the earlier findings of Adhikary (2011), Rahman (2011), and Belloumi (2014) on the positive effects of liberalized trade policies. Nordin and Ghani (2015) investigated the impact of trade liberalization on FDI in Malaysia using the bounds testing approach to cointegration from 1970 to 2009. Their findings indicated that trade openness has both long-run and short-run relationships with incoming FDI. The study also highlighted that trade liberalization could induce FDI inflows and promote sustained economic growth (Saibu & Akinbobola, 2014; Rathnayaka Mudiyansele et al., 2021).

Elimam (2017) examined the determinants of FDI in Saudi Arabia, emphasizing the role of trade openness and institutional quality in attracting foreign investment. The study reinforced the importance of liberalizing trade policies in enhancing economic growth, a theme consistently echoed in the literature. Cantah et al. (2018) used principal component analysis (PCA) to examine the relationship between FDI and trade policy openness in Sub-Saharan Africa. The results pointed out that increased openness in manufactured goods and services significantly attracts FDI. This finding aligns with Saibu and Akinbobola's (2014) research on

Sub-Saharan Africa, emphasizing the broader regional implications of trade policies on FDI. Further, Bodyli (2019) turned to Central and Eastern Europe, exploring the dynamic connections between FDI, tourism, and economic growth from 1995 to 2017. The study highlighted the importance of trade liberalization in attracting foreign investments and fostering economic growth, adding to the growing body of evidence supporting the positive effects of trade openness. Oumarou and Maiga (2019) examined the causal relationship between trade, FDI, and economic growth in Niger (West Africa) using data from 1980–2017, reaffirming that trade openness positively influences FDI inflows and contributes to economic development. Their findings paralleled those of Nordin and Ghani (2015), Elimam (2017), and Cantah et al. (2018), demonstrating the universal importance of trade openness for attracting FDI inflows from developed nations.

Thanh et al. (2019) added to this discourse by analyzing the impact of FDI, trade openness, and economic institutions on growth in 63 Vietnamese provinces from 2005 to 2015 using GMM estimation. The findings showed that institutional quality improves the positive effects of FDI and trade openness on economic activity, linking the importance of institutions with the role of trade liberalization, as previously highlighted by Elimam (2017). Nketiah et al. (2019) explored the relationship between FDI, trade openness, and economic growth in Ghana from 1975 to 2018, once again finding that trade openness significantly enhances FDI inflows, which in turn positively affects economic growth. Like Bodyli (2019) and Cantah et al. (2018), this study emphasized the importance of strong institutional quality in maximizing the benefits of FDI. Raghutla (2020) investigated the effect of trade openness on economic growth in emerging market economies from 1993 to 2016 by employing panel data estimation. The results echoed previous studies by finding that trade openness has a considerable positive effect on growth. This study further demonstrated that liberalized trade policies attract more FDI, driving economic growth. Kong et al. (2021) conducted an empirical analysis of China from 1994 to 2018, examining the relationship between trade openness and economic growth quality. Their findings echoed those of Raghutla (2020), showing that trade openness positively influences economic growth, suggesting that open trade policies lead to improved economic performance. Rathnayaka Mudiyansele et al. (2021) examined the causal links between trade openness and FDI inflows in Romania from 1997 to 2019. Although their results showed that an increase in trade openness does not affect FDI in the long run, short-run results indicated that trade openness attracts more FDI, underscoring the importance of trade liberalization in fostering foreign investment. Likewise, Cerdeiro and Komaromi (2021) focused on the long-term effects

of trade on income levels and inequality, finding that trade openness contributes positively to economic growth. Their use of an instrumental variable approach reinforced the causal relationship between trade and income, further supporting the role of trade policies in improving economic performance. Haque et al. (2022) compared 18 low-income and 53 middle-income nations from 1970–2021, finding that trade openness positively influences FDI inflows, particularly in middle-income countries. This aligns with the earlier research of Kong et al. (2021) and Belloumi (2014), demonstrating that trade policies play a crucial role in enhancing economic growth.

Triki et al. (2022) analyzed the impact of state fragility on FDI inflows in the MENA region for the period between 2002 and 2018, emphasizing the moderating role of trade openness and democratic governance. Their findings reinforced the importance of open trade policies in attracting foreign investment, particularly in politically stable environments. Çeviř (2022) investigated the economic determinants of FDI in a set of 17 developing countries and transition economies for the period 1989–2006 using quarterly data, concluding that trade openness significantly enhances FDI inflows. This study, like others before it, highlighted the critical role trade policies play in driving foreign investment and economic growth. Finally, Novák (2024) provided the most recent insights into the impact of trade liberalization on FDI inflows and economic development. Using a mixed-methods approach, the study confirmed the positive correlation between trade openness and economic growth in the Czech Republic, solidifying the long-standing argument that liberalized trade policies enhance foreign investments and promote sustainable economic development.

3.3.6 Total Factor Productivity

Total Factor Productivity (TFP) reflects the efficiency with which a country utilizes its inputs, such as labour and capital, in the production process (Tomiura, 2007; Herzer, 2011; Abdullah & Chowdhury, 2020). TFP is a critical measure of economic efficiency and plays a central role in determining the long-term impact of FDI on economic growth (Tanna, 2009; Herzer, 2012). Empirical evidence suggests that FDI can significantly boost TFP by introducing new technologies, managerial practices, and innovation into the host economy (Nam & Wang, 2014; Scalamonti, 2024). However, the extent to which FDI enhances TFP depends on the host country's capacity to absorb and integrate these new inputs effectively (Obayelu et al., 2014; Mohamed et al., 2021). Countries that prioritize innovation, research and development, and

efficient resource use are more likely to experience growth in TFP, leading to sustained economic development driven by FDI inflows (Herzer & Donaubauer, 2018; Ajide, 2023).

Baier et al. (2006) were among the first to explore the importance of capital and TFP for economic growth, utilizing a panel dataset from 1960 to 2000 for 145 countries. The study found out that TFP growth significantly contributes to economic performance, with institutional developments and financial factors playing key roles. Kyo and Noda (2008) followed by conducting a Bayesian analysis of China's economic growth dynamics. Their study revealed that although FDI contributes to growth, TFP has not been the primary driver since the economic reforms. The study further highlighted the need for improvements in TFP to fully leverage FDI benefits. In another study, Salim and Bloch (2009) conducted a study on the effect of FDI spillovers on productivity growth in Indonesia's chemical and pharmaceutical industries, utilizing plant-level panel data from 1988 to 2000. They employed a stochastic frontier approach to assess spillover effects and used a generalized Malmquist output-oriented index to decompose productivity growth. Their findings indicated that FDI generated positive productivity spillovers, with domestic firms engaged in R&D benefiting more from these spillovers than those without R&D. Further, Kukulski and Ryan (2011) examined the relationship between investment history, market orientation, and TFP in the context of FDI. Their study utilized a panel data analysis from 1990 to 2008 and found that higher TFP levels are associated with increased FDI inflows, emphasizing the role of productivity in attracting foreign investments. The authors argued that firms with higher productivity are more likely to engage in FDI, as they can leverage their efficiency to compete in international markets.

In a related study, Suphannachart and Warr (2012) used a stochastic frontier approach to analyze TFP in Thai agriculture using data from 1970–2006. The study highlighted that technology adoption and human capital investment are crucial for enhancing the benefits of FDI in agriculture. Obayelu et al. (2014) explored the relationship between rural infrastructure, productivity, and TFP in Nigeria with the help of a survey-based approach and regression analysis. Their findings indicated that improvements in infrastructure positively influence TFP, which in turn enhances the productivity of agricultural sectors that attract FDI. Around the same time, Nam and Wang (2014) examined the effects of predictable improvements in TFP on economic growth across various sectors using a structural vector autoregression (SVAR) model, concluding that TFP improvements lead to substantial growth, particularly in investment sectors that attract FDI.

Moving forward, Bjørnskov and Méon (2015) examined the relationship between trust, institutions, and TFP, finding that higher levels of trust in institutions correlate with improved TFP growth. Their study utilized cross-country regression analysis to demonstrate that institutional quality and trust are essential for enhancing productivity, which is crucial for attracting FDI. In another significant study, Hüseyini et al. (2017) examined the relationship between economic growth, exports, and TFP for OECD countries using data envelopment analysis (DEA) and panel data techniques from 1990–2013. Their findings revealed a statistically significant positive impact of TFP on both economic growth and exports, indicating that it is a crucial determinant of economic performance in developed countries. Li et al. (2018) expanded on this by studying the relationship between FDI, TFP, and economic growth in China from 2001 to 2011, concluding that FDI contributes significantly to TFP growth, which drives economic growth, particularly through technology transfer and human capital development.

Several studies have further elaborated on these relationships. Abdullah and Chowdhury (2020) investigated the critical role of TFP in driving economic growth in a balanced panel of 77 low- and middle-income countries using GMM estimation. The study demonstrated that TFP is a significant contributor to economic growth, suggesting that productivity improvements are essential for enhancing the economic performance of these countries. Vasa and Angeloska (2020) examined the correlation between FDI and economic variables in Serbia from 2007 to 2018, suggesting that while FDI positively affects economic growth, the impact on TFP is less pronounced. Haider et al. (2021) studied TFP drivers across 12 countries from 1990–2006. The study found that public investment in infrastructure and ICT capital significantly boost TFP, underscoring the importance of these factors in maximizing FDI's productivity benefits. Further, Nguyen (2021) examined TFP growth in Vietnamese enterprises using the panel data analysis from 2005–2018. The results highlighted the role of foreign investment enterprises in driving productivity improvements. Likewise, Zhang and Liu (2022) further explored this relationship in China, showing that encouraging foreign investment positively impacts TFP through technology transfer and innovation. In the same year, Pan et al. (2022) highlighted the impact of FDI on TFP in 30 provinces across China from 2010 to 2018 using pooled regression and principal component analysis (PCA), emphasizing that FDI inflows boost TFP growth, particularly in regions with higher levels of digital infrastructure. Additionally, Aktaş (2023) explored TFP's role in mediating the FDI-economic growth relationship in 18 Central Eastern Europe countries from 2007 to 2020 using panel data

estimation. The results concluded that higher TFP levels enable countries to leverage FDI for sustainable development. Han (2024) also focused on China, showing that FDI enhances TFP in agricultural enterprises, which is crucial for economic growth. Finally, Ali and Mahmood (2024) investigated the nexus between TFP, ICT, and intellectual property rights in Pakistan's textile industry, finding that ICT investments significantly raise TFP, highlighting its role in sectors that attract FDI. Scalamonti (2024) focused on the nexus between FDI flows and TFP in Ethiopia from 1992–2017 using the Autoregressive Distributed Lag (ARDL) approach to analyze the long-run and short-run relationship. The findings revealed that FDI has a positive and significant effect on TFP, indicating that foreign investments contribute to productivity improvements in host countries.

3.4 Research Gaps

The role of foreign investment in a nation's economic development remains a widely debated subject, given both its potential benefits and adverse impacts on economic growth. This ongoing debate serves as a significant motivation for the present research, which examines the influence of FDI inflows on economic growth in the emerging economies of the BRICS nations. Based on the previous literature, this study has identified the following research gaps:

3.4.1 Contextual Gap: Limited Focus on Emerging Markets, Particularly BRICS Nations

While significant research has been conducted on FDI in developed economies, existing studies predominantly focus on advanced markets, with limited attention to the unique dynamics of emerging economies like the BRICS nations. Despite their growing significance in the global economy, the role of FDI in driving economic development within BRICS countries remains underexplored. Given the distinctive economic structures, policy environments, and institutional frameworks across BRICS nations, there is a need for a more detailed investigation into how FDI influences economic growth in these emerging economies.

3.4.2 Theoretical Gap: Evolving Role of Absorptive Capacity

While prior studies recognize absorptive capacity as a key factor influencing the effectiveness of FDI in promoting economic growth, there is a lack of research examining how its role evolves over time. Existing literature does not sufficiently address how changes in institutional quality, technological progress, and human capital development affect the ability of BRICS economies to leverage FDI for sustained growth. The long-term effects of absorptive capacity

on FDI-driven development remain underexplored, necessitating further investigation into how these factors shape the dynamic relationship between FDI and economic growth.

3.4.3 Methodological Gap: Homogeneity Assumption in BRICS Studies

Most existing studies on BRICS economies assume a homogeneous impact of FDI across all member countries. However, BRICS nations exhibit significant heterogeneity in their economic policies, industrial structures, and institutional quality. Existing studies tend to take a generalized approach, often overlooking key country-specific differences that significantly impact FDI's contribution to economic growth. Factors such as institutional quality, economic stability, and absorptive capacity vary substantially among these countries, which may shape how effectively FDI stimulates economic development. This study seeks to address this gap by accounting for unobserved heterogeneity across individual BRICS nations, allowing for a more comprehensive understanding of each country's unique characteristics.

3.4.4 Empirical Gap: Lack of Comprehensive Analysis of Dynamic Coupling Effects of FDI and Economic Growth

Most empirical studies analyze either the short-term or long-term effects of FDI on economic growth, but few provide a comprehensive examination of their dynamic coupling effects over both time horizons. Understanding how FDI interacts with economic growth across different time periods is crucial for capturing its full impact. This study aims to bridge this gap by integrating short-term and long-term analyses, offering deeper insights into the evolving relationship between FDI and economic growth.

In this study, we seek to extend the literature by addressing these research gaps. Specifically, the study investigates the impact of FDI on economic growth in BRICS countries by: (1) analyzing the role of absorptive capacity in shaping FDI effectiveness over time, (2) accounting for the economic and institutional heterogeneity within BRICS nations, (3) adopting a methodological framework that moves beyond the homogeneity assumption, and (4) examining the short-term and long-term coupling effects between FDI and economic growth using advanced econometric techniques.

3.5 Conceptual Framework

The conceptual framework presents a summary of the variables and their interrelationships within the context of the study. Figure 3.3 provides a detailed overview of the macro variables used in this study. Here, FDI serves as the dependent variable, while economic growth is the

independent variable. This framework aims to illustrate how the inflow of FDI is influenced by the economic growth of BRICS economies and how, in turn, FDI can contribute to further economic expansion.

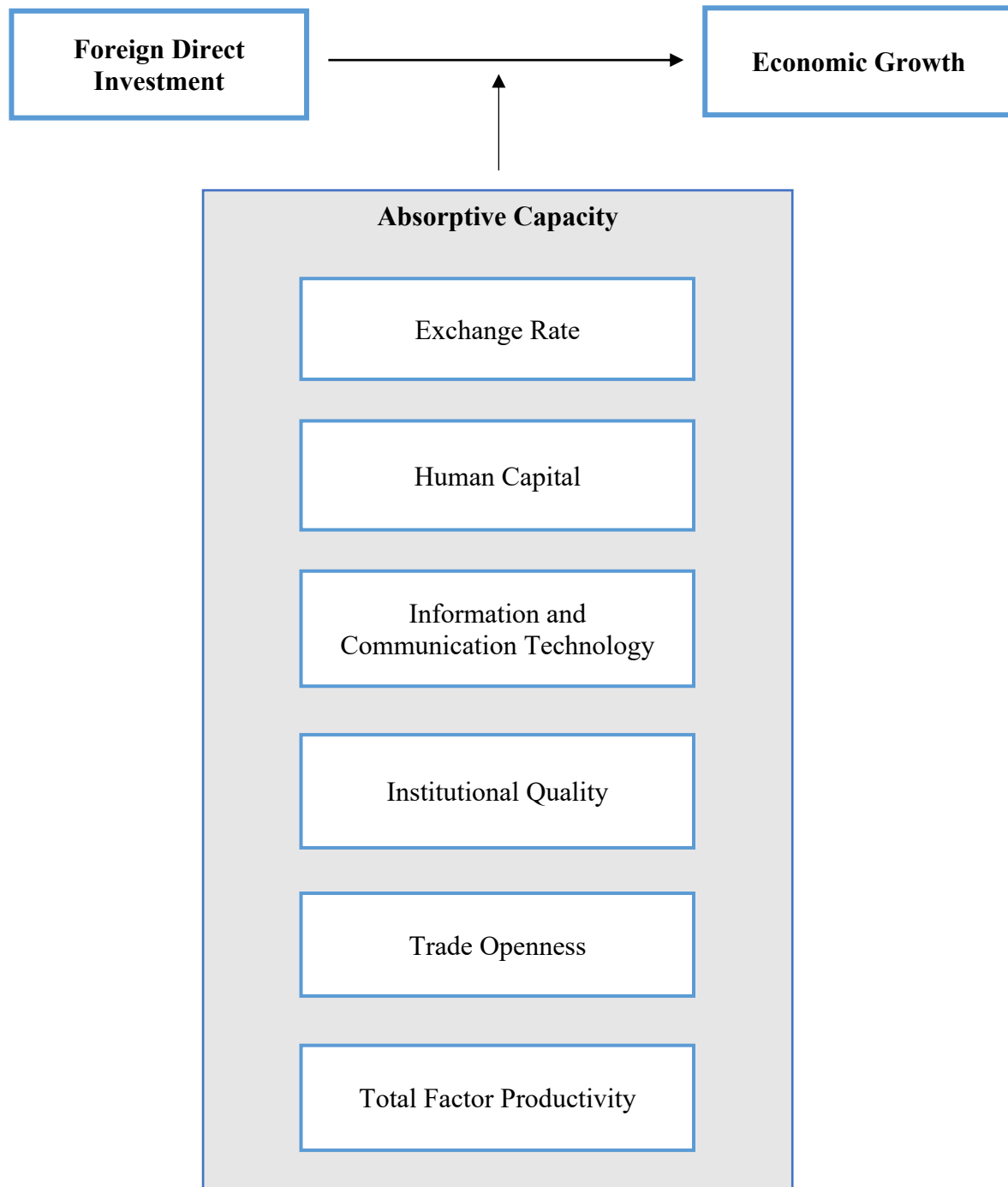


Figure 3.3 Conceptual framework
(Source: Compiled by the author)

However, the extent to which FDI translates into economic growth is mediated by the absorptive capacity of the host countries. This absorptive capacity comprises several key factors, including exchange rate stability, human capital, information and communication technology, institutional quality, trade openness, and total factor productivity. Each of these factors plays a pivotal role in determining the effectiveness of FDI inflows in promoting sustainable economic development. The framework highlights that while FDI can drive growth, its actual impact is conditional on the ability of BRICS countries to effectively utilize foreign investments through the strengthening of these absorptive capacities. By considering these mediating factors, the framework offers a nuanced view of the relationship between FDI and economic growth, recognizing that the benefits of FDI are not automatic but require an enabling environment. Ultimately, this framework provides a comprehensive perspective that aligns with the complexities of emerging economies, where both internal capabilities and external investments must work in synergy to achieve long-term economic growth and development.

3.6 Summary

This chapter provides a comprehensive review of the key theoretical and empirical foundations underlying the relationship between FDI inflows and economic growth. It begins by discussing various theories of FDI, including the eclectic paradigm, the product life cycle theory, and other perspectives that explain why firms engage in FDI and how it influences host economies. This is followed by examining the theories of economic growth, including both traditional models, such as the Solow Growth Model, and more contemporary approaches, like endogenous growth theory. These theories explain how incoming FDI can contribute to long-term economic expansion of developing countries. Through an extensive review of the empirical literature, the study analyses the relationship between FDI inflows and economic growth in various contexts, with particular attention to BRICS countries. These studies highlight both positive and conditional impacts of FDI on growth, pointing to the importance of host country conditions. The chapter also identifies several research gaps, noting the need for further exploration of how absorptive capacity factors such as exchange rate stability, human capital, information and communication technology, institutional quality, trade openness, and total factor productivity mediate the impact of incoming FDI on growth in BRICS economies. Finally, a conceptual framework is presented to summarize the key variables and their interrelationships, emphasizing that the effect of FDI on economic growth is contingent upon a country's absorptive capacity.

CHAPTER 4

RESEARCH METHODS

Research is a systematic and structured process of inquiry aimed at acquiring knowledge, uncovering relationships, and providing insights into complex economic phenomena. It involves formulating research questions, collecting and analysing data, testing hypotheses, and drawing conclusions contributing to theoretical advancement and practical applications. In the field of economics, research serves as a critical tool to understand how various macroeconomic factors interact, influencing investment flows, productivity, and overall economic growth. A well-defined research methodology ensures the rigour, reliability, and validity of findings, enabling researchers to make evidence-based recommendations that inform policy and practice. This chapter outlines the research methodology adopted in this study to examine the relationship between Foreign Direct Investment (FDI) and economic growth while identifying key determinants of FDI inflows in BRICS nations. The methodology is carefully designed to capture the complex and dynamic interactions between FDI, economic growth, and other macroeconomic variables such as trade openness, exchange rate stability, institutional quality, information and communication technology, total factor productivity, and human capital. The study employs panel data from 1991-2020, sourced from multiple databases, ensuring consistency and credibility in the analysis. Given the diverse economic structures and policy environments within BRICS nations, the methodology incorporates rigorous econometric techniques that account for heterogeneity, cross-sectional dependence, and potential heteroskedasticity issues.

Section 4.1 discusses the data used in the study, including details on the sample size, the time period of analysis, and the variables employed in the research. Each variable is defined along with its respective data sources, providing transparency and ensuring reproducibility. This section establishes the foundation for empirical analysis by detailing the economic indicators that drive FDI inflows in BRICS nations.

Section 4.2 focuses on the methodological approach, beginning with various preliminary tests essential for evaluating the quality and suitability of the dataset. These include correlation analysis, heteroskedasticity tests, autocorrelation tests, cross-sectional dependence tests, and unit root tests to examine stationarity. These diagnostic checks validate the dataset's robustness and confirm the appropriateness of the selected econometric techniques. Following these

assessments, the chapter discusses the final model estimation techniques, which include Method of Moments Quantile Regression (MMQR) with fixed effects and Wavelet Coherence Analysis. These techniques are employed to analyse the relationship between FDI, economic growth and other macro determinants. MMQR allows for a more comprehensive understanding of how various variables influence the incoming FDI flows across different quantiles. At the same time, Wavelet Coherence Analysis captures time-frequency dynamics between variables, providing deeper insights into short- and long-term relationships.

By systematically outlining the data sources, variable selection, and empirical methodology, this chapter lays a strong foundation for the subsequent analysis. Through this structured approach, the study aims to generate meaningful insights that contribute to academic discourse and policy formulation, ultimately enhancing our understanding of FDI's role in shaping economic trajectories.

4.1 Data

This section provides an overview of the data used in this study, including details on the sample size, period covered, and the variables chosen for the study, as well as their sources and measurements. The dataset is structured as panel data, allowing for the analysis of both cross-sectional and time-series variations, which enhances the robustness of the empirical investigation. The use of panel data is particularly beneficial as it accounts for individual country-specific effects while capturing dynamic changes over time.

4.1.1 Sample Size

The sample for this study consists of five emerging economies that form the original BRICS grouping. These countries were chosen due to their significant roles in the global economy, their position as key FDI destinations, and their structural economic transformations over the past three decades. The BRICS nations have exhibited diverse institutional frameworks, economic policies, and growth trajectories, making them an ideal sample for studying the impact of FDI on economic development. By focusing on this group, the study captures country-specific variations in FDI inflows and economic performance, allowing for insights into how different macroeconomic and institutional factors influence the flow of incoming foreign capital. The selection of these economies is further justified by their increasing integration into global financial markets, active participation in international trade, and growing influence on global economic policies.

4.1.2 Time Period

The study spans a 30-years from 1991 to 2020, using annual data. This timeframe is selected to encompass major economic shifts, policy changes, and financial crises that have shaped FDI inflows and economic growth in BRICS countries. The early 1990s marked the onset of economic liberalization in several of these nations, particularly in India and Russia, leading to greater openness to foreign capital and investment inflows. Additionally, this period includes significant global events such as the 1997 Asian financial crisis, the 2008 global financial crisis, and the COVID-19 pandemic in 2020, each of which had varying impacts on investment flows and economic stability across the BRICS economies. The use of annual data ensures a consistent and systematic tracking of long-term trends, allowing for a robust empirical analysis of FDI's role in economic growth.

4.1.3 Variables Used in the Study

This study examines the impact of foreign direct investment (FDI) on economic growth in the original BRICS economies from 1991 to 2020. To conduct a comprehensive empirical analysis, the study identifies a set of key variables, including FDI inflows as a dependent variable and several other macro determinants that serve as independent variables. These variables have been selected based on their theoretical and empirical relevance in the existing literature on FDI and growth dynamics. The data for the given variables have been sourced from various databases such as the World Development Indicators, the World Governance Indicators, the OECD statistics, the Penn Table 10.0, and the UNCTAD statistics. The list of the variables, along with their data sources and definition, is given in Table 4.1.

The variables used in the study are defined as follows:

- a) **Foreign Direct Investment (FDI):** FDI inflows represent the investment made by foreign entities in domestic businesses, assets, and industries. These inflows are considered a critical driver of economic growth, as they bring capital, technology, managerial expertise, and employment opportunities to the host economy. In this study, it is defined as the total volume of FDI inflows received by a country in a given year, measured in USD millions. The data for FDI inflows is collected from the World Development Indicators (WDI) Database.
- b) **Exchange Rate (EXR):** The exchange rate is defined as the annual average of monthly local currency units relative to the USD, highlighting its international competitiveness

and currency stability. The data has been collected from UNTCAD statistics for the BRICS countries from 1991-2020. Exchange rate fluctuations influence FDI decisions by affecting the cost of investment and expected returns. A depreciated exchange rate may make a country more attractive to foreign investors, as their capital can buy more local assets. However, extreme volatility in exchange rates may create uncertainty, discouraging foreign investments.

- c) **Gross Domestic Product (GDP):** Gross Domestic Product (GDP) is a fundamental measure of a country's economic performance, representing the total market value of all final goods and services produced within a nation's borders over a specific period. It serves as a key indicator of economic growth, market size, and overall economic activity, influencing investment decisions, policymaking, and macroeconomic analysis.

In this study, GDP is measured using the expenditure approach, which calculates GDP as the sum of total spending in an economy.

The formula is given as:

$$GDP = C + I + G + (X-M)$$

Where:

C = Consumption expenditure (spending by households on goods and services).

I = Investment expenditure (business investments in capital goods, including machinery, infrastructure, and inventories).

G = Government expenditure (spending by the government on public goods and services, such as education, healthcare, and defence).

X = Exports (goods and services sold to foreign markets).

M = Imports (goods and services purchased from foreign markets).

The term (X-M) represents net exports, which account for the balance of trade. A positive value indicates a trade surplus, while a negative value indicates a trade deficit. For this study, GDP is measured at constant 2015 prices in USD millions, ensuring that economic output is analyzed without the effects of inflation, allowing for meaningful comparisons over time.

d) Human Capital (HC): Human capital refers to the accumulated skills, knowledge, and experience of a workforce that contribute to economic productivity and growth. It plays a vital role in shaping a country's long-term development, as a well-trained and knowledgeable labour force enhances efficiency, innovation, and technological progress. In this study, human capital is measured using the Index of Human Capital per Person, which is derived from:

- i. **Years of Schooling** – The average number of years individuals in the labour force have spent in formal education. Higher levels of education generally indicate better skills and a greater ability to contribute to economic activities.
- ii. **Returns to Education** – The economic benefits associated with additional years of schooling, are typically reflected in increased wages, improved job opportunities, and higher productivity levels.

This index captures both the extent (years of schooling) and effectiveness (returns to education) of human capital, making it a comprehensive indicator of workforce quality. A higher human capital index suggests a more capable and adaptable labour force, which is expected to positively influence economic growth by improving labour productivity, fostering innovation, and enhancing a country's ability to attract and effectively utilize incoming FDI flows. For empirical analysis, human capital is considered a crucial determinant of FDI inflows, as economies with a well-educated and skilled workforce are better positioned to integrate advanced technologies, increase production efficiency, and sustain long-term growth.

e) Information and Communication Technology (ICT): ICT plays a critical role in economic modernization and global connectivity. The expansion of digital infrastructure enables efficient communication, e-commerce, and technological innovation, which can enhance productivity and attract foreign investors. By including ICT as an independent variable, the study evaluates how advancements in digital technology contribute to FDI inflows and economic growth. This study defines ICT as the number of active mobile cellular subscriptions (postpaid and prepaid users) within the population. The data has been collected from the World Development Indicators (WDI) Database for the original BRICS countries from 1991 to 2020.

- f) Institutional Quality (INSQ):** Institutional quality evaluates the effectiveness of public administration, governance, and institutional frameworks that impact a country's investment climate and socio-economic development. It is a measure of political stability, government effectiveness, and absence of violence in a country. Strong institutions create a stable and predictable investment climate, reducing risks for foreign investors. Conversely, weak institutions may deter FDI due to political instability, corruption, and bureaucratic inefficiencies. The study includes institutional quality as a determinant to assess whether governance factors influence FDI inflows in BRICS economies.
- g) Trade Openness (TO):** Trade openness is an important measure that reflects a country's level of integration into the global economy. It is calculated as the ratio of total trade (sum of exports and imports) to Gross Domestic Product (GDP). The formula for trade openness is:

$$TO = \left(\frac{\text{Exports} + \text{Imports}}{\text{GDP}} \right) \times 100$$

Where:

Exports refer to the total value of goods and services a country sells to the rest of the world,

Imports refer to the total value of goods and services a country buys from the rest of the world,

GDP is the total value of goods and services produced within the country during a given period.

A higher trade openness ratio indicates that a country is more engaged in international trade, while a lower ratio suggests relative trade restrictions or a more closed economy. This metric is crucial for understanding the role of globalization in attracting FDI inflows, as more open economies tend to attract higher foreign investments.

- h) Total Factor Productivity (TFP):** Total Factor Productivity (TFP) measures the technological efficiency of an economy with which inputs such as labour and capital are utilized in the production process, reflecting technological advancement, innovation, and improvements in overall productivity beyond mere input accumulation.

Table 4.1 Description of the variables

Symbol	Indicators	Data Source	Definition
FDI	Foreign Direct Investment	WDI database	Total volume of FDI inflows received by a country in one year measured in USD millions.
GDP	Gross Domestic Product	OECD statistics	The sum total of a nation's overall economic output measured at 2015 constant prices in USD millions.
EXR	Exchange Rate	UNCTAD statistics	Annual average of monthly local currency units relative to the USD.
HC	Human Capital	Penn Table 10.0	Index of human capital per person, based on years of schooling and returns to education.
ICT	Information and Communication Technology	WDI database	Number of active mobile cellular subscriptions (postpaid and prepaid users) within the population.
INSQ	Institutional Quality	WGI database	Measures the level of political stability, government effectiveness, and absence of violence in a country.
TO	Trade Openness	WDI database	Measures a country's total trade (exports + imports) to its GDP.
TFP	Total Factor Productivity	WDI database	Measures the technological efficiency within the population.

Note: USD = United states dollar, WDI = World Development Indicators, OECD = Organisation for Economic Co-operation and Development, UNCTAD = United Nations Centre for Trade and Development, WGI = World Governance Indicators.

(Source: Compiled by the author)

It is commonly estimated using the Cobb-Douglas production function, which is expressed as:

$$Y = A K^{\alpha} L^{\beta}$$

Where:

Y = Total output (GDP)

A = Total Factor Productivity (TFP)

K = Capital input

L = Labor input

α and β = Output elasticities of capital and labour, respectively.

Rearranging the equation to express TFP (A), we get:

$$A = \frac{Y}{K^{\alpha} L^{\beta}}$$

This formulation helps in estimating TFP as a residual after accounting for contributions from capital and labour. Higher TFP values indicate that an economy efficiently utilizes its resources, often due to technological progress, innovation, or improved human capital. By incorporating TFP in the study, we can analyze how technological efficiency influences FDI inflows in BRICS economies.

4.2 Methodology

This section outlines the statistical techniques and tests used to analyze the dataset and assess the validity of the research findings. The methodology addresses the key assumptions inherent in panel data models, ensuring that the empirical analysis remains robust and reliable. Panel data regression models make several assumptions about the residuals, such as homoscedasticity, no autocorrelation, and independent errors across cross-sectional units. This section emphasizes the importance of performing diagnostic tests to identify potential violations of these assumptions, as ignoring such issues could lead to biased, inconsistent, or inefficient estimates. The tests discussed in this section cover a range of diagnostic concerns, including heteroscedasticity, autocorrelation, cross-sectional dependence, and the normality of residuals. Each test is carefully selected based on its relevance to the study and the specific nature of the data.

The section not only presents the mathematical formulations of each test but also explains their practical application within the context of the research. By applying these tests, the user ensures that the underlying assumptions of the panel data models are satisfied and that the results are not driven by methodological shortcomings. This methodological framework forms the foundation for the empirical analysis and guarantees that the study's conclusions are both reliable and scientifically rigorous. The methodological framework of the study is depicted in Figure 4.1.

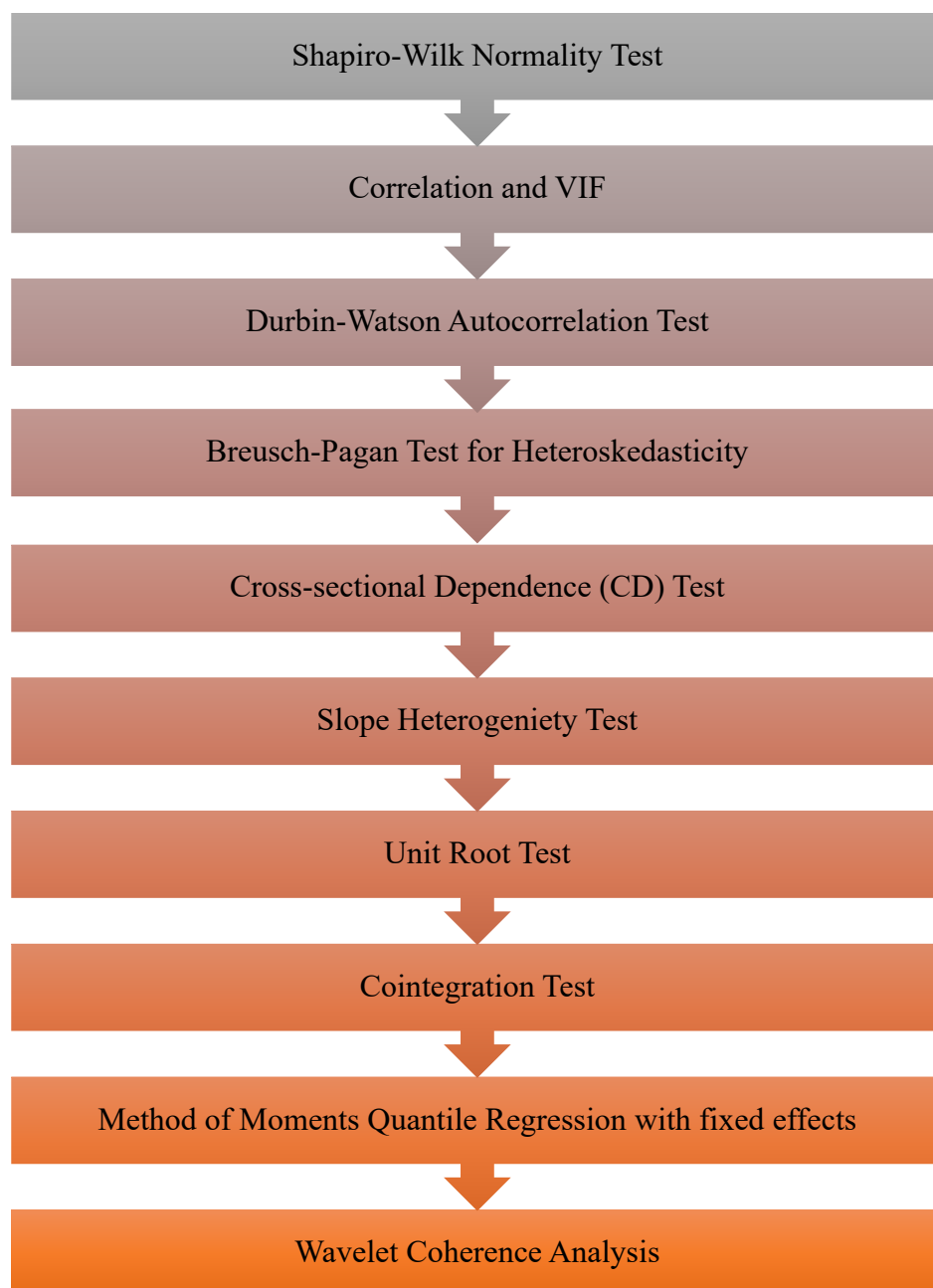


Figure 4.1 Methodological Framework
(Source: Compiled by the author)

4.2.1 Compound Growth Rate

The Exponential Trend Model is used to analyze the growth trend of Foreign Direct Investment (FDI) inflows in BRICS countries over the period of study. The model helps in estimating the compound growth rate (CGR), which measures the average annual growth rate of FDI inflows over time.

The exponential trend function is expressed as:

$$Y_t = \alpha \beta_t \mu_t$$

where:

Y_t represents FDI inflows in BRICS countries at time t ,

α is a constant (initial value of FDI when $t = 0$),

β is the growth factor,

μ_t is the error term that accounts for random fluctuations.

Log-Linear Transformation: To facilitate estimation using regression techniques, the above equation is transformed into a log-linear form by taking the natural logarithm on both sides:

$$\text{Log } Y_t = \log \alpha + t \cdot \log \beta + \log \mu_t$$

This transformation allows for the estimation of the growth rate using Ordinary Least Squares (OLS) regression, where:

$\log \alpha$ is the intercept,

$\log \beta$ is the slope coefficient,

t represents the time period.

Calculation of Compound Growth Rate (CGR)

Once the parameter $\log \beta$ is estimated, the compound growth rate (CGR) is derived using the following formula:

$$\text{CGR (\%)} = (\beta - 1) \times 100$$

where $\beta = e^{\hat{b}}$, and $\hat{b}$ is the estimated coefficient from the regression model.

This method effectively captures the long-term trend in FDI inflows, allowing for an assessment of whether FDI has grown or declined over the period under study.

4.2.2 Descriptive Statistics

Descriptive statistics are an essential tool for summarizing and understanding the fundamental properties of a dataset. By analyzing measures of central tendency, such as the mean and

median, researchers can identify the central values around which observations cluster. Additionally, the standard deviation provides insights into the dispersion of data points, indicating the degree of variability within the dataset. Skewness helps determine the asymmetry of the distribution, while kurtosis assesses the shape of the distribution in terms of its peakedness and tail thickness. The Jarque-Bera test combines skewness and kurtosis to formally test for normality and to evaluate whether the dataset follows a normal distribution. These statistical properties play a crucial role in identifying patterns, detecting anomalies, and ensuring the appropriateness of further econometric modelling and hypothesis testing.

- a) **Mean:** The mean, also known as the arithmetic average, is a measure of central tendency that represents the average value of a dataset. It is calculated by summing all observations and dividing the total by the number of observations. The mean indicates the overall magnitude of the dataset and is particularly useful in normally distributed data.

Mathematically, the mean is expressed as follows:

For a population:

$$\mu = \frac{\sum_{i=1}^N X_i}{N}$$

Where:

μ denotes the population mean,

X_i represents individual observations, and

N is the total number of observations in the population.

For a sample:

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n}$$

Where:

$\bar{X}$ represents the sample mean,

X_i denotes individual observations, and

n is the number of observations in the sample.

The mean is widely used in statistical analysis; however, it is sensitive to extreme values, which may significantly impact its accuracy in skewed distributions.

- b) **Median:** The median is the middle value of a dataset when arranged in ascending or descending order. It is another measure of central tendency that is particularly useful in skewed distributions, as it is less affected by outliers. The median divides the dataset into two equal halves, ensuring that half of the observations lie below and half above this value.

The formula for determining the median depends on whether the number of observations (n) is odd or even:

If n is odd, the median is given by:

$$\text{Median} = X_{\frac{n+1}{2}}$$

If n is even, the median is calculated as the average of the two middle values:

$$\text{Median} = \frac{X_{\frac{n}{2}} + X_{\frac{n}{2}+1}}{2}$$

Unlike the mean, the median is not influenced by extreme values, making it a robust measure of central tendency for datasets with skewed distributions.

- c) **Standard Deviation:** The standard deviation is a measure of dispersion that quantifies the extent to which individual data points deviate from the mean. It provides insight into the variability within a dataset, with higher values indicating greater dispersion and lower values signifying a more concentrated dataset. Standard deviation is essential for assessing data consistency and is widely applied in statistical inference and hypothesis testing.

The standard deviation is computed using the following formulas:

For a population:

$$\sigma = \sqrt{\frac{\sum_{i=1}^N (X_i - \mu)^2}{N}}$$

Where:

σ represents the population standard deviation,

X_i denotes individual observations,

μ is the population mean, and

N is the total number of observations.

For a sample:

$$s = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n - 1}}$$

Where:

s represents the sample standard deviation,

X_i denotes individual observations,

$\bar{X}$ is the sample mean, and

n is the number of observations in the sample.

- d) **Skewness:** It measures the asymmetry of the distribution around its mean. Mathematically, it is defined as:

$$\text{Skewness} = \frac{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^3}{\left(\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2\right)^{3/2}}$$

here, x_i is the individual residuals, $\bar{x}$ is the mean of the residuals, and n is the number of observations. A skewness value of 0 indicates a perfectly symmetrical distribution, while positive and negative values indicate right (positively) and left (negatively) skewed distributions, respectively. Skewness helps in understanding whether the data has more values concentrated on one side of the mean.

- e) **Kurtosis:** It quantifies the peakedness and tail thickness of the distribution. It is mathematically expressed as:

$$\text{Kurtosis} = \frac{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^4}{\left(\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2\right)^2}$$

A kurtosis value of 3 corresponds to a normal distribution (mesokurtic). Values greater than 3 indicate a leptokurtic distribution (sharp peak and heavy tails), whereas values less than 3 signify a platykurtic distribution (flat peak and light tails). Kurtosis helps in

determining whether extreme values (outliers) are more or less frequent in a dataset compared to a normal distribution.

- f) **Jarque-Bera (JB) Test:** The Jarque-Bera test combines skewness and kurtosis to formally test for normality. The test statistic is calculated as:

$$JB = n \left(\frac{\text{Skewness}^2}{6} + \frac{(\text{Kurtosis} - 3)^2}{24} \right)$$

Where n is the number of observations. A significant p-value associated with the JB statistic suggests a departure from normality, leading to the rejection of the null hypothesis that the dataset follows a normal distribution. The JB test is widely used to assess whether the residuals in a regression model are normally distributed, which is a key assumption in many econometric analyses.

4.2.3 Correlation

Correlation is a statistical measure that quantifies the degree to which two variables move in relation to each other. It indicates the strength and direction of the linear relationship between two continuous variables. Correlation values range between -1 and 1.

Positive Correlation ($\rho > 0$): Indicates that as one variable increases, the other variable also increases.

Negative Correlation ($\rho < 0$): Suggests that as one variable increases, the other variable decreases.

Zero Correlation ($\rho = 0$): Implies no linear relationship between the two variables.

The most commonly used correlation coefficient is the Pearson correlation coefficient, which measures the linear association between two variables.

The correlation coefficient r between two variables X and Y is given by:

$$r = \frac{\sum (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum (X_i - \bar{X})^2 \sum (Y_i - \bar{Y})^2}}$$

Where, $\bar{X}$ and $\bar{Y}$ are the means of X and Y , respectively.

4.2.4 Variance Inflation Factor (VIF)

The Variance Inflation Factor (VIF) is a statistical measure used to detect multicollinearity in regression analysis. Multicollinearity occurs when two or more independent variables in a regression model are highly correlated, which can distort the estimated coefficients and reduce the reliability of statistical inferences. VIF quantifies how much the variance of a regression coefficient is inflated due to the presence of multicollinearity. A higher VIF indicates stronger collinearity among the independent variables.

The VIF for a predictor variable X_j is computed as:

$$VIF_j = \frac{1}{1 - R_j^2}$$

Where, R_j^2 is the coefficient of determination of a regression of X_j on all other predictor variables.

4.2.5 Shapiro-Wilk Normality Test

The Shapiro-Wilk test is a statistical test used to assess whether a sample comes from a normally distributed population. It is one of the most powerful tests for normality and is commonly applied in various fields to check if the data is normally distributed. The null hypothesis for the test is that the data follows a normal distribution, while the alternative hypothesis suggests that the data does not follow a normal distribution. If the p-value is smaller than a chosen significance level (e.g., 0.05), the null hypothesis is rejected, indicating that the data is not normally distributed.

The Shapiro-Wilk test is particularly effective for small to moderate sample sizes (typically $n < 50$). For larger sample sizes, the test may become sensitive to small deviations from normality, even if they are not practically significant. The Shapiro-Wilk test assumes that the data is independent and randomly sampled from the population.

The Shapiro-Wilk test statistic is calculated as follows:

$$W = \frac{(\sum_{i=1}^n a_i X_{(i)})^2}{\sum_{i=1}^n (X_i - \bar{X})^2}$$

Where:

W is the Shapiro-Wilk statistic.

$X_{(i)}$ are the ordered sample values (i.e., the sorted values of the data).

a_i are the coefficients derived from the expected values of order statistics for a normal distribution.

$\bar{X}$ is the sample mean.

n is the sample size.

4.2.6 Durbin-Watson Test for Autocorrelation

The Durbin-Watson (DW) test is a statistical test used to detect the presence of autocorrelation (serial correlation) in the residuals of a regression analysis. Autocorrelation occurs when the residuals (errors) from one observation are correlated with those from another, which violates the assumption of independent errors in regression models. The DW test helps identify whether this assumption is violated, which is essential for the reliability of regression coefficients and hypothesis tests. The Durbin-Watson statistic (DW) ranges from 0 to 4, with the following interpretation:

DW = 2: No autocorrelation (i.e., the residuals are independent of each other).

DW < 2: Positive autocorrelation (i.e., residuals tend to follow each other in a positive direction).

DW > 2: Negative autocorrelation (i.e., residuals tend to alternate between positive and negative).

The Durbin-Watson statistic is calculated using the following formula:

$$DW = \frac{\sum_{t=2}^n (e_t - e_{t-1})^2}{\sum_{t=1}^n e_t^2}$$

Where:

e_t is the residual (error) at time t .

e_{t-1} is the residual at the previous time period (time $t-1$).

n is the number of observations in the regression model.

4.2.7 Breusch-Pagan Test for Heteroskedasticity

The Breusch-Pagan test is a statistical test used to detect the presence of heteroscedasticity in a regression model. Heteroscedasticity refers to the situation where the variance of the residuals (errors) is not constant across all levels of the independent variables. This violates one of the assumptions of classical linear regression, which assumes constant variance (homoscedasticity)

of the errors. If heteroscedasticity is present, it can lead to inefficient estimates and invalid statistical tests.

The Breusch-Pagan test checks for the relationship between the squared residuals and the independent variables. If there is a significant relationship, it suggests that the variance of the errors is dependent on the independent variables, indicating heteroscedasticity.

The test statistic is calculated as:

$$BP = \frac{nR^2}{2}$$

Where:

BP is the Breusch-Pagan test statistic.

n is the number of observations in the regression model.

R^2 is the coefficient of determination from the auxiliary regression of the squared residuals on the independent variables.

The null hypothesis (H_0) of the BP test states that the variance of the residuals is constant (no heteroscedasticity, i.e., homoscedasticity), whereas the alternative hypothesis (H_A) is that the variance of the residuals is not constant (heteroscedasticity is present). The p-value associated with the test statistic is used to decide whether to reject the null hypothesis. If the p-value is less than the significance level (e.g., 0.05), reject the null hypothesis and conclude that heteroscedasticity is present. If the p-value is greater than the significance level, fail to reject the null hypothesis, indicating no significant heteroscedasticity.

4.2.8 Cross-sectional Dependence (CD) Test

The Cross-sectional Dependence (CD) test is a statistical method used to detect cross-sectional dependence in panel data models. Cross-sectional dependence occurs when the error terms (residuals) of different cross-sectional units (e.g., countries, firms, or individuals) are correlated. This is problematic because one of the key assumptions of typical panel data regression models is that observations from different cross-sectional units are independent of each other. When this assumption is violated, the model's estimates can become biased or inconsistent. In the context of panel data analysis, testing for cross-sectional dependence is crucial, as it can arise due to various factors. One common reason is spatial dependence, where

residuals from neighbouring or related regions become correlated. Another cause is the presence of global shocks, such as economic, financial, or political events, which tend to affect multiple cross-sectional units (e.g., countries or firms) in a similar manner. The test includes various methods such as the Breusch-Pagan LM test, Pesaran's CD test, and Pesaran's scaled LM test, all of which assess the degree of correlation between residuals across cross-sections.

- a) **Breusch-Pagan LM Test:** The Breusch-Pagan LM test is used to test for cross-sectional dependence by considering the pairwise correlation between residuals across cross-sectional units.

The test statistic is given by:

$$LM = \sum_{i=1}^{N-1} \sum_{j=i+1}^N \frac{1}{T} \cdot \rho_{ij}^2$$

Where:

ρ_{ij} is the pairwise correlation coefficient of residuals between cross-sections i and j .

T is the time dimension (number of time periods).

N is the number of cross-sectional units (e.g., number of countries or firms).

The statistic sums the squared correlations between residuals for all pairs of cross-sectional units, and the test is designed to check whether these correlations are significantly different from zero. A high value of LM suggests significant cross-sectional dependence (correlated residuals across cross-sections), whereas a low value suggests no or minimal cross-sectional dependence.

- b) **Pesaran's CD Test:** The Pesaran's CD (Cross-sectional Dependence) Test is another widely used test for cross-sectional dependence, especially in cases of large panels.

The test statistic is given by:

$$CD = \frac{2}{N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \rho_{ij}$$

Where:

ρ_{ij} is the pairwise correlation of residuals between cross-sections i and j .

N is the number of cross-sectional units.

Pesaran's CD test computes the average pairwise correlation between residuals across all cross-sectional units. This test is particularly useful because it is robust and works well even in large datasets. A large value of CD suggests strong cross-sectional dependence, whereas a value close to zero suggests weak or no cross-sectional dependence.

- c) **Pesaran Scaled LM Test:** The Pesaran's Scaled LM test is a variation of the LM test that scales the correlation coefficients by the standard errors of the residuals for each cross-sectional unit.

The test statistic is calculated as:

$$LM_{\text{scaled}} = \frac{1}{N} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \frac{\rho_{ij}^2}{\widehat{\sigma_i \sigma_j}}$$

Where:

ρ_{ij} is the pairwise correlation of residuals between cross-sections i and j .

$\widehat{\sigma_i}$ and $\widehat{\sigma_j}$ are the standard errors of residuals for cross-sections i and j , respectively.

N is the number of cross-sectional units.

4.2.9 Slope Heterogeneity Test

The Slope Heterogeneity Test detects whether the relationship between the dependent variable and independent variables in a panel data model is the same across all cross-sectional units (e.g., countries, firms, individuals) or whether it varies. This type of heterogeneity is crucial because, in panel data models, one of the assumptions is that the slope (i.e., the coefficients of independent variables) is homogeneous across all cross-sectional units. If this assumption is violated, the model may produce biased estimates and incorrect inferences. Slope heterogeneity occurs when the impact of independent variables on the dependent variable differs across individual units. Testing for slope heterogeneity is important for understanding whether a

common relationship can be assumed for all units or whether unit-specific relationships must be estimated.

- a) **Pesaran and Yamagata (2008) Test:** The Pesaran and Yamagata (2008) test is a popular method for detecting slope heterogeneity in panel data models, particularly in the case of large panels with many cross-sectional units. The test is based on comparing the coefficients of the pooled model with the average coefficients of individual cross-sectional units. If the differences are statistically significant, it suggests the presence of slope heterogeneity. The test is based on the null hypothesis that the slopes are homogeneous across all cross-sectional units, and the alternative hypothesis is that the slopes vary across units.

The test statistic is defined as:

$$\text{Test Statistic} = \frac{1}{N} \sum_{i=1}^N (\hat{\beta}_i - \bar{\beta})^2$$

Where:

$\hat{\beta}_i$ is the estimated coefficient for cross-section i .

$\bar{\beta}$ is the average of the estimated coefficients across all cross-sections.

N is the number of cross-sectional units.

If the test statistic is large, this suggests significant slope heterogeneity across units, meaning that a common slope assumption is inappropriate.

- b) **Blomquist and Westerlund (2013) Test:** The Blomquist and Westerlund (2013) test is another method for detecting slope heterogeneity in panel data models. It extends the Pesaran and Yamagata approach by considering the effect of cross-sectional dependence in the data. In the presence of cross-sectional dependence, standard tests may lead to misleading conclusions, and this test offers a more robust alternative by adjusting for the correlation between residuals across units. The Blomquist and Westerlund test applies bootstrap methods to calculate critical values and p-values, making it more robust in the presence of cross-sectional dependence.

The null hypothesis for this test is that the slopes are homogeneous across cross-sectional units, while the alternative is that the slopes are heterogeneous.

The test statistic is given by:

$$W = \frac{1}{N} \sum_{i=1}^N (\hat{\beta}_i - \bar{\beta})^2$$

Similar to Pesaran and Yamagata, this statistic assesses the variability of individual slopes relative to the average slope. However, it incorporates bootstrapping to address potential biases due to cross-sectional dependence. If the test statistic exceeds the critical value from the bootstrap distribution, the null hypothesis of slope homogeneity is rejected, suggesting significant heterogeneity in the slopes.

4.2.10 Unit Root Test

Unit root tests are essential in the econometric analysis, particularly when working with panel data. They are used to determine whether a time series is stationary or non-stationary, which affects the type of econometric models that can be used. If a series has a unit root, it indicates a non-stationary process, meaning its statistical properties, such as mean and variance, change over time. The presence of a unit root implies that shocks to the series have a permanent effect, as opposed to stationary series where shocks only have a temporary impact. Unit root tests are classified into first-generation and second-generation tests, depending on whether they account for cross-sectional dependence among units in the panel data.

- i. **First-Generation Unit Root Tests:** The first-generation unit root tests are designed to test for stationarity, assuming no cross-sectional dependence between the cross-sectional units (e.g., countries, firms). These tests are based on the assumption that the errors in the model are independent across units.
 - a) **Augmented Dickey-Fuller (ADF) Test:** The Augmented Dickey-Fuller (ADF) test is one of the most commonly used unit root tests. It is an extension of the Dickey-Fuller test, which tests whether a time series has a unit root. The ADF test accounts for higher-order serial correlation by adding lagged differences of the dependent variable to the test regression.

The ADF test regression for a time series y_t is specified as:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{i=1}^p \delta_i \Delta y_{t-i} + \epsilon_t$$

Where:

Δy_t is the first difference of the series y_t .

α is the intercept term.

β_t is a time trend.

γ is the coefficient of the lagged value of y_t , which is tested for a unit root (i.e., $\gamma = 0$ indicates a unit root).

ϵ_t is the error term.

p is the number of lags included to account for autocorrelation.

The null hypothesis of the ADF test is that there is a unit root (i.e., $\gamma = 0$), while the alternative hypothesis is that the series is stationary (i.e., $\gamma < 0$). If the test statistic is larger than the critical value, the null hypothesis of a unit root cannot be rejected, indicating that the series is non-stationary.

- b) **Phillips-Perron (PP) Test:** The Phillips-Perron (PP) test is another widely used first-generation unit root test. It is similar to the ADF test but differs in how it handles serial correlation and heteroscedasticity in the error term. While the ADF test uses a parametric approach to adjust for serial correlation, the PP test uses a non-parametric method.

The PP test regression is as follows:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \epsilon_t$$

Where:

The equation is similar to the ADF test, but the error correction term is adjusted for serial correlation non-parametrically.

The null hypothesis of the Phillips-Perron (PP) test is that the series has a unit root (non-stationary), while the alternative hypothesis is that the series is stationary. The PP test is similar to the Augmented Dickey-Fuller (ADF) test but differs in how it handles serial correlation and heteroscedasticity. If the test statistic is not significantly different from zero, the null hypothesis cannot be rejected, indicating that the series is non-stationary. Both the ADF and PP tests are first-generation tests,

as they assume that the residuals across cross-sectional units are independent. However, these tests can lead to misleading results when applied to panel data that exhibits cross-sectional dependence.

ii. **Second-Generation Unit Root Tests:** The second-generation unit root tests address the issue of cross-sectional dependence in panel data. These tests are particularly important in panel datasets where cross-sectional units (e.g., countries or firms) may share common shocks or trends that induce correlation between their residuals. Ignoring cross-sectional dependence in the presence of such correlations can lead to incorrect conclusions.

a) **CIPS Test (Cross-sectional Im, Pesaran, and Shin):** The CIPS (Cross-sectional Im, Pesaran, and Shin) test is an extension of the Im, Pesaran, and Shin (IPS) test, which is a well-known panel unit root test. The CIPS test is specifically designed to account for cross-sectional dependence in the residuals, allowing for a more robust test of stationarity in panel data models with correlated errors.

The CIPS test statistic is calculated as follows:

$$\text{CIPS Statistic} = \frac{1}{N} \sum_{i=1}^N \hat{\gamma}_i$$

Where:

$\hat{\gamma}_i$ is the coefficient from the individual unit root test for each cross-sectional unit i .
 N is the number of cross-sectional units in the panel.

The null hypothesis of the CIPS test is that all cross-sectional units have a unit root (non-stationary), while the alternative hypothesis is that at least one unit is stationary. A significantly negative CIPS statistic indicates that the null hypothesis of unit roots can be rejected for the panel, suggesting that the series is stationary. If the statistic is close to zero or positive, it indicates that the series is non-stationary.

b) **CADF Test (Cross-sectional Augmented Dickey-Fuller Test):** The CADF (Cross-sectional Augmented Dickey-Fuller) test is another second-generation unit

root test that addresses the issue of cross-sectional dependence. The CADF test is an extension of the Augmented Dickey-Fuller (ADF) test for panel data. It augments the individual ADF tests with a correction for cross-sectional dependence by adding lagged residuals from other cross-sectional units to the test regression.

The CADF test regression is specified as follows:

$$\Delta y_{it} = \alpha_i + \beta t + \gamma y_{it-1} + \sum_{j \neq i} \lambda_{ij} \widehat{\epsilon}_{jt-1} + \epsilon_{it}$$

Where:

y_{it} is the dependent variable for cross-sectional unit i at time t .

α_i is the individual-specific intercept.

γ is the coefficient on the lagged dependent variable.

$\widehat{\epsilon}_{jt-1}$ is the lagged residual from the other cross-sectional units.

The null hypothesis for the CADF test is that each cross-sectional unit has a unit root (non-stationary), while the alternative hypothesis is that at least one unit is stationary. A negative CADF statistic indicates rejection of the null hypothesis, suggesting stationarity in the panel. If the statistic is not significantly different from zero, the null hypothesis of a unit root is not rejected.

4.2.11 Cointegration Test

Cointegration tests determine whether a long-run equilibrium relationship exists among the variables. When individual time series are non-stationary, but a linear combination of them is stationary, the variables are said to be cointegrated. This implies that despite short-term deviations, the variables move together in the long run. Testing for cointegration is crucial in econometric analysis, particularly in panel data studies, as it helps to avoid spurious regressions that arise from using non-stationary data. In a panel data framework, cointegration tests assess whether multiple cross-sectional units share a common long-term equilibrium. If cointegration is present, it suggests that the dependent and independent variables have a stable relationship over time. Several panel cointegration tests have been proposed in the literature, with Pedroni (1999, 2004) and Westerlund (2007) being widely used. Both Pedroni's test and Westerlund's test help determine whether a long-run relationship exists among panel variables. While Pedroni's method focuses on residual stationarity, Westerlund's approach directly assesses the

presence of an error correction mechanism. Using both tests together strengthens the robustness of the analysis in empirical panel data research.

- a) **Pedroni Cointegration Test:** The Pedroni test extends traditional Engle-Granger cointegration tests to a panel data framework. It allows for heterogeneous intercepts and slope coefficients across cross-sections and tests the null hypothesis that no cointegration exists. Pedroni (1999, 2004) developed seven different test statistics, which can be categorized into within-dimension (panel statistics) and between-dimension (group statistics).

Consider the following panel regression model:

$$y_{it} = \alpha_i + \beta_i x_{it} + \epsilon_{it}$$

Where:

y_{it} is the dependent variable and x_{it} is the independent variable,

α_i allows for individual fixed effects,

β_i represents the slope coefficients,

ϵ_{it} is the residual term.

To test for cointegration, Pedroni examines whether the residuals ϵ_{it} are stationary. The estimated residuals are used in an augmented Dickey-Fuller (ADF) type regression:

$$\Delta \widehat{\epsilon}_{it} = \rho_i \widehat{\epsilon}_{it-1} + \sum_{j=1}^p \delta_j \Delta \widehat{\epsilon}_{it-j} + v_{it}$$

Where:

ρ_i is the autoregressive coefficient,

v_{it} is the error term.

If $\rho_i < 0$, the residuals are stationary, implying cointegration. Pedroni provides seven test statistics, four based on pooling within the panel (panel statistics) and three based on averaging across groups (group statistics). The null hypothesis (H_0) states that there is no cointegration (i.e., $\rho_i = 0$ for all i) whereas the alternative hypothesis (H_A) states

that cointegration exists (i.e., $\rho_i < 0$ for at least some units). If the Pedroni test rejects the null hypothesis, it confirms a long-run relationship among the panel variables.

- b) **Westerlund Bootstrap Cointegration Test:** The Westerlund (2007) bootstrap test is another panel cointegration test focusing on error correction dynamics rather than residual stationarity. It improves over Pedroni's test by directly testing whether an error correction mechanism exists in the panel. Westerlund proposes four test statistics, two that pool information across the panel and two that allow for heterogeneity across units.

Error Correction Model for Westerlund Test:

$$\Delta y_{it} = \alpha_i + \beta_i t + \gamma_i y_{it-1} + \sum_{j=1}^p \delta_j \Delta x_{it-j} + \sum_{j=1}^q \lambda_j \Delta y_{it-j} + \epsilon_{it}$$

Where:

γ_i is the error correction coefficient,

If $\gamma_i < 0$, the system returns to equilibrium after a shock, indicating cointegration.

The Westerlund's Test Statistics include Panel statistics (G_t, G_α), which test whether the error correction term is significantly negative for the average panel. The Group statistics (P_t, P_α) test whether the error correction term is negative for all cross-sections individually. The null hypothesis (H_0) states that there is no cointegration ($\gamma_i = 0$, meaning no error correction), whereas the alternative hypothesis (H_A) states that cointegration exists ($\gamma_i < 0$, implying an adjustment toward equilibrium). To improve the robustness of results, Westerlund's test uses bootstrap resampling techniques to account for cross-sectional dependence, making it more reliable in real-world panel datasets.

4.2.12 Method of Moments Quantile Regression

Quantile regression extends traditional regression analysis by estimating conditional quantiles of the dependent variable rather than just the mean. This approach provides a more comprehensive understanding of the relationship between independent and dependent variables, particularly when the distribution of the dependent variable is skewed or exhibits heteroskedasticity. In panel data settings, fixed effects (FE) quantile regression accounts for unobserved heterogeneity across cross-sectional units while estimating the impact of regressors

at different quantiles. One prominent method for implementing quantile regression with fixed effects is the Method of Moments Quantile Regression (MM-QR), developed by Machado and Silva (2019). This approach overcomes the computational challenges associated with conventional fixed-effects quantile regression, which typically requires numerical optimization techniques that can be inefficient in large datasets. The method of moments quantile regression (MM-QR) with fixed effects combines the robustness of quantile regression with the ability to control for unobserved heterogeneity across panel data. This approach is helpful in capturing the impact of covariates at different points of the conditional distribution of the dependent variable while also accounting for individual-specific effects.

Quantile Regression Model with Fixed Effects

Consider a standard panel data model:

$$y_{it} = x'_{it} \beta + \alpha_i + u_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T$$

Where:

y_{it} is the dependent variable for unit i at time t ,

x_{it} is a vector of independent variables,

β represents the quantile-specific regression coefficients,

α_i captures individual-specific fixed effects,

u_{it} is the error term.

In traditional quantile regression, the conditional quantile function is given by:

$$Q_\tau(y_{it}|x_{it}, \alpha_i) = x'_{it} \beta_\tau + \alpha_i$$

Where $Q_\tau(\cdot)$ denotes the conditional τ^{th} quantile. The objective is to estimate β_τ , which describes how the explanatory variables influence different points in the conditional distribution of y_{it} .

Method of Moments Estimation

To incorporate fixed effects while maintaining computational efficiency, the Method of Moments Quantile Regression (MM-QR) approach uses instrumental variables (IV) to transform the estimation problem into a set of moment conditions. The key idea is to construct

moment conditions that ensure the estimated quantiles satisfy the required orthogonality conditions with respect to the instrumental variables.

The moment condition in the MM-QR approach is given by:

$$E[\psi_{\tau}(y_{it} - x'_{it}\beta_{\tau} - \alpha_i) z_{it}] = 0$$

Where:

$\psi_{\tau}(u) = \tau - I(u < 0)$ is the quantile score function,

z_{it} is an instrumental variable,

$I(.)$ is an indicator function taking value 1 when the argument is true and zero otherwise.

This approach allows for consistent estimation of β_{τ} while eliminating the individual fixed effects α_i , which are treated as nuisance parameters.

Mathematical Model for the Study

Consider a panel dataset with $i = 1, \dots, N$ individuals (here, BRICS countries) and $t = 1, \dots, T$ time periods. The dependent variable y_{it} represents the log of FDI for country i at time t . The independent variables x_{it} include the logs of the exchange rate (EXR), gross domestic product (GDP), human capital (HC), information and communication technology (ICT), institutional quality (INSQ), trade openness (TO), and total factor productivity (TFP).

The quantile regression model with fixed effects can be specified as follows:

$$Q_{y_{it}}(\tau | x_{it}, \alpha_i) = x'_{it}\beta(\tau) + \alpha_i$$

Where:

y_{it} is the dependent variable for individual i at time t .

$Q_{y_{it}}(\tau | x_{it}, \alpha_i)$ represents the conditional τ^{th} quantile of y_{it} given the covariates x_{it} and the fixed effect α_i .

x_{it} is a vector of covariates for individual i at time t .

$\beta(\tau)$ is a vector of quantile-specific coefficients. α_i is the fixed effect for individual i .

Fixed effects transformation: To eliminate the fixed effects α_i , we use the within-transformation:

$$\tilde{y}_{it} = y_{it} - \bar{y}_{it}$$

$$\tilde{x}_{it} = x_{it} - \bar{x}_{it}$$

Where $\bar{y}_{it}$ and $\bar{x}_{it}$ are the individual-specific means of y_{it} and x_{it} over time.

The transformed model is:

$$Q_{\tilde{y}_{it}}(\tau | \tilde{x}_{it}) = \tilde{x}_{it}' \beta(\tau)$$

The subsequent model for the study is formulated as follows:

$$Q_{\tilde{y}_{it}}(\tau | \tilde{x}_{it}) = \beta_0(\tau) + \beta_1(\tau) \ln(\text{EXR}_{it}) + \beta_2(\tau) \ln(\text{GDP}_{it}) + \beta_3(\tau) \ln(\text{HC}_{it}) + \beta_4(\tau) \ln(\text{ICT}_{it}) + \beta_5(\tau) \ln(\text{INSQ}_{it}) + \beta_6(\tau) \ln(\text{TO}_{it}) + \beta_7(\tau) \ln(\text{TFP}_{it})$$

Method of Moments: The method of moments approach for quantile regression involves solving moment conditions derived from the quantile regression objective function. For the τ^{th} quantile, the objective function is:

$$\min_{\beta(\tau)} = \sum_{i=1}^N \sum_{t=1}^T \rho_{\tau}(\tilde{y}_{it} - \tilde{x}_{it}' \beta(\tau))$$

where $\rho_{\tau}(u) = u(\tau - 1_{\{u < 0\}})$ is the check function for quantile τ .

The moment conditions for quantile regression are derived from the first-order conditions of this objective function. Let $z_{it} = \tilde{y}_{it} - \tilde{x}_{it}' \beta(\tau)$. The moment conditions are:

$$E[\psi_{\tau}(z_{it}) \tilde{x}_{it}] = 0,$$

where $\psi_{\tau}(z_{it}) = \tau - 1_{\{z_{it} < 0\}}$

4.2.13 Wavelet Coherence Analysis

Wavelet coherence analysis is used in this study to examine the co-movement and lead-lag relationships between two series across different time horizons. It helps identify how the relationship between variables (e.g., FDI and economic growth) evolves over time. This method is particularly useful for understanding how two variables align or lead each other over varying time scales. This technique is based on the foundational work of Goupillaud et al. (1984). It has been further refined in the fields of economics and finance by Pal and Mitra (2017), Kalmaz and Kirikkaleli (2019), and Adebayo (2020).

Coupling Effects: Coupling effects refer to the strength and direction of the relationship between two economic variables over short-term, medium-term, and long-term periods. In this study, it helps determine whether FDI and economic growth move together consistently and which variable leads or lag in different timeframes.

Mathematically, the wavelet coherence between two variables x_t and y_t can be described as follows:

Wavelet Transform: The continuous wavelet transform (CWT) of x_t with respect to a wavelet function $\psi(t)$ is given by:

$$W_x(a, b) = \int_{-\infty}^{\infty} x(t) \psi^* \left(\frac{t-b}{a} \right) dt$$

Where a and b represent the scale and translation parameters, respectively, and $\psi^*(t)$ is the complex conjugate of the mother wavelet $\psi(t)$.

Cross-Wavelet Transform: The cross-wavelet transform of x_t and y_t is defined as:

$$W_{xy}(a, b) = W_x(a, b) W_y^*(a, b)$$

Where $W_y^*(a, b)$ is the complex conjugate of the wavelet transform of y_t .

Wavelet Coherence: The wavelet coherence measure is then computed as:

$$R_{xy}^2(a, b) = \frac{|S\{W_{xy}(a, b)\}|^2}{S\{|W_x(a, b)|^2\} \cdot S\{|W_y(a, b)|^2\}}$$

Where $S\{\cdot\}$ denotes a smoothing operator in both time and scale. The wavelet coherence $R_{xy}^2(a, b)$ ranges between 0 and 1, with values close to 1 indicating a strong local correlation.

Phase Difference: The phase difference between the two time series at scale a and time b is given by the argument of the cross-wavelet transform:

$$\phi_{xy}(a, b) = \tan^{-1} \left(\frac{\Im\{W_{xy}(a, b)\}}{\Re\{W_{xy}(a, b)\}} \right)$$

Where $\Im\{\cdot\}$ and $\Re\{\cdot\}$ denote the imaginary and real parts, respectively. The phase difference provides insights into the lead-lag relationship between the series, with arrows pointing right indicating in-phase movement and arrows pointing left indicating anti-phase movement.

The WTC graph can be interpreted with the help of Table 4.2.

Table 4.2 Interpretation of WTC graphs

Time period	Frequency range
Short-term	0–4
Medium-term	4–16
Long-term	16–32
Low frequency	0.0–0.3
Medium frequency	0.3–0.7
High frequency	0.7–1.0
Direction of arrows	Interpretation
	A leads (causes) B: In phase
	B leads (causes) A: In phase
	A leads (causes) B: Anti-phase
	B leads (causes) A: Anti-phase

(Source: Nupehewa et al., 2022)

4.3 Summary

This chapter outlines the research methodology, detailing the dataset, variables, and econometric techniques used to analyze the relationship between FDI inflows and economic growth in BRICS nations. Section 4.1 covered the data, including the sample size, time period (1991–2020), and key macroeconomic variables such as GDP, exchange rate, human capital, institutional quality, trade openness, ICT, and total factor productivity, and their definitions and sources. Section 4.2 discussed the methodological approach, beginning with preliminary tests like correlation analysis, heteroskedasticity detection, autocorrelation, cross-sectional dependence, and unit root tests to ensure data robustness. The study then employs the Method of Moments Quantile Regression (MMQR) with fixed effects to assess the heterogeneous impact of various macroeconomic variables on FDI inflows and Wavelet Coherence Analysis to examine their time-frequency relationship. This chapter lays a strong foundation for

empirical analysis by systematically defining the data and methodology, which will be further explored in the subsequent chapter.

CHAPTER 5

EMPIRICAL RESULTS

This chapter offers a comprehensive analysis and discussion of the empirical findings based on the methodological framework applied. The chapter begins by computing the Compound Growth Rate (CGR) to analyze the trend in FDI inflows among the BRICS countries, followed by a detailed exploration of the data through descriptive statistics, providing insights into the distribution and fundamental characteristics of the key variables under study. To ensure the robustness of the data, preliminary tests such as the Shapiro-Wilk normality test are performed, which assess the normality of the variables. This is followed by a correlation heatmap to explore the interrelationships between the variables, identifying potential multicollinearity issues. Subsequent tests focus on the presence of cross-sectional dependence and slope heterogeneity, which are critical for addressing panel data characteristics in a multi-country context like this. A unit root test is also conducted to check the stationarity of the variables, laying the groundwork for further econometric modelling. Building on these initial diagnostics, the chapter then examines the long-run relationship between FDI inflows and economic growth through cointegration analysis, identifying whether the two variables move together over time. The results from the Method of Moments Quantile Regression (MMQR) with fixed effects are presented next, offering a nuanced understanding of how the relationship between FDI and other macroeconomic determinants varies across different quantiles. Finally, wavelet coherence analysis explores the time-frequency dynamics between FDI inflows and economic growth, providing deeper insights into how these variables interact across various time horizons. This comprehensive approach ensures that the findings presented in this chapter are rigorous and reflective of the complex relationship between FDI inflows and economic growth in the BRICS nations.

5.1 Compound Growth Rate (CGR)

The Compound Growth Rate (CGR) or Exponential Growth Rate Function is employed in this study to calculate the growth rate of FDI inflows in BRICS countries from 1991 to 2020. This method has been selected over the Average Annual Growth Rate (AAGR) and Compound Annual Growth Rate (CAGR) due to its ability to incorporate all observations within the data

series, thereby providing a more precise measure of FDI growth. The Exponential trend function is commonly used in UNCTAD reports and is acknowledged for its reliability in capturing long-term growth trends by minimizing the limitations of AAGR and CAGR.

The Exponential trend function for determining the growth rate is expressed as follows:

$$Y_t = \alpha \beta^t \mu_t$$

where Y_t represents FDI inflow in BRICS countries, α is a constant, β denotes the growth factor, and μ_t represents the error term. By taking the logarithm of both sides, the equation is transformed into a linear log-linear model:

$$\log Y_t = \log \alpha + t \cdot \log \beta + \log \mu_t$$

This log-linear transformation enables the application of Ordinary Least Squares (OLS) regression to estimate the growth rate of FDI inflows for each BRICS nation, enabling a clearer understanding of their FDI growth patterns. The Compound Growth Rate (CGR) results in Table 5.1 reveal notable differences in FDI inflow growth across the BRICS countries.

- i. **Brazil:** The estimated growth coefficient (β) for FDI inflows in Brazil is 0.123460, yielding a compound growth rate of 13.14%. The t-statistic of 8.294534 is highly significant at a 5% level of significance, with a standard error of 0.014884. The model's R-squared value of 0.710742 demonstrates a strong fit, indicating that the estimated growth model explains approximately 71.07% of the variability in Brazil's FDI inflows.
- ii. **China:** China's FDI inflows exhibit a growth coefficient (β) of 0.106245, translating to a compound growth rate of 11.21%. The t-statistic is 11.04473, which is statistically significant at the 5% level of significance, supported by a standard error of 0.009620. An R-squared of 0.813316 shows that the model accounts for about 81.33% of the variation in FDI inflows, suggesting a robust relationship between the estimated model and actual FDI growth in China.
- iii. **India:** With a growth coefficient (β) of 0.184007, India's FDI inflows grew at a compound rate of 20.21%, the highest among the BRICS countries. The t-statistic of 13.18018 is also significant at the 5% level of significance, and the standard error of 0.013961 is relatively low, indicating the reliability of the estimate. The R-squared value of 0.861192 implies that the model captures 86.12% of the variance in India's FDI inflows, indicating a strong model fit.

Table 5.1 Compound Growth Rate (CGR) of FDI Inflows in BRICS Countries

Country	β	CGR (%)	t-statistic	Std. Error	Prob.	R-squared
Brazil	0.123460	13.14	8.294534***	0.014884	0.0000	0.710742
China	0.106245	11.21	11.04473***	0.009620	0.0000	0.813316
India	0.184007	20.21	13.18018***	0.013961	0.0000	0.861192
Russia	0.125840	13.40	6.326255***	0.019892	0.0000	0.588365
South Africa	0.131289	14.04	4.376261***	0.030000	0.0002	0.406171

Note: *** p<0.01, **p<0.05, *p<0.1.

(Source: Computed by the author)

- iv. **Russia:** Russia's FDI inflows have a growth coefficient (β) of 0.125840, resulting in a compound growth rate of 13.40%. The t-statistic of 6.326255 is statistically significant at the 5% level of significance, with a standard error of 0.019892. The R-squared value of 0.588365 suggests that the model explains 58.84% of the variability in FDI inflows, a moderately strong fit.
- v. **South Africa:** South Africa's FDI inflows show a growth coefficient (β) of 0.131289, corresponding to a compound growth rate of 14.04%. The t-statistic of 4.376261 is statistically significant at the 5% level of significance, with a higher standard error of 0.030000 compared to the other BRICS nations. An R-squared value of 0.406171 indicates that the model explains approximately 40.62% of the variance, suggesting a weaker fit than other BRICS countries.

The 'Actual vs. Fitted' graphs for BRICS countries visually confirm the CGR trends observed in the analysis. In Figure 5.1, Brazil's FDI inflows show steady growth, with the fitted model closely aligning with actual values. Figure 5.2 for China indicates moderate growth with occasional surges, aligning with its consistent but lower CGR. India, shown in Figure 5.3, exhibits a strong upward trend in FDI inflows, supporting its highest CGR among BRICS nations. Russia's graph, shown in Figure 5.4, reveals fluctuations in FDI inflows, with periods of divergence from the fitted line. Finally, Figure 5.5 for South Africa displays fluctuating patterns with periods of sharp increases, deviating from the fitted model. This reflects the volatility in FDI flows observed in South Africa. Collectively, these graphs confirm the CGR values and reinforce the effectiveness of the exponential trend model in capturing FDI growth dynamics across BRICS countries.

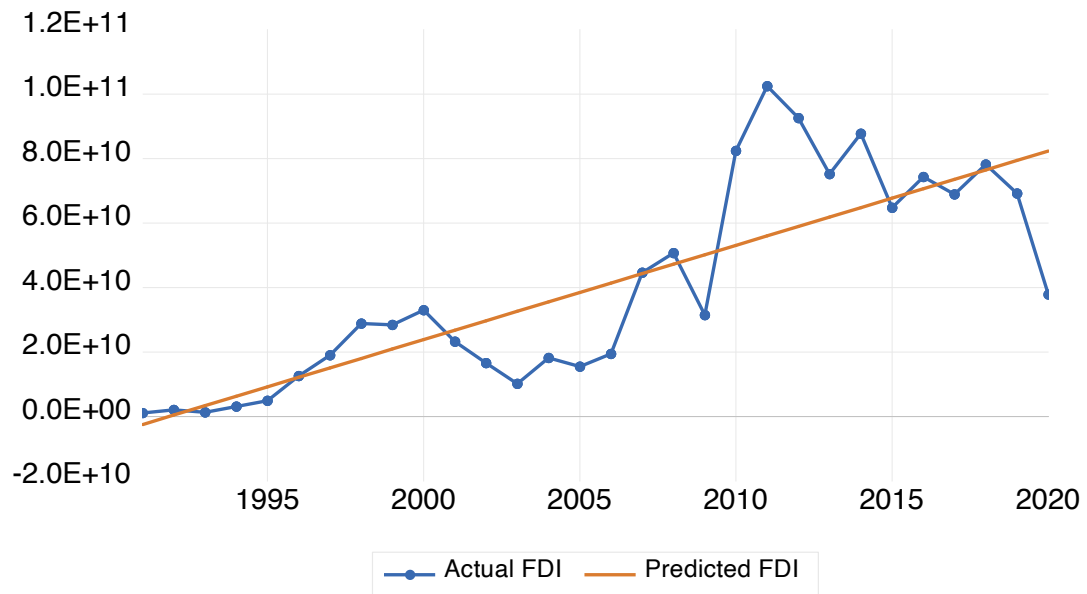


Figure 5.1 Actual line vs Fitted line (FDI) for Brazil
(Source: Computed by the author)

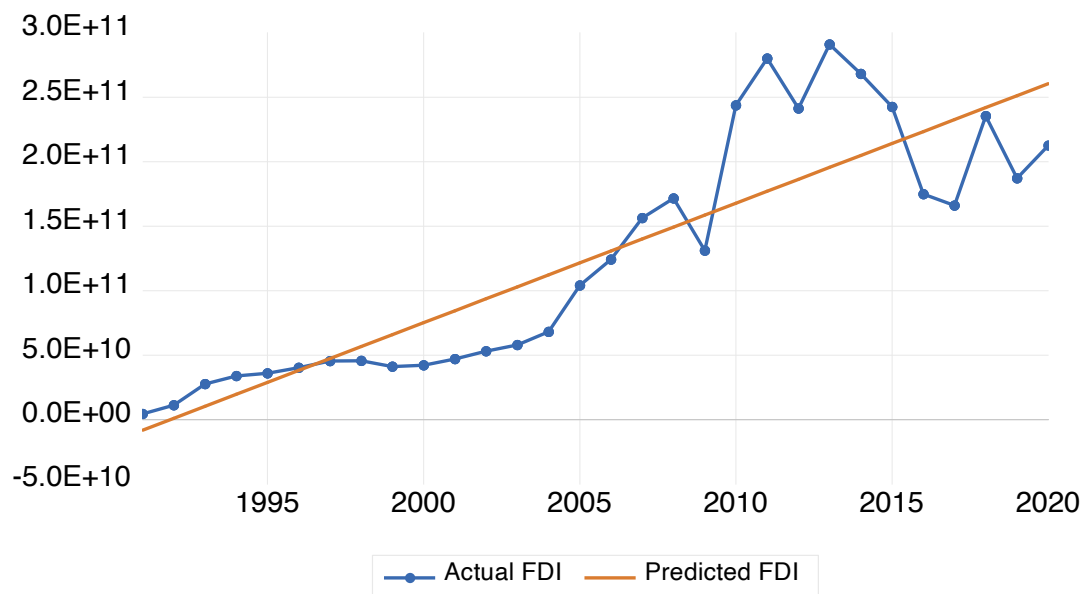


Figure 5.2 Actual line vs Fitted line (FDI) for China
(Source: Computed by the author)

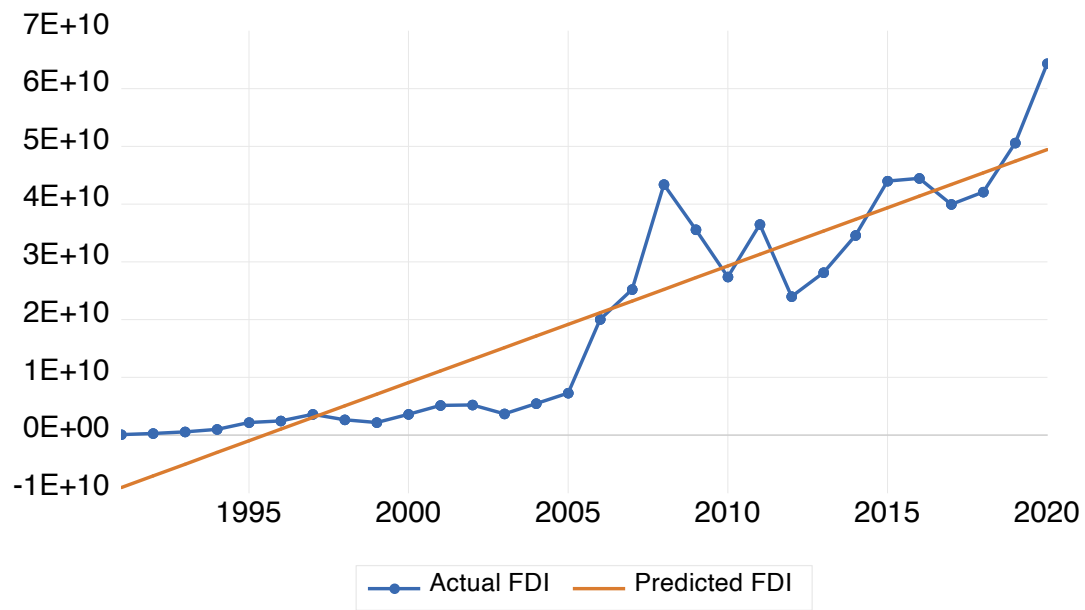


Figure 5.3 Actual line vs Fitted line (FDI) for India
(Source: Computed by the author)

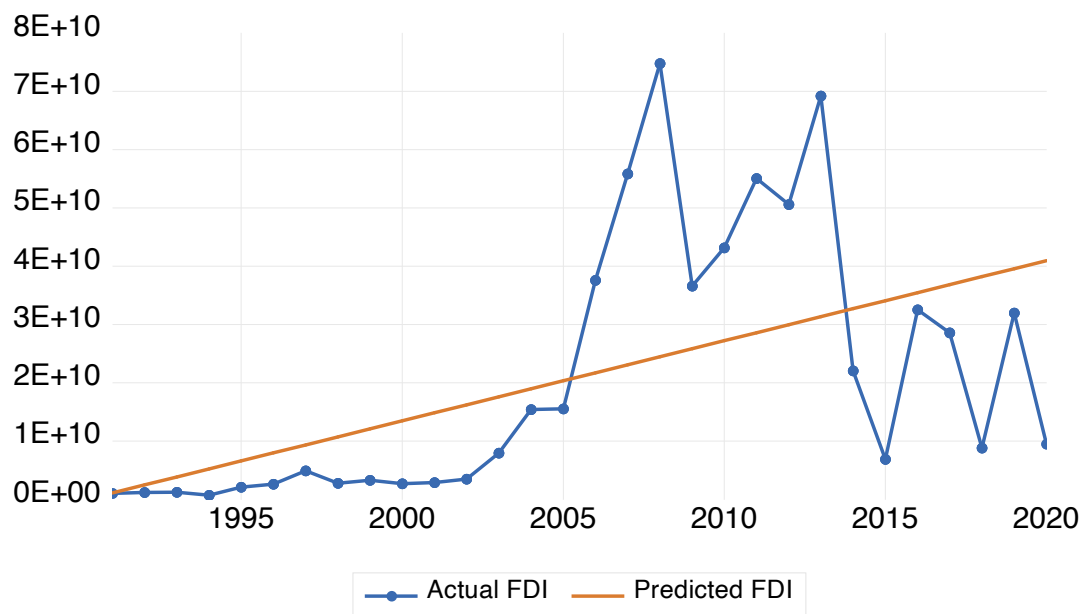


Figure 5.4 Actual line vs Fitted line (FDI) for Russia
(Source: Computed by the author)

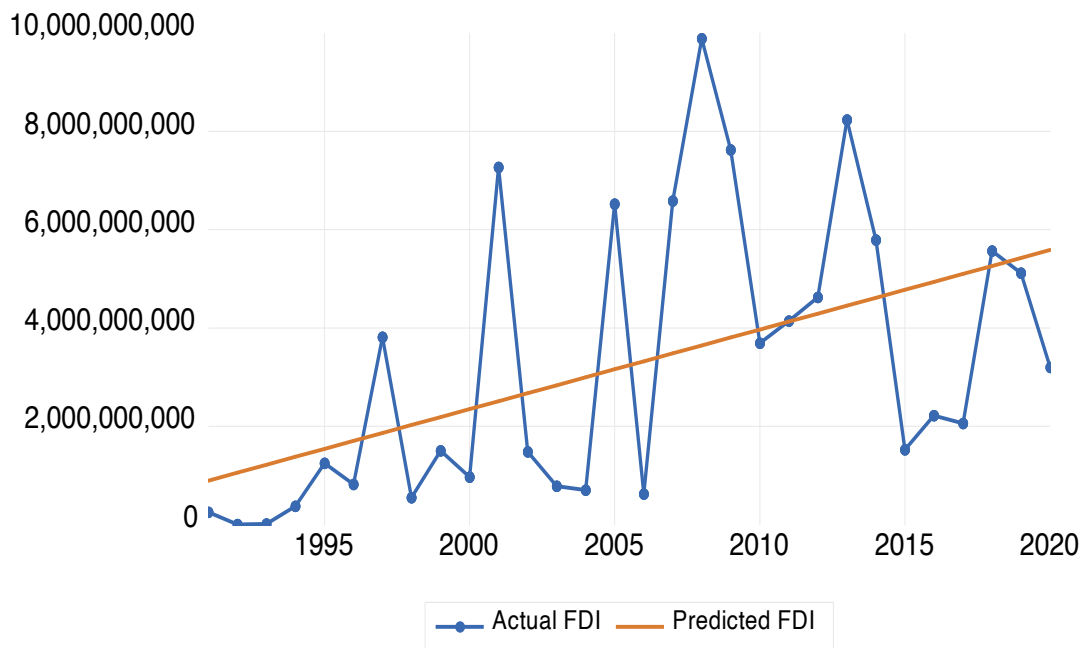


Figure 5.5 Actual line vs Fitted line (FDI) for South Africa
(Source: Computed by the author)

5.2 Descriptive Statistics

The descriptive statistics presented in Table 5.2 provide insightful details about the distribution of the variables in the dataset, which include FDI, GDP, EXR, HC, ICT, INSQ, TO, and TFP. The data comprises a balanced panel collected over the period 1991–2020. The given variables have been transformed into their natural logarithmic values to reduce the impact of outliers and stabilize the variance of the data. The statistical metrics include the mean, standard deviation, skewness, kurtosis, and Jarque-Bera test, which help in understanding the distribution and characteristics of the data. The mean is a measure of central tendency that represents the sum of all values in a dataset divided by the number of observations. It gives a single value that reflects the central point of the data distribution. Here, GDP has the highest mean value of 27.77, followed by FDI with a value of 23.20, while HC has the lowest mean value of 1.15. The standard deviation values capture the variability within the dataset. TFP exhibits the greatest variability with a standard deviation of 4.47, followed by ICT at 4.25, indicating a significant degree of dispersion. The skewness values indicate the asymmetry of the data distribution. FDI and ICT are negatively skewed, with values of -0.88 and -1.95 , respectively, suggesting that a majority of the data points are concentrated above the mean.

On the other hand, GDP has a positive skewness of 0.32, meaning that most observations fall below the mean. TFP exhibits a particularly high positive skewness of 2.89, suggesting the presence of extreme values on the right tail of the distribution. The kurtosis values reflect the peakedness of the distributions. High kurtosis (leptokurtic) suggests a distribution with heavy tails and a sharp peak, indicating more frequent extreme deviations from the mean. Conversely, low kurtosis (platykurtic) reflects lighter tails and a flatter peak, implying fewer extreme deviations. A normal distribution has a kurtosis value of 3, referred to as mesokurtic. EXR has an exceptionally high kurtosis value of 15.93, indicating a leptokurtic distribution with a sharp peak and fat tails, which is characteristic of significant outliers. ICT and TFP also exhibit high kurtosis values of 7.59 and 10.80, respectively, further confirming the presence of extreme values in these variables.

The Jarque-Bera test results test for normality in the distributions. The significant Jarque-Bera values for FDI (32.95), EXR (1211.32), ICT (227.71), INSQ (11.89), TO (15.49), and TFP (590.91) indicate that these variables deviate significantly from a normal distribution, with p-values significant at 5% level in each case. This suggests the possibility of non-normal distributions and the existence of outliers within these variables.

Table 5.2 Descriptive Statistics

Variables	lnFDI	lnGDP	lnEXR	lnHC	lnICT	lnINSQ	lnTO	lnTFP
Mean	23.20068	27.77184	2.150484	1.154526	16.77105	3.237383	3.478765	3.825563
Median	23.64495	27.82848	2.112515	1.1844330	18.20788	3.371588	3.589802	2.560300
Maximum	26.39634	30.31422	4.305410	1.372994	21.28073	4.045504	4.084114	23.31751
Minimum	15.02686	25.91265	-8.645027	0.906125	5.703782	2.050270	2.050899	0.921953
Std. Dev.	1.984469	1.027467	1.707677	0.131727	4.257055	0.491545	0.484192	4.479230
Skewness	-0.883579	0.324771	-2.580344	-0.114762	-1.955322	-0.513944	-0.780065	2.896900
Kurtosis	4.466093	3.071128	15.92975	1.720280	7.597871	2.079735	2.785701	10.80890
Jarque-Bera	32.95173	2.668527	1211.320	10.56479	227.7097	11.89653	15.49956	590.9190
Probability	0.000000	0.263352	0.000000	0.005080	0.000000	0.002610	0.000431	0.000000
Sum	3480.102	4165.776	322.5726	173.1789	2515.658	485.6075	521.8148	573.8345

Note: Std. Dev. = Standard deviation.

(Source: Computed by the author)

5.3 Shapiro-Wilk Normality Test

The Shapiro-Wilk test is used to determine whether a dataset is normally distributed. It is particularly sensitive to departures from normality in small to moderate-sized samples. The null and alternate hypotheses for the Shapiro-Wilk test are as follows:

H₀: The data follows a normal distribution.

H₁: The data does not follow a normal distribution.

Table 5.3 presents the results of the Shapiro-Wilk normality test for eight variables: lnFDI, lnGDP, lnEXR, lnHC, lnICT, lnINSQ, lnTO and lnTFP. The test examines whether the data follows a normal distribution for each variable. The "W" column displays the Shapiro-Wilk test statistic, with values closer to 1 indicating a distribution closer to normality. In this case, the W values for all variables range from 0.54638 (lnTFP) to 0.95772 (lnGDP), which suggests deviations from normality in varying degrees for the tested variables.

Table 5.3 Shapiro-Wilk Normality Test Results

Variable	Obs.	W	V	z	Prob > z
lnFDI	150	0.94544	6.349	4.190	0.00001
lnGDP	150	0.95772	4.919	3.612	0.00015
lnEXR	150	0.79102	24.32	7.235	0.00000
lnHC	150	0.94069	6.901	4.379	0.00001
lnICT	150	0.81122	21.97	7.004	0.00000
lnINSQ	150	0.93234	7.873	4.678	0.00000
lnTO	150	0.91210	10.28	5.271	0.00000
lnTFP	150	0.54638	52.78	8.992	0.00000

Note: Obs = Observations, Prob = probability.

(Source: Computed by the author)

The test also provides the "V" statistic, which measures how far the sample distribution is from the normal distribution. Higher values of "V," such as 52.78 for lnTFP and 24.32 for lnEXR, indicate greater departures from normality. The "z" column reflects the z-score associated with the W statistic, and the corresponding p-values are provided in the "Prob > z" column. The p-values for all variables are extremely small, indicating that we reject the null hypothesis of normality for all variables at a 5% significance level. This implies that none of the variables

follow a normal distribution. The smallest p-values, such as 0.00000 for lnEXR, lnICT, lnINSQ, lnTO, and lnTFP, suggest strong evidence against normality for these variables. Overall, the results indicate non-normal distributions for all the given variables.

Further, the histogram of standardized residuals in Figure 5.6 supports the results of the Shapiro-Wilk test. The horizontal axis represents the values of standardized residuals, and the vertical axis shows their frequency. The distribution appears to be skewed to the left, indicating a non-normal distribution. The skewness is -1.5809, confirming that the distribution is left-skewed, meaning more residuals are concentrated on the right with a long left tail. The kurtosis value of 10.596 indicates that the distribution has heavy tails, suggesting the presence of outliers or extreme values far from the mean. The Jarque-Bera test statistic of 423.1425, with a probability value of 0.000, strongly rejects the null hypothesis of normality at a 5% level of significance. This confirms that the residuals do not follow a normal distribution and that there are significant deviations in terms of skewness and kurtosis. Thus, the results of both the Shapiro-Wilk test and Standardized residuals confirm that the given data is not normally distributed for the time period 1991–2020.

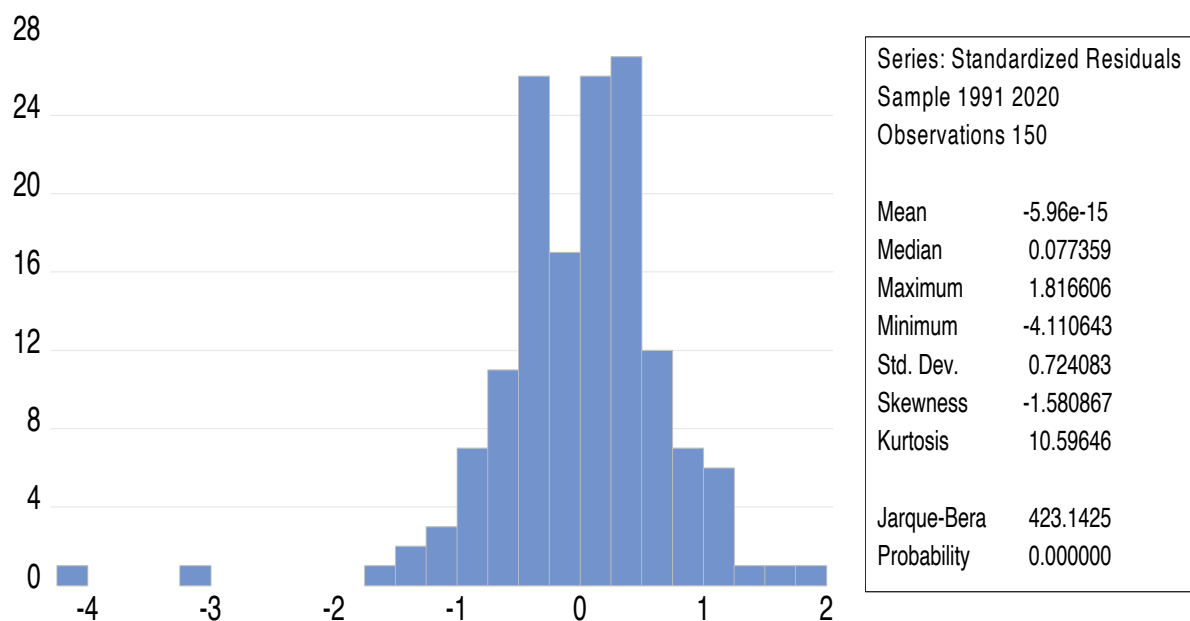


Figure 5.6 Histogram of Standardized Residuals
(Source: Computed by the author)

5.4 Correlation Matrix

The correlation matrix presented in Table 5.4 shows the pairwise correlations between the key variables in the study, all of which have been transformed into their natural logarithms. The correlation between all the variables is generally low except for lnFDI with lnGDP and lnFDI with lnICT. lnFDI has a strong positive correlation with lnGDP (0.826) and lnICT (0.743), indicating that higher FDI inflows are closely linked to economic growth and ICT development.

Table 5.4 Correlation Matrix

	lnFDI	lnGDP	lnEXR	lnHC	lnICT	lnINSQ	lnTO	lnTFP
lnFDI	1.000000							
lnGDP	0.825749	1.000000						
lnEXR	0.127466	0.031140	1.000000					
lnHC	0.428858	0.675136	0.333205	1.000000				
lnICT	0.742586	0.494406	0.269934	0.180407	1.000000			
lnINSQ	0.103467	-0.051812	-0.494839	-0.417073	0.130833	1.000000		
lnTO	0.035200	-0.179697	0.430628	-0.097885	0.486659	-0.199716	1.000000	
lnTFP	0.431586	0.636795	-0.114055	0.403096	0.319582	0.212871	0.120917	1.000000

(Source: Computed by the author)

Further, the correlation heatmap in Figure 5.7 provides a visual representation of the correlation matrix, making it easier to identify the strength and direction of relationships between the selected variables: lnFDI, lnGDP, lnEXR, lnHC, lnICT, lnINSQ, lnTO, and lnTFP. The heatmap is generated using the MATLAB software. In this heatmap, the colours represent correlation coefficients, with the colour bar on the right indicating the spectrum from -1 to 1. Dark purple corresponds to strong negative correlations (closer to -1), while bright orange represents strong positive correlations (closer to 1).

lnFDI shows a strong positive correlation with lnGDP and lnICT, depicted by the light-coloured squares, indicating that as lnFDI increases, lnGDP and lnICT also increase, reflecting their interconnected dynamics. Conversely, lnEXR and lnINSQ have weaker or negative correlations with most other variables, as seen by the darker shades, indicating less direct or opposite movement with these variables.

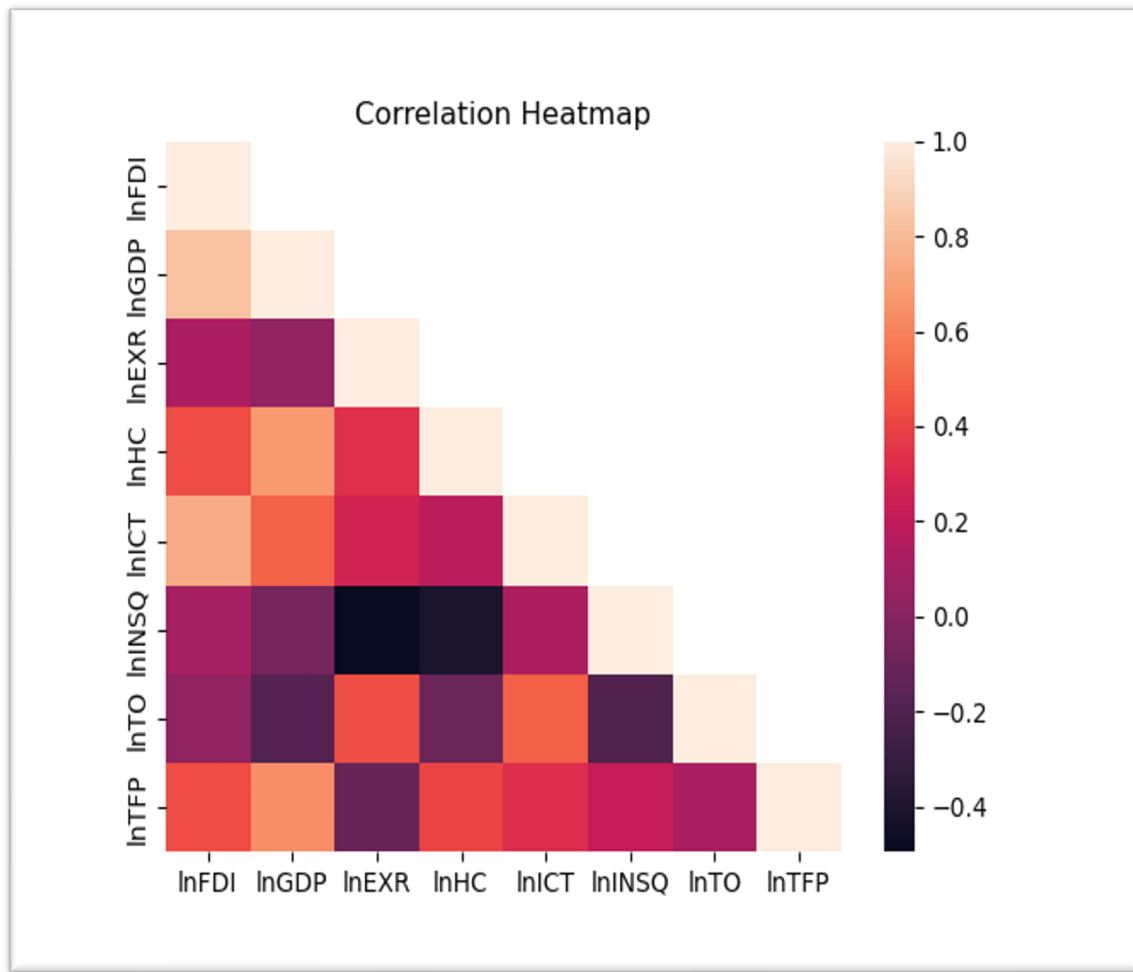


Figure 5.7 Correlation Heatmap
(Source: Computed by the author)

5.5 Variance Inflation Factor (VIF)

Table 5.5 presents the Variance Inflation Factor (VIF) and its reciprocal ($1/VIF$) for the variables included in the analysis. VIF measures the degree of multicollinearity, or the correlation among independent variables in a regression model, by indicating how much the variance of a regression coefficient is inflated due to the correlations with other predictors. Generally, VIF values above 10 raise concerns about multicollinearity (Yoo et al., 2014; Kim, 2019; Shrestha, 2020). In this case, the VIF values for all variables are below 5, with the highest VIF observed for lnICT (4.726), followed closely by lnGDP (4.555) and lnTO (4.476). The mean VIF is 3.58, which falls well within the acceptable range. The $1/VIF$ values, which are the reciprocals of the VIF values, are also sufficiently high, indicating a good level of tolerance and confirming that there is no severe multicollinearity present in the model. The VIF results confirm that the model does not suffer from problematic multicollinearity, even though some

variables, such as lnGDP and lnICT, show moderate correlations with lnFDI, as seen in the correlation matrix in Table 5.5. Therefore, the estimated regression coefficients are reliable, and multicollinearity is absent in the analysis.

Table 5.5 VIF and 1/VIF Values

Variables	VIF	1/VIF
lnGDP	4.555377	0.219521
lnEXR	1.939619	0.515565
lnHC	3.040509	0.328892
lnICT	4.726282	0.211583
lnINSQ	2.811516	0.355680
lnTO	4.476207	0.223403
lnTFP	3.542984	0.282248
Mean VIF	3.584642	

Note: VIF = Variance inflating factor.

(Source: Computed by the author)

5.6 Durbin-Watson Test for Autocorrelation

Table 5.6 presents the results of the Durbin-Watson (DW) test, a statistical test used to detect the presence of autocorrelation (serial correlation) in the residuals of a regression model. Autocorrelation occurs when the error terms of a model are correlated over time, which can lead to inefficient estimators and unreliable statistical inferences.

Table 5.6 Durbin-Watson Test Results

Test	Statistic
Durbin-Watson	1.85153

(Source: Computed by the author)

Here, the computed DW statistic is 1.85153, it is very close to 2, suggesting that there is no significant autocorrelation in the residuals of the regression model. This indicates that the model's assumptions regarding independent error terms hold, making the regression estimates statistically reliable. The lack of significant autocorrelation suggests that the regression model is well-specified in terms of its residual structure. This strengthens the validity of the findings,

as it implies that the estimated coefficients are efficient and the standard errors are not biased due to serial correlation.

5.7 Breusch-Pagan Test for Heteroskedasticity

The Breusch-Pagan test is commonly employed to detect heteroskedasticity in the model in the case of panel data. It operates under the assumption that the variance of the residuals may be a linear function of one or more explanatory variables. The null hypothesis (H_0) of the test posits that the residuals of the model exhibit homoskedasticity, meaning constant variance across observations. The alternative hypothesis (H_1) suggests the presence of heteroskedasticity, indicating that the residuals have non-constant variance.

Table 5.7 Breusch-Pagan Test Results

Chi²(7)	0.07
Prob>chi²	0.7689

(Source: Computed by the author)

Table 5.7 shows the Breusch-Pagan test results, with a Chi-squared value of 0.07 and a p-value of 0.7689. Since the p-value is greater than 0.05, we fail to reject the null hypothesis of homoskedasticity at a 5% level of significance. Thus, the test suggests that there is no significant evidence of heteroskedasticity, implying that the residuals have constant variance across the model. This further confirms the reliability of the model in terms of constant variance across the residuals.

5.8 Cross-Sectional Dependence (CD) Test

Table 5.8 presents the results of the Cross-Sectional Dependence (CD) tests used to determine whether there is dependence between cross-sectional units in the panel data model. Cross-sectional dependence can arise when unobserved common factors affect multiple cross-sections, potentially leading to biased estimators.

The Breusch-Pagan LM test is used in cases where $n < t$ (here, n = number of cross-section units and t = time periods). The result shows a statistic of 26.90938 with 10 degrees of freedom and a p-value of 0.0027, indicating significant cross-sectional dependence at a 5% level of significance. Similarly, the Pesaran scaled LM test produces a statistic of 3.781053 with a p-value of 0.0002, further confirming the presence of dependence across cross-sections.

Although the Pesaran CD test reports a statistic of 0.923330 with a p-value of 0.3558, failing to reject the null hypothesis of no cross-sectional dependence, the majority of tests (Breusch-Pagan LM and Pesaran scaled LM) provide strong evidence of cross-sectional dependence. Therefore, employing a second-generation unit root test for stationarity is appropriate due to the observed cross-sectional dependence among the variables (Barbieri, 2009; Demetrescu et al., 2010; Pesaran, 2021).

Table 5.8 Cross-Sectional Dependence (CD) Test Results

Test	Statistic	d.f.	P-value
Breusch-Pagan LM	26.90938	10	0.0027
Pesaran scaled LM	3.781053		0.0002
Pesaran CD	0.923330		0.3558

Note: d.f. = degrees of freedom, CD = cross-sectional dependence, LM = Lagrange multiplier.

(Source: Computed by the author)

5.9 Slope Heterogeneity Test

The slope heterogeneity test is a statistical tool used in panel data analysis to assess whether the relationship between independent and dependent variables is consistent (homogeneous) or varies (heterogeneous) across different cross-sectional units. In this study, the cross-sectional units are the BRICS countries. The primary purpose of slope heterogeneity tests is to detect whether there is variation in the slope coefficients across these units.

The Pesaran and Yamagata (2008) test is a commonly used method for detecting slope heterogeneity in panel data models, particularly useful for panels with large time series and cross-sectional dimensions. The test results in Table 5.9 show values of $\Delta = 4.409$ and $\Delta_{adj.} = 5.270$, both associated with p-values of 0.000, which are statistically significant at the 5% level of significance. These results indicate that the null hypothesis of slope homogeneity is rejected, meaning that the slope coefficients differ across the cross-sectional units (the BRICS countries).

Additionally, the Blomquist and Westerlund (2013) test is employed to assess slope heterogeneity, especially in cases where cross-sectional dependence is present. This test enhances the reliability of detecting heterogeneity. The Blomquist-Westerlund test results in Table 5.9 report values of $\Delta = 3.955$ and $\Delta_{adj.} = 4.727$, both with p-values of 0.000. These results also reject the null hypothesis of slope homogeneity at the 5% level of significance, highlighting that the relationship exhibits significant variation across the units in the panel.

Thus, both tests provide strong evidence of heterogeneity in the slopes of the given panel data model.

Table 5.9 Slope Heterogeneity Test Results

Pesaran-Yamagata test	
Δ	$\Delta_{adj.}$
4.409 (0.000)	5.270 (0.000)
Blomquist-Westerlund test	
Δ	$\Delta_{adj.}$
3.955 (0.000)	4.727 (0.000)

Note: p-values in parentheses.

(Source: Computed by the author)

5.10 Second-Generation Panel Unit Root Test

Table 5.10 presents the results from the Pesaran Cross-sectional Im, Pesaran, and Shin (CIPS) test and the Cross-sectional Augmented Dickey-Fuller (CADF) test, both of which are second-generation unit root tests. These tests are used to assess the stationarity of variables in panel data settings where cross-sectional dependence is present.

Table 5.10 Pesaran CIPS and CADF Test Results

Variables	Level	
	Pesaran CIPS	Pesaran CADF
lnFDI	-2.849***	-2.585**
lnGDP	-3.059***	-3.215***
lnEXR	-2.424**	-2.902***
lnHC	-3.882***	-2.831***
lnICT	-2.793***	-3.040***
lnINSQ	-2.728***	-3.437***
lnTO	-2.985***	-2.625**
lnTFP	-2.531**	-2.477**

Note: *** p<0.01, **p<0.05, *p<0.1.

(Source: Computed by the author)

The CIPS test, introduced by Pesaran (2007), extends the Im-Pesaran-Shin (IPS) test to handle cross-sectional dependencies. It evaluates the null hypothesis that all panel series contain unit roots, indicating non-stationarity, against the alternative that at least some series are stationary. This test adjusts for cross-sectional dependence by incorporating cross-sectional averages of lagged levels and first differences. Similarly, the CADF test addresses cross-sectional dependence by augmenting the standard ADF regression with averages of the lagged dependent variable and first differences, making it well-suited for analyzing datasets where dependencies exist across countries or other cross-sections.

The findings from the Pesaran CIPS and CADF tests presented in Table 5.10 reveal that all variables: $\ln\text{FDI}$, $\ln\text{GDP}$, $\ln\text{EXR}$, $\ln\text{HC}$, $\ln\text{ICT}$, $\ln\text{INSQ}$, $\ln\text{TO}$, and $\ln\text{TFP}$ reject the null hypothesis of a unit root at either the 1% or 5% significance levels ($p < 0.01$, $p < 0.05$). This indicates that each variable is stationary at the level, confirming that they do not contain a unit root.

5.11 Cointegration Test

After conducting the unit root tests to determine stationarity, the next step is to assess the presence of cointegration among the variables. Cointegration tests help identify whether a long-term equilibrium relationship exists between the variables. For this analysis, two types of cointegration tests have been employed: the Pedroni cointegration test and the Westerlund bootstrap panel cointegration test. The results for each test are presented in Tables 5.11 and 5.12, respectively.

5.11.1 Pedroni Cointegration Test

The Pedroni (2001, 2004) cointegration test results, presented in Table 5.11, aim to assess whether a long-run equilibrium relationship exists between FDI inflows and economic growth in the BRICS countries by testing the null hypothesis of no cointegration. This test provides results in both within-dimension and between-dimension approaches.

In the within-dimension panel, all four statistics (v -statistic, ρ -statistic, PP-statistic, and ADF-statistic) exhibit significant p -values, with most of them rejecting the null hypothesis of no cointegration at either the 1% or 5% significance level. Specifically, the v -Statistic is significant at 5% with a p -value of 0.0346 for the panel statistic and 0.0301 for the weighted statistic. The ρ -Statistic, PP-Statistic, and ADF-Statistic are all significant at the 1% level, indicating strong evidence against the null hypothesis and suggesting the existence of cointegration within the panel.

Table 5.11 Pedroni Cointegration Test Results

Newey-West automatic bandwidth selection and Bartlett kernel				
Null Hypothesis: No cointegration				
Within-dimension				
Panel	Statistic	P-value	Weighted Statistic	P-value
v-Statistic	1.817137	0.0346	1.878864	0.0301
rho-Statistic	−3.614196	0.0002	−3.059275	0.0011
PP-Statistic	−3.849884	0.0001	−3.652788	0.0001
ADF-Statistic	−3.564045	0.0002	−2.321543	0.0101
Between-dimension				
Group	Statistic	P-value		
rho-Statistic	−1.911633	0.0280		
PP-Statistic	−3.725577	0.0001		
ADF-Statistic	−2.045903	0.0204		

Note: PP = Phillips-Perron, ADF = Augmented Dickey-fuller.

(Source: Computed by the author)

For the between-dimension group, the rho-statistic, PP-statistic, and ADF-statistic also show significant p-values, with the PP-Statistic particularly significant at the 1% level and the ADF-Statistic at the 5% level. These results collectively support the existence of a long-term equilibrium relationship between FDI inflows and economic growth in BRICS countries.

5.11.2 Westerlund Bootstrap Panel Cointegration Test

The Westerlund (2008) bootstrap panel cointegration test in Table 5.12 further confirms the existence of cointegration by applying bootstrapping to ensure robustness against cross-sectional dependencies. This test examines four statistics: Gt, Ga, Pt, and Pa, each representing different dimensions of the cointegration analysis.

The Gt and Pt statistics yield significant results at the 1% level, with p-values of 0.000, which strongly rejects the null hypothesis of no cointegration. The Ga and Pa statistics are also significant, with the Ga statistic showing significance at the 5% level (p-value 0.045), and the Pa statistic at the 1% level (p-value 0.000). These results indicate that there is a robust cointegrating relationship among the variables, reinforcing the findings from the Pedroni test

and providing strong evidence that incoming FDI flows and economic growth share a long-term association across the BRICS countries.

Table 5.12 Westerlund Bootstrap Panel Cointegration Test Results

Statistic	Value	Z-value	P-value
G_t	−2.646	−3.588	0.000
G_a	−7.257	−1.698	0.045
P_t	−6.869	−4.907	0.000
P_a	−9.135	−6.263	0.000

(Source: Computed by the author)

In conclusion, both the Pedroni and Westerlund cointegration tests reject the null hypothesis (H_1) of no cointegration at the 5% level of significance, confirming a stable, long-term relationship between FDI inflows and economic growth in the BRICS countries. This implies that FDI not only contributes to immediate capital inflows but also fosters sustained economic growth over time. Such a relationship suggests that FDI inflows stimulate efficiency, innovation, and technology transfer in the host economies, which, in turn, fuels growth. This also helps BRICS countries to integrate more deeply into global production networks and elevates their economic resilience. The alignment of these findings with earlier studies, such as those conducted by Agrawal (2015), Gupta and Singh (2016), Maryam and Mittal (2020), and Banday et al. (2021), more recently, Rao et al. (2023), further supports the robustness of this positive and stable association. Like the present study, these authors have emphasized the role of FDI as a catalyst for growth and development in BRICS countries.

5.12 Method of Moments Quantile Regression (MM-QR)

The results of the Method of Moments Quantile Regression (MM-QR) with fixed effects for BRICS countries explain how various macroeconomic factors influence FDI inflows across different quantiles (0.10, 0.25, 0.50, 0.75, 0.90). Here, the dependent variable is $\ln FDI$, while the independent variables include $\ln GDP$, $\ln EXR$, $\ln HC$, $\ln ICT$, $\ln INSQ$, $\ln TO$, and $\ln TFP$. The results in Table 5.13 reveal how the effects of these variables vary across different levels of FDI inflows, offering a more nuanced understanding than traditional mean-based regression approaches.

Table 5.13 Method of Moments Quantile Regression (MM-QR) Test Results

Variables	Quantiles				
	0.10	0.25	0.50	0.75	0.90
lnGDP	1.427082* (0.773763)	1.275213** (0.510427)	1.082311*** (0.378876)	0.971770** (0.482821)	0.884459** (0.621424)
lnEXR	-0.089135* (0.139785)	-0.014171** (0.0924997)	-0.081043** (0.068900)	-0.135614** (0.085592)	-0.178711* (0.111506)
lnHC	-6.440719 (3.834388)	-4.781166 (2.533648)	-2.673215 (1.884575)	-1.465284 (2.367443)	-0.511189 (3.067984)
lnICT	0.251867** (0.112404)	0.197799*** (0.074388)	0.129122*** (0.055369)	0.089768** (0.068943)	0.058684** (0.089689)
lnINSQ	0.243108** (0.648854)	0.478426** (0.428516)	0.777325** (0.318492)	0.948605** (0.402100)	1.083892** (0.519817)
lnTO	0.313541** (0.967710)	0.715424** (0.639474)	1.225893*** (0.4755616)	1.518412** (0.597686)	1.749456** (0.774303)
lnTFP	-0.106909* (0.057418)	-0.107107*** (0.037874)	-0.107359*** (0.028098)	-0.107504*** (0.035886)	-0.107618** (0.046133)

Note: Standard errors in parentheses, *** p<0.01, **p<0.05, *p<0.1.

(Source: Computed by the author)

5.12.1 Gross Domestic Product (lnGDP)

The coefficient of lnGDP is positive and significant across all quantiles, indicating that GDP consistently has a positive influence on FDI inflows in BRICS countries. This effect is strong in the lower quantiles (0.10 and 0.25) with coefficients of 1.427 and 1.275, respectively, and remains positive across the distribution, although it slightly diminishes at higher quantiles. Therefore, we do not reject the alternative hypothesis (H_{2a}), which states that GDP has a significant impact on FDI inflows in BRICS countries at the 5% level of significance. This significance of lnGDP across all quantiles suggests that higher economic output and market size are attractive to foreign investors, likely due to increased demand and profit potential in larger economies (Owusu-Nantwi & Erickson, 2019; Soe, 2020; Sijabat, 2023). This aligns with the market-seeking theory of FDI, where investors are drawn to countries with substantial market size (Iqbal et al., 2014; Sengupta & Puri, 2020).

5.12.2 Exchange Rate (lnEXR)

The variable lnEXR shows a negative relationship with FDI across most quantiles, although this effect is statistically significant at 10% and 5% level of significance. At the lower quantiles (0.10 and 0.25), the coefficients are -0.089 and -0.014 , both significant at the 10% level, indicating that a weaker currency (depreciation) slightly discourages FDI. This negative effect intensifies at higher quantiles, with coefficients reaching -0.135 and -0.178 at the 0.75 and 0.90 quantiles, respectively. Therefore, we do not reject the alternative hypothesis (H_{2b}), which states that EXR has a significant impact on FDI inflows in BRICS countries at the 5% level of significance. This finding suggests that, as FDI inflows increase, investors may become more sensitive to exchange rate fluctuations, likely due to the increased cost of capital in volatile currency environments (Latief & Lefen, 2018; Batat & Ahmadu, 2021; Warren et al. 2023). This outcome is consistent with risk-averse behaviour, where exchange rate instability may discourage FDI inflows (Dal Bianco & Loan, 2017; Morina et al., 2020; Lajevardi & Chowdhury, 2024).

5.12.3 Human Capital (lnHC)

Human capital (lnHC) exhibits a negative but insignificant effect across all quantiles, with coefficients decreasing from -6.440 at the 0.10 quantile to -0.511 at the 0.90 quantile. Therefore, we reject the alternative hypothesis (H_{2c}), which states that HC has a significant impact on FDI inflows in BRICS countries at the 5% level of significance. This lack of significance suggests that, within the BRICS context, variations in human capital are not a major factor in influencing FDI inflows (Fagbemi & Osinubi, 2020; Kechagia & Metaxas, 2022). One possible reason could be that foreign investors in these countries are more focused on market size or resource availability rather than human capital quality (Maryam & Mittal, 2020; Sahoo et al., 2022). However, the negative coefficients indicate that a low level of education, particularly secondary education, can significantly hinder the positive impacts of FDI on economic growth (Kar, 2013; Kaulihowa & Adjasi, 2019; Abdouli & Omri, 2021). The presence of inadequate educational infrastructure diminishes the ability of local workers to absorb and utilize foreign technologies effectively, leading to a situation where FDI does not translate into enhanced productivity or economic growth (Aigheyisi, 2017; Ibukun et al., 2024).

5.12.4 Information and Communication Technology (lnICT)

The variable lnICT shows a positive and significant effect on FDI at most quantiles. The effect is stronger at lower quantiles (0.10 and 0.25) with coefficients of 0.251 and 0.197, respectively, which are significant at the 5% and 1% levels of significance. This positive relationship persists across quantiles but decreases slightly at higher quantiles, with coefficients of 0.089 and 0.058 at the 0.75 and 0.90 quantiles, respectively. Therefore, we do not reject the alternative hypothesis (H_{2d}), which states that ICT has a significant impact on FDI inflows in BRICS countries at the 5% level of significance. The significance of ICT suggests that advancements in digital infrastructure are favourable for FDI inflows, especially in lower quantiles where FDI is comparatively low. This finding is in line with earlier studies by Sinha and Sengupta (2022), Hammed and Ademosu (2023), and Bello et al. (2023), which emphasize the importance of ICT in facilitating investment by improving communication and reducing transaction costs.

5.12.5 Institutional Quality (lnINSQ)

Institutional quality (lnINSQ) has a positive and significant impact on FDI, with its effect becoming more pronounced at higher quantiles. At the 0.50, 0.75, and 0.90 quantiles, the coefficients are 0.777, 0.949, and 1.083, respectively, all significant at the 5% level. Therefore, we do not reject the alternative hypothesis (H_{2e}), which states that INSQ has a significant impact on FDI inflows in BRICS countries at the 5% level of significance. This suggests that institutional quality is especially critical for attracting higher levels of FDI. Investors tend to place a premium on strong institutions as they provide a stable and transparent business environment, reducing risks associated with corruption, regulatory inefficiencies, and contract enforcement (Sabir et al., 2019; Adegboye et al., 2020; Mehmood et al., 2023). The increasing effect at higher quantiles indicates that institutional quality becomes more crucial for attracting larger FDI inflows, aligning with previous studies by Aziz (2022), Wani et al. (2023), and Kumeka et al. (2024), which demonstrates that strong institutions foster investor confidence.

5.12.6 Trade Openness (lnTO)

Trade openness (lnTO) also demonstrates a positive and significant relationship with FDI, particularly at the median and higher quantiles. While the effect is less pronounced in the lower quantiles, it becomes significant at the 0.50 quantile with a coefficient of 1.226 and grows further at the 0.75 and 0.90 quantiles with coefficients of 1.518 and 1.749, respectively. Therefore, we do not reject the alternative hypothesis (H_{2f}), which states that TO has a significant impact on FDI inflows in BRICS countries at the 5% level of significance. This

suggests that greater trade openness is more appealing to FDI inflows at higher levels, likely because it facilitates the movement of goods, services, and capital, enhancing the operational efficiency of foreign firms (Nordin & Ghani, 2015; Rathnayaka Mudiyanse et al., 2021). This finding highlights that countries with liberal trade policies attract more foreign investment by allowing easier access to international markets (Belloumi, 2014; Cantah et al., 2018; Haque et al., 2022).

5.12.7 Total Factor Productivity (lnTFP)

Total factor productivity (lnTFP) consistently shows a negative and significant impact on FDI flows across all quantiles. The coefficient values remain stable throughout the distribution, ranging from -0.106 at the 0.10 quantile to -0.107 at the 0.90 quantile. Consequently, we do not reject the alternative hypothesis (H_{2g}), which posits that TFP has a significant impact on FDI inflows in BRICS countries at the 5% significance level. This consistent inverse relationship may suggest that as productivity increases, the need for foreign capital decreases, possibly due to the more efficient utilization of local resources in the host nation (Liu et al., 2016; Abdullah & Chowdhury, 2020; Chai et al., 2021; Han et al., 2024).

Moreover, this study finds a negative and insignificant impact of human capital on FDI inflows, reinforcing the observed TFP-FDI relationship in the BRICS countries. Low levels of human capital could limit the host country's capacity to adopt and effectively implement advanced technologies that foreign investment brings, thereby restricting productivity gains from FDI (Li & Tanna, 2019; Ali & Akhtar, 2024). As a result, countries with insufficient human capital may be unable to fully leverage FDI inflows, weakening the positive effects FDI could have on productivity (Zhuang, 2017; Anetor, 2020; Abbas et al., 2022).

Further, the graphs display the effects of various independent variables (GDP, EXR, HC, ICT, INSQ, TO, and TFP) on FDI inflows across quantiles, as estimated through the MM-QR model with fixed effects. The y-axis shows the coefficient estimates for each variable, while the x-axis represents different quantiles (from the 0th to the 100th percentile of FDI inflows). The solid line represents the estimated coefficient, and the shaded region shows the confidence intervals, which indicate the uncertainty around the estimates at each quantile level. Figure 5.8 shows that GDP has a strong positive influence on FDI inflows across all quantiles, though this effect slightly diminishes at higher quantiles. Figure 5.9 illustrates that EXR maintains a consistently negative impact, becoming more pronounced at extreme quantiles.

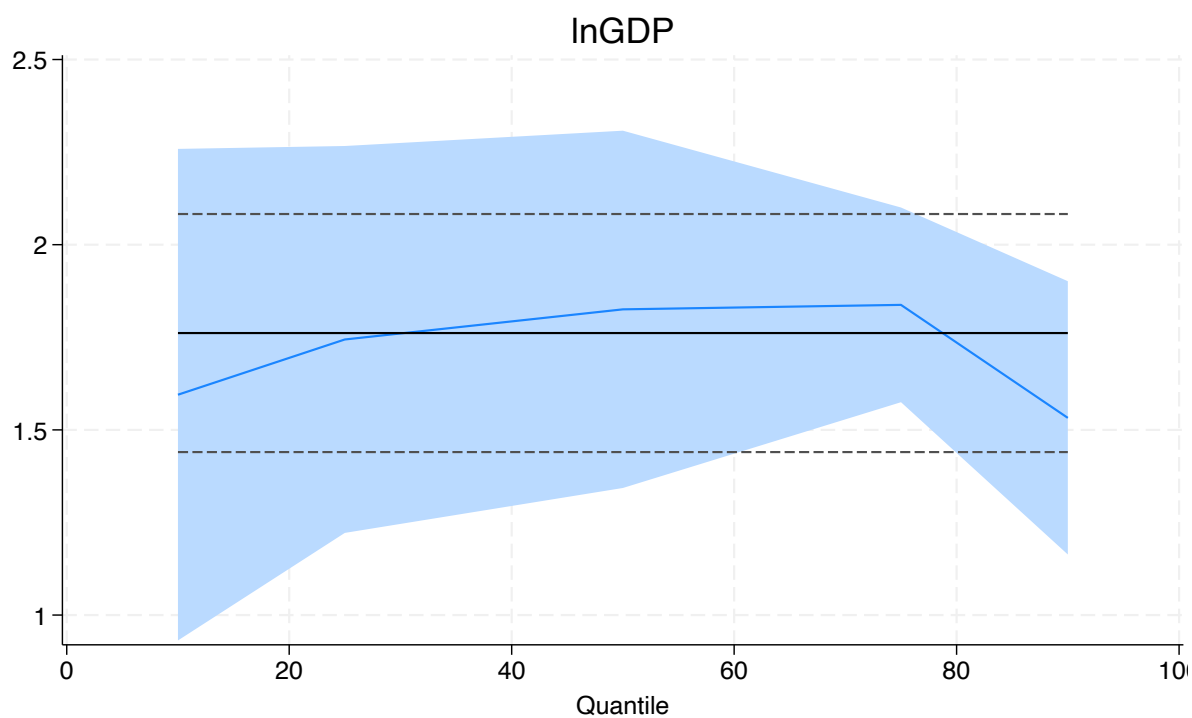


Figure 5.8 Impact of GDP on FDI across Quantiles in BRICS Nations
(Source: Computed by the author)

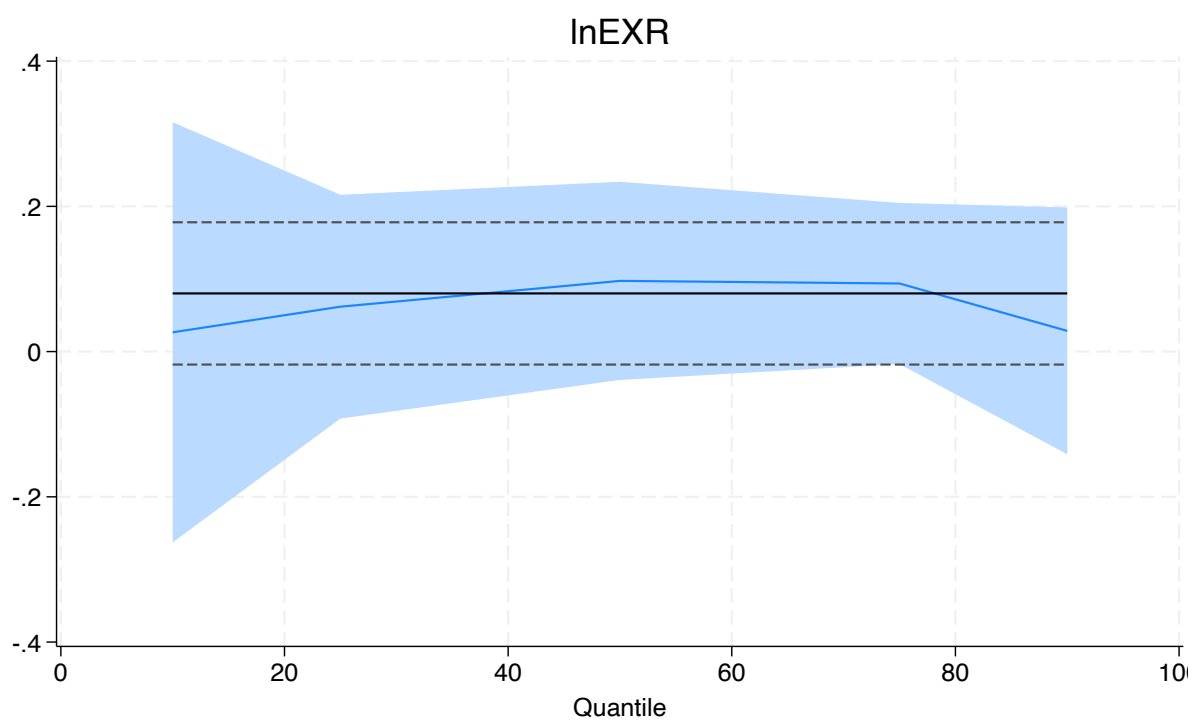


Figure 5.9 Impact of EXR on FDI across Quantiles in BRICS Nations
(Source: Computed by the author)

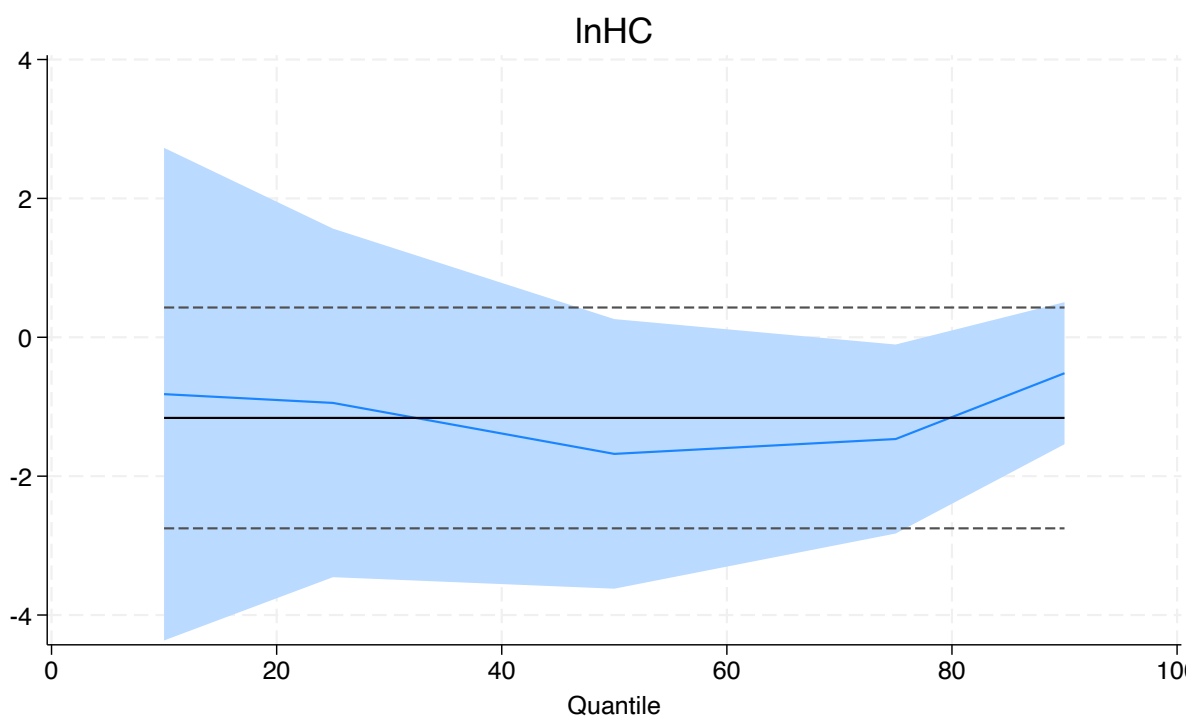


Figure 5.10 Impact of HC on FDI across Quantiles in BRICS Nations
(Source: Computed by the author)

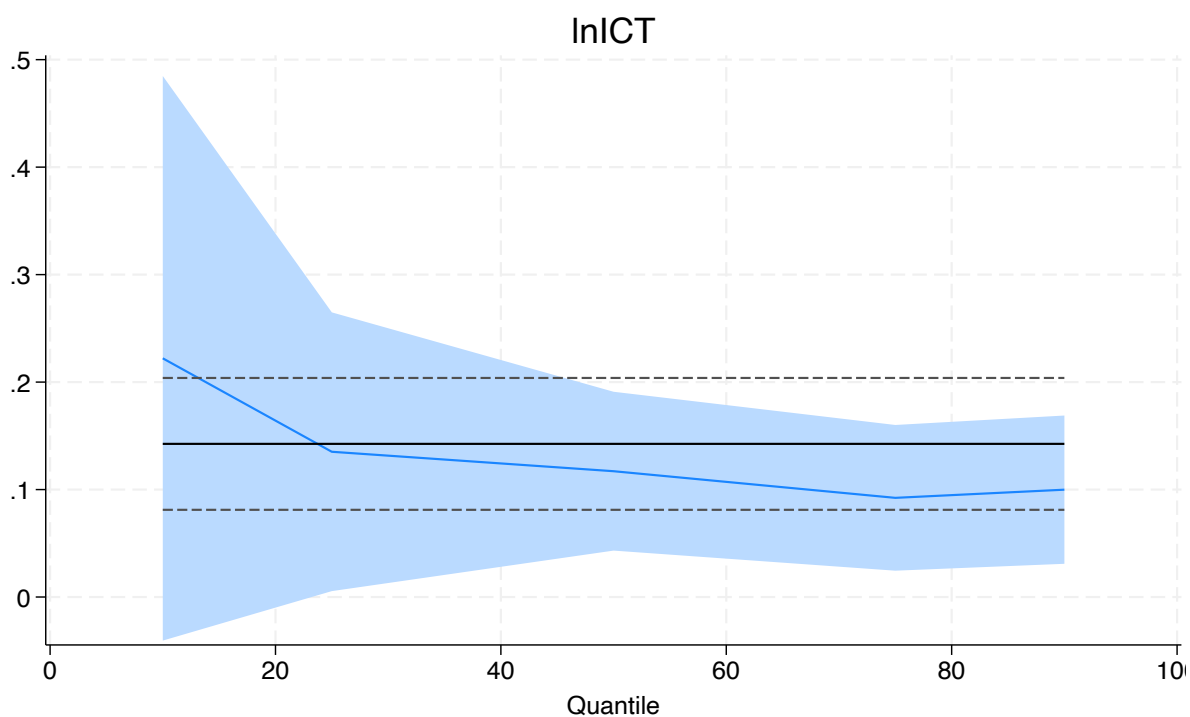


Figure 5.11 Impact of ICT on FDI across Quantiles in BRICS Nations
(Source: Computed by the author)

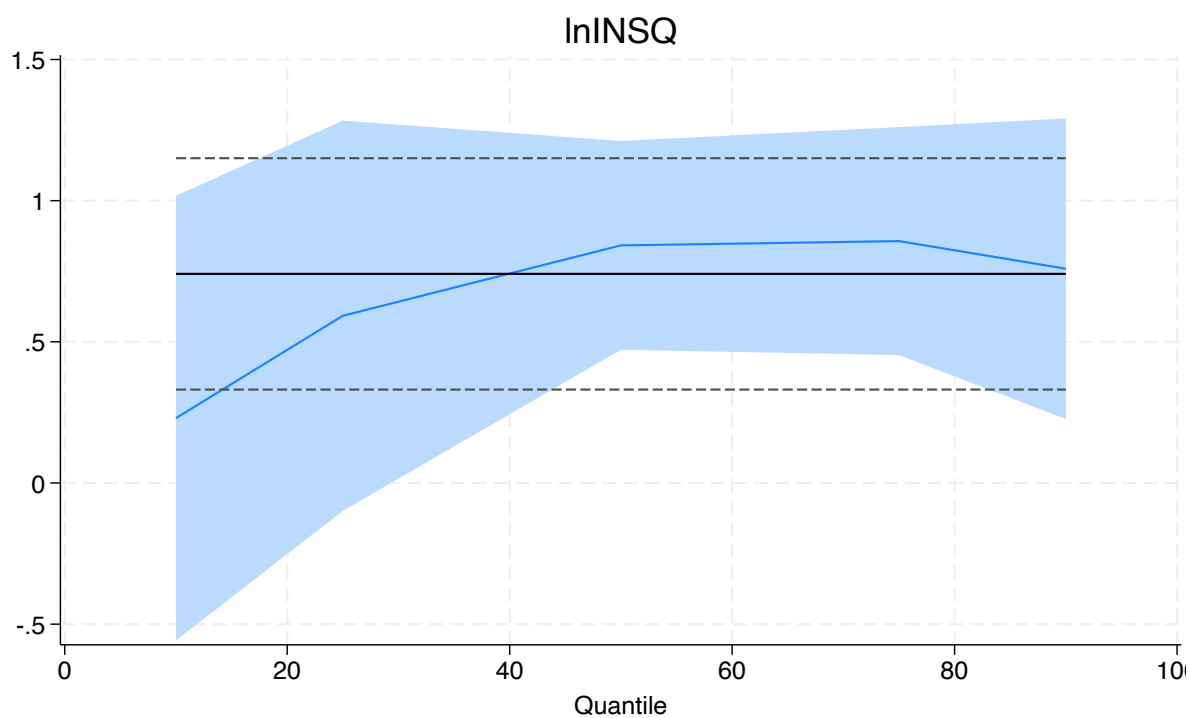


Figure 5.12 Impact of INSQ on FDI across Quantiles in BRICS Nations
(Source: Computed by the author)

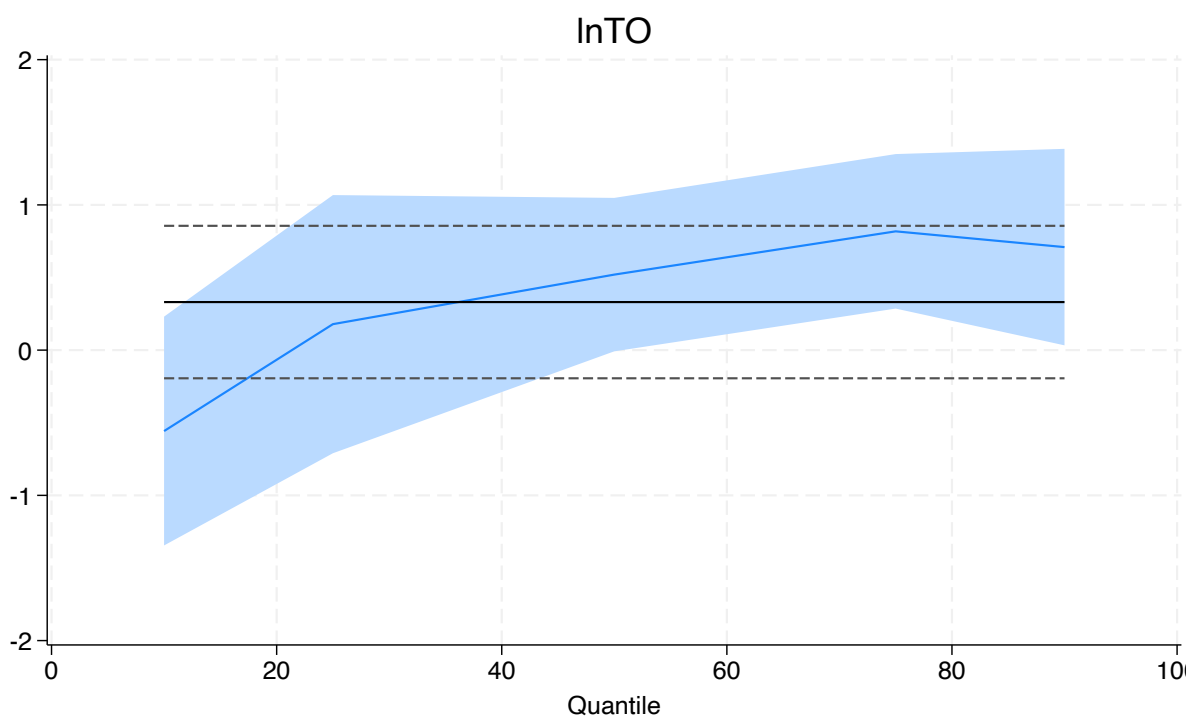


Figure 5.13 Impact of TO on FDI across Quantiles in BRICS Nations
(Source: Computed by the author)

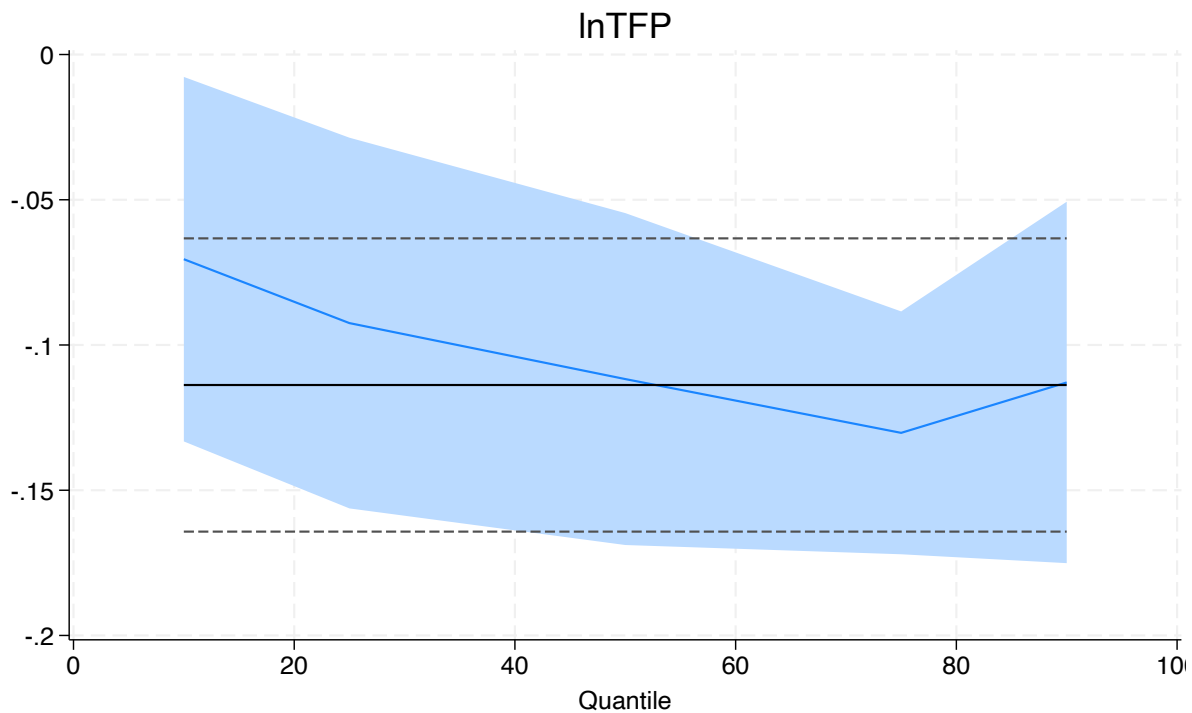


Figure 5.14 Impact of TFP on FDI across Quantiles in BRICS Nations
(Source: Computed by the author)

Figures 5.11 and 5.12 indicate that ICT and INSQ both have positive impacts on FDI; ICT's effect gradually decreases at higher quantiles, while INSQ strengthens. Trade openness (TO), shown in Figure 5.13, has an increasing positive effect, especially pronounced at upper quantiles, highlighting its significance for attracting higher FDI levels. Human capital (HC) has a broadly negative and insignificant impact, indicated by flat slopes and wide confidence intervals in Figure 5.10. Lastly, Figure 5.14 demonstrates that TFP maintains a slight negative influence across all quantiles, with stable confidence intervals.

5.13 Wavelet Coherence Analysis

In this analysis, the results are visualized through wavelet coherence contour plots for each FDI determinant, from 1991 to 2020, displayed in Figure 4. Each contour plot has time on the x-axis (1991–2020) and frequency on the y-axis, representing short- to long-term interactions. The significance of coherence between FDI and each economic indicator is marked by thick black contours, which are established through Monte Carlo simulations, ensuring statistical robustness. The colour scale in each plot visually represents the strength of coherence between FDI and each determinant. Warm colours like red indicate strong coherence, signifying a high level of correlation, while cooler colours like blue show weak or no coherence, indicating a

low correlation. This colour gradient allows for an immediate visual interpretation of the correlation strength (Athari & Hung, 2022). Within each contour plot, arrows illustrate the phase relationship between FDI and the respective economic variable. Rightward-pointing arrows mean that FDI and the given variable are moving in phase or positively correlated, signifying that changes in one variable correspond with similar directional changes in FDI. Leftward arrows, conversely, indicate an anti-phase relationship or negative correlation, meaning that as one variable increases, the other tends to decrease. The shaded grey area, known as the cone of influence, marks regions where the edge effects of the data may reduce reliability (Kirikkaleli & Athari, 2020).

The wavelet coherence (WTC) graph presented in Figure 5.15 provides a detailed time-frequency analysis of the relationship between FDI inflows and GDP in BRICS countries from 1991 to 2020. The colour gradient in the graph represents the degree of coherence between FDI and GDP, where red areas indicate high coherence (strong relationship), while blue areas suggest weak or no coherence. From the graph, it is evident that there are periods of strong co-movement between FDI and GDP, particularly in the mid-1990s, early 2000s, and post-2010. The presence of red regions in both lower and higher time-frequency scales suggests that FDI and GDP share both short-term and long-term relationships. The phase arrows provide crucial information regarding the direction of influence. Arrows pointing to the right indicate that FDI and GDP move in phase, suggesting a positive correlation. Arrows pointing upward-right imply that FDI leads GDP, meaning that an increase in FDI results in subsequent economic growth. Conversely, arrows pointing downward-right indicate that GDP leads FDI, suggesting that economic expansion attracts foreign investment.

H_{3a}: There is short-term co-movement between FDI inflows and economic growth in BRICS countries.

To test the above hypothesis (H_{3a}), we focus on the areas with strong coherence in lower time scales (between 4 to 8 years). The graph highlights short-term co-movement between FDI and GDP, particularly in the early 2000s and after 2015, where the coherence values are high. These periods show a strong cyclical relationship, indicating that FDI inflows had an immediate impact on economic growth and vice versa. The arrows in these regions mostly point to the right and slightly upward, suggesting that FDI led GDP growth in the short run. Since the wavelet coherence confirms significant short-term co-movement between FDI inflows and GDP, H_{3a} is accepted.

H_{3b}: There is long-term co-movement between FDI inflows and economic growth in BRICS countries.

To evaluate the above hypothesis (H_{3b}), we examine higher time scales (16 to 32 years). The presence of large red regions from 1995 to 2020 at higher scales suggests strong long-term co-movements. The arrows in these regions indicate a stable phase relationship, primarily pointing to the right, signifying that FDI and GDP move together over long periods. The arrows also indicate both FDI leading GDP and GDP leading FDI at different times, implying a bidirectional relationship. This long-term co-movement aligns with the theoretical view that sustained FDI inflows contribute to economic development through capital accumulation, technology spillovers, and productivity gains, while higher economic growth attracts further FDI. Given the strong coherence in the long run, H_{3b} is also accepted.

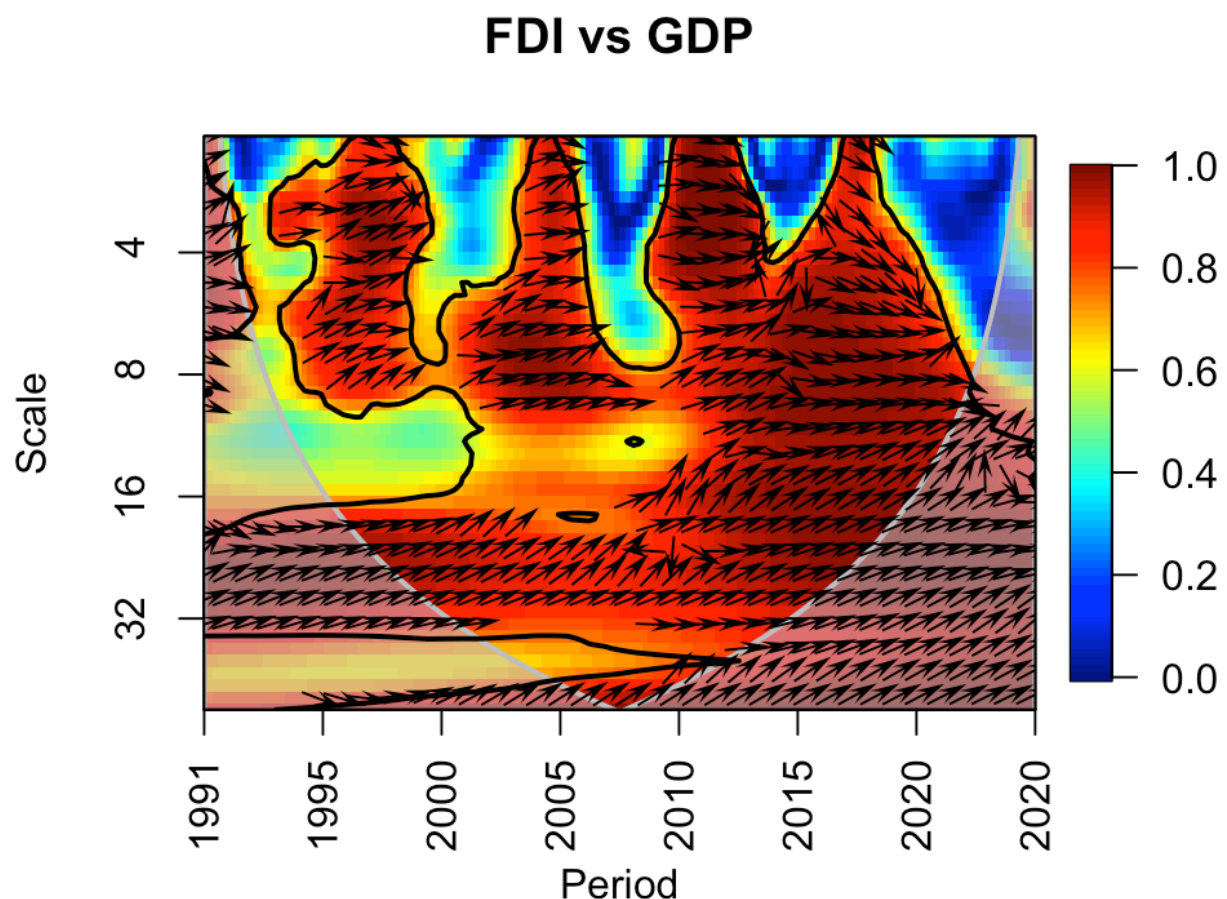


Figure 5.15 WTC Plot for FDI vs GDP for BRICS Countries

(Source: Computed by the author)

FDI vs EXR

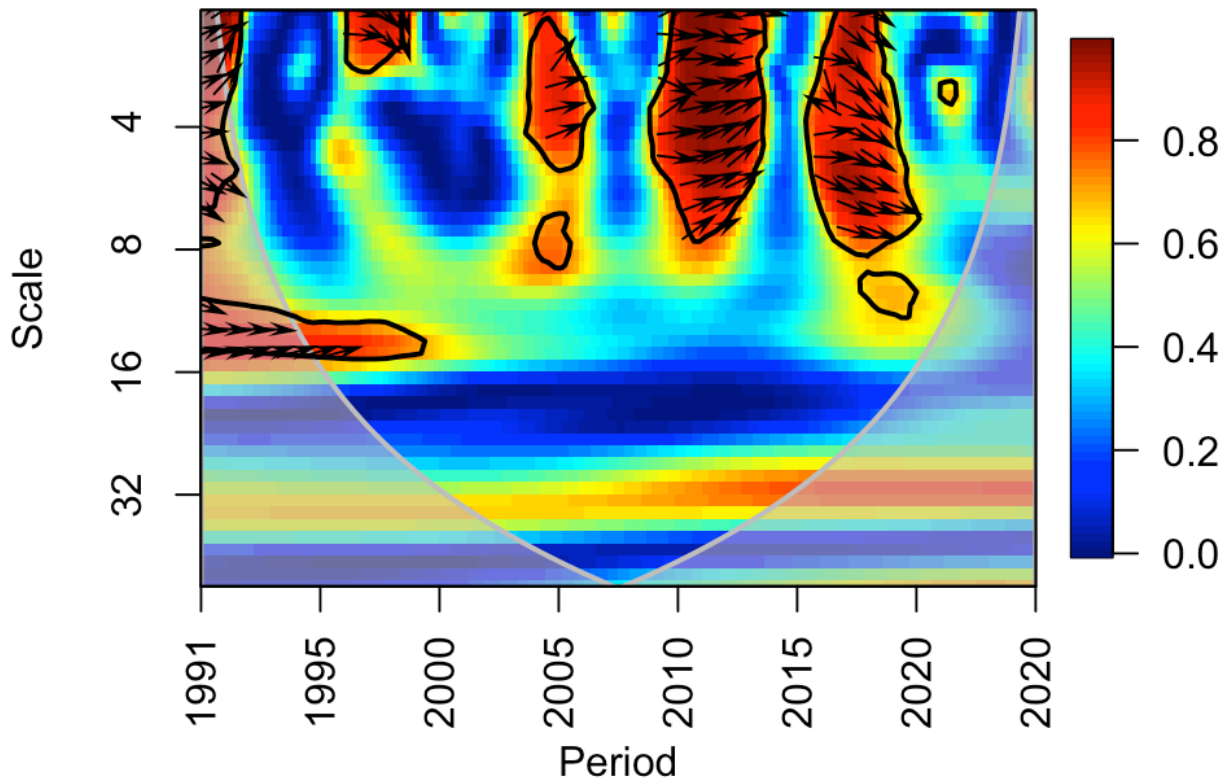


Figure 5.16 WTC Plot for FDI vs EXR for BRICS Countries

(Source: Computed by the author)

The WTC graph for FDI and Exchange Rate (EXR) in Figure 5.16 illustrates the time-frequency relationship between the two variables from 1991 to 2020 in the BRICS countries. In the short run (4–8 years), there are strong patches of coherence in the mid-1990s, early 2000s, and post-2010, particularly in the 2005–2015 period. The arrows in these regions mostly point downward-right, suggesting that the exchange rate fluctuations influenced FDI inflows in the short term. This aligns with the economic theory that exchange rate volatility affects investor confidence, as currency depreciation may make foreign investments cheaper, while appreciation can deter investment inflows. In the long-term (16–32 years), the coherence is weak. Unlike the short-term, the long-term relationship appears weaker, with only a few significant red regions visible, particularly in the early 1990s and early 2000s. The lack of strong coherence in the long run suggests that the exchange rate's impact on FDI diminishes over time, possibly because other factors, such as institutional quality, trade openness, and economic stability, play a more dominant role in attracting foreign capital.

FDI vs HC

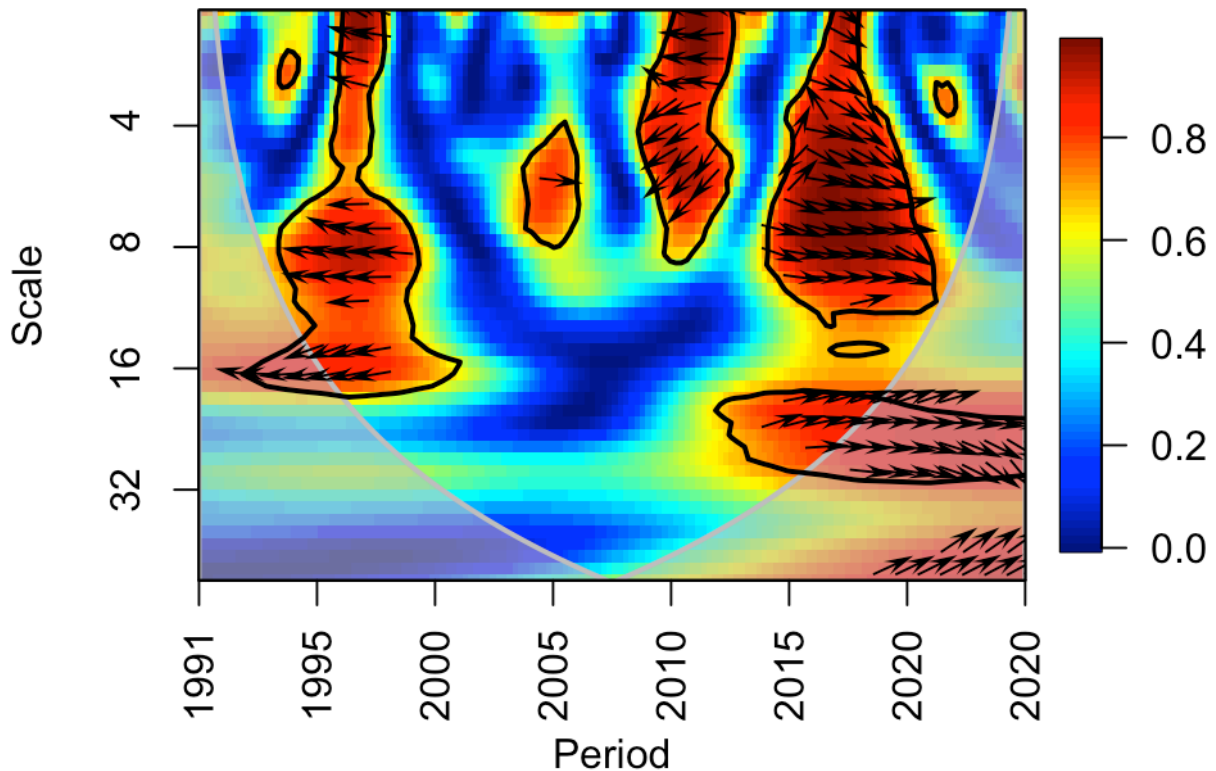


Figure 5.17 WTC Plot for FDI vs HC for BRICS Countries

(Source: Computed by the author)

The WTC graph for FDI and Human Capital (HC) in Figure 5.17 illustrates the time-frequency relationship between the two variables from 1991 to 2020 for the BRICS countries. The relationship between FDI and HC exhibits strong short-term coherence (4–8 years), particularly during 2014–2016. The rightward arrows in these periods indicate an in-phase relationship, meaning that HC and FDI moved together, with HC influencing FDI inflows. This suggests that during these years, improvements in human capital, such as better education, skill development, or labour productivity, positively impacted foreign investment decisions. In the medium term, the coherence remains but becomes less pronounced, implying that while HC still plays a role in attracting FDI, other factors might moderate this relationship. Structural economic policies, institutional quality, or macroeconomic stability could be influencing this phase. In the long term (16–32 years), the coherence is weak, suggesting that the impact of HC on FDI is not sustained over extended periods. This could indicate that while HC attracts initial investment, long-term FDI trends are shaped by broader macroeconomic factors rather than HC alone.

FDI vs ICT

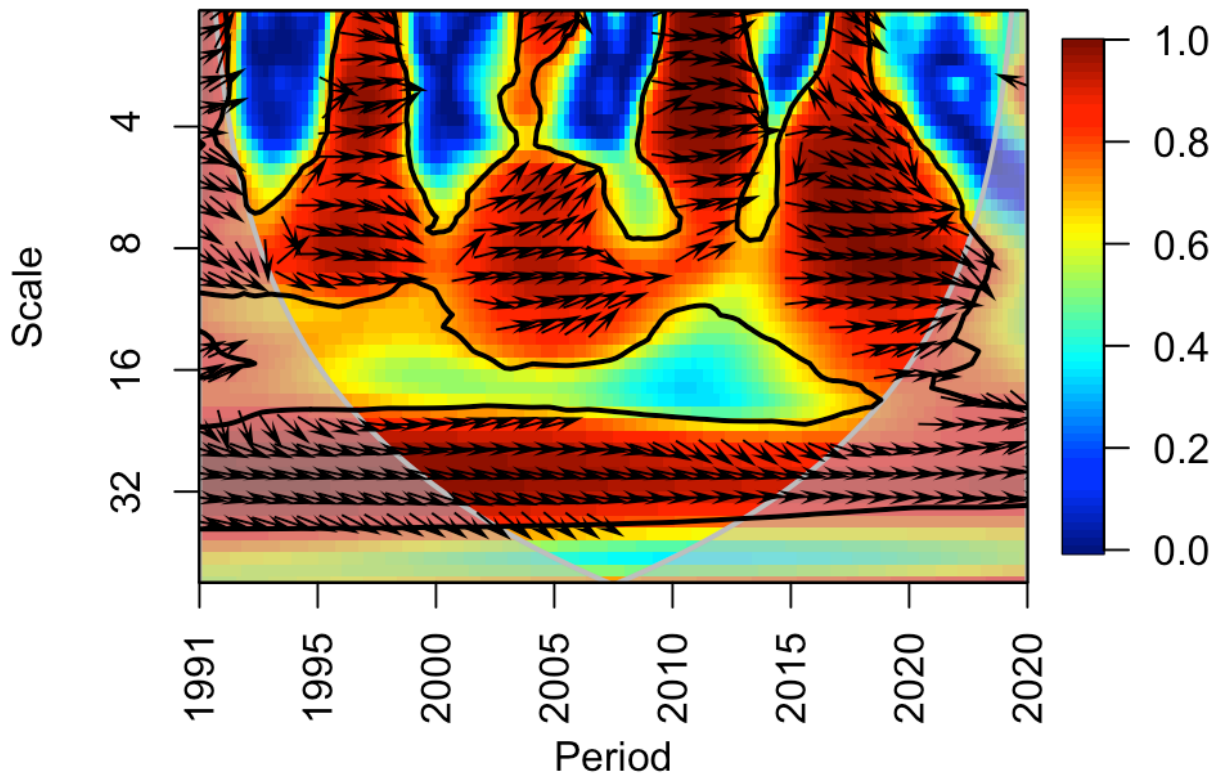


Figure 5.18 WTC Plot for FDI vs ICT for BRICS Countries

(Source: Computed by the author)

The WTC graph for FDI and Information and Communication Technology (ICT) in Figure 5.18 illustrates the time-frequency relationship between the two variables from 1991–2020 for the BRICS countries. The graph reveals strong short-term coherence (4–8 years) during multiple periods, particularly between 1995–2005 and 2010–2020. The rightward arrows in these regions suggest an in-phase relationship, indicating that advancements in ICT infrastructure played a crucial role in attracting FDI during these years. The strong coherence indicates that improvements in digital connectivity, internet penetration, and technological advancements significantly influenced foreign investment decisions in the short term. In the medium term (8–16 years), the coherence remains significant, especially around 2000–2015, but with some fluctuations. The directional arrows indicate a mix of in-phase and out-of-phase relationships. In the long term (16–32 years), the coherence weakens, particularly beyond 2015, implying that the relationship between ICT and FDI is not sustained indefinitely. This suggests that while ICT attracts initial investment, long-term FDI inflows depend on the broader economic stability of the economy.

FDI vs INSQ

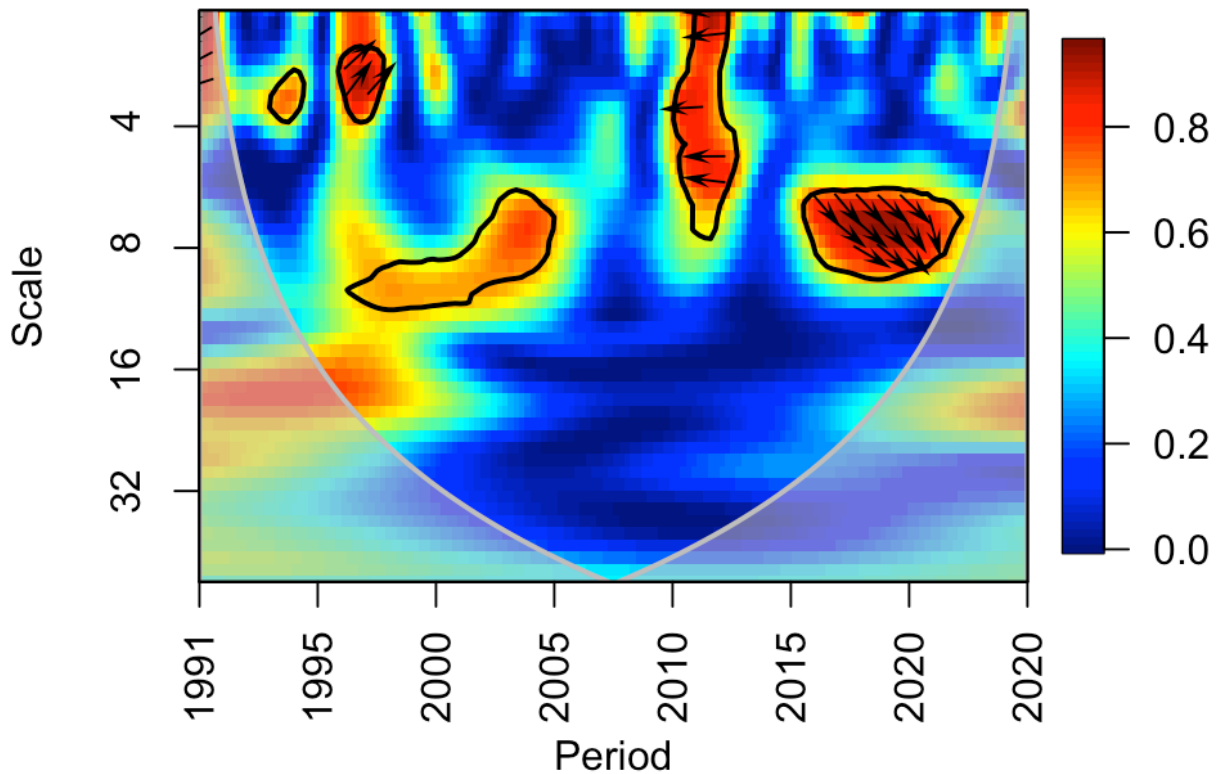


Figure 5.19 WTC Plot for FDI vs INSQ for BRICS Countries

(Source: Computed by the author)

The WTC graph for FDI and Institutional Quality (INSQ) in Figure 5.19 illustrates the time-frequency relationship between the two variables from 1991–2020 for the BRICS countries. In the short term (4–8 years), significant coherence is observed during periods such as 1995–1997, 2005–2007, and 2015–2017, suggesting that improvements in institutional quality had a strong positive impact on FDI inflows. The presence of rightward arrows in these regions indicates an in-phase relationship, meaning that as institutional quality improved, FDI inflows increased simultaneously. In the medium term (8–16 years), moderate coherence is visible between 2000–2005 and 2010–2015, though it is less consistent. However, in the long term (16–32 years), coherence weakens significantly, particularly after 2020. This suggests that while institutional quality plays a key role in attracting FDI in the short to medium term, other structural and economic factors become more dominant over longer periods. This pattern indicates that strong institutional frameworks enhance FDI inflows in the short run, but sustained investment may require additional factors such as macroeconomic stability and openness to trade.

FDI vs TO

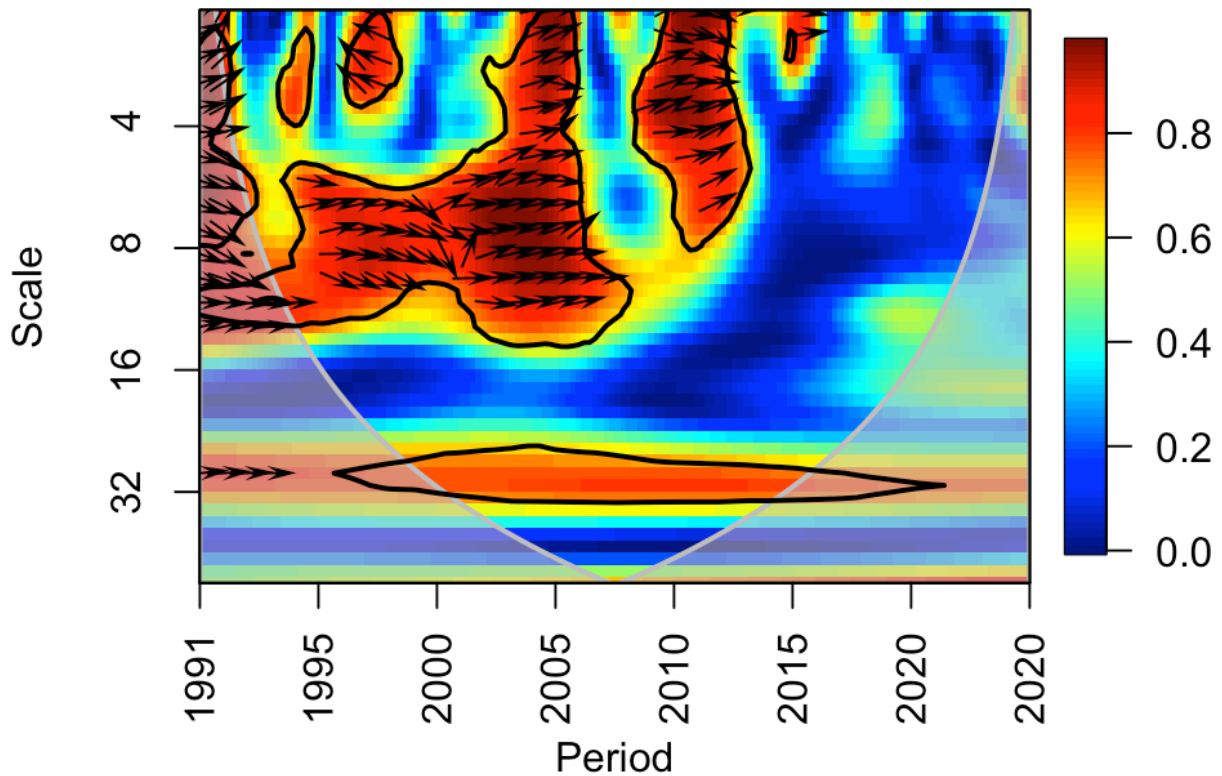


Figure 5.20 WTC Plot for FDI vs TO for BRICS Countries

(Source: Computed by the author)

The WTC graph for FDI and Trade Openness (TO) in Figure 5.20 exhibits strong short-term coherence (4–8 years) around 1995–2000 and 2005–2010, with rightward arrows indicating a positive, in-phase association where increased TO drove higher FDI inflows. In the medium term (8–16 years), significant coherence is observed between 1995 and 2005, suggesting that trade liberalization played a crucial role in attracting FDI during this period. The long-term relationship (16–32 years) shows low coherence around 2000–2025, but the influence of TO on FDI weakens after 2020, implying that other macroeconomic factors may have gained prominence in determining FDI inflows. However, the varying strength of coherence over time suggests that while TO is an essential determinant, its impact fluctuates, possibly due to external shocks, policy shifts, or evolving global economic conditions. Overall, the WTC analysis indicates that trade openness has been a significant determinant of FDI inflows, particularly in the short to medium term. However, as economies evolve, additional factors beyond trade openness may play a more significant role in sustaining FDI inflows.

FDI vs TFP

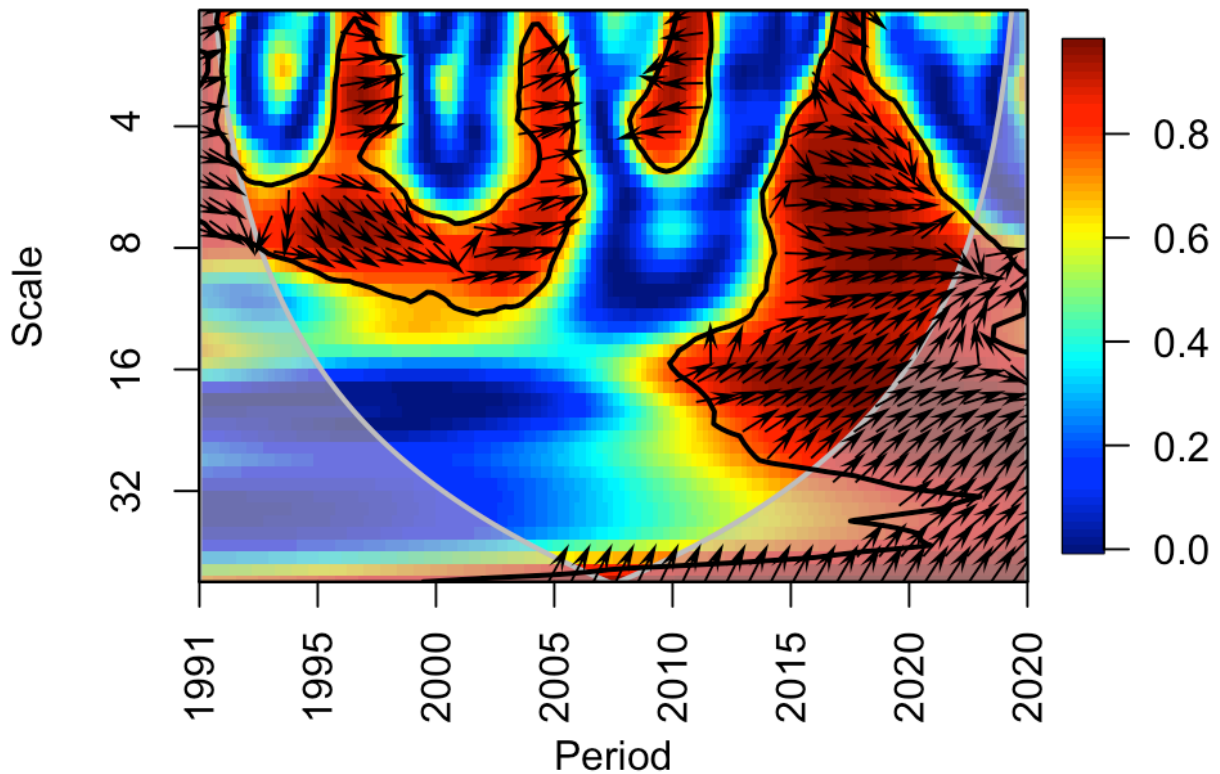


Figure 5.21 WTC Plot for FDI vs TFP for BRICS Countries
(Source: Computed by the author)

The WTC graph for FDI and Total Factor Productivity (TFP) in Figure 5.21 illustrates the time-frequency relationship between the two variables from 1991–2020 for the BRICS countries. Strong coherence is observed at different time scales, particularly in the short-term (4–8 years) around 1995–2000 and 2010–2020, where the red regions indicate a significant correlation. The rightward arrows in these areas suggest an in-phase relationship, implying that FDI and TFP moved together, with higher FDI inflows contributing to increased TFP. In the medium-term (8–16 years), coherence is evident around 2005–2015, showing sustained interaction between the two variables. However, beyond this period, coherence weakens, indicating a diminishing long-term influence of FDI on TFP. The presence of leftward arrows in some regions suggest intermittent negative associations, possibly reflecting phases where TFP responded with a lag to FDI inflows. Overall, the findings highlight that while FDI has played a crucial role in shaping TFP over different periods, its influence varies across time horizons.

Overall, short-term coherence (4-8 years) is most pronounced across variables, particularly for GDP, TFP, TO, and ICT, indicating strong immediate interactions with FDI inflows. Medium-term coherence (8-16 years) shows varied relationships, with trade openness and institutional quality displaying intermittent associations. Long-term coherence (16-32 years) is generally weaker across variables, though GDP and TFP exhibit slightly more stable long-term impacts compared to exchange rate, human capital, institutional quality, trade openness, and ICT.

5.14 Summary

Chapter 5 presents the empirical findings on the relationship between FDI and economic growth, along with other macroeconomic variables in BRICS economies from 1991 to 2020. The analysis begins with descriptive statistics and preliminary tests, including normality (Shapiro-Wilk test), correlation heatmap, cross-sectional dependence, slope heterogeneity, and unit root tests. Cointegration tests confirm the presence of long-term relationships between FDI and economic growth in the BRICS economies. The study employs the Method of Moments Quantile Regression (MMQR) with fixed to capture heterogeneous effects across different quantiles, revealing the impact of key macro variables on FDI inflows. Additionally, wavelet coherence analysis provides a time-frequency perspective, showing strong short-term coherence between FDI and GDP, TFP, and ICT, while long-term coherence is less pronounced. The results highlight the importance of absorptive capacity factors such as GDP, exchange rate, institutional quality, institutional quality, and trade openness in attracting FDI inflows for economic development.

CHAPTER 6

CONCLUSION

This chapter presents the concluding remarks of the study, summarizing the key findings, theoretical contributions, practical implications, and future research directions. The study has examined the relationship between Foreign Direct Investment (FDI) and economic growth in BRICS economies, incorporating various macroeconomic determinants and utilizing robust econometric techniques. The findings highlight the complex nature of FDI inflows, influenced by factors such as GDP, exchange rate, human capital, institutional quality, trade openness, ICT, and total factor productivity. Moreover, the cointegration tests establish a long-term relationship between FDI and economic growth, reinforcing the significance of foreign investment in fostering economic development. These insights contribute to a deeper understanding of FDI's role in emerging economies and provide a basis for more targeted and effective policy interventions.

The chapter is structured as follows: Section 6.1 summarizes the major findings of the study, outlining key empirical results. Section 6.2 revisits the research objectives, assessing the extent to which the study has achieved its aims. Section 6.3 discusses the theoretical implications, examining how the findings align with or extend existing economic theories. Section 6.4 highlights the practical implications, offering recommendations for policymakers and stakeholders to enhance FDI inflows. Lastly, Section 6.5 acknowledges the limitations of the study and suggests future research directions. The study consolidates its contributions through this chapter, offering valuable insights for academic research, policy formulation, and economic development strategies.

6.1 Major Findings of the Study

This study analyzed the relationship between Foreign Direct Investment (FDI) and economic growth in BRICS economies, considering various macroeconomic determinants. The empirical analysis led to several significant findings:

- a) **Non-Normality of Data:** The results from the Shapiro-Wilk normality test indicated that the dataset does not follow a normal distribution. This suggests that traditional

parametric techniques may not be suitable for estimation, necessitating the use of robust econometric approaches.

- b) **Presence of Cross-Sectional Dependency:** The findings of the CD test (Bruesh Pagan LM test, Pesaran Scaled LM test, and Pesaran CD test) confirmed the existence of cross-sectional dependency among the BRICS economies. This indicates that economic shocks or policy changes in one country can have spillover effects on other member nations, reinforcing the need for econometric models that account for such interdependencies.
- c) **Heterogeneity Across Countries:** The findings revealed significant heterogeneity in the relationship between FDI and other macroeconomic variables across BRICS nations. The Pesaran and Yamagata (2008) and Blomquist and Westerlund (2013) tests confirm that the slope coefficients differ across the cross-sectional units. This justifies the use of methodologies that allow for country-specific variations rather than assuming a homogeneous effect.
- d) **Stationarity in the Data:** The stationarity of the variables was examined using second-generation unit root tests, specifically the Cross-Sectionally Augmented IPS (CIPS) test and the Cross-Sectionally Augmented Dickey-Fuller (CADF) test, due to the presence of cross-sectional dependency in the data. The results indicated that all variables are stationary at the level, suggesting that the dataset does not contain a unit root.
- e) **Long-term Relationship between FDI and Economic Growth:** The presence of a long-run equilibrium relationship between FDI inflows and economic growth was tested using the Pedroni Cointegration Test and the Westerlund Bootstrap Cointegration Test. The results from both tests confirm the existence of a long-term relationship, indicating that FDI contributes to economic growth over time, reinforcing the role of FDI as a catalyst for growth and development in BRICS countries.
- f) **Impact of Gross Domestic Product (GDP) on FDI:** The results from the Method of Moments Quantile Regression (MMQR) indicated that GDP has a positive and significant relationship with FDI, suggesting that higher economic output and market size attracts more foreign investment by providing a stable and larger consumer base.

- g) **Impact of Exchange Rate (EXR) on FDI:** The MMQR findings showed that Exchange Rate (EXR) has a negative and significant relationship with FDI, suggesting that currency volatility or depreciation may discourage foreign investors due to increased risks and uncertainty.
- h) **Impact of Human Capital (HC) on FDI:** The study found out that Human Capital (HC) has a negative but insignificant relationship with FDI, implying that while education and workforce skills are important, other factors such as economic stability and institutional strength may play a more decisive role in attracting foreign investment.
- i) **Impact of Information and Communication Technology (ICT) on FDI:** The findings revealed that Information and Communication Technology (ICT) has a positive and significant effect on FDI inflows, highlighting the role of digital infrastructure and technological advancements in attracting foreign investors.
- j) **Impact of Institutional Quality (INSQ) on FDI:** The analysis confirmed that Institutional Quality (INSQ) is positively and significantly associated with FDI, emphasizing that stronger governance, legal frameworks, and regulatory stability create a favourable environment for foreign investments.
- k) **Impact of Trade Openness (TO) on FDI:** The results indicated that Trade Openness (TO) has a positive and significant effect on FDI, reinforcing the idea that economies with fewer trade restrictions and open markets are more attractive to foreign investors.
- l) **Impact of Total Factor Productivity (TFP) on FDI:** The results revealed that Total Factor Productivity (TFP) has a negative and significant impact on FDI, indicating that as productivity increases, the need for foreign capital decreases, possibly due to the more efficient utilization of local resources in the host nation.
- m) **Wavelet Coherence Analysis:** According to WTC graphs, short-term coherence (4-8 years) is most pronounced across variables, particularly for GDP, TFP, and ICT, indicating strong immediate interactions with FDI inflows. Medium-term coherence (8-16 years) shows varied relationships, with trade openness and institutional quality

displaying intermittent associations. Long-term coherence (16-32 years) is generally weaker across variables, though GDP and TFP exhibit slightly more stable long-term impacts compared to exchange rate, human capital, institutional quality, trade openness, and ICT.

6.2 Conclusion: Revisiting the Objectives

This section revisits the core research objectives outlined at the beginning of the study and assesses the extent to which they have been achieved. The study aimed to analyze the relationship between FDI inflows and economic growth in BRICS economies, considering various macroeconomic determinants.

The first objective of this research has been:

Objective 1: To examine the impact of foreign direct investment on economic growth in BRICS countries.

The first objective of this study was to examine the impact of Foreign Direct Investment (FDI) on economic growth in BRICS countries. To achieve this, the study tested the long-term relationship between FDI and economic growth using the Pedroni Cointegration Test and the Westerlund Bootstrap Cointegration Test. The results of the Pedroni Cointegration Test provided strong evidence of a long-term relationship between FDI inflows and economic growth. The majority of the test statistics rejected the null hypothesis of no cointegration, confirming that FDI and economic growth move together in the long run. This implies that foreign investment plays a critical role in shaping the economic trajectory of BRICS nations, supporting the theoretical argument that FDI fosters sustainable development through capital accumulation, technology transfer, and productivity improvements. Similarly, the Westerlund Bootstrap Cointegration Test reinforced these findings by rejecting the null hypothesis of no cointegration at a high level of statistical significance. This test, which accounts for cross-sectional dependence and heterogeneity among BRICS nations, confirmed that despite structural differences among these economies, there exists a robust long-run equilibrium relationship between FDI and economic growth. This suggests that, over time, FDI inflows contribute to economic expansion, provided that macroeconomic conditions and institutional frameworks support the efficient utilization of foreign capital.

The results from both tests confirmed the presence of a stable long-run equilibrium relationship between FDI inflows and economic growth, indicating that FDI serves as a key driver of economic development over time in BRICS economies. The confirmation of cointegration supports the hypothesis that FDI contributes to long-term economic growth, reinforcing the theoretical foundation that foreign capital inflows create sustainable growth opportunities. These findings suggest that policies to attract FDI should focus on ensuring a stable macroeconomic environment and strengthening institutional frameworks to maximize the long-term benefits of foreign investments. The results align with prior empirical studies emphasizing the importance of attracting stable and long-term foreign investments to ensure consistent economic expansion.

Table 6.1 Hypothesis Testing for Objective 1 of the Study

	Hypothesis	Findings	Result
H₁	There is a long-term relationship between FDI inflows and economic growth in BRICS countries.	FDI inflows and economic growth have a long-term relationship. Thus, the alternative hypothesis is accepted	Accepted

Objective 2: To identify and evaluate the key factors influencing foreign direct investment in BRICS countries.

The second objective of this study was to identify and evaluate the key factors influencing Foreign Direct Investment (FDI) in BRICS countries. To achieve this, the study employed the Method of Moments Quantile Regression (MMQR) with fixed effects to assess the impact of various macroeconomic determinants on FDI inflows. This approach combines the robustness of quantile regression with the ability to control for unobserved heterogeneity across panel data. The results revealed that GDP, Information and Communication Technology (ICT), Institutional Quality (INSQ), and Trade Openness (TO) positively and significantly influence FDI, suggesting that larger market size, strong digital infrastructure, better governance, and open trade policies enhance a country's attractiveness to foreign investors. These findings support the theoretical premise that investors are drawn to economies with stable macroeconomic environments, efficient institutions, and policies that encourage international trade.

Table 6.2 Hypotheses Testing for Objective 2 of the Study

	Hypothesis	Findings	Result
H_{2a}	Gross Domestic Product (GDP) has a significant impact on FDI inflows in BRICS countries.	GDP has a positive and significant relationship with FDI inflows in BRICS countries.	Accepted
H_{2b}	Exchange Rate (EXR) has a significant impact on FDI inflows in BRICS countries.	EXR has a negative and significant relationship with FDI inflows in BRICS countries.	Accepted
H_{2c}	Human Capital (HC) has a significant impact on FDI inflows in BRICS countries.	HC has a negative and insignificant relationship with FDI inflows in BRICS countries.	Rejected
H_{2d}	Information and Communication Technology (ICT) has a significant impact on FDI inflows in BRICS countries.	ICT has a positive and significant relationship with FDI inflows in BRICS countries.	Accepted
H_{2e}	Institutional Quality (INSQ) has a significant impact on FDI inflows in BRICS countries.	INSQ has a positive and significant relationship with FDI inflows in BRICS countries.	Accepted
H_{2f}	Trade Openness (TO) has a significant impact on FDI inflows in BRICS countries.	TO has a positive and significant relationship with FDI inflows in BRICS countries.	Accepted
H_{2g}	Total Factor Productivity (TFP) has a significant impact on FDI inflows in BRICS countries.	TFP has a negative and significant relationship with FDI inflows in BRICS countries.	Accepted

Conversely, the results showed that Exchange Rate (EXR) and Total Factor Productivity (TFP) have a negative and significant impact on FDI, indicating that currency volatility and higher productivity levels may deter foreign investors. Additionally, Human Capital (HC) was found to have a negative but insignificant relationship with FDI, suggesting that while workforce skills and education are essential, other factors such as economic stability and institutional strength may play a more decisive role in attracting foreign investment. These findings confirm the study's hypothesis regarding the influence of macroeconomic variables on FDI inflows and highlight the need for targeted policy measures to enhance the investment climate in BRICS

nations. The results presented in the hypothesis table further validate these relationships, emphasizing the importance of maintaining macroeconomic stability, strengthening institutions, and fostering technological advancements to sustain FDI inflows.

Objective 3: To determine the short-term and long-term coupling effects between foreign direct investment and economic growth in BRICS countries.

The third objective of this study was to determine the short-term and long-term coupling effects between Foreign Direct Investment (FDI) and economic growth in BRICS countries. To achieve this, wavelet coherence analysis was employed, which allows for the examination of time-frequency relationships between these two variables. This method provided deeper insights into how the relationship between FDI and economic growth evolved over time, capturing both short-run fluctuations and long-run trends.

Table 6.3 Hypotheses Testing for Objective 3 of the Study

	Hypothesis	Findings	Result
H_{3a}	There is short-term co-movement between FDI inflows and economic growth in BRICS countries.	A short-term (4-8 years) in-phase relationship is observed between FDI and GDP.	Accepted
H_{3b}	There is long-term co-movement between FDI inflows and economic growth in BRICS countries.	A long-term (16-32 years) bidirectional relationship is observed between FDI and GDP.	Accepted

In the short-term period, strong coherence between FDI and GDP is observed, particularly in the early 2000s and after 2015. The arrows in these regions mostly point to the right and slightly upward, suggesting that FDI led GDP growth in the short run. In the long-term period, the arrows in these regions indicate a stable phase relationship, primarily pointing to the right, signifying that FDI and GDP move together over long periods. The arrows also indicate both FDI leading GDP and GDP leading FDI at different times, implying a bidirectional relationship. This long-term co-movement aligns with the theoretical view that sustained FDI inflows contribute to economic development through capital accumulation, technology

spillovers, and productivity gains, while higher economic growth attracts further FDI. Thus, both the hypotheses (H_{3a} and H_{3b}) are accepted.

6.3 Theoretical Implications of the Study

This study contributes significantly to the theoretical discourse on FDI and economic growth by integrating multiple theoretical frameworks to explain the dynamics observed in BRICS economies. The findings align with existing economic theories while also challenging some conventional assumptions, thereby providing new insights that enrich the literature. One of the primary theoretical contributions of this study is its validation of the endogenous growth theory. This theory posits that economic growth is driven by internal factors such as human capital, technological progress, and institutional quality rather than solely relying on external capital inflows. The positive and significant relationship between institutional quality (INSQ), information and communication technology (ICT), and trade openness (TO) with FDI corroborates the central premise of endogenous growth models. Strong institutions create a stable environment for investments, while ICT infrastructure enhances productivity and connectivity, fostering greater economic activity. Trade openness facilitates market access and competitive efficiency, attracting multinational corporations. These findings reinforce the idea that domestic policies and structural reforms are crucial in leveraging FDI for sustained economic growth.

Additionally, this study makes a theoretical contribution by examining the role of macroeconomic determinants within the framework of the eclectic paradigm, also known as the OLI (Ownership, Location, and Internalization) framework developed by Dunning. The OLI paradigm suggests that firms undertake FDI based on ownership advantages (firm-specific capabilities), location advantages (host country attributes), and internalization advantages (control over resources and operations). The results show that GDP exerts a positive and significant impact on FDI, affirming the location advantage aspect of the OLI framework. Countries with higher economic output and market size tend to attract more foreign investment, as larger economies offer greater opportunities for market expansion and economies of scale. On the other hand, the negative and significant impact of exchange rate volatility suggests that currency instability poses risks to foreign investors, thereby limiting FDI inflows. This finding aligns with risk-aversion theories in international finance, emphasizing the deterrent effect of exchange rate fluctuations on investment decisions. Moreover, the study contributes to the literature on the absorptive capacity hypothesis, which highlights the importance of a host country's ability to integrate and maximize the benefits of FDI. The results indicate that human

capital (HC) has a negative but insignificant impact on FDI, which challenges traditional expectations that a highly skilled workforce automatically attracts foreign investors. This finding suggests that while human capital is essential, other structural factors, such as regulatory stability and market access, may exert a more dominant influence on FDI decisions. Future theoretical models could integrate a more nuanced understanding of how different aspects of absorptive capacity interact to determine FDI effectiveness.

Another important theoretical implication stems from the study's confirmation of the long-term relationship between FDI and economic growth, as established through the Pedroni and Westerlund Bootstrap Cointegration tests. This evidence supports the investment-led growth hypothesis, which posits that sustained FDI inflows contribute to long-run economic development by facilitating capital formation, technology transfer, and industrial expansion. However, the negative and significant relationship between total factor productivity (TFP) and FDI challenges the conventional view that increased productivity levels always enhance FDI attractiveness. This counterintuitive result may suggest that as domestic firms become more efficient, their reliance on foreign capital diminishes, thereby reducing FDI inflows. This finding opens new avenues for theoretical exploration regarding the interplay between domestic productivity advancements and foreign investment patterns.

The study also contributes to the broader discussion on globalization and regional economic integration. The results reinforce the idea that trade openness positively influences FDI, supporting theories that advocate for liberalization policies as a means to attract foreign capital. The BRICS economies, despite their diverse economic structures and policy frameworks, exhibit commonalities in their FDI determinants, suggesting that regional economic groupings can play a pivotal role in shaping investment trends. This has implications for the theoretical debate on regionalism versus globalization, as it underscores the potential of regional blocs in facilitating FDI inflows through coordinated economic policies and trade agreements.

In conclusion, this study advances several theoretical perspectives by providing empirical evidence that refines existing models and introduces new dimensions to the analysis of FDI and economic growth. By validating elements of endogenous growth theory, the eclectic paradigm, the absorptive capacity hypothesis, and the investment-led growth hypothesis while also challenging certain conventional assumptions, this research contributes to a more comprehensive understanding of FDI dynamics in emerging economies.

6.4 Practical Implications of the Study

The findings of this study provide several practical implications for policymakers, investors, and economic strategists in BRICS nations. The identification of a long-term relationship between FDI and economic growth highlights the significance of foreign investment as a critical driver of economic development. Policymakers should create an investment-friendly environment by ensuring macroeconomic stability, strengthening institutional frameworks, and improving infrastructure to attract sustained FDI inflows. Given that GDP, ICT, institutional quality, and trade openness are positively associated with FDI, governments should design policies that encourage economic growth, enhance technological capabilities, and promote a regulatory landscape conducive to investment.

The study highlights that exchange rate volatility negatively impacts FDI, suggesting the need for stable and predictable currency policies. Sudden fluctuations in exchange rates can deter foreign investors due to increased risks and uncertainty. Central banks and monetary authorities should implement policies that mitigate excessive exchange rate volatility and provide currency stability to encourage foreign capital inflows. Additionally, trade openness has a significant positive effect on FDI, reinforcing the need for trade liberalization and integration into global markets. Policymakers should strive to reduce trade barriers, simplify regulatory procedures, and promote free trade agreements to attract multinational corporations. The significant role of ICT in driving FDI inflows suggests that governments should prioritize digital infrastructure development. Investments in broadband connectivity, digital literacy, and technological innovation will not only attract FDI but also enhance productivity and competitiveness in global markets. Furthermore, strong institutional quality is found to be a key determinant of FDI. Countries with transparent governance, efficient legal systems, and reduced corruption levels create an environment that fosters investor confidence. Strengthening institutions through policy reforms, anti-corruption measures, and judicial efficiency can significantly enhance a nation's attractiveness to foreign investors.

On the other hand, the study found that human capital has a negative but insignificant relationship with FDI. This suggests that while education and workforce skills are essential, they may not be the primary determinants of FDI inflows. However, investing in higher education, vocational training, and skill development programs can enhance workforce quality and long-term economic competitiveness. Policymakers should align education systems with industry needs to ensure that the workforce possesses relevant skills for emerging sectors and high-tech industries. The findings also indicate that total factor productivity (TFP) has a negative and significant impact on FDI. This may suggest that highly productive economies

rely less on foreign capital and more on domestic innovation and efficiency improvements. While this is not necessarily a drawback, policymakers should strike a balance between leveraging foreign capital and enhancing domestic productivity. Encouraging research and development (R&D), fostering innovation-driven industries, and providing incentives for domestic enterprises to improve efficiency can help achieve this balance.

For investors, the results of the study provide insights into the factors that influence FDI location choices. Countries with stable economic growth, strong institutional frameworks, technological advancements, and open trade policies present attractive opportunities for foreign investors. Investors should assess macroeconomic indicators, policy frameworks, and governance structures before making investment decisions. Moreover, understanding the implications of exchange rate volatility and productivity levels can help investors devise risk mitigation strategies and optimize their investment portfolios.

In conclusion, this study provides valuable insights into the factors influencing FDI inflows in BRICS economies. The practical implications suggest that policymakers should focus on macroeconomic stability, institutional quality, technological development, and trade openness to attract foreign investment. Investors, in turn, should consider these factors while making investment decisions. By implementing strategic policy measures based on these findings, BRICS nations can enhance their economic growth and competitiveness in the global market.

6.5 Limitations and Future Research Directions

This study, while comprehensive, has certain limitations that provide avenues for future research. First, the analysis focuses on the original BRICS group (Brazil, Russia, India, China, and South Africa) over the period from 1991-2020. With the recent expansion of the BRICS group to include five additional countries: Egypt, Ethiopia, Iran, Indonesia, and the UAE, future studies can explore FDI dynamics in this expanded group. This would provide a broader perspective on the determinants and patterns of FDI across a more diverse set of emerging economies. Second, this study examines aggregate FDI inflows but does not differentiate FDI by sector. Future research could delve into sectoral-level FDI, analyzing the factors driving investments in key industries such as manufacturing, services, technology, and renewable energy. This sectoral analysis could uncover industry-specific dynamics and enable policymakers to design more targeted strategies to attract FDI in priority sectors.

Another limitation of this study is that it does not account for firm-level dynamics or the role of multinational corporations (MNCs) in shaping FDI inflows. Future research could incorporate firm-level data to assess how the characteristics of investing firms, such as size,

ownership structure, and R&D intensity, impact the effectiveness of FDI in host economies. Expanding the scope of the analysis in these directions would deepen the understanding of FDI dynamics and enhance the policy relevance of such studies.

6.6. Summary

This chapter provides a comprehensive conclusion to the study by summarizing its key findings, theoretical contributions, practical implications, and future research directions. The study examined the relationship between FDI inflows and economic growth in BRICS economies while considering several macroeconomic determinants such as GDP, exchange rate, human capital, institutional quality, trade openness, ICT, and total factor productivity. The results also established a long-term relationship between FDI and economic growth, reinforcing the role of foreign investment as a crucial driver of economic development. The chapter revisited the objectives of the study and assessed their fulfilment through empirical analysis. It discussed the theoretical implications, emphasizing how the findings contribute to existing literature and economic theories, particularly in the context of emerging economies. Additionally, it outlined the practical implications, providing policy recommendations for attracting FDI and maximizing its benefits. Lastly, the study's limitations were acknowledged, and future research directions were proposed, including an expanded analysis of the newly added BRICS members, sector-specific FDI assessments, and the role of financial markets in shaping FDI trends. Overall, this chapter consolidated the study's contributions and offered valuable insights for academics, policymakers, and economic strategists.

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Appendix A (List of Publications):

S.No.	Type (Year)	Title	Journal/Publisher	Indexation
1.	Research Article (2023)	Does FDI Impact the Economic Growth of BRICS Economies? Evidence from Bayesian VAR DOI: 10.3390/jrfm17010010	Journal of Risk and Financial Management (Special Issue: Emerging Issues in Economics, Finance and Business)	ABDC – “B”
2.	Research Article (2024)	Can Stronger Governance and Institutional Quality Drive Growth through Inward Foreign Direct Investments in BRICS Nations? DOI: 10.4102/sajems.v27i1.5785	South African Journal of Economic and Management Sciences	SSCI (I.F. = 1.2)
3.	Research Article (2025)	The Dynamics of the FDI-Productivity Nexus in BRICS: A Wavelet Coherence Study DOI: in press	Technological and Economic Development of Economy	SSCI (I.F. = 4.8)
4.	Book Chapter (2024)	Foreign Direct Investment and Economic Development: The Case of Global South Economies DOI: 10.4324/9781032694337-21	Routledge, Taylor and Francis (Book Title: Polycrisis and Economic Development in the Global South)	Scopus

Appendix B (Papers Presented in Conferences):

S.No.	Paper Title	Year	Conference Name and Venue
1.	Does FDI Impact Economic Growth in BRICS Economies? Evidence from Bayesian VAR	2023	33 rd RSEP International Conference on Economics, Finance & Business. (University of Washington, Rome Center, Rome, Italy)
2.	BRICS Nations and FDI-Driven Economic Growth: Bayesian VAR Insights	2023	3 rd Annual International Research Conference and Doctoral Workshop. Theme: Transforming Business and Management in Digital Age. (IIM Lucknow, India)
3.	FDI's Impact on Economic Growth in BRICS Nations: An In-depth Analysis	2023	16 th ISDSI-Global Conference 2023. Theme: Reimagining Globalization: The Power of Digital Interconnection in a Deglobalizing World. (IIM Ranchi, India)
4.	BRICS Economic Evolution: Assessing the Relationship between Foreign Direct Investment, Economic Growth, and Trade Openness	2024	9 th PAN IIM World Management Conference 2023. Theme: Entrepreneurial Innovation And Digital Governance For Inclusive And Sustainable Growth. (IIM Sambalpur, India)
5.	BRICS on the Rise: The Power of Foreign Direct Investment in Driving Economic Growth	2024	The Sixth International Conference on Development and Governance in the BRICS. Theme: Innovation in the BRICS' Public Sector. (IIM Raipur, India)

