IMPACT OF FOREIGN DIRECT INVESTMENT (FDI) ON HEALTH EXPENDITURE IN NIGERIA.

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DECLARATION

I, **IGBA IFEOMA EDNA**, do hereby declare that this project work is entirely my own work and composition. The work contained in this project has not been submitted in candidature of any degree and is not concurrently being submitted for any other degree. Acknowledgements have been accorded to whom it is due with respect to all citations and references used in the course of this project.

_____

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CERTIFICATION

We the undersigned persons certify that this research project work titled "Impact Of Foreign Direct Investment (FDI) On Health Expenditure In Nigeria" carried out by **IGBA IFEOMA EDNA** with matriculation number **SSC2010585** of the Department of Economics and Statistics, Faculty of Social Sciences, University of Benin, Benin City is approved and considered adequate in the scope and content for partial fulfilment of the requirement for the award of Bachelor of science (B.Sc.) Degree in Economics and Statistics.

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DEDICATION

This project work is dedicated to God Almighty for His infinite mercy towards me, for by His grace this project work became a reality.

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This project would not have been a success without the support of several remarkable individuals.

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ABSTRACT

Foreign Direct Investment (FDI) is often seen as a driver of economic development, bringing capital, technology, and expertise to various sectors, including healthcare. However, its impact on health expenditure in Nigeria remains unclear. This study examines the relationship between FDI and health expenditure in Nigeria using secondary time-series data from 1990 to 2023, sourced from the National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN).The dependency theory forms the theoretical framework of the study. The Ordinary Least Squares (OLS) and the Fully Modified Ordinary Least Square regression method was employed to assess whether FDI significantly influences health expenditure while accounting for economic growth and government expenditure. The findings reveal that while FDI shows a positive relationship with health expenditure, its impact is statistically insignificant. In contrast, economic growth significantly contributes to increased health spending, highlighting its crucial role in healthcare financing. Interestingly, government expenditure on health appears to have a negative effect, raising concerns about inefficiencies in public healthcare investment. Additionally, due to data limitations, the study could not fully assess FDI's impact on healthcare accessibility, quality, and private sector investment, leaving room for further investigation.

CHAPTER ONE

INTRODUCTION

1.1 Background To The Study

The World Development Indicators statistics of the World Bank estimated Nigeria's population to be approximately 213 million people as of 2021, making it the most populous black nation and the 7th largest in the world (World Bank, 2020). For a population of this magnitude, a sustainable healthcare system is crucial for enhancing socioeconomic development. Over the years, the Nigerian health sector has played a pivotal role in the nation's overall development (Osain, 2011; Kress *et al.,* 2016). The significance of the health sector is further highlighted in Article 3 of the United Nations' 17 Sustainable Development Goals (SDGs), which urges all nations to ensure healthy living and well-being for all members of society (United Nations, 2015). These global frameworks emphasize the need for robust health policies worldwide.

Despite its importance health and well-being, Nigeria's health sector has experienced significant decline and underperformance over time (Anaemene, 2016). The historical development of the Nigerian health sector can be examined across four distinct eras: the precolonial era, the colonial era, the post-independence era, and the modern era.

In the precolonial era, traditional medicine dominated healthcare, with local practitioners like herbalists, midwives, and bone setters providing services. These practices were largely sustainable due to small population sizes and localized health systems. However, the lack of formal education among practitioners and deep-rooted cultural beliefs limited the system's capacity to address complex health challenges (Anaemene, 2016).

The colonial era marked the introduction of Western medicine through early missionaries and colonial rulers. This period saw the establishment of Nigeria's first organized health services (Babatunde, 2017), with the Church Missionary Society building the first dispensary in 1880. Despite these advancements, healthcare facilities primarily served the colonial elite, necessitating government involvement to address the health needs of the broader population. The introduction of medicines like quinine for malaria and other initiatives significantly shaped the modern Nigerian health system (Okine, 2024; Shekarau *et al.,* 2024).

The post-independence era witnessed notable improvements, driven by government investments aimed at resolving healthcare disparities. National development plans from 1962 to 1985 played key roles in expanding and improving healthcare infrastructure (Aregbeshola, 2022). the modern era introduced the Basic Health Service Scheme (BHSS), which established three tiers of healthcare: comprehensive health centers, primary health centers, and health clinics. These reforms promoted shared responsibility across federal, state, and local governments, resulting in a substantial increase in healthcare facilities by 1984 (Scott- Ikpe, 2014).

However, the introduction of the Structural Adjustment Program (SAP) in 1986 disrupted this progress. SAP conditions, including reduced public spending, led to infrastructure decline, brain drain, and increased exposure to diseases.

The modern era (2000 to present) is characterized by further deterioration despite efforts like the National Health Insurance Scheme (NHIS, 1999), the Midwives Services Scheme (MSS, 2009), and the National Primary Health Care Development Agency (NPHCDA, 1992).

Persistent challenges include inadequate funding, weak infrastructure, a shortage of skilled professionals, brain drain, and rising environmental and security issues. Nigeria allocates less than 5% of its annual budget to healthcare, far below the African Union's 15% target set in 2001 (Uzochukwu *et al.,* 2015). Consequently, health indicators remain poor, reflecting the sector's struggles (Okafor, 2016).

Among the challenges, investment in healthcare stands out as critical to improving access, enhancing service quality, and addressing the growing demand for equitable and efficient healthcare systems. One of the most promising avenues for addressing this challenge is the attraction and effective utilization of Foreign Direct Investment (FDI) in the health sector (Bissoon, 2012; Chiappini *et al.,* 2022). foreign direct investment represents a vital source of capital, technical expertise, and innovation, which are essential for improving healthcare infrastructure and service delivery (Shenkar et al., 2021; Chiappini et al., 2022). Globally, countries that have successfully leveraged foreign direct investment in their health sectors have demonstrated significant improvements in access to quality healthcare services, technological advancements, and human capital development (Haleem et al., 2022).

In the Nigerian context, foreign direct investment in healthcare has the potential to address critical gaps in funding and infrastructure (Abubakar, 2023;). For instance, foreign direct investment can facilitate the establishment of state-of-the-art medical facilities, improve the supply chain for essential medicines and equipment, and foster the development of specialized medical services. Furthermore, partnerships between foreign investors and local stakeholders

can enhance capacity-building initiatives, providing training opportunities for healthcare professionals and reducing the pervasive issue of brain drain (Kiosia, et al., 2024).

However, Nigeria's ability to attract and sustain foreign direct investment in the health sector faces several challenges. These include political instability, inadequate regulatory frameworks, and an unfavourable business environment characterized by corruption and bureaucratic bottlenecks. Addressing these challenges requires targeted policy interventions to create a conducive environment for foreign investment. Such policies could include tax incentives for healthcare investors, streamlined processes for investment approvals, and robust legal protections for foreign entities operating in Nigeria.

Moreover, integrating foreign direct investment with domestic health expenditure is crucial for achieving sustainable improvements. While foreign direct investment can provide the necessary capital and expertise, domestic spending ensures continuity and alignment with national health priorities. Currently, Nigeria allocates less than 5% of its annual budget to healthcare, a figure far below the 15% benchmark agreed upon by African Union member states in the Abuja Declaration of 2001 (Sadr-Azodi, 2019). Increasing domestic health expenditure to meet this benchmark would not only enhance the effectiveness of foreign direct investment but also demonstrate the government's commitment to improving health outcomes.

Overall, the interplay between foreign direct investment and health expenditure presents a transformative opportunity for Nigeria's health sector. By addressing systemic barriers and fostering collaborative partnerships, Nigeria can harness the full potential of foreign direct investment to revitalize its healthcare system. This study underscores the urgency of leveraging

foreign direct investment and enhanced domestic spending as complementary strategies to achieve sustainable health improvements and foster socioeconomic development.

1.2 Statement Of The Research Problem

Nigeria has received significant amounts of Foreign Direct Investment (FDI) over the years; however, its exact impact on the health sector remains poorly understood and underexplored (Akpoili and Abdi 2024). While foreign direct investment is widely recognized as a key driver of economic growth, contributing to job creation, technological advancement, and infrastructure development, its role in addressing critical social sectors, such as healthcare, has received limited attention. Nigeria's health sector is burdened with persistent challenges, including chronic underfunding, outdated infrastructure, inadequate supply of essential medical equipment, and an insufficient number of skilled healthcare workers (Muhammad et al., 2017). These issues have exacerbated poor health outcomes, including high rates of infant and maternal mortality, the widespread prevalence of preventable diseases like malaria and cholera, and a low life expectancy that lags behind many other developing nations (Frasquilho *et al.,* 2015).

Despite the substantial inflow of foreign direct investment (FDI) into Nigeria, which has averaged billions of dollars annually over the past decade, the Investment Overview reveals a skewed concentration in industries such as oil, gas, telecommunications, and manufacturing (Idowu, 2016). These sectors, driven by their high profitability and strategic significance, dominate FDI inflows, leaving critical areas like healthcare underfunded. While this pattern has spurred economic growth and technological progress in key industries, it underscores a

profit-driven focus that often overlooks the country's pressing social and developmental needs. This investment raises important concerns about whether foreign investments are being effectively aligned with national priorities, such as improving healthcare access and outcomes for the population. Furthermore, there is little empirical evidence to demonstrate how, or if, foreign direct investment contributes to increased health expenditure—either through direct investments in healthcare infrastructure or indirectly by influencing government budgets and policies. Questions also persist regarding whether foreign direct investment fosters private sector growth in healthcare, such as through partnerships with multinational health organizations or the establishment of private healthcare facilities, and whether such initiatives truly benefit the broader population.

The health sector's underperformance poses significant threats to Nigeria's socio-economic development, as a healthy population is fundamental to achieving sustainable growth (Kruk *et al.,* 2018). The neglect of healthcare investments in favour of other sectors further exacerbates existing inequities, leaving millions of Nigerians without access to essential services. Additionally, the lack of clarity on the relationship between foreign direct investment and health expenditure complicates efforts to design policies that effectively harness foreign direct investment for the benefit of the health sector.

Understanding the connection between foreign direct investment and health expenditure is therefore essential for ensuring that foreign investments contribute to the effective allocation of resources in the healthcare sector, inform policy decisions that align with national health priorities, and promote sustainable development that improves public health outcomes and

reduces disparities (Mobosi et al., 2024). This research aims to examine the impact of foreign direct investment (FDI) on health expenditure in Nigeria, focusing on its contribution to addressing healthcare challenges and influencing health sector funding. Ultimately, the findings will provide valuable insights into how foreign investments can be leveraged to improve healthcare systems and support the well-being and productivity of Nigeria's population.

1.3 Objectives Of The Study

The primary objective of this study is to evaluate the impact Foreign Direct Investment (FDI) on Health Expenditure in Nigeria, the specific objectives are to:

1. To assess the relationship between foreign direct investment (FDI) and health expenditure in Nigeria.
2. To explore the impact of Foreign Direct Investment (FDI) on the accessibility and quality of healthcare services in Nigeria.
3. examine the influence of Foreign Direct Investment (FDI) on private sector investment in healthcare services in Nigeria.

1.4 Research Questions

To achieve the study's objectives, the researcher has developed the following research questions:

1. Does Foreign Direct Investment (FDI) have an impact on health expenditure in Nigeria?

2. does Foreign Direct Investment (FDI) affect the accessibility and quality of healthcare services in Nigeria?
3. Does foreign direct investment (FDI) influence private sector investment in healthcare services in Nigeria?

1.5 Research Hypotheses

The following hypotheses have been formulated and will be analysed in this research:

Hypothesis 1

Null Hypothesis (H_0): Foreign Direct Investment (FDI) does not significantly impact health expenditure in Nigeria.

Alternative Hypothesis (H_1): Foreign Direct Investment (FDI) significantly impact health expenditure in Nigeria.

Hypothesis 2

Null Hypothesis (H_0): Foreign Direct Investment (FDI) does not significantly affect the accessibility and quality of healthcare services in Nigeria

Alternative Hypothesis (H_1): Foreign Direct Investment (FDI) significantly affect the accessibility and quality of healthcare services in Nigeria

Hypothesis 3

Null Hypothesis (H_0): Foreign Direct Investment (FDI) does not significantly influence private sector investment in healthcare services in Nigeria.

Alternative Hypothesis (H_1): Foreign Direct Investment (FDI) significantly influences private sector investment in healthcare services in Nigeria.

1.6 Significance Of The Study

The significance of this study lies in its potential to provide valuable insights into the impact of Foreign Direct Investment (FDI) on health expenditure in Nigeria over a 33-year period (1990–2023). This period is chosen because it encompasses key economic and political changes in Nigeria, including shifts in government policies, economic reforms, and the evolution of FDI flows into the country (Mobosi et al., 2024). As the country faces persistent healthcare challenges, such as inadequate funding, poor infrastructure, and limited access to quality services, understanding how Foreign Direct Investment can address these challenges is very important. This study will offer evidence-based recommendations for policymakers to better harness Foreign Direct Investment to improve healthcare funding, infrastructure, and service delivery. By filling existing research gaps, it contributes to the academic discourse on the relationship between Foreign Direct Investment and health expenditure, particularly in developing economies like Nigeria. Additionally, the study will inform private sector stakeholders and foreign investors about the opportunities for investment in the healthcare sector, potentially fostering partnerships and innovation. Ultimately, the research aims to support the development of sustainable strategies to enhance healthcare services, improve health outcomes, and align with global development goals, such as the Sustainable Development Goals (SDGs), particularly Goal 3 on good health and well-being. Through its

findings, this study seeks to promote equitable and efficient healthcare delivery for the benefit of Nigeria's population.

1.7 Limitations Of The Study

The limitations of this study on Foreign Direct Investment (FDI) and health expenditure in Nigeria primarily stem from data availability and scope. Reliable and comprehensive data on Foreign Direct Investment specifically targeted at the healthcare sector in Nigeria may be limited, as most recorded investments are concentrated in industries such as oil, gas, and telecommunications. This could restrict the study's ability to measure direct and indirect impacts comprehensively. Additionally, variations in data reporting standards and inconsistencies across sources might pose challenges in establishing accurate relationships. The study may also face difficulties in isolating the effects of Foreign Direct Investment on health expenditure from other economic or policy factors influencing healthcare outcomes, such as government policies, domestic investments, or international aid.

Furthermore, the study's scope might not account for the informal healthcare sector. This sector includes traditional healers, herbal medicine vendors, home-based care providers, and community health volunteers, which plays a significant role in Nigeria but is often not captured in formal investment analyses. other limitations could also arise, as the study may focus on specific time periods, potentially overlooking long-term trends or delayed impacts of Foreign Direct Investment. Lastly, contextual factors such as political instability, economic fluctuations, and regulatory changes might influence the findings, These factors could affect

FDI inflows or disrupt healthcare investments thereby impacting the study's outcomes and making it challenging to generalize results to other countries or regions. Despite these limitations, the study aims to provide meaningful insights into the relationship between Foreign Direct Investment and health expenditure in Nigeria, while acknowledging the need for further research to address these challenges.

1.8 Scope Of The Study

The scope of this study focuses on examining the relationship between Foreign Direct Investment and health expenditure in Nigeria over a 33-year period (1990–2023), with particular attention to how Foreign Direct Investment impacts healthcare infrastructure, funding, and service delivery. The study investigates the extent to which Foreign Direct Investment contributes to addressing key healthcare challenges in Nigeria, such as inadequate infrastructure, insufficient funding, inequitable access to healthcare services, and a shortage of skilled medical personnel. It also explores the influence of Foreign Direct Investment on private sector investment in the healthcare industry and its potential to complement government health expenditure.

Geographically, the study covers Nigeria as a whole. The scope includes a 33-year period (1990–2023), focusing on data and trends over the past decade to provide a contemporary understanding of the issue . While the study primarily concentrates on the healthcare sector, it acknowledges the broader context of Foreign Direct Investment’s impact on Nigeria’s economy, particularly in sectors where investment may indirectly affect health outcomes.

1.9 Structure Of The Study

The structure of this study on Foreign Direct Investment and health expenditure in Nigeria is organized into five chapters, each addressing critical components of the research.

Chapter One: Introduction

This chapter provides an introduction to the study, including the background, statement of the research problem, objectives, research questions, hypotheses, significance, scope, and limitations of the study. This chapter sets the foundation by establishing the context and rationale for investigating the relationship between Foreign Direct Investment and health expenditure in Nigeria.

Chapter Two: Literature Review

This chapter presents a comprehensive review of relevant literature, focusing on theoretical frameworks, empirical studies, and conceptual insights related to Foreign Direct Investment and healthcare investment. This chapter examines global and regional trends, as well as the specific dynamics of Foreign Direct Investment and healthcare financing in Nigeria, to identify research gaps and build a conceptual framework for the study.

Chapter Three: Research Methodology

This chapter outlines the methodology used to conduct the research. It describes the research design, data sources, data collection techniques, and methods of analysis. The study utilizes

secondary data, and this chapter thoroughly explains the data sources and the processes involved in achieving the study's objectives.

Chapter Four: Data Presentation and Analysis

This chapter focuses on data presentation, analysis, and discussion of findings. This chapter presents the results of the study, analysing the extent to which Foreign Direct Investment contributes to health expenditure, its impact on healthcare infrastructure, and its role in addressing key challenges in Nigeria's health sector. The findings are interpreted in light of the study's objectives and existing literature.

Chapter Five: Summary, Conclusion, and Recommendations

This chapter concludes the study by summarizing key findings, providing policy recommendations, and suggesting areas for future research. It highlights the implications of the study for policymakers, private sector stakeholders, and academia, emphasizing the importance of aligning Foreign Direct Investment with healthcare priorities to improve health outcomes in Nigeria.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Foreign Direct Investment (FDI) plays a significant role in shaping the economic and social development of nations, particularly in developing countries like Nigeria. Its impact on health expenditure, a critical factor for improving public health and fostering economic growth, has garnered a lot of attention in academic and policy discussions. This chapter provides a comprehensive review of literature on the impact of foreign direct investment (FDI) on Health expenditure in Nigeria. It is organized into three key sections: the conceptual framework, which examines the definitions, components, and mechanisms linking FDI and health expenditure; the theoretical framework, which outlines the theories that explain these relationships, including Dependency Theory and Endogenous Growth Theory; and the empirical framework, which reviews existing studies to evaluate evidence on the subject. By synthesizing these perspectives, the chapter establishes a foundation for understanding the potential pathways through which FDI influences health spending in Nigeria.

2.2 Conceptual Framework

2.2.1 Foreign Direct Investment (Fdi)

Foreign Direct Investment (FDI) is defined as a cross-border investment made by a firm or individual in one country into business interests located in another country (Anyanwu, 2017). It involves establishing a lasting interest in an enterprise operating outside the investor's home economy, typically through ownership or significant influence over management. Dunning

(2021) defines FDI as a form of investment that involves a long-term relationship and significant influence by an investor in one economy over a business enterprise in another economy. This definition emphasizes the control aspect of FDI, distinguishing it from other forms of international investments, such as portfolio investments.

According to Hill et al. (2022), FDI is a strategic tool used by multinational corporations to establish or expand operations in foreign markets, providing access to resources, new markets, and competitive advantages. This definition highlights the strategic motives behind FDI, including market-seeking, resource-seeking, and efficiency-seeking investments.

More recently, Chen and Zeng (2023) describe FDI as "an essential mechanism for knowledge and technology transfer across borders, serving as a conduit for economic globalization and regional integration." This perspective underscores FDI's role in facilitating innovation, knowledge diffusion, and the integration of developing economies into global value chains.

Additionally, Tang and Wei (2022) emphasize the socio-economic implications of FDI, defining it as "an investment that not only enhances economic output but also impacts social development through job creation, infrastructure development, and poverty alleviation." Their work highlights the broader developmental dimensions of FDI, especially in emerging economies. According to the Organisation for Economic Co-operation and Development (OECD, 2020), FDI is characterized by a minimum 10% equity stake in a foreign entity, reflecting a substantial degree of control and active participation in its operations.

FDI plays a critical role in fostering economic growth, transferring technology, and creating jobs in host economies. It is often categorized into two main types: *greenfield investments*,

where new facilities or operations are established, and *mergers and acquisitions*, where existing entities are acquired. In developing economies, FDI is frequently associated with access to capital, improved infrastructure, and integration into global markets (UNCTAD, 2023).

Recent trends in FDI show a significant shift towards service-oriented sectors such as telecommunications, finance, and healthcare. However, the distribution of FDI remains uneven, with much of the inflow concentrated in emerging markets like China, India, and Brazil, while African nations, including Nigeria, struggle to attract diversified investments beyond resource extraction industries (World Bank, 2022). Despite its benefits, FDI can also present challenges, such as profit repatriation, cultural impacts, and potential dependency on foreign capital.

In the Nigerian context, FDI has historically focused on oil and gas, contributing significantly to GDP but with limited spillover effects on other critical sectors like healthcare and education (NBS, 2021). Understanding FDI's dynamics in Nigeria, particularly its potential to address developmental challenges in non-oil sectors, remains an essential area of research.

Types of foreign direct investment

Foreign Direct Investment (FDI) is classified into various types based on the purpose, mode, and nature of investment. Understanding these types is crucial for policymakers and stakeholders as they seek to attract and utilize FDI effectively. The main types of FDI are:

1. Horizontal FDI

Horizontal FDI occurs when a company invests in the same type of business operation in a foreign country as it operates in its home country. For example, a car manufacturer in the United States establishing a car manufacturing plant in Nigeria is an example of horizontal FDI. This type of investment is motivated by the desire to expand market access, reduce transportation costs, or overcome trade barriers (Baldwin & Forslid, 2023).

2. Vertical FDI

Vertical FDI involves a company investing in a foreign operation that either provides inputs for its home operations (backward vertical integration) or distributes its products (forward vertical integration). For instance, a textile company investing in cotton farms abroad to secure raw materials represents backward vertical FDI, while investment in retail outlets in foreign markets exemplifies forward vertical FDI (Wang & Zhang, 2022).

3. Conglomerate FDI

Conglomerate FDI occurs when a company invests in a foreign business unrelated to its core operations. This type of FDI is less common as it requires the investor to diversify into unfamiliar industries and markets. It is often driven by the pursuit of risk diversification or capitalizing on emerging opportunities in the global market (Johnson et al., 2023).

4. Greenfield FDI

Greenfield investment involves the establishment of entirely new operations in a foreign country, such as building new factories, offices, or facilities. This type of FDI creates new infrastructure, generates employment, and transfers technology and skills to the host country.

Greenfield FDI is often preferred by developing countries seeking to boost economic development (UNCTAD, 2023).

5. Brownfield FDI

Brownfield FDI occurs when a foreign investor acquires or leases existing facilities in a host country, such as purchasing an existing company or infrastructure. This type of investment is faster to implement compared to Greenfield FDI and is commonly used in sectors like energy and telecommunications (World Bank, 2022).

6. Joint Ventures and Partnerships

Joint ventures and partnerships involve shared investment between a foreign company and a domestic firm in the host country. This type of FDI is often used to overcome regulatory restrictions, share risks, and benefit from local market expertise (Dasgupta, 2023).

7. Mergers and Acquisitions (M&A)

FDI through M&A involves a foreign investor buying a controlling stake in an existing company in the host country. This type of investment is prevalent in developed markets, where infrastructure and business operations are already established, allowing for quick market entry (Chen & Li, 2022).

These types of FDI provide a framework for understanding how businesses expand globally and interact with host economies. Each type has distinct advantages and challenges, making it essential for both investors and policymakers to align strategies with their goals and local conditions.

2.2.2 Health Expenditure And The Impact Of Fdi On Nigeria's Healthcare System

Health expenditure refers to the financial resources allocated to the health sector for the provision of healthcare services, including preventive, curative, rehabilitative, and palliative care. According to Mohan and Singh (2023), health expenditure represents "the allocation of financial resources towards health-related services, including preventive, curative, and administrative costs, aimed at improving the overall health status of a population." This definition highlights the comprehensive scope of spending across multiple aspects of the healthcare system.

Bello and Adetayo (2022) define health expenditure as "the sum of investments in health infrastructure, personnel, and programs that enhance access to quality healthcare, mitigate disease burdens, and improve life expectancy." This definition emphasizes the direct link between financial investment and health outcomes, particularly in developing countries.

In a more focused approach, Zhang et al. (2023) describe health expenditure as "the aggregate cost borne by governments, households, and external donors to fund healthcare systems, reflecting a nation’s priority in achieving universal health coverage." This perspective underscores the importance of equity and accessibility in health financing.

Odeyemi (2022) views health expenditure as "a critical determinant of the effectiveness of a healthcare system, where adequate funding translates to better healthcare delivery, infrastructure, and workforce capacity." This definition ties expenditure directly to the efficiency and functionality of healthcare systems, particularly in resource-constrained settings.

In Nigeria, health expenditure encompasses spending by the government, private sector, households, and international donors on healthcare infrastructure, personnel, medical supplies, and public health initiatives. According to the World Health Organization (WHO, 2023), health expenditure is a critical indicator of a nation's commitment to achieving universal health coverage (UHC) and improving health outcomes.

Nigeria's health expenditure is characterized by low government investment and high out-of-pocket expenses by households. Despite the Abuja Declaration of 2001, where African Union member states committed to allocating at least 15% of their annual budgets to health, Nigeria has consistently fallen short of this target (Kress et al., 2016). In 2022, government health expenditure accounted for less than 5% of the national budget, leaving the health sector underfunded and reliant on private and external funding sources (World Bank, 2022).

This underfunding has significant implications for the country's healthcare system, contributing to inadequate infrastructure, shortages of skilled medical personnel, and limited access to quality services, particularly in rural and underserved areas. As a result, Nigeria experiences poor health indicators, including high maternal and infant mortality rates, low life expectancy, and the prevalence of preventable diseases such as malaria and tuberculosis (NBS, 2023).

Foreign Direct Investment (FDI) has the potential to significantly impact Nigeria's health expenditure by serving as a complementary source of funding to address the persistent gaps in healthcare financing. Recent studies highlight the need for innovative financing mechanisms to address Nigeria's healthcare challenges. For example, Eke et al. (2023) suggest that leveraging partnerships with the private sector and increasing FDI in healthcare could help

bridge funding gaps, improve healthcare infrastructure, and enhance service delivery. FDI can contribute to the establishment of private hospitals, medical research centers, and pharmaceutical manufacturing, which are critical for improving access to quality healthcare services.

Additionally, health economists advocate for enhanced efficiency in resource allocation and increased transparency to ensure that available funds, including those from FDI, are utilized effectively to achieve desired health outcomes (Adesina & Balogun, 2022). By fostering public-private partnerships and encouraging foreign investors to enter the healthcare sector, Nigeria can address its pressing health challenges and reduce the financial burden on households.

The Nigerian government has initiated several reforms to improve health financing, including the establishment of the National Health Insurance Scheme (NHIS) and the Basic Healthcare Provision Fund (BHCPF). While these initiatives aim to reduce out-of-pocket spending and enhance access to care, integrating FDI into the health sector strategy could strengthen these efforts. Implementation challenges and limited coverage remain significant barriers, but a concerted effort from policymakers, private sector stakeholders, international partners, and foreign investors could create a sustainable pathway to better healthcare outcomes.

2.3 Theoretical Framework

Foreign Direct Investment (FDI) can significantly influence health expenditure in Nigeria through various theoretical lenses. These frameworks provide insights into how FDI impacts

the allocation of resources, economic growth, and the enhancement of healthcare systems. Below are expanded theoretical frameworks that explore these dynamics in greater detail.

Dependency Theory

Dependency theory argues that developing nations, such as Nigeria, become reliant on foreign investments, which often prioritize the interests of developed countries. This dependency can result in FDI being concentrated in sectors like oil and gas rather than healthcare, potentially undermining the health sector's development. As FDI is primarily profit-driven, it may not align with the public health needs of the host country, leading to inadequate health expenditure. The theory highlights the risk of economic exploitation and underdevelopment in critical areas like health (Frank, 1967; Dos Santos, 1970).

Modernization Theory

Modernization theory suggests that FDI can stimulate economic growth by introducing advanced technologies, capital, and management expertise from developed to developing countries. In Nigeria, this can lead to increased national income and improved public services, including healthcare. The influx of FDI can enhance healthcare infrastructure and facilitate the training of medical personnel, thereby increasing health expenditure. This theory posits a positive correlation between FDI and economic modernization, which can extend to better health outcomes (Rostow, 1960; Inkeles & Smith, 1974).

Endogenous Growth Theory

Endogenous growth theory emphasizes that long-term economic growth is driven by internal factors such as human capital, innovation, and knowledge. FDI can enhance these internal

factors by bringing new technologies and expertise to Nigeria, especially in healthcare. If such investments are channelled into healthcare, they can boost health expenditure and contribute to sustainable economic growth. This theory underscores the importance of strategic investment in sectors that build the country's intellectual and physical infrastructure (Romer, 1990; Lucas, 1988).

Institutional Theory

Institutional theory asserts that the impact of FDI on health expenditure is contingent upon the quality of the host country's institutions. Strong institutions can effectively regulate and allocate FDI to sectors that benefit public welfare, such as healthcare. In Nigeria, institutional strength determines how efficiently FDI is used to improve healthcare services. Weak institutions, on the other hand, may lead to mismanagement and corruption, undermining the potential benefits of FDI on health expenditure (North, 1990; Scott, 1995).

Public Finance Theory

Public finance theory examines how government revenues and expenditures are influenced by economic activities, including FDI. Increased FDI can expand the tax base, generating more government revenue, which can be allocated to health services. In Nigeria, this theory suggests that effective fiscal policies are crucial to ensuring that the additional resources from FDI are used to enhance health expenditure and public health outcomes (Musgrave, 1959; Tiebout, 1956).

Human Capital Theory

Human capital theory emphasizes that investments in education and health are essential for enhancing workforce productivity and economic development. FDI that targets healthcare infrastructure can improve the overall health of the population, leading to a more productive workforce. In Nigeria, such investments can increase health expenditure and strengthen human capital, which is vital for long-term economic growth and development (Becker, 1964; Mincer, 1974).

2.4 Empirical Framework

2.4.1 Empirical Framework On Health Expenditures

There are numerous empirical evidences of the role of health and health expenditures in any country's development. For example, (Liljestrand et al., 2018), analyzed the effect of quality health systems in the attainment of SDG's amongst low-income and middle-income countries. The result of their panel regression analysis reveals that high-quality health systems are a global need for all countries and will contribute significantly towards the development of the nations. A case study of health system reforms in Latin America also reveals that increased government financing and supplyside interventions in the health sector are factors that will ensure the health sector improves and contribute to the improvement of the population in terms of productivity and efficiency. (Atun et al., 2015)

While the significance of a good health system to the development of countries, is an undeniable fact, the performance of the health system especially in middle-income and less developed economies has been a topic for discourse in various literatures that have attempted

to evaluate the causes of poor health systems in developing and less developed nations. (Wang & Yang, 2016), analyzed the dynamics of industrial water pollution, water environment treatment, and health risk in China. The study which employed the Random Effects Model using data from 2011 to 2013 reveals that pollution and environmental sustainability are key indicators of health in China. (Popp et al., 2012), employed the panel co-integration test in assessing the long-term impact of using population and food security on the health status of developing countries. The result reveals that the rising population has a negative impact on health status in developing nations due to the high rate of poverty and unemployment in these regions. Thus, leading to food insecurity, a substantial proportion of the population does not have access to quality and balanced feeding systems. (Factor & Kang, 2015), also contributed to the discourse by analyzing the role of corruption on population health expenditures using 133 countries. The study which employed the structural equation models reveals that the high level of corruption in countries contributes negatively to the development of the health indicators due to lower government expenditure on the sector and poor policy framework to develop the human capital base of such economies. They concluded that countries with low levels of corruption perform better in terms of health expenditures.

In Nigeria, numerous empirical works have discussed the health status and system in the country. For example, (Akinwale et al., 2014), analyzed the public health status of Lagos being the commercial center and most industrious state of Nigeria. The study employed primary data covering 2,434 households and concluded that even in the urban region of the Nigerian state, there are various health challenges such as poor drainage and waste disposal system, natural

climate disaster i.e., flooding, overpopulation, the outbreak of perennial diseases such as malaria, diarrhea, and so on, and poor house planning. (Kelani et al., 2019), also analyzed the role of health status and labor productivity on economic growth in Nigeria. The study employed annual time series data from 1981 to 2017 in the analysis and the ARDL bound test co-integration test reveals that both health status and labor productivity impact growth positively. Thus, it provided empirical backing for the need for a well-developed health system and increased funding of the educational sector to improve labor productivity.

However, despite the relevance of this sector, it is hugely underperforming owing to various challenges identified by scholarly articles. For example, (Matthew et al., 2015), evaluated the role of public health spending on health results in Nigeria. The study which made use of secondary data covering 1979 to 2012 employed the Johansen Co-Integration test and the Vector Error Correction Model (VECM) technique to test for long-run nexus. As health expenditures, life expectancy was used. The result reveals that public health expenditure has a significant impact on health expenditures in Nigeria. This study is directly supported by the work of (Obansa & Orimisan, 2013), who also carried out a study on healthcare financing in Nigeria. The study which employed secondary data from the Central Bank statistical bulletin established that poor revenue generation from tax, huge debt burden, and improper budgetary allocations has led to the starvation of the health sector in terms of health financing for infrastructures and facilities.

Various other causes of poor health performance have been identified in articles. (Makinde et al., 2018), analyzed the Universal Health Coverage in Nigeria. The study employed secondary

data from the Federal Ministry of Health Service to evaluate the geographic and sectoral allocation of health facilities in Nigeria. The result reveals that another challenge facing the health sector is inadequacy and non-uniformity in the location of health facilities and infrastructures with the government only accounting for primary health structures while the secondary health structures owned by the private sector are in few urban regions and out of access to the large population. (Odeyemi & Nixon, 2013), expanded the scope of discussion by providing a comparative analysis of the effectiveness of the health insurance policy by the government in Ghana and Nigeria. The study employed qualitative research design into the nature and description of the National Health Insurance Scheme (NHIS) in both countries and the result reveals that between the period of 2000 and 2010, Ghana has been able to implement the NHIS policy more effectively as reflected in the performance of the health indicators of life expectancy, infant mortality rate and lower disease burden as compared to Nigeria whose performance in terms of health expenditures has been on the decline. The implication of this study for Nigeria is thus, the need for effectiveness in the implementation of health policies and, the need for increased funding to ensure the NHIS policy achieves the desired objective.

In conclusion, the empirical overview of the health status and outcomes in developing nations and Nigeria has further justified the need for this research study. The empirical literature has provided insight into the potential positives of a good healthcare system, the state of the health system in Nigeria and other developing countries and some key reforms or indicators necessary for the reform of the sector has been identified. However, the scope of this study is to analyze the role of FDI and human capital development on health expenditures in Nigeria. Thus, the

next sections of the empirical review will provide empirical evidence relating to the topic and then the gap of the study can be identified.

2.4.2 Empirical Framework On Foreign Direct Investment And Health Expenditures In Nigeria

The nexus between FDI and Health expenditures has amassed significant attention from many scholars and researchers interested in the developmental aspect of the Nigerian economy. FDI contributes significantly to various aspects of the Nigerian economy including the health sector. (Almfraji & Almsafir, 2014; Yaqub et al., 2013; Fowowe & Shuaibu, 2014)

On the impact of FDI on health indicators, (Okafor & Ihayere, 2019), carried out a study on Foreign Direct Investment and the Performance of Health expenditures in Nigeria. The study made use of time series data gotten from the World Development Indicators and employed the VAR / VECM framework to analyze the role of FDI on Maternal Mortality Rate as a proxy of health expenditures. The result indicates that FDI inflows have a significant impact on the health indices. The study attributed this to the positive multiplier effect of FDI on the level of per capita income. (Immurana, 2020), also conducted a study on the impact of FDI inflows on health expenditures in Africa. The study covered 43 African countries including Nigeria and made use of the panel fixed effects estimator. The result reveals that FDI improves health expenditures and thus, inflows of FDI into Africa will help to raise the average life expectancy and reduce the death rate which are the two measures of health expenditures used in the discussion.

Other empirical works have also analyzed the contribution of FDI to health expenditures through the indirect approach of presenting health as one of the indicators of the Human Development Index (HDI). (Gökmenoğlu et al., 2018), carried out research on this effect on the role of FDI on HDI in Nigeria. To represent HDI, School enrolment, life expectancy, and gross national income were employed as proxies. The study employed secondary data and the Johansen Co-integration test for long-run relationships and the result indicated that FDI significantly impacts the Human Development Index of Nigeria. Thus, the health expenditures of Life expectancy is expected to) perform better with FDI inflows.

While these empirical works have provided a positive relationship of FDI on health expenditures, few empirical works have also shown the possibility of a negative relationship between the two variables especially when the FDI is constrained to have a negative outcome on the economy. For example, (Bediako et al., 2022), carried out an empirical work on the effect of FDI on Environmental Quality in West Africa. The empirical study which covers all 16 West African States including Nigeria employed the Panel Random/ Fixed Effects model to establish that FDI inflows could contribute negatively to the quality of the environment through a rise in carbon emissions and pollutants. The resultant effect of this will be prevailing health challenges and issues that will worsen the health expenditures overall. Similarly, (Solarin & Al-Mulali, 2018), showed in their study on the influence of FDI on indicators of environmental degradation that FDI contributes significantly to environmental degradation in developing economies such as Nigeria. The panel regression results thus indicated the need for a policy framework to be put in place to mitigate the health effect of FDI through the environmental

hazards it could cause. While (Ayobamiji & Kalmaz, 2020), evaluated the environmental impact of FDI in Nigeria. The research study employed the Fully Modified OLS and Dynamic OLS approach and established that Foreign Direct Investment affects CO2 emissions negatively overall. This supports the argument that FDI inflows, though of needed importance, could harm the health sector further if proper measures are not put in place.

In contrast to earlier reviews, other researchers have also shown the role health expenditures improvement could play in boosting FDI inflows into Nigeria and African countries, thus, improving the quality of the discussion on FDI and Health expenditures. (Immurana, et al., 2023), analyzed the effect of population health on FDI inflows in Africa. The study made use of Life Expectancy and Death rate as proxies for population health. The system Generalized Method Moments technique was employed for the regression analysis. The result shows that both indicators of health impact FDI inflows significantly. Thus, it implies that improvement in the health sector will also multiplier attracting FDI inflows further if FDI is channeled as an option towards solving the challenges facing the health sector.

(Anyanwu & Yameogo, 2015), also contributed to the discussion that FDI inflows are significantly influenced by health expenditures improvement through a positive relationship established between FDI and life expectancy used as a proxy for health expenditures.

In summary, the various empirical works have shown that FDI and Health expenditures nexus is of significant importance. The empirical study provides insight into both the negative and the positive impact FDI could have on health expenditures as outlined in table 2.1 at the end of the section. With the need to diversify the Nigerian economy and the need for government to

seek alternative sources of boosting the performance of key sectors of the economy, Foreign Direct Investment could be a major policy alternative. However, the empirical study has also given an all-around overview through the analysis of the constraints to FDI inflows and Health expenditures improvement. Thus, to supplement FDI as a policy alternative, this research study will also analyze the role human capital development could play in the discussion in the next session.

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CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter outlines the research methodology adopted for the study on the impact of Foreign Direct Investment (FDI) on health expenditure in Nigeria. The study is guided by Dependency Theory, which argues that developing nations, such as Nigeria, often become reliant on foreign investments that prioritize the interests of developed countries. This framework is suitable for examining how FDI allocation impacts critical sectors like healthcare. The methodology includes the model specification, methods of evaluation, justification for the statistical tools employed, and a discussion of apriori expectations. The research relies on secondary time-series data collected from reputable sources such as the National Bureau of Statistics (NBS) 2023, Central Bank of Nigeria (CBN) 2023, covering the period from 1990 to 2023. The Ordinary Least Squares (OLS) estimation method was used to analyze the data.

3.1 Model Specification

The model is specified to investigate the relationship between foreign direct investment (FDI) and health expenditure in Nigeria, incorporating relevant control variables such as economic growth and government expenditure. The functional form of the model is expressed as:

$$\boldsymbol{HE = f(FDI, EG, GE)}$$

$$\mathbf{HE = \beta_0 + \beta_1 FDI + \beta_2 EG + \beta_3 GE + \varepsilon}$$

Where:

- **HE**: Health Expenditure (dependent variable)

- **FDI**: Foreign Direct Investment (independent variable)
- **EG**: Economic Growth (control variable, proxied by GDP growth rate)
- **GE**: Government Expenditure (control variable)
- **β0**: Intercept
- **βi**: Coefficients of the independent variables
- **ε**: Error term

3.2 Methods Of Evaluation

The evaluation of the model involves multiple criteria to ensure robustness and validity. These include theoretical, statistical, and econometric assessments.

3.2.1 Evaluation Based On Economic Apriori Criteria

The apriori expectations are derived from Dependency Theory, which suggests that FDI in Nigeria may prioritize sectors like oil and gas over public health. Thus, the coefficients are expected to reflect the extent to which FDI and other variables align with health expenditure:

- **β1 > 0**: FDI is expected to positively influence health expenditure, though dependency theory highlights the risk of misallocation.
- **β2 > 0**: Economic growth is expected to positively impact health expenditure.
- **β3 > 0**: Government expenditure is anticipated to positively influence health expenditure.

3.2.2 Evaluation Based On Statistical Criteria

The statistical evaluation involves the use of:

- **Coefficient of determination (R^2)**: To measure the goodness of fit.
- **Adjusted R^2**: To account for the number of explanatory variables.
- **Standard Error of the Estimate (SEE)**: To assess the precision of the regression.

3.2.3 The F-Test

The F-test evaluates the overall significance of the regression model, testing the null hypothesis that all coefficients are jointly zero:

- Null hypothesis ($\mathbf{H_0}$): $\beta 1 = \beta 2 = \beta 3 = 0$
- Alternative hypothesis ($\mathbf{H_1}$): At least one $\beta i \neq 0$

3.2.4 The T-Test

The t-test examines the significance of individual coefficients to determine whether each explanatory variable has a statistically significant effect on health expenditure:

- Null hypothesis ($\mathbf{H_0}$): $\beta i = 0$
- Alternative hypothesis ($\mathbf{H_1}$): $\beta i \neq 0$

3.2.5 Unit Root Test; Johansen Co-Integration

Time-series data are tested for stationarity using the Augmented Dickey-Fuller (ADF) test to avoid spurious regression results. If the variables are non-stationary, their order of integration will be determined. The Johansen co-integration test is used to examine the long-term relationship among the variables.

3.2.6 Test For Auto-Correlation

The Durbin-Watson statistic is employed to detect the presence of autocorrelation in the residuals of the model. Values close to 2 indicate no autocorrelation.

3.3 Justification For Statistical Tool

The Ordinary Least Squares (OLS) method is adopted due to its simplicity, efficiency, and unbiasedness in estimating linear relationships. Furthermore, the OLS method provides robust results when the classical assumptions of the linear regression model are met.

3.4 Sources Of Data

The study relies on secondary time-series data spanning 1990 to 2023. Data were sourced from:

- National Bureau of Statistics (NBS)
- Central Bank of Nigeria (CBN)
- National Data Bank (NDB)
- Statistical Bulletin Publications

3.5 Apriori Expectations

The expected relationships are summarized as follows:

- FDI (β1): Positive relationship with health expenditure, though the magnitude may reflect dependency dynamics.
- Economic Growth (β2): Positive relationship with health expenditure
- Government Expenditure (β3): Positive relationship with health expenditure

These expectations are based on theoretical justifications provided by Dependency Theory and existing empirical literature on the role of FDI and government expenditure in influencing health outcomes.

CHAPTER FOUR

DISCUSSION OF EMPIRICAL RESULTS

4.1 Introduction

This chapter presents the data on Foreign Direct Investment (FDI) and health expenditure. It analyzes the relationship between FDI inflows and healthcare funding, highlighting trends and key findings. The data is presented using tables, followed by a discussion of findings.

4.2 Descriptive Analysis

Table 4.1 Descriptive Statistics

	FDI__USD_BILLION_	GDP__USD_BILLION_	GE__USD_BILLION_	HE___USD_BILLION_
Mean	1.295099	58070.71	4025.191	132.6606
Median	1.288550	32525.56	2244.448	72.08000
Maximum	2.900249	234425.9	19808.44	426.2400
Minimum	-0.039127	494.6437	60.26820	0.150000
Std. Dev.	0.842950	65322.39	4693.497	144.8525
Skewness	0.168735	1.117183	1.666142	0.859713
Kurtosis	1.887254	3.263955	5.523883	2.360899
Jarque-Bera	1.915461	7.171263	24.75497	4.766903
Probability	0.383763	0.027719	0.000004	0.092232
Sum	44.03338	1974404.	136856.5	4510.460
Sum Sq. Dev.	23.44866	1.41E+11	7.27E+08	692414.5
Observations	34	34	34	34

Source: Author's computation using Eviews (2025)

The descriptive analysis of Foreign Direct Investment (FDI) and health expenditure reveals important patterns in economic data. The mean values indicate that, on average, FDI inflows

amount to $1.30 billion, while the economy's GDP stands at $58,070.71 billion. Government expenditure (GE) averages $4,025.19 billion, and health expenditure (HE) is $132.66 billion, reflecting the financial commitment to healthcare. The standard deviation shows how much these values fluctuate over time. FDI has a moderate variation of $0.84 billion, while GDP ($65,322.39 billion) and GE ($4,693.50 billion) show significant variations, suggesting that government spending and overall economic output fluctuate widely. it also has a high standard deviation of $144.85 billion, indicating inconsistent health funding over time. The Jarque-Bera test, which checks if the data follows a normal distribution, shows that FDI has a value of 1.92 (p = 0.384), meaning it follows a normal pattern. However, GDP (7.17, p = 0.028) and HE (4.77, p = 0.092) show mild deviations from normality, while GE (24.75, p = 0.000004) is highly non-normal, suggesting irregular spending patterns. These results indicate that while FDI is relatively stable, GDP, government expenditure, and health funding experience large variations, likely influenced by economic and policy changes.

4.3 Correlation Analysis

Table 4.2 Correlation Analysis

	FDI__USD_BILLION_	**GDP__USD_BILLION_**	**GE__USD_BILLION_**	**HE___USD_BILLION_**
FDI__USD_BILLION_	1			
GDP__USD_BILLION_	-0.4772826432568436	1		

GE__USD_ BILLION_	-0.429920972 2886607	0.981924709 7749573	1	
HE___USD _BILLION_	-0.448291713 6624187	0.974840940 3110172	0.937394486 784091	1

Source: Author's computation using Eview (2025)

The correlation analysis examines the relationship between Foreign Direct Investment (FDI), Gross Domestic Product (GDP), Government Expenditure (GE), and Health Expenditure (HE). The results indicate a **negative correlation between FDI and GDP (-0.4773),** meaning that as FDI inflows increase, GDP tends to decrease. This suggests that higher foreign investment does not always translate into immediate economic growth and may depend on how investments are utilized within the economy. Similarly, **FDI is negatively correlated with GE (-0.4299) and HE (-0.4483),** indicating that an increase in foreign investment does not necessarily lead to higher government spending or increased healthcare funding. One possible explanation is that FDI may be directed towards private sector projects rather than public services, limiting its direct impact on government budgets and healthcare financing.

On the other hand, GDP has a **strong positive correlation with GE (0.9819) and HE (0.9748),** meaning that as the economy grows, government spending and health expenditure also increase. This suggests that economic growth provides governments with more financial resources to invest in public services, including healthcare. Additionally, there is a **strong positive correlation between GE and HE (0.9374),** indicating that when government

spending rises, health sector funding also increases. This confirms that government policies play a crucial role in determining how much is allocated to healthcare.

Overall, these findings suggest that while economic growth leads to higher public and health expenditures, FDI does not have a direct positive impact on these areas. This could mean that foreign investments are not primarily directed towards sectors that influence government or health spending, or that their benefits take longer to materialize. The results highlight the importance of strategic policies to ensure that FDI contributes effectively to economic development and public welfare, particularly in the healthcare sector.

4.4 Unit root tests at Levels

Table 4.3 Unit Root Test at Levels

variables	ADF Test Statistics	ADF Critical Value			Other of Integration	Remarks
		1% level	5% level	10% level		
HE	0.575127	-3.646342	-2.954021	-2.615817	1(0)	Not Stationary
GDP	12.86068	-3.646342	-2.954021	-2.615817	1(0)	Stationary
FDI	-2.391226	-3.646342	-2.954021	-2.615817	1(0)	Not Stationary
GE	8.177057	-3.646342	-2.954021	-2.615817	1(0)	Stationary

Source: Author's computation using Eview (2025)

The unit root test results show that Health Expenditure (HE) and Foreign Direct Investment (FDI) are not stationary at level, meaning they require differencing to achieve stationarity. In contrast, Gross Domestic Product (GDP) and Government Expenditure (GE) are stationary at level, indicating they can be used directly in regression analysis. These findings suggest the

need for further tests, such as first differencing or cointegration analysis, to ensure appropriate econometric modeling of FDI's impact on health expenditure in Nigeria.

4.5 Unit Root Test at First Difference

Table 4.4 Unit Root Test at First Difference

variables	ADF Test Statistics	ADF Critical Value			Other of Integration	Remarks
		1% level	5% level	10% level		
HE	-6.153479	-3.653730	-2.957110	-2.617434	1(1)	Stationary
GDP	4.668938	-3.679322	-2.967767	-2.622989	1(1)	Stationary
FDI	-6.967159	-3.653730	-2.957110	-2.617434	1(1)	Stationary
GE	4.406633	-3.699871	-2.976263	-2.627420	1(1)	Stationary

Source: Author's computation using Eview (2025)

The unit root test at first difference confirms that all variables (**HE, GDP, FDI, and GE**) are **stationary** at **I(1)** after differencing. This indicates that the data no longer exhibit unit roots, making them suitable for regression analysis without spurious correlations.

4.6 Johansen Co-Integration Test

Table 4.6 Johansen Co-Integration Test

Date: 02/15/25 Time: 07:09
Sample (adjusted): 1992 2023
Included observations: 32 after adjustments
Trend assumption: Linear deterministic trend
Series: HE___USD_BILLION_ GE__USD_BILLION_ GDP__USD_BILLION_ FDI__USD_BILLION_
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.711247	70.40439	47.85613	0.0001
At most 1 *	0.491513	30.65447	29.79707	0.0397
At most 2	0.224898	9.012362	15.49471	0.3642
At most 3	0.026518	0.860034	3.841466	0.3537

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.711247	39.74992	27.58434	0.0009
At most 1 *	0.491513	21.64211	21.13162	0.0424
At most 2	0.224898	8.152328	14.26460	0.3634
At most 3	0.026518	0.860034	3.841466	0.3537

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's computation using Eview (2025)

The Johansen cointegration test results indicate the presence of a long-term relationship among FDI, health expenditure (HE), government expenditure (GE), and GDP in Nigeria. The trace and maximum eigenvalue tests both reject the null hypothesis of no cointegration, suggesting two cointegrating equations at the 0.05 significance level. This means that the variables are related in the long run, and their movements are linked. Therefore, FDI likely impacts health expenditure in Nigeria, and any deviations from this relationship will adjust over time.

4.7 Estimation Result

Table 4.6 Regression Analysis

Dependent Variable: HE___USD_BILLION_
Method: Least Squares
Date: 02/05/25 Time: 15:53
Sample: 1990 2023
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.165680	13.51779	-0.678046	0.5029
GDP__USD_BILLION_	0.003546	0.000433	8.192290	0.0000
FDI__USD_BILLION_	9.039952	7.032204	1.285508	0.2085
GE__USD_BILLION_	-0.018836	0.005864	-3.212206	0.0031

R-squared	0.963308	Mean dependent var	132.6606
Adjusted R-squared	0.959639	S.D. dependent var	144.8525
S.E. of regression	29.10093	Akaike info criterion	9.689548
Sum squared resid	25405.92	Schwarz criterion	9.869120
Log likelihood	-160.7223	Hannan-Quinn criter.	9.750787
F-statistic	262.5406	Durbin-Watson stat	1.531068
Prob(F-statistic)	0.000000		

The estimated coefficients, standard errors, t-statistics, and probability (p-values) for each variable are summarized in the table below:

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**p-Value**
Constant (C)	-9.1657	13.5178	-0.6780	0.5029
FDI	9.0399	7.0322	1.2855	0.2085 (Not significant)

Variable	Coefficient	Std. Error	t-Statistic	p-Value
GDP	0.0035	0.0004	8.1922	0.0000 (Highly significant)
GE	-0.0188	0.0059	-3.2122	0.0031 (Significant)

Model Performance and Goodness of Fit

- **R-squared: 0.9633** → This means 96.33% of the variations in health expenditure are explained by the independent variables (FDI, GDP, and GE).
- **Adjusted R-squared: 0.9596** → The model remains highly predictive even after adjusting for degrees of freedom.
- **F-statistic: 262.54 (p = 0.0000)** → The overall model is statistically significant, meaning the independent variables collectively explain the variations in health expenditure.

Interpretation of Key Findings

FDI and Health Expenditure

Coefficient of FDI : 9.0399

This suggests that a 1 billion USD increase in FDI leads to a 9.04 billion USD increase in health expenditure.

p-value = 0.2085 (greater than 0.05)

This indicates that FDI does not have a statistically significant impact on health expenditure at a 5% significance level.

Conclusion: We fail to reject the first null hypothesis (H_0) → FDI does not significantly impact health expenditure in Nigeria.

GDP and Health Expenditure

Coefficient of GDP: 0.0035

A 1 billion USD increase in GDP leads to a 0.0035 billion USD increase in health expenditure.

p-value = 0.0000 (highly significant)

Economic growth has a strong, positive, and statistically significant effect on health expenditure.

Conclusion: A growing economy directly contributes to increased health spending, suggesting that a strong economic foundation is crucial for healthcare investment.

Government Expenditure (GE) and Health Expenditure

Coefficient of GE: -0.0188

A 1 billion USD increase in government expenditure leads to a 0.0188 billion USD decrease in health expenditure.

p-value = 0.0031 (significant at the 5% level)

This suggests a statistically significant negative relationship between government expenditure and health spending.

Conclusion: The negative effect raises concerns about inefficiencies or misallocation of public health resources, meaning increased government spending may not always lead to better health outcomes.

4.8 Discussion Of Findings

Foreign Direct Investment (FDI) is often regarded as a catalyst for economic development, bringing in capital, technology, and expertise to various sectors, including healthcare. This study examines whether FDI has a significant impact on health expenditure in Nigeria using an Ordinary Least Squares (OLS) regression model. The analysis controls for economic growth (proxied by GDP growth rate) and government expenditure (GE) to isolate the specific effect of FDI on health expenditure (HE). The study also explores whether FDI influences healthcare accessibility, quality, and private sector investment in healthcare services.

Three null hypotheses (H_0) were tested: (1) FDI does not significantly impact health expenditure, (2) FDI does not significantly affect healthcare accessibility and quality, and (3) FDI does not significantly influence private sector investment in healthcare services. The OLS regression was estimated using annual data from 1990 to 2023 (34 years). The model demonstrated a strong fit, with an R-squared value of 0.9633, meaning that 96.33% of the variation in health expenditure was explained by the independent variables (FDI, GDP, and GE). The F-statistic of 262.54 ($p = 0.0000$) confirmed that the overall model was statistically significant.

However, despite a positive coefficient of 9.04 for FDI, indicating that a 1 billion USD increase in FDI could lead to a 9.04 billion USD increase in health expenditure, the effect was

statistically insignificant (p = 0.2085). This means there is no sufficient evidence to reject the first null hypothesis, implying that FDI does not significantly impact health expenditure in Nigeria. In contrast, GDP growth had a strong and statistically significant positive effect on health expenditure (p = 0.0000), confirming that economic growth plays a key role in increasing health spending. Interestingly, government expenditure (GE) had a statistically significant but negative effect on health expenditure (p = 0.0031), suggesting potential inefficiencies in public health spending.

Given that FDI does not significantly impact total health expenditure, its effect on healthcare accessibility and quality remains uncertain. Accessibility and quality indicators—such as hospital infrastructure, medical workforce, and service availability—were not included in the model, making it difficult to assess whether FDI directly improves healthcare services. Therefore, the second null hypothesis could not be rejected, and further research incorporating direct healthcare indicators is needed. Similarly, the third null hypothesis regarding private sector healthcare investment remains inconclusive, as the current model did not include private healthcare investment as a separate variable. Future studies should analyze whether FDI encourages or crowds out private healthcare financing in Nigeria.

From a policy perspective, economic growth appears to be the strongest driver of healthcare investment, highlighting the need for policies that promote sustainable economic development to improve healthcare financing. The negative effect of government expenditure on health spending suggests inefficiencies that require further investigation. Policymakers should evaluate resource allocation, reduce corruption, and ensure funds reach healthcare services.

Since FDI does not significantly impact overall health expenditure, targeted incentives should be introduced to attract FDI specifically in healthcare infrastructure, pharmaceuticals, and hospital development.

In conclusion, this study finds no statistically significant evidence that FDI influences health expenditure in Nigeria. Instead, economic growth plays a crucial role in determining healthcare spending, while government expenditure has a negative relationship with health expenditure, suggesting inefficiencies. To gain a clearer picture of FDI's impact on Nigeria's healthcare sector, future research should incorporate private healthcare investment, healthcare quality metrics, and accessibility indicators.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary

This study investigated the impact of Foreign Direct Investment (FDI) on health expenditure in Nigeria, considering economic growth (GDP) and government expenditure (GE) as control variables. The research employed an Ordinary Least Squares (OLS) regression model using annual data from 1990 to 2023. The primary objective was to determine whether FDI significantly influences health expenditure, healthcare accessibility and quality, and private sector investment in healthcare services. The study tested three null hypotheses: (1) FDI does not significantly impact health expenditure, (2) FDI does not significantly affect healthcare accessibility and quality, and (3) FDI does not significantly influence private sector investment in healthcare.

The regression results showed that while FDI had a positive coefficient of 9.04, suggesting a potential increase in health expenditure, the effect was statistically insignificant ($p = 0.2085$). This implies that there is no sufficient evidence to conclude that FDI directly affects health expenditure in Nigeria. Conversely, GDP exhibited a strong and statistically significant positive impact on health expenditure ($p = 0.0000$), indicating that economic growth is a key determinant of healthcare financing. Notably, government expenditure had a statistically significant negative effect on health expenditure ($p = 0.0031$), suggesting inefficiencies in public health spending.

The study also found that FDI's effect on healthcare accessibility and quality remains uncertain due to the absence of direct indicators in the model. Similarly, the impact of FDI on private sector healthcare investment could not be determined, as private healthcare investment was not included as a separate variable in the analysis. Given these findings, further research is needed to explore the role of FDI in enhancing healthcare accessibility and private sector participation in Nigeria's healthcare sector.

5.2 Conclusion

The findings of this study indicate that FDI does not have a statistically significant impact on health expenditure in Nigeria. While FDI showed a positive association with health expenditure, the lack of statistical significance suggests that other factors, such as economic growth and government policies, play more crucial roles in determining healthcare financing. Economic growth emerged as the strongest driver of health expenditure, highlighting the importance of sustainable economic development in improving healthcare investment. The negative impact of government expenditure on health spending suggests inefficiencies in public sector resource allocation, warranting further investigation.

Overall, the results imply that FDI alone is not a sufficient determinant of healthcare expenditure in Nigeria. Instead, targeted policies that promote economic growth and efficient government spending are essential for enhancing healthcare financing. Additionally, the absence of significant findings on healthcare accessibility and private sector investment suggests the need for more comprehensive models that include direct healthcare indicators.

5.3 Recommendations

Based on the study's findings, the following recommendations are proposed:

1. **Encouraging Sector-Specific FDI**: While FDI in general does not significantly impact health expenditure, targeted policies should be introduced to attract FDI specifically in healthcare infrastructure, pharmaceutical industries, and hospital development. Incentives such as tax breaks and public-private partnerships could help direct more FDI into the health sector.
2. **Enhancing Economic Growth Policies**: Since GDP growth was found to have a strong positive impact on health expenditure, policymakers should focus on economic strategies that promote long-term growth. Stable economic policies, industrial development, and job creation will enhance national income and, consequently, healthcare financing.
3. **Improving Government Health Expenditure Efficiency**: The study revealed a negative relationship between government expenditure and health spending, suggesting inefficiencies. Policymakers should ensure better allocation of public funds, minimize corruption, and implement monitoring mechanisms to enhance the effectiveness of government spending in the health sector.
4. **Expanding Research on Healthcare Accessibility and Private Investment**: Future studies should incorporate indicators such as hospital infrastructure, medical workforce availability, and private healthcare investments to provide a clearer understanding of FDI's role in improving healthcare services.

5. **Strengthening Public-Private Partnerships**: To improve healthcare accessibility and quality, the government should foster collaborations between the public and private sectors. This can help mobilize resources, expand healthcare facilities, and enhance service delivery across Nigeria.

Overall, this study underscores the importance of economic growth and efficient public spending in driving health expenditure in Nigeria. While FDI alone does not significantly influence healthcare financing, targeted investment strategies can enhance its contribution to the health sector. Future research should adopt a broader approach to include more healthcare-specific variables to fully understand the impact of FDI on Nigeria's healthcare system.

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APPENDIX

year	GDP (USD Billion)	HE (USD Billion)	GE (USD Billion)	FDI (USD Billion)
1990	4.95E+02	0.5	60.3	1.088
1991	5.90E+02	0.62	66.6	1.197
1992	9.06E+02	0.15	92.8	1.722
1993	1.26E+03	3.87	191.2	2.372
1994	1.77E+03	2.09	160.9	2.437
1995	3.10E+03	3.32	248.8	0.238
1996	4.09E+03	3.18	337.2	0.269
1997	4.42E+03	3.89	428.2	0.234
1998	4.81E+03	4.74	487.1	0.137
1999	5.48E+03	16.64	947.7	1.699
2000	7.06E+03	15.22	701.1	1.648
2001	8.23E+03	24.52	1,018.0	1.619
2002	1.15E+04	40.62	1,018.2	1.972
2003	1.36E+04	33.27	1,226.0	1.915
2004	1.81E+04	34.2	1,504.2	1.380
2005	2.31E+04	55.7	1,919.7	2.836

2006	3.04E+04	62.25	2,038.0	2.036
2007	3.47E+04	81.91	2,450.9	2.169
2008	4.00E+04	98.22	3,240.8	2.414
2009	4.35E+04	90.2	3,453.0	2.900
2010	5.55E+04	99.1	4,194.6	1.642
2011	6.37E+04	231.8	4,712.1	2.133
2012	7.26E+04	197.9	4,605.3	1.524
2013	8.10E+04	180	5,185.3	1.070
2014	9.01E+04	195.98	4,587.4	0.817
2015	9.52E+04	257.7	4,988.9	0.622
2016	1.03E+05	200.82	5,858.6	0.853
2017	1.15E+05	245.19	6,456.7	0.642
2018	1.29E+05	296.44	7,813.7	0.184
2019	1.46E+05	388.37	9,712.2	0.486
2020	1.54E+05	423.33	10,232.3	0.552
2021	1.76E+05	386.24	12,164.1	0.752
2022	2.02E+05	406.24	14,946.2	-0.039
2023	2.34E+05	426.24	19,808.4	0.515

DESCRIPTIVE STATISTICS

	HE___USD_BILLION_	GE__USD_BILLION_	GDP__USD_BILLION_	FDI__USD_BILLION_
Mean	132.6606	4025.191	58070.71	1.295099
Median	72.08000	2244.448	32525.56	1.288550
Maximum	426.2400	19808.44	234425.9	2.900249
Minimum	0.150000	60.26820	494.6437	-0.039127
Std. Dev.	144.8525	4693.497	65322.39	0.842950
Skewness	0.859713	1.666142	1.117183	0.168735
Kurtosis	2.360899	5.523883	3.263955	1.887254
Jarque-Bera	4.766903	24.75497	7.171263	1.915461
Probability	0.092232	0.000004	0.027719	0.383763
Sum	4510.460	136856.5	1974404.	44.03338
Sum Sq. Dev.	692414.5	7.27E+08	1.41E+11	23.44866
Observations	34	34	34	34

CORRELATION ANALYSIS

	HE___USD_BILLION_	GE__USD_BILLION_	GDP__USD_BILLION_	FDI__USD_BILLION_
HE___USD_BILLION_	1	0.937394486784091	0.9748409403110172	-0.4482917136624187
GE__USD_BILLION_	0.937394486784091	1	0.9819247097749573	-0.4299209722886607
GDP__USD_BILLION_	0.9748409403110172	0.9819247097749573	1	-0.4772826432568436
FDI__USD_BILLION_	-0.4482917136624187	-0.4299209722886607	-0.4772826432568436	1

Unite Root At Levels

GDP

Null Hypothesis: GDP__USD_BILLION_ has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		12.86068	1.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP__USD_BILLION_)
Method: Least Squares
Date: 02/16/25 Time: 14:40
Sample (adjusted): 1991 2023
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP__USD_BILLIO N_(-1)	0.122668	0.009538	12.86068	0.0000
C	620.9478	743.4987	0.835170	0.4100

R-squared	0.842157	Mean dependent var	7088.826
Adjusted R-squared	0.837065	S.D. dependent var	7793.112
S.E. of regression	3145.708	Akaike info criterion	19.00416
Sum squared resid	3.07E+08	Schwarz criterion	19.09485
Log likelihood	-311.5686	Hannan-Quinn criter.	19.03467
F-statistic	165.3971	Durbin-Watson stat	1.422741
Prob(F-statistic)	0.000000		

GE

Null Hypothesis: GE__USD_BILLION_ has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		8.177057	1.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GE__USD_BILLION_)
Method: Least Squares
Date: 02/16/25 Time: 15:26
Sample (adjusted): 1991 2023
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GE__USD_BILLION_(-1)	0.220175	0.026926	8.177057	0.0000
C	-182.5120	139.4752	-1.308562	0.2003

R-squared	0.683235	Mean dependent var	598.4294
Adjusted R-squared	0.673016	S.D. dependent var	1021.158
S.E. of regression	583.9237	Akaike info criterion	15.63611
Sum squared resid	10569972	Schwarz criterion	15.72681
Log likelihood	-255.9958	Hannan-Quinn criter.	15.66663
F-statistic	66.86426	Durbin-Watson stat	1.397681
Prob(F-statistic)	0.000000		

FDI

Null Hypothesis: FDI__USD_BILLION_ has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.391226	0.1518
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI__USD_BILLION_)
Method: Least Squares
Date: 02/16/25 Time: 15:32
Sample (adjusted): 1991 2023
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI__USD_BILLION_(-1)	-0.323749	0.135390	-2.391226	0.0230
C	0.409571	0.211081	1.940350	0.0615

R-squared	0.155727	Mean dependent var	-0.017373
Adjusted R-squared	0.128492	S.D. dependent var	0.692819
S.E. of regression	0.646779	Akaike info criterion	2.025066
Sum squared resid	12.96800	Schwarz criterion	2.115764
Log likelihood	-31.41360	Hannan-Quinn criter.	2.055583
F-statistic	5.717960	Durbin-Watson stat	2.099447
Prob(F-statistic)	0.023048		

HE

Null Hypothesis: HE___USD_BILLION_ has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.575127	0.9868
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(HE___USD_BILLION_)

Method: Least Squares

Date: 02/16/25 Time: 15:48

Sample (adjusted): 1991 2023

Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HE___USD_BILLION_(-1)	0.026183	0.045526	0.575127	0.5694
C	9.660691	8.346098	1.157510	0.2559
R-squared	0.010557	Mean dependent var		12.90121

Adjusted R-squared	-0.021360	S.D. dependent var	34.99825
S.E. of regression	35.37006	Akaike info criterion	10.02830
Sum squared resid	38782.28	Schwarz criterion	10.11900
Log likelihood	-163.4670	Hannan-Quinn criter.	10.05882
F-statistic	0.330771	Durbin-Watson stat	2.306265
Prob(F-statistic)	0.569357		

At First Difference

Null Hypothesis: D(FDI__USD_BILLION_) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.967159	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI__USD_BILLION_,2)
Method: Least Squares
Date: 02/16/25 Time: 15:37
Sample (adjusted): 1992 2023
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI__USD_BILLION_(-1))	-1.246630	0.178929	-6.967159	0.0000

C	-0.030002	0.122763	-0.244387	0.8086

R-squared	0.618035	Mean dependent var	0.013906
Adjusted R-squared	0.605303	S.D. dependent var	1.103917
S.E. of regression	0.693535	Akaike info criterion	2.166431
Sum squared resid	14.42971	Schwarz criterion	2.258039
Log likelihood	-32.66289	Hannan-Quinn criter.	2.196796
F-statistic	48.54130	Durbin-Watson stat	2.022728
Prob(F-statistic)	0.000000		

GDP

Null Hypothesis: D(GDP__USD_BILLION_) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.668938	1.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP__USD_BILLION_,2)
Method: Least Squares
Date: 02/16/25 Time: 15:39
Sample (adjusted): 1995 2023
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP__USD_BILLION_(-1))	0.388942	0.145729	2.668938	0.0134

D(GDP__USD_BILLION_(-1),2)	-0.853456	0.259096	-3.293981	0.0031
D(GDP__USD_BILLION_(-2),2)	-0.676743	0.280482	-2.412791	0.0238
D(GDP__USD_BILLION_(-3),2)	-0.856947	0.285495	-3.001615	0.0062
C	-92.36595	974.3597	-0.094797	0.9253

R-squared	0.400787	Mean dependent var	1087.906
Adjusted R-squared	0.300919	S.D. dependent var	3928.686
S.E. of regression	3284.817	Akaike info criterion	19.18760
Sum squared resid	2.59E+08	Schwarz criterion	19.42334
Log likelihood	-273.2201	Hannan-Quinn criter.	19.26143
F-statistic	4.013142	Durbin-Watson stat	2.026349
Prob(F-statistic)	0.012448		

GE

Null Hypothesis: D(GE__USD_BILLION_) has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		4.406633	1.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GE__USD_BILLION_,2)
Method: Least Squares
Date: 02/16/25 Time: 15:40
Sample (adjusted): 1997 2023
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GE__USD_BILLION_(-1))	1.949815	0.442473	4.406633	0.0003
D(GE__USD_BILLION_(-1),2)	-2.092798	0.509741	-4.105612	0.0005
D(GE__USD_BILLION_(-2),2)	-1.286507	0.512504	-2.510236	0.0208
D(GE__USD_BILLION_(-3),2)	-1.336863	0.522530	-2.558441	0.0187
D(GE__USD_BILLION_(-4),2)	-1.919369	0.574130	-3.343089	0.0032
D(GE__USD_BILLION_(-5),2)	-1.333318	0.441237	-3.021774	0.0067
C	-361.5772	172.2275	-2.099416	0.0487

R-squared	0.547108	Mean dependent var	176.8051
Adjusted R-squared	0.411240	S.D. dependent var	750.3166
S.E. of regression	575.7232	Akaike info criterion	15.76755
Sum squared resid	6629145.	Schwarz criterion	16.10350
Log likelihood	-205.8619	Hannan-Quinn criter.	15.86744
F-statistic	4.026767	Durbin-Watson stat	1.865947
Prob(F-statistic)	0.008326		

HE

Null Hypothesis: D(HE___USD_BILLION_) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.153479	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HE___USD_BILLION_,2)
Method: Least Squares
Date: 02/16/25 Time: 15:44
Sample (adjusted): 1992 2023
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HE___USD_BILLION_(-1))	-1.114406	0.181102	-6.153479	0.0000
C	14.75122	6.737423	2.189445	0.0365

R-squared	0.557948	Mean dependent var	0.621250
Adjusted R-squared	0.543213	S.D. dependent var	53.01502
S.E. of regression	35.83075	Akaike info criterion	10.05595
Sum squared resid	38515.28	Schwarz criterion	10.14756
Log likelihood	-158.8952	Hannan-Quinn criter.	10.08632
F-statistic	37.86530	Durbin-Watson stat	2.059159
Prob(F-statistic)	0.000001		

Johansen Co-Integration Test

Date: 02/15/25 Time: 07:09
Sample (adjusted): 1992 2023
Included observations: 32 after adjustments
Trend assumption: Linear deterministic trend
Series: HE___USD_BILLION_ GE__USD_BILLION_ GDP__USD_BILLION_ FDI__USD_BILLION_
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.711247	70.40439	47.85613	0.0001
At most 1 *	0.491513	30.65447	29.79707	0.0397
At most 2	0.224898	9.012362	15.49471	0.3642
At most 3	0.026518	0.860034	3.841466	0.3537

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.711247	39.74992	27.58434	0.0009
At most 1 *	0.491513	21.64211	21.13162	0.0424
At most 2	0.224898	8.152328	14.26460	0.3634
At most 3	0.026518	0.860034	3.841466	0.3537

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

HE___USD_BILLION_	GE__USD_BILLION_	GDP__USD_BILLION_	FDI__USD_BILLION_

-0.005671	0.001481	-2.36E-05	0.271996
0.063716	-0.001031	-0.000113	0.143474
-0.013742	-0.001194	0.000126	1.642346
-0.004168	0.001658	-9.75E-05	0.445607

Unrestricted Adjustment Coefficients (alpha):

D(HE___USD_B ILLION_)	-16.30543	-9.992038	5.787750	-2.410996
D(GE__USD_BI LLION_)	257.8586	-278.2526	-93.00581	33.50592
D(GDP__USD_ BILLION_)	2764.920	-680.8061	249.2524	-15.16103
D(FDI__USD_BI LLION_)	-0.062119	-0.085937	-0.235506	-0.062104

1 Cointegrating Equation(s): Log likelihood -708.2368

Normalized cointegrating coefficients (standard error in parentheses)

HE___USD_BIL LION_	GE__USD_BILLI ON_	GDP__USD_BIL LION_	FDI__USD_BILLI ON_
1.000000	-0.261169	0.004159	-47.96416
	(0.05601)	(0.00329)	(37.6834)

Adjustment coefficients (standard error in parentheses)

D(HE___USD_B ILLION_)	0.092465
	(0.02898)
D(GE__USD_BI LLION_)	-1.462270
	(0.57285)
D(GDP__USD_ BILLION_)	-15.67937
	(2.31463)
D(FDI__USD_BI LLION_)	0.000352
	(0.00071)

2 Cointegrating Equation(s): Log likelihood -697.4157

Normalized cointegrating coefficients (standard error in parentheses)

HE___USD_BIL LION_	GE__USD_BILLI ON_	GDP__USD_BIL LION_	FDI__USD_BILLI ON_
1.000000	0.000000	-0.002159	5.567835
		(0.00019)	(5.97598)
0.000000	1.000000	-0.024191	204.9707
		(0.00467)	(149.114)

Adjustment coefficients (standard error in parentheses)

D(HE___US D_BILLION_)	-0.544187	-0.013849	
	(0.30196)	(0.00852)	
D(GE__USD _BILLION_)	-19.19140	0.668725	
	(5.43784)	(0.15339)	
D(GDP__US D_BILLION_)	-59.05757	4.796747	
	(24.6729)	(0.69599)	
D(FDI__USD _BILLION_)	-0.005123	-3.42E-06	
	(0.00795)	(0.00022)	

3 Cointegrating Equation(s): Log likelihood-693.3395

Normalized cointegrating coefficients (standard error in parentheses)

HE___USD_ BILLION_	GE__USD_BI LLION_	GDP__USD_ BILLION_	FDI__USD_B ILLION_
1.000000	0.000000	0.000000	68.53978
			(20.0825)
0.000000	1.000000	0.000000	910.4431
			(275.574)
0.000000	0.000000	1.000000	29162.50
			(8339.43)

Adjustment coefficients (standard error in parentheses)

D(HE___US D_BILLION_)	-0.623721	-0.020760	0.002239
	(0.29979)	(0.00991)	(0.00078)

D(GE__USD_BILLION_)	-17.91333	0.779778	0.013555
	(5.43236)	(0.17965)	(0.01416)
D(GDP__USD_BILLION_)	-62.48275	4.499128	0.042866
	(25.0323)	(0.82785)	(0.06526)
D(FDI__USD_BILLION_)	-0.001887	0.000278	-1.85E-05
	(0.00755)	(0.00025)	(2.0E-05)