Financial Sector Development and Health Outcomes in Nigeria

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Certification

This is to certify that this thesis titled "Financial Sector Development and Health Outcomes in Nigeria" was carried out by Ibrahim SAMAILA with Matriculation number of LCU/PG/002779 in the Department of Economics, Faculty of Management and Social Sciences, Lead City University, Ibadan, under my supervision and that this work has not been previously submitted.

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Dedication

This research is dedicated to almighty ALLAH, who in his infinite mercy spared my life up to this present moment and for his grace,care, love and opportunity given to me to be able to achieve my aim during the computation of this thesis.

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Abstract

One major problem arising from the relationship of financial sector development and health outcomes in the Nigerian economy is the lack of comprehensive understanding of how specific financial instruments and institutions influence various health indicators like life expectancy and child mortality.Existing studies often focus on aggregate measures, and there is a need for more in-depth investigations that consider the diverse pathways through which financial sector dynamics such as money, bank and stock markets influence specific health outcomes.This study investigates the effects of money market instruments (monetary policy rate, 12-month deposit rate and treasury bill rate), bank sector (liquidity ratio, loan to deposit ratio and domestic credit), and stock market indices (market capitalization, market stock traded and all share index) on health outcome in Nigeria over the period 1985-2022. Using the ARDL bound testing approach, monetary policy rate and 12-month deposit rate have negative impact on short-run life expectancy in Nigeria. Meanwhile, life expectancy reacted positively to monetary policy rate but negatively affected by treasury bill rate in the long run. Treasury bill rate and 12-month deposit rate positively relate with child mortality rate in the short run.It discovers that liquidity ratio positively influences life expectancy both in the short and long run. The study found that under-5 mortality is positively and significantly influenced by bank sector development measures in the short run. Only liquidity ratio and domestic credit are negatively significant on long-run child mortality.In addition, total stocks transaction value influences life expectancy positively in the short run but negatively in the long run. Also, all share index directly influence life expectancy both in the short and long run. Stock market capitalization negatively influence child mortality both in the short and long run. However, total stock transaction value positively relates to under-5 mortality in the short and long run. All share index has a direct influence on child mortality rate in the short run.There is a need for the policymakers and government agencies to carefully consider the potential health implications when implementing measures that increase interest rates. Also, they should balance the long-term economic goals with the potential health consequences.

Keywords: Money market, banking sector, stock market, life expectancy, child mortality.

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Chapter One

Introduction

1.1 Background to the Study

Nigeria, as the most populous nation in Africa, has experienced significant economic changes in recent decades. The economy of the region encompasses a wide range of sectors, such as agriculture, industry, services, and oil production. The financial sector, which includes the money market, stock market, and banking business, has had a significant impact on shaping the economic landscape of the country. Simultaneously, Nigeria has faced persistent obstacles in health outcomes, encompassing indicators like as life expectancy and rates of infant mortality.

The health status of each economy plays a crucial role in the advancement and nourishment of human capital. The health status is closely related to economic developments[1].There is also a contention that the enhancement of health status is concurrently fostering economic expansion by boosting productivity. The impact of population health on a country's productivity is significant, as a robust labor force is essential for making substantial contributions to the production and growth of national output. Like a conventional production function, wherein the quantity or level of inputs influences the quantity or level of output based on the scale of production and returns to scale, the financial sector facilitates the provision of funds that accelerate economic activities, thereby contributing to an expansion in national productivity[2].

The financial sector plays a vital role in the economic advancement of every country. The money market in Nigeria is a crucial element comprising various financial instruments such as treasury bills, commercial papers, and certificates of deposit. These instruments are subject to regulation by the Central Bank of Nigeria (CBN). Over the course of its existence, the subject in question has experienced notable transformations with the objective of improving the availability of liquid assets, expanding the scope of financial markets, and refining the process of allocating capital effectively. In a similar vein, the Nigerian Exchange Group (NEG) has undergone significant development as the principal venue for trading equities, drawing the attention of both domestic and international investors due to regulatory reforms and developments in technology. The banking industry has experienced significant expansion, assuming a crucial function in facilitating financial intermediation, credit distribution, and payment mechanisms, while regulatory actions have been implemented to safeguard stability and safeguard the interests of consumers. Simultaneously, a rise in the overall productivity of a nation guarantees the provision of necessary products and services to households, so contributing to an enhanced standard of life.

The impact of financial sector development on population health is evident in its direct provision of financial products and services, as well as its indirect influence on a nation's economic prosperity[3].Financial development refers to a policy-oriented process that aims to eliminate regulatory constraints on financial operations, allowing market forces to function as the primary mechanism for determining the prices of financial services[4]. According to prevailing economic theory, it is widely acknowledged that the presence of robust financial development is crucial for some sectors of the economy, such as the health sector. This factor significantly contributes to the overall enhancement of economic growth[5]. The positive impacts of financial development on a nation's macro economy, such as fostering economic growth, are widely acknowledged. It is expected that these benefits would extend to several areas of the economy, including the healthcare sector[6].

Financial growth can have a significant impact on the health status of a nation through a range of pathways. The first channel to consider is the income effect. The process of financial development facilitates the emergence of industrialization and leads to innovative economic endeavors, resulting in an increase in both employment levels and per capita income. The increase in per capita income enables individuals to access health and nutritional food, improved housing, advanced medical institutions, and healthcare services, all of which contribute to excellent health outcomes at the national level. Furthermore, it is worth noting that education serves as an important link that can exert a beneficial influence on life expectancy. This is because advancements in financial development have the propensity to enhance the overall literacy rate within a given culture, hence contributing to an increase in life expectancy. Another significant factor to consider is the impact of gender equality, which posits that as the financial sector of the economy develops, women in society experience increased financial independence[7].

In order to attain optimal levels of health, it is imperative to ascertain the essence of health as well as the influential aspects that impact it. Failure to identify the elements that pose a threat to health, along with their respective significance, can lead to a sense of uncertainty surrounding the implementation of actions aimed at promoting the well-being of both individuals and society. Conversely, certain countries, particularly those characterized by poverty and need, have experienced a distribution of resources through time that has led to diminished healthcare access and heightened death rates.

The promotion of public health has garnered significant interest from economists and policymakers, who have been actively engaged in identifying the most effective approaches and mechanisms. These endeavors have yielded noteworthy outcomes, positively impacting human health and overall well-being across many regions globally. The extent to which life expectancy is elevated is dependent upon the allocation of resources by nations towards enhancing social indicators, including but not limited to healthcare, education, retirement provisions, health initiatives, food infrastructure, and environmental amelioration. Enhancing the health status of individuals within a given community is a crucial concern for health policy makers. The life expectancy at birth has been adversely affected by various reasons, including insufficient healthcare infrastructure, a significant disease burden, and socio-economic inequalities. Despite certain advancements in recent times, the life expectancy in Nigeria continues to fall behind the global average. In addition, it is noteworthy that infant mortality rates have consistently exhibited elevated levels when compared to global benchmarks. This can be mostly attributed to challenges pertaining to the availability of maternal and child healthcare services, malnutrition, and the prevalence of infectious diseases. Despite the implementation of government efforts such as the National Health Insurance Scheme (NHIS), the problem continues to persist. While previous studies have explored the general connection between economic development and health, the primary objective of this research is to specifically analyze the impact of the financial sector, encompassing the money market, stock market, and banking industry, on health indicators such as life expectancy and child mortality in Nigeria.

Moreover, several authors in the empirical literature have posited that the financial sector of an economy exerts a significant influence on the health outcomes of its population[8, 9]. The authors highlighted that the theoretical connection between financial development and health outcomes is contingent upon health expenditure in the empirical literature[10]. The underlying cause of this phenomenon can be attributed to the positive impact of financial development on the allocation of finances across all sectors of the economy, including the health sector, which manifests as increased health expenditure.

1.2 Statement of the Problem

Nigeria stands at a crossroads marked by continuous progress and persistent challenges in its financial sector and health outcomes. The financial sector, which encompasses the money market, stock market, and banking business, has experienced significant expansion and undergone regulatory reforms, indicative of its economic dynamism. Despitethe significant economic expansion, life expectancy falls below worldwide averages, while infant mortality rates remain high. This highlights a concerning disparity between economic growth and the well-being of public health.

Economists have posited that a substantial portion of a country's resources ought to be allocated towards the healthcare sector with the aim of enhancing the overall health outcomes of its populace[11]. Nevertheless, the health sector in developing nations, namely Nigeria in this context, continues to face significant obstacles related to limited availability, high expenses, and insufficient access to appropriate funding, thereby impeding the efficacy of the healthcare system. In 2019, the World Health Organization (WHO) highlighted that Nigeria, like many other African nations, continues to exhibit below-average levels of healthcare expenditure per capita[12,13]. Moreover, the proportion of GDP allocated to the health sector remains relatively low in comparison to affluent nations[14].

The global trade stance of Sub-Saharan African nations, particularly Nigeria, has been influenced by the execution of structural reforms, as reported by the Economist Intelligence Unit. Nigeria has emerged as a notable exemplar in implementing effective financial development strategies. Nevertheless, notwithstanding the advancements in financial growth, the health sector has not witnessed substantial enhancements. The SSA region, including Nigeria, continues to witness slow advancements in population health. For example, Nigeria has a high HIV prevalence, affecting over 69% of adults[15]. Additionally, it is worth noting that the mortality rate for children under the age of five in the Sub-Saharan Africa (SSA) region was calculated to be 89.2 per 1,000 live births in the year 2013, as reported by the World Bank in 2014. The life expectancy in Nigeria has a persistently low trend, with an estimated average of 56 years for females and 54 years for males, according to the World Development Indicators (WDI) data for the year 2022. Also, the infant mortality rate in Nigeria stands at 72 per 1,000 live births as reported by the World Bank in 2022. Furthermore, a significant number of nations in the region, Nigeria included, were unable to meet the health-related targets set forth by the Millennium Development Goals[16].

The role of financial development is conspicuously absent in the health care system financing literature even though financial markets play a key role in mobilizing resources for health care expenditure and investment at both household and national levels. The current body of scholarly research on health care funding appears to neglect the significance of financial development in the context of health care financing, which has a direct impact on health outcomes. Hence, the primary objective of this research is to investigate the impact of financial development on health outcomes within the context of Nigeria.

1.3 Research Questions

The following questions are developed in line with the objectives above to guide the research questions.

1. What is the influence of money market development on health outcomes in Nigeria?
2. To what extent does bank sector development influence health outcomes in Nigeria?
3. How does stock market development affect the health outcomes in Nigeria?

1.4 Objectives of the Study

The broad objective of the study is to investigate the effect of financial development on health outcomes in Nigeria.The specific objectives were to:

1. investigate the role of money market development on health outcome in Nigeria.
2. evaluate the influence of bank sector development on health outcome in Nigeria.
3. determine the effect of stock market development on health outcome in Nigeria.

1.5 Hypotheses

The following hypotheses are developed in line with the objectives above to guide the research questions.

H_{01}: There is no significant effect of money market development on health outcome in Nigeria.

H_{02}: There is no significant effect of bank sector development on health outcome in Nigeria.

H_{03}: There is no significant effect of stock market development on health outcome in Nigeria.

1.6 Scope of the Study

This study focused on investigating the effect of financial sector development and health outcomes in Nigeria between the period of 1985 and 2022. This scope was selected because it falls under the period of financial sector reforms in Nigeria when the government of Nigeria has been emphasizing that banks increase their provision for credit to the private sector. Moreover, the study intends to recognize the post-structural period were health sector reforms takes a full shape in Nigeria. Data was sourced from the Central Bank of Nigeria (CBN) statistical bulletin and Word development Indicators (WDI, 2022).

1.7 Significance of the Study

The study's significance lies in bridging the gap between finance and health, shedding light on how financial sector development can influence health outcomes in Nigeria. By comprehending this relationship, policymakers and stakeholders can make well-informed decisions aimed at promoting sustainable economic growth and enhancing health outcomes, so eventually contributing to the overall well-being of the Nigerian population.

The findings of this study have the potential to offer significant insights to policymakers, regulators, and financial institutions operating within the Nigerian context. The examination of the relationship between the growth of the financial sector and health outcomes can shed light on the significance of a robust financial system in facilitating and advancing the general welfare of society. Policymakers can utilize this knowledge to formulate and execute financial sector changes that place emphasis on stability, inclusiveness, and efficiency. This approach can ultimately lead to improved health outcomes by facilitating enhanced funding and investment prospects within the health sector.

This study possesses significance that extends beyond the geographical boundaries of Nigeria. Numerous emerging economies face the same contradiction wherein they have notable economic growth and persistent health inequities. Lessons drawn from this study can be applied globally, offering valuable insights to policymakers in other nations facing similar challenges. Therefore, this study makes a valuable contribution to the existing body of knowledge that guides the creation of policies aimed at striking a balance between economic growth and the well-being of individuals' health in emerging economies.

The examination of how financial sector development impacts health disparities among different socio-economic groups is another crucial aspect of this study's significance. It sheds light on the issue of health equity, which is of paramount importance in a diverse and populous nation like Nigeria. These findings can be utilized by policymakers to formulate policies that aim to achieve a more equitable distribution of the advantages of economic growth throughout society, hence contributing to the mitigation of health inequities.

This study has the potential to serve as a fundamental basis for future research endeavors within the realm of finance and its impact on health outcomes. This study offers an initial framework for investigating the intricate connection between financial development and health. It enables researchers to further examine specific elements, such as the influence of financial inclusion, stability within the banking sector, or the effects of innovative financial products on health indicators. Furthermore, this emphasizes the importance of multidisciplinary research in comprehending the interaction between finance and health, fostering the collaboration of future scholars and the exploration of intriguing lines of investigation.

1.8 Operational Definition of Terms

Credit: a financial facility that enables a person or business to borrow money to purchase products and raw materials.

Deposit money bank: the financial institution licensed by the regulatory authority to mobilize deposits from the surplus unit and channel the funds through loan to the deficit unit and performs other financial activities.

Deposit money bank credit: A credit is the lending of money by one or more individuals, organizations or other entities to other individuals, organizations etc. The recipient incurs a debt, and usually liable to pay interest on that debt until it is repaid, and also to repay the principal amount borrowed.

Financing: To provide funds for a person or an enterprise. Financing is the process of providing funds for business activities making purchases or investing.

Financial Sector: Financial sector is the set of institutions, instruments, markets, as well as the legal and regulatory framework that permit transactions to be made by extending credit.

Financial Reforms: Financial reforms refer to the process or change in the components of the financial sector (i.e. deposit money banks, stock markets other financial intermediaries and a central bank becoming more efficient in providing financial service.

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Chapter Two

Literature Review

This section provides an overview of the relevant concepts, theories, and empirical research pertaining to financial sector development and health outcomes in Nigeria. This section provides a conceptual review for understanding the concepts of financial sector development proxy by money market, stock market and bank sector and health outcomes proxy by life expectancy and infant mortality rate in Nigeria. Furthermore, the study includes an in-depth review of relevant theories and empirical research pertaining to the subject matter. Finally, gaps in the existing body of literature were identified.

2.0 Preamble

2.1 Conceptual Review

2.1.1 Financial Sector Development

Financial sector development refers to the enhancement and advancement of the financial system within an economy. One potential approach involves augmenting the supply of financial assets within the economy and establishing a competent and efficient intermediation mechanism. This strategy aims to boost the overall well-being of individuals in society and foster economic growth. The government frequently enhances its financial system by intervention, achieved by the promulgation of laws, rules, and policies. The primary focus of financial policies centers on the advancement of a nation's financial sector[1]. Therefore, a well-developed financial system is considered to be a driving force behind economic advancements and development.

Financial development pertains to the progression of developing and augmenting the financial system within a given country or region. The concept incorporates multiple dimensions, such as the extent, scope, effectiveness, robustness, and inclusivity of financial institutions, markets, and instruments. The function of financial development is of utmost importance in stimulating economic growth, facilitating the effective allocation of resources, mobilizing savings, and providing support for investment and entrepreneurship.

Financial development encompasses the establishment and enhancement of financial intermediaries, such as banks and non-bank financial institutions, alongside the advancement of financial markets, including money markets, stock markets, equity markets, and derivative markets[2]. These institutions and markets serve as a medium for individuals, organizations, and governments to obtain and manage financial resources, engage in transactions, and mitigate risks.

Financial development also includes the creation and execution of legal and regulatory frameworks that provide support. This encompasses the establishment of legislative and regulatory frameworks that oversee financial operations, guarantee transparency, safeguard the interests of investors and consumers, and uphold the stability and integrity of the financial system.

The notion of financial development is intricately connected to the idea of financial inclusion, which pertains to the provision of accessible and cost-effective financial services to individuals and businesses. Financial inclusion has a pivotal role in fostering comprehensive financial development by facilitating inclusive economic growth, alleviating poverty, and fostering social development.

Empirical research has shown that financial development has significant positive effects on economic growth and development. Numerous studies have presented empirical evidence supporting the existence of a favorable relationship between financial development and economic growth. These studies highlight the significance of financial intermediation and the availability of financial resources in promoting investment, fostering innovation, and enhancing productivity[3].

In basic terms, financial development pertains to the establishment and development of financial institutions, markets, and frameworks that facilitate economic growth, allocation of resources, mobilization of savings, and management of risk. The process encompasses the establishment and advancement of financial intermediaries, markets, and regulatory frameworks. The importance of financial development cannot be overstated in its role of facilitating growth, mitigating poverty, and nurturing inclusive development.

The Nigerian government has implemented several processes, concepts, and policies in its pursuit of achieving effective financial development. These include financial deepening, financial inclusion, financial liberalization, financial intermediation, the cashless policy, and various financial reforms. This section provides an explanation of the government's policies and processes aimed at promoting financial development, which serve as the specific objectives of this study.

2.1.1.1 Money Market Development

The term "money market development" refers to the expansion and development of the money market, a division of the financial market where short-term borrowing and lending of funds are conducted. This development encompasses various aspects, including the expansion of market participants, the introduction of new financial instruments, the enhancement of regulatory frameworks, and the adoption of advanced technologies.

The money market is of paramount importance in the comprehensive operation of the financial system as it enables financial institutions to manage liquidity effectively and serves as a platform for the efficient allocation of short-term funds. The involvement of a wide variety of market participants is one of the key factors influencing money market development[4]. The presence of diversity in a market environment serves to increase market liquidity and mitigate concentration risks.

One of the primary instruments in the Nigerian money market is Treasury Bills (T-Bills). These are short-term government securities with maturities ranging from 91 days to 364 days. Investors purchase T-Bills at a discount to their face value and receive the full face value at maturity. The Central Bank of Nigeria (CBN) issues these bills on a weekly basis through auctions, thereby serving the dual purpose of enhancing liquidity in the financial system and offering opportunities for investment. Open Market Operations (OMO) represent a crucial component inside the money market. The Central Bank of Nigeria (CBN) conducts Open Market Operations (OMO) auctions as a means to regulate liquidity within the money market. The utilization of Open Market Operations (OMO) instruments is employed to absorb surplus money or provide liquidity to the financial system, hence exerting an effect on interest rates and upholding monetary stability. The Nigerian money market encompasses many financial instruments, including Commercial Papers (CPs) and Banker's Acceptances (BAs), in addition to T-Bills and OMO. Commercial papers (CPs) are commonly issued by enterprises and financial institutions as a means to generate short-term capital. Conversely, bank acceptances (BAs) play a crucial role in facilitating trade finance and are particularly vital in international trade transactions. Certificate of Deposits (CDs) are also part of the money market, allowing banks to raise funds from the public for a specified period at a predetermined interest rate.

Significant changes and reforms have been made to the Nigerian money market over time. In 2006, the introduction of the Dutch Auction System (DAS) for T-Bills brought more transparency and competitiveness to the auction process. This change was pivotal in enhancing the efficiency of the market. In 2011, the Nigerian Treasury Bills (NTB) replaced the old Federal Government Treasury Bills (FGTB), deepening the money market and providing a benchmark yield curve for shorter-dated government securities. Further reforms in 2012 aimed to increase the participation of retail investors in primary market auctions of T-Bills and Federal Government Bonds, broadening market participation.

The Nigerian Interbank Offered Rate (NIBOR) underwent a revamp in 2014, with the introduction of new guidelines to enhance transparency and efficiency in the interbank lending market. In 2019, the Central Bank directed banks to maintain a minimum Loan to Deposit Ratio (LDR) to stimulate lending to the real sector, thus redirecting funds from the money market to productive sectors. The year 2020 had distinctive difficulties as a result of the global COVID-19 epidemic. The CBN responded with measures that included reducing interest rates on OMO bills and introducing a Targeted Credit Facility (TCF) to support households and businesses affected by the economic impact of the pandemic.

The development of money markets is further facilitated by the introduction of new financial instruments and technologies. A prime example of this phenomenon is the introduction of asset-backed commercial paper (ABCP), which enabled financial institutions to convert illiquid assets, such as mortgages, into marketable short-term products. This innovation has significantly enhanced the liquidity and efficiency of the money market[5]. Regulatory frameworks are of utmost importance in safeguarding the stability and integrity of the money market. Enhancing regulatory frameworks and implementing effective supervision measures instills trust among market participants and mitigates the occurrence of systemic risks. For instance, the implementation of Basel III regulations, which introduced stricter capital requirements for banks, aimed to enhance the resilience of the banking system and indirectly benefit the money market[6].

Technological improvements furthermore play a role in fostering the development of the money market. The implementation of electronic trading platforms and settlement systems has been found to boost transparency, decrease transaction costs, and improve market accessibility. The implementation of electronic trading platforms has led to increased trading volumes and improved market efficiency in the money market[7].

In summary, the development of the money market involves multiple elements, such as the involvement of a wide range of market participants, the introduction of novel financial products, the enhancement of regulatory frameworks, and the adoption of significant technological advancements. These aforementioned characteristics play a pivotal role in fostering the expansion, fluidity, and effectiveness of the money market, hence yielding advantageous outcomes for the broader financial system.

2.1.2 Effects of Money Market Development

The development of the money market sector has the potential to have a considerable impact on the Nigerian economy. Money markets play an important role in the financial system by promoting the efficient deployment of funds and ensuring the financial system's stability.

Improved liquidity management is one of the most significant effects of the expansion of the money market industry. A developed money market provides the Central Bank of Nigeria (CBN) with better tools to manage liquidity in the banking system. This enables the CBN to carry out effective monetary policy, which is critical for managing inflation and maintaining overall economic stability.

Furthermore, the growth of the money market allows for greater regulation of interest rates. When the money market is well-established, the CBN can employ instruments such as Treasury bills to affect interest rates more efficiently. Lower interest rates can encourage economic borrowing and investment, which can be advantageous to businesses and economic growth.

Increased access to borrowing and finance choices is another important benefit. A developed money market provides access to numerous short-term funding mechanisms for both the government and the business sector. This means that the government will have easier access to funds to finance budget deficits, and businesses will have easier access to capital to fund operations and investments.

Additionally, a developed money market supports risk management. To hedge against interest rate and liquidity concerns, market participants might utilize a variety of money market instruments. This not only helps individual businesses but also contributes to the overall stability of the economy.

The money market is closely linked to the foreign exchange market, and its development can contribute to exchange rate stability. It enables market participants to buy and sell foreign currency, which is necessary for international trade and investment.

Increasing investor confidence is another critical factor. A well-regulated and transparent money market helps boost investor confidence in the Nigerian economy. When investors have faith in the financial system's stability and integrity, they are more inclined to invest in Nigerian assets such as government securities and corporate bonds.

Furthermore, the establishment of money markets helps increase financial inclusion. It provides accessible and low-risk investment options to a greater segment of the public, assisting individuals and households in more successfully saving and investing their money.

Finally, a well-developed money market can help to economic growth by providing a secure and efficient financial infrastructure that facilitates investment, savings, and economic activity. However, delivering these benefits requires efficient regulation, transparency, and sufficient oversight to preserve the financial system's stability and integrity. To realize the full potential of Nigeria's money market sector, policymakers must carefully balance market development promotion with these considerations.

2.1.1.2 Bank Sector Development

Bank sector development pertains to the growth and evolution of the banking industry, embracing several facets such as the expansion of banking institutions, regulatory reforms, technology improvements, and programs aimed at promoting financial inclusion. The advancement of the banking industry is of paramount importance in fostering financial intermediation, mobilizing savings, offering credit services, and facilitating growth in the economy. Several researchers have conducted research that emphasizes the positive correlation between the growth of the banking sector and economic development[8]. They have underscored the significance of a banking system that operates effectively and efficiently. One significant facet of the development of the banking sector is to the expansion of financial institutions. This expansion can involve the entry of new banks, both domestic and foreign, or the expansion of existing banks into new geographical areas. The presence of a varied range of banks boosts competition, improves access to financial services, and promotes financial stability[9].

The Nigerian banking system has undergone substantial advancements and reforms over time, resulting in a transformation of its overall structure and operations. This sector encompasses wide range financial institutions, including as commercial banks, microfinance banks, development finance institutions, and others, all of which are supervised by regulatory bodies like the Central Bank of Nigeria (CBN) and the Nigeria Deposit Insurance Corporation (NDIC).

Regulatory reforms are of paramount importance in influencing the trajectory of the banking sector's growth and evolution. The promotion of financial stability and the mitigation of risks are achieved through the strengthening of regulatory frameworks and the enhancement of supervisory systems.

The banking sector consolidation in 2005 stands as a significant turning point in the history of Nigerian banking. In order to enhance the sector's capacity to withstand challenges, the Central Bank of Nigeria (CBN) implemented an increase in the minimum capital requirement for banks. This policy led to a series of mergers and acquisitions, reducing the number of banks but significantly boosting their capital base. This restructuring made Nigerian banks more robust and better equipped to handle financial shocks.

In the year 2010, the Central Bank of Nigeria (CBN) implemented risk-based supervision (RBS) as a component of its regulatory reforms. RBS aimed to assess the risk profiles of banks and allocate regulatory resources accordingly, ensuring more effective oversight. This transition from a one-size-fits-all regulatory approach to a more targeted and risk-focused policy improved the sector's stability.

In 2013, Nigeria commenced the implementation of the Basel II and subsequently Basel III frameworks in order to conform to global standards. These frameworks introduced enhanced risk management practices, capital adequacy requirements, and disclosure standards for banks, further solidifying the sector's regulatory framework[10].

Islamic banking was introduced in Nigeria in the year 2011. The CBN granted licenses to some banks to operate Islamic banking windows, catering to the financial needs of the Muslim population and promoting financial inclusion through Sharia-compliant banking services.

The year 2012 marked the introduction of the cashless policy and payment system reforms. This policy sought to lessen dependency on physical cash while encouraging electronic payments. As a result, it initiated the expansion of digital banking services, encompassing mobile banking and internet transactions, hence enhancing the accessibility of financial services to the Nigerian population.

The banking sector in Nigeria has not been without issues, most notably high levels of Non-Performing Loans (NPLs). In order to tackle this matter, the Central Bank of Nigeria (CBN) formed the Asset Management Corporation of Nigeria (AMCON) in the year 2015. AMCON's role is to purchase and resolve NPLs, relieving banks of the burden and promoting financial stability. In 2019, the Central Bank of Nigeria (CBN) implemented a policy known as the Minimum Loan to Deposit Ratio (LDR) with the aim of promoting increased lending to the real sector of the economy. This policy necessitated that banks uphold a minimum Loan-Deposit Ratio (LDR), thereby reallocating funds from the money market toward productive sectors and fostering economic expansion.

In response to the economic impact of the COVID-19 pandemic in 2020, the CBN implemented various measures, including regulatory forbearance, loan restructuring, and liquidity support to banks. These initiatives intended to lessen the impact of the epidemic on the banking industry and the economy as a whole.

Technological improvements have altered the banking industry, resulting in substantial changes. The implementation of digital banking technologies, including internet banking, mobile banking, and fintech advancements, has resulted in increased availability of financial services, decreased expenses, and enhanced operational effectiveness[11]. These developments have also paved the way for the establishment of new business models, such as digital-only banks and peer-to-peer lending platforms.

The promotion of financial inclusion constitutes a significant facet of the development of the banking sector. Initiatives aiming at increasing access to financial services for underserved populations, such as low-income individuals and rural communities, help to drive inclusive economic growth. For example, the introduction of microfinance institutions and the execution of financial literacy programmes have been essential in augmenting financial inclusion[12].

In summary, the development of the bank sector encompasses various aspects such as the growth of banking institutions, regulatory modifications, developments in technology, and programs aimed at promoting financial inclusion. Several elements have a significant role in enhancing the efficiency, stability, and accessibility of the banking system, hence promoting economic growth and development.

2.1.1.3 Stock Market Development

Stock market development refers to the expansion and evolution of stock markets, which includes factors such as market size, liquidity, efficiency, regulatory frameworks, and technology improvements. The Nigerian stock market, which is supervised by the Securities and Exchange Commission (SEC) and principally facilitated by the Nigerian Stock Exchange (NSE), is critical to the country's financial system. It serves as a platform for enterprises to generate funds through the issue of shares, as well as providing investment options to a wide range of investors. Stock markets play an important role in mobilizing funds, promoting capital development, and efficiently allocating resources within an economy. Some academics have emphasized the relevance of well-functioning stock markets in stimulating investment and innovation[13].

The huge increase in the Nigerian stock market in the mid-2000s was one of the notable developments. During this time, market capitalization achieved new highs, driven by strong economic development, rising investor interest, and a variety of regulatory reforms. This expansion attracted both domestic and international investors, contributing to the development of Nigeria's financial sector.

The Nigerian Stock Exchange (NSE) successfully concluded its demutualization process in March 2020, as part of a significant reform initiative. This shift transformed the exchange from a mutual organization owned by its members to a corporation owned by its shareholders.

The demutualization was intended to improve corporate governance, transparency, and competitiveness by bringing the NSE in line with global best practices in stock exchange operations.

The NSE introduced several changes to its listing rules over the years to enhance transparency and corporate governance standards. These changes were intended to make the exchange more appealing to companies looking to go public and to increase investor trust. By accommodating different types of companies and investors through market segments such as the Premium Board, Main Board, and Alternative Securities Market (ASeM), the NSE aimed to cater to a broader range of listing requirements and company sizes.

Another major development in the Nigerian stock market was the introduction of exchange-traded funds (ETFs). ETFs offer investors a handy option to obtain exposure to diversified asset portfolios. This financial product grew in popularity because it allowed investors to diversify their holdings and better control risk.

The market faced challenges during economic downturns, prompting regulatory changes in the 2010s to address market volatility and improve risk management. These changes included the implementation of circuit breakers and adjustments to margin trading rules, aiming to stabilize the market during turbulent times.

To improve the experience of shareholders and reduce unclaimed dividends, the SEC initiated the e-Dividend Mandate Management System and Direct Cash Settlement in 2016. These measures streamlined the dividend payment process, enhancing investor protection and reducing the number of unclaimed dividends.

The COVID-19 pandemic in 2020 had an impact on the Nigerian stock market, as it did globally. In response to the market's volatility during this time, the NSE implemented safeguards such as circuit breakers and allowed remote trading capabilities to maintain the market's orderly operation while safeguarding market participants' health.

In parallel with these developments, the NSE invested in technology upgrades to enhance trading and market data dissemination. These enhancements were designed to attract new investors, boost market efficiency, and keep the exchange competitive in the digital age.

Furthermore, the SEC and NSE have consistently improved market surveillance and enforcement procedures in order to detect and discourage market abuses, guaranteeing market integrity and investor trust.

Another aspect of stock market development is the expansion of market size and liquidity. A larger market size, in terms of the number of listed companies and market capitalization, attracts more investors and enhances market depth. According to some academics, a broad and liquid stock market encourages financial intermediation, decreases the cost of capital, and enables company financing[14]. Efficiency in stock markets is crucial for fair pricing, transparent trading, and accurate information dissemination. The creation of efficient trading methods, such as electronic trading platforms, increases market transparency, lowers transaction costs, and increases liquidity. The introduction of electronic trading systems has been associated with increased trading volumes and improved market efficiency[15].

Regulatory frameworks are critical in shaping the evolution of stock markets. Transparent and well-enforced regulations are essential to protect investors' interests, ensure market integrity, and reduce information asymmetry. Implementing regulatory measures like disclosure requirements, insider trading restrictions, and company governance standards boosts investor confidence and attracts both domestic and foreign investors[16].

Technological improvements have had a profound impact on the evolution of the stock market. The use of modern trading technologies like algorithmic trading and high-frequency trading has boosted market efficiency and liquidity. Furthermore, the use of information technology in market surveillance and regulatory control has increased market transparency and made quick interventions possible[17].

Finally, stock market development takes into account a variety of aspects such as market size, liquidity, efficiency, regulatory frameworks, and technology improvements. These characteristics help the stock market work as a whole, stimulate economic growth, and allow for more efficient capital allocation.

2.1.2 Health Outcomes

Health outcomes refer to the measurable effects on individuals or populations resulting from healthcare interventions, policies, or other factors that influence health. These outcomes can encompass a wide range of dimensions, including physical health, mental well-being, mortality rates, disease prevalence, quality of life, and healthcare utilization. For this study emphasis will be placed on life expectancy and infant mortality rate as they are used to proxy health outcomes.

Life expectancy is a critical indicator of a population's overall health and well-being. It measures the average number of years a person can expect to live from birth, assuming current mortality rates remain constant. This metric is an essential tool for assessing the overall health of a nation and understanding the effectiveness of its healthcare system. In the year 2023, the life expectancy in Nigeria was approximately 61.79 years. To be more precise, the statistic indicated a life expectancy of 60 years for males and 64 years for females. The life expectancy at birth in Nigeria is comparatively low, both within the African continent and globally.

Several factors influence life expectancy, including access to healthcare, socio-economic conditions, lifestyle choices, and genetics. In developed countries with robust healthcare systems, access to quality medical care, disease prevention measures, and advancements in medical technology contribute to longer life expectancies. On the other hand, in developing countries with limited access to healthcare and higher rates of infectious diseases, life expectancy tends to be lower.

Efforts to improve life expectancy often involve addressing social determinants of health, such as poverty, education, and nutrition. Public health interventions, vaccination programs, and initiatives to reduce smoking and alcohol consumption have also played significant roles in increasing life expectancy worldwide. Additionally, advancements in medical research and healthcare delivery have led to longer, healthier lives for many individuals.

While life expectancy has generally been increasing globally, disparities still exist within and between countries. Addressing these disparities requires a multifaceted approach that considers not only healthcare but also broader social and economic factors that impact health outcomes.

The infant mortality rate (IMR) is another crucial indicator of a nation's health outcomes, specifically focusing on the well-being of its youngest citizens. IMR measures the number of infants who die before their first birthday per 1,000 live births in a given year. A low IMR is a sign of a healthy population, as it indicates that infants are surviving their critical early months of life. As of 2023, the infant mortality rate in Nigeria was measured at 55.17 per 1,000 live births. This indicates that the infant mortality rate was approximately 55 fatalities per 1,000 live births for infants under the age of one year. In Africa, there is a relatively high rate of child mortality.

IMR is strongly linked to the quality and accessibility of maternal and child healthcare services, as well as broader socio-economic factors. Adequate prenatal care, skilled birth attendants, access to clean water and sanitation, and vaccinations all contribute to reducing infant mortality. Additionally, efforts to improve maternal health and nutrition play a significant role, as healthier mothers are more likely to have healthier babies.

Reductions in IMR are often seen as a marker of a country's progress in healthcare and social development. Public health initiatives, like immunization campaigns and education on safe infant care practices, have been successful in driving down IMR in many parts of the world. International organizations and governments have also worked together to improve access to healthcare in underserved areas and address preventable causes of infant mortality, such as infectious diseases and malnutrition.

Despite global progress, significant disparities persist in infant mortality rates, both between and within countries. Addressing these disparities requires a comprehensive approach that includes improving access to healthcare, reducing poverty and inequality, and promoting education and awareness about maternal and child health. Efforts to reduce IMR are essential for ensuring that every child can grow and thrive[18, 19, 20].

2.2 Theoretical Review

2.2.1 Bismarck Health Care Financing Model (Social Insurance-Based)

The Bismarck health care finance model is characterized by its adoption of a social insurance framework. In the present paradigm, the provision of healthcare services is financed by means of contributions made to a health fund. The primary source of contributions commonly stems from the payroll, wherein both the employer and employee allocate a proportionate amount of their respective salaries[21]. Social insurance plans has significant potential for delivering efficient risk protection, particularly within nations with high income levels. The primary drawbacks associated with social health insurance models arise from their limited coverage, particularly in low-income nations where these models predominantly cater to formal sector employees and simply aggregate the health risks of scheme members. The implementation of social health insurance necessitates the presence of sufficient fiscal capacity within the government, as well as widespread acceptability among the population. Similar to taxes, social health insurance encounters some challenges that diminish its efficacy in terms of tax collection. Additionally, contributions to social health insurance by employers increase the cost of labor and may lead to increases in unemployment levels[22]. Tanzania (17 percent) and Kenya (11 percent) are among the countries with the largest coverage of social health insurance schemes[23]. Similar to national health insurance schemes, social health insurance schemes in Sub-Saharan Africa (SSA) encounter challenges due to their restricted subscription bases, mostly because the formal sector in this region is relatively tiny.

2.2.2 Income and Expenditure Theory

This theory posits that financial sector development, particularly increased access to credit and financial services, can contribute to higher income levels for individuals. Higher income is associated with improved living standards and greater capacity to afford healthcare services, leading to better health outcomes. The Income and Expenditure Theory is a macroeconomic concept that explores the relationships between aggregate income and aggregate expenditure within an economy. Developed primarily by economist John Maynard Keynes, this theory serves as a foundational framework for understanding the determinants of national income and the factors that influence overall economic activity. In essence, the Income and Expenditure Theory posits that the total level of economic output, or national income, is primarily determined by the total level of expenditures in the economy. These expenditures include consumption by households, investment by businesses, government spending, and net exports (exports minus imports). According to Keynesian economics, which is closely associated with this theory, the key driver of economic activity is the total spending or demand in the economy. The theory introduces the concept of an equilibrium level of income, where the total expenditures in the economy match the total income generated. At this equilibrium point, there is neither a surplus nor a shortfall in overall spending, leading to economic stability. However, the economy may deviate from this equilibrium, and such deviations can have significant implications for unemployment, inflation, and overall economic well-being.

The Income and Expenditure Theory, which focuses on the relationships between aggregate income and total expenditures in an economy, can be applied to the intersection of financial sector development and health outcomes. In the context of healthcare, financial sector development plays a crucial role in shaping the income and expenditure dynamics related to health services. As the financial sector evolves and becomes more sophisticated, it facilitates income growth through mechanisms such as increased access to credit, investments in health infrastructure, and the expansion of health-related industries. This income growth can positively impact individual and household spending on healthcare, leading to improved access to medical services, preventive measures, and overall better health outcomes. Moreover, the Income and Expenditure Theory's multiplier effect is relevant in the context of financial sector development and health outcomes. A well-developed financial sector can contribute to increased income not only through direct investments in health but also through the creation of employment opportunities and the expansion of economic activities related to healthcare. This, in turn, can trigger a multiplier effect, where the initial financial investments in health lead to subsequent rounds of spending, job creation, and income growth. The resulting positive feedback loop can contribute to sustainable improvements in health outcomes as communities benefit from increased resources for healthcare services and infrastructure. In summary, financial sector development, guided by the principles of the Income and Expenditure Theory, can foster economic growth, increase income, and positively influence health outcomes by enhancing the capacity of individuals and communities to invest in their well-being.

2.2.3 Grossman Theory on Health Investment and Outcomes

The Grossman model of health investment posits that individuals make rational decisions about their health by investing in medical care and health-related activities. This economic theory, developed by Michael Grossman, views health as a form of capital that can be improved through investments in health-enhancing activities and medical care. In the context of financial sector development and health outcomes, the Grossman model suggests that a well-functioning financial sector plays a crucial role in facilitating individuals' ability to make optimal health investments. Access to credit, insurance mechanisms, and financial instruments can empower individuals to allocate resources efficiently, enabling them to make investments in preventive measures, medical care, and a healthier lifestyle.

Financial sector development can enhance the Grossman model's applicability by providing individuals with the means to make informed health investments. For example, improved financial literacy, coupled with accessible financial services, allows individuals to plan for and afford health-enhancing activities. Additionally, the availability of health insurance and other risk-mitigation tools within a well-developed financial sector can protect individuals from the financial burden of unexpected health expenses. As a result, the Grossman model suggests that a symbiotic relationship exists between financial sector development and health outcomes, where a robust financial sector empowers individuals to make effective health investments, leading to improved overall health and well-being.

Grossman developed a model for good health in 1972, and health has been treated as a durable capital stock[23,24]. According to Grossman, healthy days are said to have been born out of health stock, where utility is said to have been gained both directly because it allows for the enjoyment of good health (via consumption commodity) and indirectly because it allows for time to be expended on other market as well as non-market activities (via individual commodity). As Grossman enforces two constraints, it is assumed that individuals maximize the utility they derive from consumption. First, such time constraints that establish time in a specified period has to be allotted to investment, consumption, or wage generation. An increase in sick days reduces the amount of time available for actions. Second, income constraints should represent the real cost of time spent on consumption or some levels of investment rather than wage generation, which is a maximization issue. There is an unwavering assumption that individuals are born with some level of health stock that deteriorates with age. The reduction could be offset by investment activities, but when the stock reaches the critical level, it dies. Grossman develops a pure model of consumption as well as a pure investment model on the assumption that the marginal cost is constant[35], based on the marginal benefit being increased with consumption and investment activities taken as additive[25].

The marginal benefit of consumption and that of investment are separated and then equated to the health shadow price as an additive function of interest rate and rate of health depreciation (given). As a result, the empirical evaluation of the investment model's three key predictions is possible. First, a higher depreciation rate with a positive correlation with wage would lead to a decrease in demand for health care. This is due to the fact that as the cost of producing healthy days rises, the marginal cost of investment tends to be higher than the marginal benefits of investment. Second, an increase in wages will have an indeterminate effect on the quantity of health demand. When wages rise, marginal productivity rises because more health days are available to earn higher wages, resulting in more incentives for health investment and higher health stock demand[25].

2.2.4 Financial Development Theory

The theory of financial development holds significant importance within the field of economics as it analyses the complex interplay between a nation's financial sector and its overall economic growth and development[24,25]. The present idea postulates that the establishment of a robust and effective financial system plays a pivotal role in facilitating economic advancement. The process of allocating savings to productive investments and promoting economic development is facilitated by financial intermediaries such as banks, financial markets, and institutions. This theory emphasizes the significance of financial inclusion, the enlargement of financial markets, and financial innovations in fostering economic growth and stability.

Financial development theory places significant emphasis on the pivotal role played by the banking sector[26,27]. A banking system that is robust and stable serves as a reliable means of financial support for both enterprises and individuals, hence fostering investment and entrepreneurial activities. Moreover, it underscores the importance of an enabling legal and regulatory structure that guarantees property rights, facilitates contract enforcement, and fosters a stable ecosystem for the flourishing of financial endeavors. Furthermore, the concept of financial liberalization is an additional dimension that underscores the significance of diminishing constraints and regulations in order to foster the movement of capital and promote economic expansion, all while ensuring the preservation of stability remains a pivotal factor[28,29].

The theory of financial development also acknowledges the significance of financial innovation. The implementation of novel financial products, services, and technologies contributes to the optimization of the financial sector, facilitating the more efficient allocation of resources towards productive ventures. The stability of the financial sector is a paramount concern due to its potential to undermine economic development. The theory emphasizes the importance of implementing risk management strategies and ensuring financial stability in order to sustain the overall economic well-being.

Financial development is driven by a combination of domestic and foreign forces within a global environment. The development of a country's financial sector can be greatly influenced by cross-border financial flows, commerce, and foreign investments. Domestic economic policies and institutions play a crucial role in determining the trajectory and magnitude of financial development. Furthermore, there is an increasing emphasis on the correlation between financial development and inclusive growth[30]. The primary objective of policymakers is to facilitate financial development in a manner that fosters inclusivity, so mitigating income disparity and fostering a more egalitarian trajectory of economic advancement.

2.3 Empirical Review

2.3.1 Evidence from Developed Economy

To examine the effects of financial globalization, institutions, and economic growth on the advancement of the European financial sector, a comprehensive investigation was carried out using panel data spanning from the years 1989 to 2016. The empirical results show that economic growth and institutional quality have a favorable relationship with financial development when using the composite index of financial development, which covers various dimensions of the financial market, such as depth, access, and efficiency. Financial globalization, on the other hand, hinders the development of the financial industry. The findings are robust to utilizing other proxies for economic growth, institutional measures, and capturing the financial crisis period. These empirical findings propose policy suggestions for developing the financial sector using economic tools such as globalization, institutional quality, and economic growth[31].

To empirically examine the association between financial development variables and growth in 11 European Countries throughout the period of 1995-2016. Some scholars employed the dynamic panel models, specifically utilizing the Pooled Mean Group estimator. The results indicated that there is a positive association between financial development and economic growth, but this relationship is only significant in the short-term. This conclusion supports the idea that financial development leads to economic growth through the supply side. When examining the hypothesis concerning non-linearities in the finance-growth nexus, it is observed that the relationship exhibits an inverted U-shaped pattern. Specifically, the impact of financial development on economic activity is positive up to a certain threshold, beyond which the association turns negative. The veracity of the non-linearity hypothesis is applicable just to the variable of domestic credit to the private sector. In relation to policy implications, it was advised that governments should prioritize the allocation of resources towards investment projects that demonstrate efficiency, with the aim of enhancing economic growth and facilitating the effective expansion of the banking sector[32].

To investigate the impact of financial development and financial globalization on the significant increase in life expectancy in China, India, and Japan. The researchers utilized annual data from 1991 to 2019 to analyze this phenomenon. The ARDL limits testing approach provides empirical evidence supporting the existence of a long-term association between financial development, financial globalization, and life expectancy, while controlling for factors such as GDP, health expenditure, and internet usage. The empirical evidence from long-term studies suggested a positive correlation between financial development and life expectancy in China, with a 0.599% increase in life expectancy associated with financial development. Their findings also suggest that there is a positive correlation between financial globalization and life expectancy, with a 1.247% increase observed in Japan and a 1.121% increase observed in India. The results of their study provide valuable empirical knowledge for policymakers seeking to enhance life expectancy in China, India, and Japan[33].

To ascertain the causal relationship between the development of the stock market, the development of the banking sector, and the economic growth in Central and Eastern European (CEE) countries. A scholar focused on examining the correlation between the development of the stock market, the development of the banking sector, and the economic growth within the Central and Eastern European (CEE) countries. The study utilized annual data from two distinct time periods, specifically 1999-2012 and 1999-2015, for a total of 8 and 5 Central and Eastern European (CEE) countries, respectively. The research was grounded in the utilization of the Granger causality test and linear regression models. The findings of the study indicated that the advancement of the stock market has a significant impact on the attraction of foreign direct investment and the promotion of economic growth in Central and Eastern European (CEE) nations in the long run. The ways through which stock market capitalization indirectly influences economic growth are disclosed. The stock market capitalization exerts influence on the banking sector and gross capital formation, hence affecting the economic growth of Central and Eastern European (CEE) countries. The economic growth in Central and Eastern European (CEE) countries between 1999 and 2015 was influenced by the development of both the stock market and the banking sector. The relationship between the size of the stock market and economic growth is found to be positive, whereas the influence of domestic loans to the private sector is observed to be negative. The practical ramifications of this phenomenon are worth considering. The study provided evidence supporting the rationale for Central and Eastern European (CEE) nations to pursue enhanced development of their stock markets. This entails enhancing the market infrastructure and institutional environment to facilitate the expansion of the stock market. By doing so, these countries may make a valuable contribution to their economic growth[34].

2.3.2 Evidence from Developing/Emerging Economy

Some researchers undertook a comprehensive analysis of the impact of financial inclusion on life expectancy and newborn mortality rates and investigate if this impact is influenced by potential threshold effects, which are defined by the extent of income inequality and poverty levels. Their conclusions were derived on an analysis of 61 emerging and transitional economies spanning the time frame of 2011 to 2017. By employing a composite hybrid financial inclusion index, they demonstrated that there exists a direct and favorable impact of financial inclusion on health outcomes. Moreover, in countries characterized by a higher prevalence of poverty and economic inequality, the efficacy of financial inclusion as a policy instrument for attaining improved health outcomes is enhanced. The findings have enormous importance from a policy standpoint, as increased financial inclusion provides opportunities to invest in health capital and strengthens the ability of the most disadvantaged groups to handle risks associated with health crises[35].

To examine the impact of remittances on health outcomes in a sample of 39 chosen Sub-Saharan African (SSA) countries from 1996 to 2016. Some researchers examined the various avenues via which remittances impact health outcomes, specifically focusing on the role of financial development and institutional quality. Through the application of dynamic panel estimates, their analysis revealed that remittances play a crucial role in sustaining health outcomes. Furthermore, they observe that both financial development and institutional quality act as complementary factors to remittances in this regard. It is imperative for countries within the SSA region to persistently enhance their financial sectors and elevate the quality of their institutions to a satisfactory standard. The establishment and enhancement of robust financial systems and institutions have the potential to facilitate and attract significant inflows of remittances, thereby contributing to the improvement of human capital, health outcomes, and the reduction of poverty[36].

To examine the impact of financial growth on human development indicators, specifically life expectancy and primary enrollment rates, in developing countries disaggregated by gender throughout the period spanning from 2016 to 2020. The research employed the Generalized Method of Moments (GMM) panel method to estimate the experimental model. The variables considered in the analysis included facilities granted to the private sector, the ratio of money to GDP, the degree of economic openness, as well as the impact of educational and health expenditures. The findings from the estimation of the model suggest that the provision of facilities to the private sector has a statistically significant and beneficial impact on human capital. The impact of the ratio between money supply and GDP is deemed to be adverse, primarily attributed to the detrimental consequences of inflation on various economic models. In all models, except for the female registration rate, the coefficient of the degree of openness of the economy exhibits a positive and statistically significant relationship. The impact of educational expenses on the enrollment rates of males and females, as well as men's life expectancy, was found to be positive and statistically significant. The impact of health expenditures was consistently positive and statistically significant across all models, including those examining life expectancy for men and women, as well as women's registration rate. Hence, it is imperative for governments to prioritize the promotion of exports, undertake tariff system reforms that incentivize the importation of capital goods, ensure currency stability, streamline banking operations, and facilitate the process of opening letters of credit[37].

To analyze the impact of health expenditure on various health outcomes, specifically life expectancy, infant mortality, under-five mortality, and crude death rates, within the sub-Saharan Africa region. The panel of 39 sub-Saharan African Countries for the years 1995-2014 was subjected to the use of the linear dynamic generalized method of moments instrumental variable (GMM-IV). The findings of their study indicated a substantial positive relationship between health expenditure and several health outcomes, including increased life expectancy and reduced rates of infant mortality, under-five mortality, and crude death in the Sub-Saharan Africa region. There is a notable correlation between public and private health expenditures and various health outcomes, such as life expectancy, infant mortality, under-five mortality, and crude death rates. Specifically, public health expenditures were found to have a positive impact on life expectancy and a negative impact on infant mortality, under-five mortality, and crude death rates. Similarly, private health expenditures also exhibit a substantial positive association with life expectancy and a negative relationship with infant mortality, under-five mortality, and crude death rates. The study calculated a lag of one period in health expenditure and found that the regression findings demonstrated a statistically significant association with health outcomes. In conjunction with health expenditure, many factors such as Gross Domestic Product (GDP) per capita, urbanization, immunization, and access to basic drinking water have contributed to advancements in life expectancy, newborn mortality rates, under-five mortality rates, and crude death rates. On the contrary, the presence of HIV and high levels of unemployment are variables that have a detrimental impact on life expectancy, as well as exacerbating rates of newborn mortality, under-five mortality, and crude death. Their study demonstrates that health expenditure plays a significant role in achieving enhanced health outcomes in Sub-Saharan African countries. Hence, allocating a higher proportion of health expenditure to the health sector results in improved health outcomes. Further examination of policy revisions aimed at enhancing GDP per capita, immunization rates, urbanization, and access to basic drinking water services, alongside the implementation of methods designed to decrease HIV prevalence and unemployment, can contribute to the attainment of improved health outcomes[38].

Similarly, some researchers conducted a study and obtained data from 11 African countries spanning the period from 2001 to 2017. The study examined the issue of causation using the Dumitrescu and Hurlin test, which specifically addresses the presence of cross-section dependency. The study's variables exhibit cross-sectional dependence. The findings of the causality research revealed the existence of a bidirectional association between financial development and health factors. The expansion of work opportunities and the reduction of salary disparities between skilled and unskilled labor are observed as financial development occurs. Conversely, it becomes feasible for the government to allocate additional funds towards healthcare expenses targeted at individuals with low socioeconomic status. The significance of individuals' health levels lies in their ability to translate the education they acquire into economic productivity. Within this context, it is anticipated that there exists a reciprocal association between the advancement of financial systems and the state of health. The findings of the study revealed a significant correlation between health and financial development, so providing empirical support to existing scholarly literature on the subject matter[39].

Similarly, to examine the causal relationship between energy consumption, environmental degradation, financial development, and health consequences in the context of Pakistan. Some scholars employed life expectancy and infant mortality as proxy for health outcomes. Various econometric techniques have been employed to analyze time series data, including unit root tests, co-integration procedures, causality techniques, and co-integration regressions. Furthermore, their analysis not only identifies the causal direction between variables but also quantifies the magnitude of causation using variance decomposition. The findings of the study provided confirmation that all variables examined in the research exhibit co-integration over an extended period. The examination of causation indicated that there is a one-way causal relationship from energy consumption and environmental degradation to health results. On the other hand, a two-way causal relationship exists between financial development and health outcomes in the long term. Furthermore, their study examined the impact of energy, environmental degradation, and financial development on the health outcome model. The findings indicated that both energy and financial development have the potential to enhance health outcomes in Pakistan[40].

To examine the impact of financial growth on the significant increase in life expectancy in Bangladesh, using annual data from 1972 to 2013. Some researchers investigated the unit root characteristics of the variables by utilizing a structural break unit root test. The utilization of the combined co-integration and ARDL limits testing approach provides empirical evidence supporting the existence of a sustained relationship between financial development and life expectancy, even when considering the influence of globalization, income inequality, and economic growth. Their empirical findings suggested that there exists a positive relationship between financial development and globalization, and life expectancy in Bangladesh. The results of the VECM Granger causality analysis suggest the presence of a feedback relationship between financial development and life expectancy. There is evidence to suggest that economic expansion and globalization have a causal relationship with life expectancy, as indicated by their Granger causality analysis[41].

Some researchers carried out a study to investigate the correlation between financial development and healthcare expenditure in a sample of 46 countries in Sub Saharan Africa (SSA). Their study posits that healthcare expenditure serves as a crucial transmission mechanism via which financial development impacts improved health outcomes. The study employed random and fixed effects models, as well as instrumental variable estimate techniques, utilizing data spanning from 1995 to 2014. The findings indicated that there is a positive correlation between financial development and healthcare expenditure. The results of this study highlighted the need of promoting financial development in economies within Sub-Saharan Africa (SSA) as a means of facilitating the mobilization of domestic resources for financing healthcare expenditures[42].

To investigate the potential moderating role of financial development in mitigating the impact of growth volatility on the Malaysian economy. Some researchers observed a robust correlation between long-term growth volatility and financial development based on annual data spanning from 1972 to 2018. Additionally, the results suggest that the presence of financial development mitigates the occurrence of fluctuations in economic growth over an extended period. The empirical model demonstrated that trade openness has a statistically significant positive effect on growth volatility in Malaysia. Conversely, inflation volatility, inward foreign direct investment (FDI), and financial development exhibited statistically significant negative effects on growth volatility in the country[43].

2.3.3 Evidence from Nigeria

Some researchers investigated the relationship between financial development, public health expenditure, and health outcomes in Nigeria from 1981 to 2020. The study utilized annual time series data obtained from the Central Bank of Nigeria (CBN) statistical bulletin and the World Development Index (WDI). The data was subjected to analysis using the Autoregressive Distributed Lag Model (ARDL) with Bounds Testing. Their findings indicate that in the near term, an increase in government spending on healthcare has a negative impact on health outcomes, namely life expectancy. However, in the long term, this increased investment is associated with improvements in life expectancy. Additionally, the findings indicated that the impact of financial development on health outcomes is contingent upon the specific financial development indicator utilized, whereas inflation has a negative and statistically significant effect on health outcomes in Nigeria. The study suggested that the Nigerian government should allocate more funds to the health sector and ensure the stability of the financial sector. These measures are deemed necessary to effectively enhance the desired level of health outcomes in Nigeria[44].

Some researchers empirically examined the relationship between public health expenditure and infant mortality rate in Nigeria from 1991 to 2018, utilizing time series data. The study employed the Fully Modified Ordinary Least Square (FMOLS) analytical approach to investigate the associations. Several robustness assessments were conducted to ascertain the dependability of the findings for policymakers. The results of the study indicated that the variables included had a favorable effect on INFM. It is thus suggested that additional efforts should be made to disseminate public awareness regarding the significance of administering DPT immunization to infants. Furthermore, it is imperative to enhance the education of nursing mothers regarding the importance of providing adequate care for their children, particularly during the early stages of development. This entails avoiding the delegation of parental responsibilities solely to nursery[45].

Similarly, some scholars investigated the relationship among health expenditure, child mortality, and economic growth in Nigeria by analyzing time series data from the years 1980 to 2020. The data was analyzed using the Ordinary Least Square (OLS) approach. The empirical findings indicated that there is a lack of substantial correlation between government health expenditure and under-five child mortality. The study also revealed that government capital expenditure had a statistically negligible and negative effect on under-five death rates. Conversely, government recurrent expenditure had a statistically significant and negative effect on under-five mortality rates. The influence of gross fixed capital creation on under-five child mortality was shown to be both positive and statistically significant. The study also revealed that child mortality, government capital spending, and domestic investment exhibited a positive and statistically significant influence on economic growth. Conversely, inflation was found to have a negative and statistically significant effect on economic growth. It was recommended that there be an augmentation in the annual financial allocation towards the health sector. However, the crucial factor for achieving positive results does not solely rely on a mere increase in budget allocation. Instead, it hinges on the implementation of an effective public finance system that can expand and potentially connect specific expenditure and revenue choices, while also ensuring the appropriate utilization of allocated funds in a transparent manner[46].

To examine the impact of government health expenditure on under-five death rates in Nigeria. Some scholars used autoregressive distribution lag technique to investigate the long-term impact of public health expenditure on under-five mortality in Nigeria. The data utilized in the study were obtained from the World Development Indicators, covering the time frame from 1985 to 2017. The study's findings indicate that public health expenditure has a statistically significant positive correlation with under-five mortality. The findings of the study suggest that a one-unit increase in public health expenditure is associated with a corresponding rise of 1.56 units in the under-five death rate. However, within the Nigerian context, this phenomenon can be more comprehensively elucidated through the absence of effective coordination of health funding and various other aspects, including maternal education. Consequently, the study recommended that the establishment of effective coordination mechanisms between health and funding entities is imperative to ensure the appropriate utilization of given resources within the health sector[47].

In a similar vein, some scholars examined the impact of health shocks on the poverty rate in Nigeria from 1981 to 2017. The research employed the Vector Error Correction Model (VECM) to examine the relationship between Out of Pocket (OOP) expenditure on health and the death rate, and its impact on the poverty level in Nigeria. The findings of the study indicate that an increase in OOP spending on health and the death rate is associated with a considerable exacerbation of the poverty level in Nigeria. Similarly, an examination was conducted to assess the co integration relationship between healthcare expenditure and economic growth in Nigeria from 1981 to 2010. They utilized a multivariate co integration model to determine the presence of a long-term association between healthcare expenditure and economic growth within the specified study period[48].

A study was conducted to examine the relationship between the development of the financial sector and economic growth in Nigeria. The investigation utilized a vector autoregressive model. The aim of their study was to verify the premise that the expansion observed in the money and capital markets has not resulted in sustained economic growth. The findings indicate, among other things, that there is no evidence of a long-term causal relationship between indices of financial system development and economic growth. This suggests that the development of the financial system does not appear to have a substantial impact on the trends of economic growth in Nigeria. Nevertheless, it is worth noting that the impact of financial system development on economic growth has demonstrated a statistically significant positive correlation solely in the short-term context. The findings indicate that to effectively facilitate both short-term and long-term economic growth in Nigeria, it is imperative to enhance the depth of the financial system. This can be achieved through the introduction and provision of innovative financial products and services by market operators, as well as the establishment and enforcement of robust monetary policies and regulations[49].

2.4 Summary of the Gaps in Literature

In the field of research that explores the relationship between financial sector development and health outcomes, several noteworthy gaps persist in the current body of knowledge. The presence of these gaps highlights the importance of the proposed study and demonstrates the unique contributions it aims to provide.

One notable deficiency in the existing body of literature is the lack of a comprehensive health outcome indicator that encompasses several dimensions of a country's health status. While previous research frequently examines individual health indicators separately, the current study aims to address this limitation by developing a comprehensive health outcome score that incorporates many variables. This index aims to integrate key health indicators, namely life expectancy and child survival rate. This comprehensive metric will provide a more intricate and comprehensive viewpoint on the overall health condition of Nigeria, illuminating the varied aspects of health outcomes.

Furthermore, it is worth noting that although there exist a considerable amount of scholarly literature investigating the overarching connection between economic development and health outcomes, there is a dearth of research that delves into the specific impact of the financial sector on influencing health outcomes, particularly in emerging nations such as

Nigeria. This study aims to fill a notable research vacuum by examining the financial sector, use the bank sector, money market, and stock market as indicators of financial sector development. The objective of this study is to offer a comprehensive understanding of the influence of the financial sector, which serves as a vital driver of economic development, on health outcomes in Nigeria.

Moreover, prior scholarly investigations have frequently demonstrated correlations between economic development and health outcomes. However, these studies have not extensively explored the underlying mechanisms and routes by which the expansion of the financial sector affects health. The objective of this study is to investigate the complex connections between financial sector development and health, specifically focusing on the precise causal interconnections and mechanisms that influence the impact. Gaining a more profound comprehension will facilitate the development of a comprehensive viewpoint about the interplay between these two areas.

The literature lacks sufficient analysis of policy alignment and cooperation between the financial and healthcare sectors. The present study aims to fill this research vacuum by evaluating the degree of synergy, or the absence thereof, in current policies. The objective of this study is to comprehend the influence of these policies on the relationship between economic growth and health outcomes, thereby enhancing our comprehension of the policy environment in Nigeria.

The available literature has not thoroughly examined the unequal effects of financial sector development on different socio-economic groups and its role in contributing to health disparities. The study will investigate the degree to which economic growth contributes to equitable distribution of benefits across various population segments or exacerbates pre-existing health disparities, thereby providing insights into the socio-economic aspects of the matter.

Finally, it is worth noting that there is a lack of comprehensive research that thoroughly investigates the resilience and vulnerabilities of the financial and healthcare sectors, especially within a global framework. The examination of the responses of these sectors to economic and health shocks, as well as their interplay during periods of crises, represents a significant knowledge need. This study aims to offer useful insights into the resilience and vulnerabilities of the aforementioned sectors. The findings will provide significant information for policymakers and stakeholders in both sectors, thereby contributing to global conversations on economic and health preparation.

Through an examination of the various gaps in existing literature, the proposed research aims to provide a significant addition to the comprehension of the complex correlation between the development of the financial sector and health outcomes. These insights are anticipated to provide valuable information for evidence-based policy-making, contribute to the promotion of health equity, and increase the overall quality of life for the Nigerian people. Furthermore, these findings are pertinent to other developing nations that encounter similar obstacles at the convergence of economic development and public health.

2.5 Theoretical Framework

Thisstudy's theoretical framework is based on Grossman's theory of health investment and outcomes. The hypothesis emphasizes health as a fundamental commodity, implying that healthcare demand is derived. In the theoretical model, individuals are both consumers and producers of health. The model predicts that an individual will invest in health until the marginal benefit of health equals the marginal cost of health; this equilibrium demand for health implies that an individual's life span will be determined endogenously. Following the theoretical work of Grossman developed by Rajkumar and Swaroop who modelled outcome of a financial sector development programme as:

$hout = incp^{\alpha} \times fd^{\beta}$ where $\alpha > 0$, and $\beta \geq 0$ (2.1)

Per capita income is denoted by *incp*, financial sector development measured by money market, band market and stock market development, and outcome could for example, be indicators of health status such as life expectancy, child survival rates. Equation (2.1) implies that health outcome (for example life expectancy and child survival rates) does the followings: (a) improves with an increase in per capita income; (b) improves (or does not worsen) if an increased proportion of the country's resources are spent on health care.

Taking the logs of equation (2.1), we have the linear form of (2.1) as equation (2.2) as:

$$\ln hout = \alpha \ln incp + \beta \ln fd \quad (2.2)$$

In modeling the relationship between public spending and outcome as specified in equation (2.2), a researcher would usually take the information on money, bank and stock market development information.

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Chapter Three

Methodology

3.1 Model Specification

3.1.1 Model Estimating the Effects of Money Market Development on Health Outcomes

Following the theoretical framework development in the last section of chapter two, the study adapts and modifies the model of previous studies to investigate the impact of money market development measure by monetary policy rate, treasury bill rate and 12-months deposit rate on human health outcome measured by life expectancy and child mortality in Nigeria[1,2,3,4,5,6]. The model specifies health outcomes (*hout*) as a function of money market development (*mmd*),gross fixed capital formation (*gfcf*), trade openness (*topen*) and inflation (*inf*). Consequently, the model is stated functionally as:

$$hout_t = f(mmd_t, gfcf_t, topen_t, \inf_t) \tag{3.1}$$

In mathematical form, it becomes:

$$hout_t = \theta_0 + \mathrm{B}mmd_t + \theta_1 gfcf_t + \theta_2 topen_t + \theta_3 \inf_t + e_t \tag{3.2}$$

Where: *hout* is a vector of health outcomes measured by life expectancy and child mortality; *mmd* represents a vector of money market development such as monetary policy rate (*mpr*), treasury bill rate (*tbr*) and 12-months deposit rate (*mdr*); *gfcf* is gross fixed capital formation to GDP; *topen* represents trade openness measured by total trade to GDP; *inf* denotes inflation; $\theta_0, \mathrm{B}, \theta_{1-3}$ are parameters; *t* is time; e is stochastic term.

3.1.2 Model Estimating the Role of Banking Sector Development in Health Outcomes

This study adapts and modifies the model of previous studies to examine the role of banking sector development in human health outcomes in Nigeria[1,2,7,8,9]. The model specifies human health outcomes measured by life expectancy and child mortality (*hout*) as a function of banking sector development (*bsd*) measured by liquidity ratio, loan to deposit ratio, and domestic credit to private sector by banks to GDP ratio; gross fixed capital formation (*gfcf*); trade openness (*topen*); and inflation (*inf*). Thus, the equation is stated functionally as:

$$hout_t = f(bsd_t, gfcf_t, topen_t, \inf_t) \quad (3.3)$$

In mathematical form, it becomes:

$$hout_t = \vartheta_0 + \Phi bsd_t + \vartheta_1 gfcf_t + \vartheta_2 topen_t + \vartheta_3 \inf_t + v_t \quad (3.4)$$

Where: *hout* is a vector of health outcomes measured by life expectancy and child mortality; *bsd* represents a vector of banking sector development such as liquidity ratio (*lr*), loan to deposit ratio (*ldr*), and domestic credit to private sector by banks to GDP ratio (*dcps*); *gfcf* is gross fixed capital formation to GDP; *topen* represents trade openness measured by total trade to GDP; *inf* denotes inflation; $\vartheta_0, \Phi, \vartheta_{1-3}$ are parameters; *t* is time; v is error term.

3.1.3 Model Estimating the Effect of Stock Market Development on Health Outcomes

Following the empirical models of past studies, this study adapts and modifies the model to investigate the effect of stock market development on human health outcomes measured by life expectancy and child mortality in Nigeria[3,4,5,7,8]. The model specifies health outcomes (*hout*) as a function of stock market development captured by stock market capitalization to GDP, total stock transaction value to GDP, and all share index; gross fixed capital formation (*gfcf*); trade openness (*topen*); and inflation (*inf*). As a result the model is stated functionally as:

$$hout_t = f\left(smd_t, gfcf_t, topen_t, \inf_t\right) \quad (3.5)$$

In econometrics form, it becomes:

$$hout_t = \varpi_0 + \Psi smd_t + \varpi_1 gfcf_t + \varpi_2 topen_t + \varpi_3 \inf_t + \mu_t \quad (3.6)$$

Where: *hout* is is a vector of health outcomes measured by life expectancy and child mortality; *smd*denotes a vector of stock market development measured by stock market capitalization to GDP (*smk*), total stock transaction value to GDP (*tstv*), and all share index (*asi*);*gfcf* is gross fixed capital formation; *topen* represents trade openness; *inf* denotes inflation; $\varpi_0, \Psi, \varpi_{1-3}$ are parameters; *t* is time; μ is error term.

3.2 Theoretical Expectation

For human health outcome measured by life expectancy and child mortality model, a direct relationship is expected between money market development and life expectancy but negatively related with under-5 mortality. Similarly, an increase in stock market development is expected to have a positive relationship with life expectancy while negative with child mortality. Also, banking sector development ensures that an excess fund that will be available for domestic use by the credit providers will increase human longevity and decrease child mortality. This is so as financial sector development usesfunds to provide adequate health services and facilities support human capital development in a way that it improves life expectancy and deteriorates child mortality.

More so, gross fixed capital formation and financial sector development are expected to have positive relationship with life expectancy and negative with child mortality. As gross fixed capital formation increases, there are high chances of more healthcare facilities available to people living in an economy thus improving human longevity and reduces child mortality.As well, trade openness is expected to have a direct relationship with life expectancy and an indirect relationship with child mortality. This is because as the trade between countries improves, more income is expected to improve human welfare development in that country. Concerning inflation, it has a negative relationship with human health longevity. Country experiencing price instability has higher chances of low human health outcomes.

3.3 Data Requirements and Sources

This research work uses annual time series data for the period of 38 years (1985-2022). The study uses secondary data of banking, money and stock market development data published by the Central Bank of Nigeria (CBN) statistical bulletin, volume 33, 2022; while life expectancy, under-5 mortality, trade openness, inflation, and gross fixed capital formation data were sourced from World Development Indicators (WDI), 2023. Table 3.1 presents the source and measurement of the variables.

Table 3.1: Definition and source of data and variable measurements

Variables	Description	Measurement	Data source
hout	Health outcomes is the treatment results that affect health status as measured by the length or quality of a person's life and child mortality in a country for a specific period of time.	It is measured in number of years and mortality per 1,000 births	World Development Indicators (2023)
mmd	Money market development captured by monetary policy rate, treasury bill rate and 12-months deposit rate.	They are measure in percentage	Central Bank of Nigeria Bulletin (2022)
bsd	Banking sector development measured by liquidity ratio, loan to deposit ratio, and domestic credit to private sector by banks to GDP ratio.	They are measure in percentage	Central Bank of Nigeria Bulletin (2022)
smd	Stock market development measured by stock market capitalization to GDP, total stock transaction value to GDP, and all share index	They are measure in percentage of GDP except all share idex	Central Bank of Nigeria Bulletin (2022)
topen	Trade openness captures the total trade as a percentage of gross domestic product in a country.	It is measured as total trade as a percentage of GDP	World Development Indicators (2023)
inf	Inflation is measured by annual rate of consumer price index of a country.	Annual growth	World Development Indicators (2023)
gfcf	Gross fixed capital formation includes the total domestic investment of private and public sector to the size of GDP in a country	It is measured as a percentage of GDP	World Development Indicators (2023)

Source: Author's compilation (2023).

3.4 Estimation Techniques

The specification and estimation of the models requires that we test the time series properties of the data in order to determine whether the variables contain integrated components, hence, this study adopt time series estimation techniques. Before estimating the parameters, the study examines the stationarity (presence of a unit root) of the variables using the Augmented Dickey Fuller (ADF) test. Afterwards, the study tests for the cointegration of the variables depending on the results of the stationarity of the variables. In addition, the appropriate estimator was also employed to evaluate the coefficients of the empirical models.

3.4.1 Unit root test

This study used the unit root test to test for the stationarity of the times series data collected for the research to avoid the danger of bias that stationarity of data may pose to the study if they are not checked. The unit root test was employed because in the literature most time series variables are non-stationary and using non-stationary variables in the model might lead to a spurious regression. In order to ascertain whether time series data were stationary or non-stationary and to determine the number of times (the level) at which the variables must be differenced before becoming stationary, unit root tests were conducted. The Dickey – Fuller regression is estimated as follows for unit root.

$$\Delta Y_t = \lambda Y_{t-1} + V_t \tag{3.7}$$

If λ equals 0, Y_t is non-stationary, as a result Y_t and X_t are not co-integrated. In order words, if λ is significantly different from 0 Y_t and X_t are found integrated individually. Given the inherent weakness of the unit root to distinguish between null and the alternative hypotheses, it is desirable that the Augmented Dickey Fuller (ADF) test be applied. To be co-integrated; both Y_t and X_t must have the same order of integration[10,11]. The ADF regression is specified as follows:

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \gamma_i \sum_{t=1}^{m} \Delta Y_{t-1} + \varepsilon_t \tag{3.8}$$

Δ is the first difference operator, ε_t is the new random error term, M is the optimum number of lags needed to obtain "white noise". The null hypothesis of non-stationarity is rejected if the estimated ADF statistic is found to be larger in absolute term or more negative than its critical values at 1 or 5 percent level of significance.

3.4.2 Co-integration Test

The purpose of the co-integration test is to determine whether a group of non-stationary time series is co-integrated to reduce bias. The concept of co-integration creates the link between integrated processes and the concept of steady state equilibrium[12].Thus, in this study, autoregressive distributed lag (ARDL) tests for co-integration analysis was employed to investigate the long-term relationship between the variables of interest.

3.4.3 ARDL Estimation Test

In this study, the autoregressive distributed lag (ARDL) was used to estimate the short-run and long-run estimates of the existing relationship between institutions, government health spending and health outcomes. Three advantages[13] for using this method are stated as: (a) small sample data (b) variables with mixed stationarity level either I(0) or I(1) and (c) both long- and short-run estimates can be derived simultaneously. The lag length is selected using the Akaike information criteria (AIC). The calculated F-statistic value is used to make the decision about the cointegration. The significance of our calculated value is compared with the two tabulated values (upper bound and lower bound) computed by a scholar[14]. The decision criteria support cointegration if the calculated value is greater than the upper bound value; no cointegration if the value is lesser than the lower bound value; and inconclusive if the value lies between the two bounds values.

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Chapter Four

Results and Discussion of Findings

This study entails data presentation, estimation and the results of the empirical investigation of the links between financial sector development and health outcomes in Nigeria. Also, it addresses the long-run and short-run relationship between financial sector development and health outcomes in Nigeria. This is divided into descriptive analysis which include the mean, median as well measures of variation, it also takes into consideration the trend analysis which shows the trend of the time series data used from 1985 to 2022 and econometric analysis which focuses on unit root tests, co-integration test and autoregressive distributed lagged model.

4.1 Data Presentation

The data used for analyzing the relationship between financial sector development and health outcomes in Nigeria is presented in Appendix.

4.2 Presentation of Results

4.2.1 Summary Statistics

Table 4.1 provides a summary of the preliminary study that details the mean, standard deviation, skewness, and peaking of the variables used to examine the connection between financial sector and health outcomes in Nigeria. According to the table, the average life expectancy and under-5 mortality rate were 48.84 years and 164.65 per 1,000 live births, respectively. The table showed that their maximum values were 52.91 years and 209.6 live births, while their minimum values were 45.49 years and 110.8/1,000 live births. This suggests that Nigeria's health outcomes are low.The average money market instruments were13.62%, 11.81%, and 11.56% for monetary policy rate, treasury bill rate, and 12-month deposit rates, with highest values of 26%, 26.9%, and 25.65%, and lowest values of 6%, 3.17%, and 4.71%, respectively.As regards banking sector development measures, the averages of liquidity ratio, loan to deposit ratio and domestic credit to private sector to GDP were 49.16%, 65.89%, and 12.14%, respectively. Their maximumsare 104.2%, an96.82%, and 22.76%, while their minimum values are 26.39%, 37.56%, and 5.81%,correspondingly.The averages of the stock market measures are 12.45%, 0.83%, and 18,821.7 for stock marketisation to GDP ratio, total stock transaction value to GDP ratio, and all share index respectively. The highest values are 38.01%, 4.2%, and 57,990.2, and the minimum valuesare 3.09%, 0.04% and 127.3, respectively.

Table 4.1: Descriptive statistics

Signs	Variable measurements	Mean	Std Dev.	Max.	Min.	Kurtosis	Skewness	Jarque-Bera	Prob.
lexp	Life expectancy at birth, total (years)	48.839	2.774	52.91	45.487	-1.680	0.149	4.289	0.117
un5m	Mortality rate, under-5 (per 1,000 live births)	164.65	36.641	209.6	110.8	-1.666	-0.029	4.103	0.129
mpr	Monetary policy rate	13.618	3.737	26	6	2.459	0.818	10.195	0.006
tbr	Treasury bill rate	11.810	4.785	26.9	3.17	1.610	0.760	5.857	0.053
mdr	12 months deposit rate	11.562	4.652	25.645	4.705	1.165	0.945	6.392	0.041
lr	Liquidity Ratio	49.155	14.856	104.20	26.393	4.192	1.550	33.492	0.000
ldr	Loan to Deposit Ratio	65.886	13.172	96.817	37.559	-0.017	-0.030	0.050	0.975
dcps	Domestic credit to private sector to GDP	12.143	5.663	22.755	5.806	-1.611	0.475	5.176	0.075
smk	Stock marketisation to GDP	12.450	8.657	38.014	3.085	0.229	0.784	3.595	0.166
tstv	Total stock transaction value to GDP	0.828	0.912	4.203	0.041	4.995	2.089	53.506	0.000
asi	All share index	18821.7	16461.4	57990.2	127.3	-0.738	0.500	2.470	0.291
inf	Inflation, consumer prices (annual %)	19.111	17.204	72.836	5.388	2.444	1.875	26.740	0.000
topen	Trade (% of GDP)	33.417	11.246	53.278	9.136	-0.453	-0.316	1.063	0.588
gfcf	Gross fixed capital formation (% of GDP)	31.156	12.802	54.948	14.169	-1.170	0.246	2.541	0.281

Note: Std. Dev. - standard deviation; Max. - maximum; Min. - minimum; Prob. - probability; Observation is 38.
Source: Author's computation (2023).

Additionally, the average figures for trade openness measured by total trade to GDP ratio, and gross fixed capital formation to GDP ratio are 33.42%, and 31.16% respectively. Additionally, their maximum rates are 53.28%, and 54.95%, respectively, while their minimum rates are 9.14%, and 14.17%.The average rate of inflation is 19.11%, with highest and minimum values of 72.84% and 5.39%, respectively.

Furthermore, a normal distribution always exists at 0 for the skewness, which quantifies the asymmetry of the distribution of the series around its mean. A distribution is said to have a long right tail if the skewness is positive, and a long left tail if the skewness is negative. The findingsin Table 4.1 revealed that all the variables are positively skewed, with the exception ofunder-5 mortality rate, loan to deposit ratio, and trade openness (which are negatively skewed), suggesting that the right tails of the distributions are long. Kurtosis gauges the series' distribution's peaking or flattening as well. The distribution is peaked or leptokurtic in relation to the normal if the kurtosis is greater than three, and flat or platykurtic in relation to the normal if it is less than three. According to the table's outcome, only the values for liquidity ratio and total stock transaction value to GDP ratio are greater than three, which suggests that they have peaked or are leptokurtic. The values of the other variables are below three, indicating flatness or platykurtic behavior. According to their Jarque-Bera statistics, this suggests that the variables are not normally distributed.

Figures 4.1, 4.2, 4.3 and 4.4 show the trend analysis of the variables used to analyze how financial sector development and health outcomes interact in Nigeria. The trend series for Nigeria's money market development indices, life expectancy, and infant mortality rates are shown in Figure 4.1. From 1985 to 2022, Nigeria has witnessed a gradual improvement in life expectancy at birth. The values have consistently increased, reflecting advancements in healthcare, nutrition, and overall living conditions. In 1985, life expectancy stood at 46.317 years, and by 2022, it reached 52.676 years. This upward trend suggests a positive trajectory in the overall health of the population, indicating a potential improvement in healthcare infrastructure, disease prevention, and other contributing factors.The under-5 mortality rate, representing the number of deaths per 1,000 live births for children under five years of age, has also shown notable improvement. In 1985, the mortality rate was 207.2, indicating a relatively high risk of child mortality. Over the subsequent years, there has been a consistent decline in this rate. By 2022, the under-5 mortality rate reduced significantly to 110.8, highlighting substantial progress in child health and survival. This decline may be attributed to various factors such as improved access to healthcare, vaccination programs, and socio-economic development.The consistency in the improvement of these health outcomes suggests sustained efforts in public health interventions and healthcare infrastructure development. The decrease in the under-5 mortality rate indicates a successful focus on maternal and child health, while the increase in life expectancy suggests broader improvements in health systems and overall living standards.

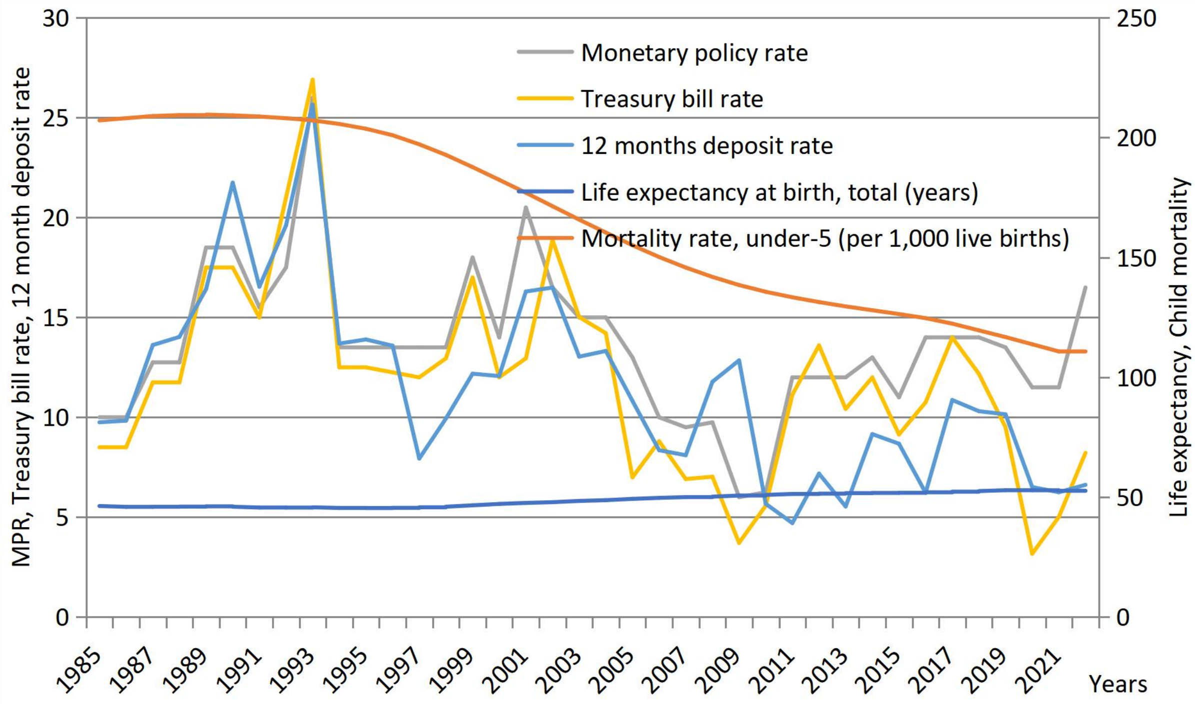

Figure 4.1: Money market instrument and health outcomes
Source: Auhor's computation (2023)

In Figure 4.1, it also shows a historical perspective on Nigeria's money market instruments, highlighting the dynamic nature of monetary policy over the years.The monetary policy rate (MPR) being the benchmark interest rate set by the Central Bank of Nigeria (CBN) to guide monetary policy decisionsfluctuates over the years. Notably, there have been periods of significant adjustments, reflecting the CBN's response to economic conditions. For instance, the MPR increased from 10% in 1986 to a peak of 26% in 1993, indicating a tightening of monetary policy. Subsequent years saw various adjustments, with the rate reaching 16.5% in 2022. These changes in the MPR have implications for interest rates in the broader economy.Treasury bills are short-term debt instruments issued by the government to control money supply and raise funds. Like the MPR, there are periods of volatility, reflecting shifts in monetary policy. For example, the Treasury bill rate increased from 8.5% in 1986 to

26.9% in 1993, aligning with a period of high MPR. Subsequently, there were adjustments, and by 2022, the rate stood at 8.22%.The 12-Months Deposit Rate represents interest rates on fixed-term deposits. Notably, there was a significant increase in the early 1990s, reaching 21.745% in 1990. Subsequent years witnessed fluctuations, and by 2022, the rate was 6.620%. The deposit rate movements reflect not only monetary policy decisions but also the dynamics of the banking sector and the broader financial market.The trends in these money market instruments have implications for economic activities. High-interest rates, as seen in the early 1990s, attract foreign capital but also stifle domestic investment. Conversely, lower rates, as observed in recent years, could stimulate improved health outcomes.

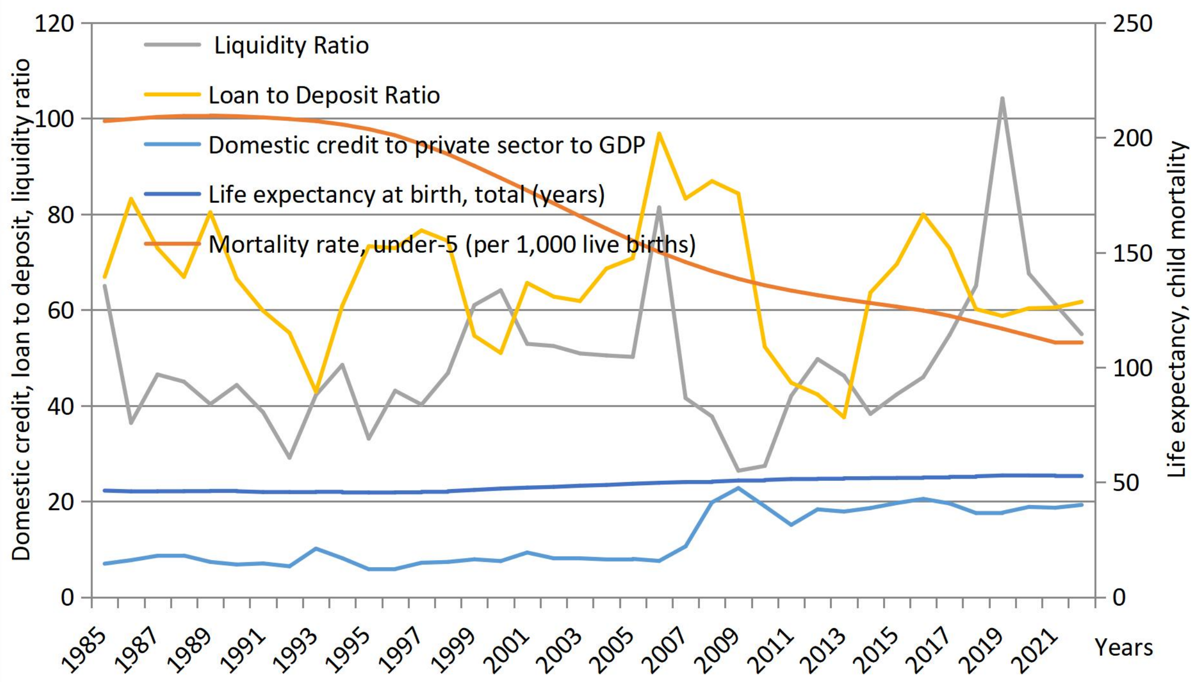

Figure 4.2: Bank sector development and health outcomes
Source: Auhor's computation (2023)

Figure 4.2 shows the series movement for banking sector development measures, life expectancy, and under-5 mortality.The liquidity ratio measures the proportion of a bank's assets held in cash or assets that can be quickly converted to cash. In 1986, the liquidity ratio was notably low at 36.4%, indicating a potential vulnerability in the banking sector. Over the years, there were fluctuations, with the ratio reaching a peak of 104.202% in 2019, suggesting a significant increase in banks' liquidity positions. However, the ratio decreased to 54.934% in 2022, reflecting changes in liquidity management strategies or economic conditions.The loan to deposit ratio reflects the proportion of a bank's total loans to its total deposits. In 1986, the LDR was high at 83.2%, suggesting an aggressive lending strategy. Subsequent years saw variations, with the ratio fluctuating between 37.559% in 2013 to 96.817% in 2006. The LDR in 2022 stands at 61.696%, indicating a moderate level of loans relative to deposits. An optimal LDR is crucial for banks to balance risk and profitability, and regulatory authorities often use it as a tool to influence credit creation.This indicator represents the credit extended to the private sector by domestic banks relative to the GDP. The trend shows an increasing pattern, reaching 22.755% in 2009 and subsequently fluctuating between 15.068% in 2011 to 19.249% in 2022. This variability reflects changes in lending practices, economic conditions, and regulatory policies. A higher credit-to-GDP ratio can indicate robust economic activity but may pose risks if not managed prudently. Intuitively, a high liquidity ratio, while indicating financial stability, may also suggest underutilization of resources that could be deployed for income-generating activities. A moderate loan to deposit ratio reflects a balance between risk and lending activities, contributing to sustainable banking practices. The rising trend in domestic credit to the private sector implies increased access to credit for businesses, potentially driving economic growth.

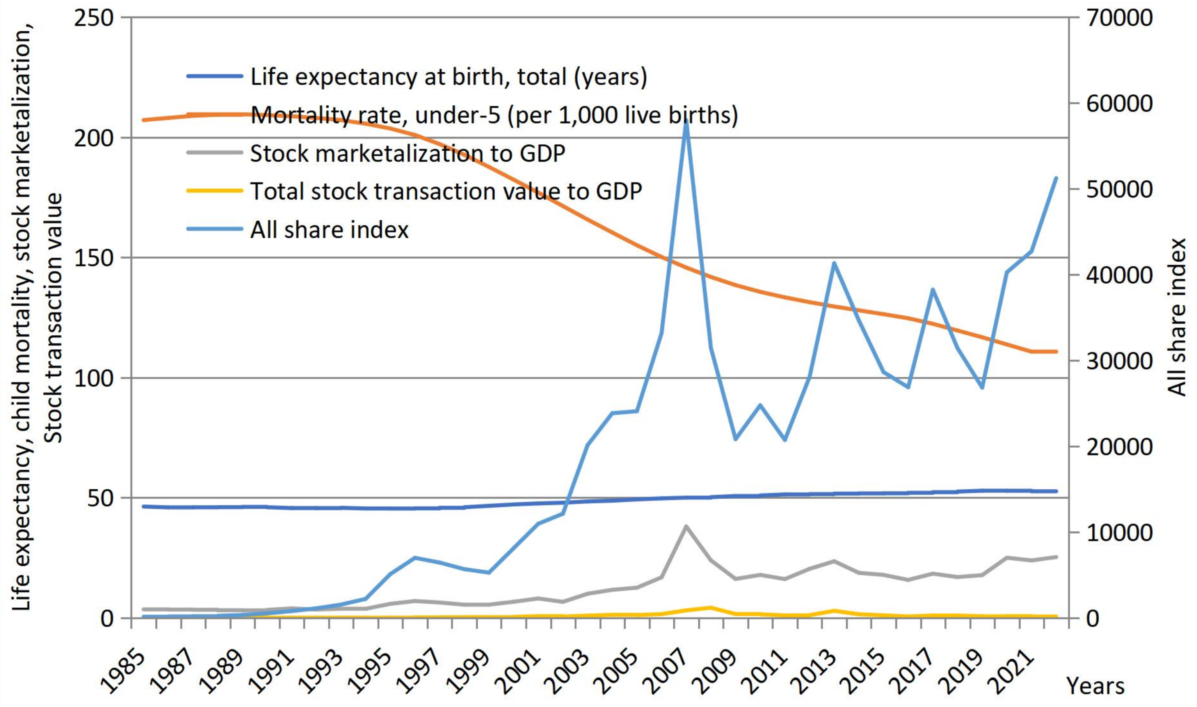

Figure 4.3: Stock market instrument and health outcomes
Source: Auhor's computation (2023)

Figure 4.3 shows the patterns in stock market development measures and health outcome variables (life expectancy and child mortality). Stock market capitalization to GDP is a measure of the stock market's size relative to the country's overall economic output. The values fluctuate over the years, starting at 3.514 in the base year (1985) and reaching 25.295 in 2022. This indicates a significant expansion of the stock market relative to the economy, suggesting increased market capitalization and potential attractiveness to investors. However, the year-to-year variations underscore the influence of economic conditions, regulatory changes, and investor sentiment on the stock market's relative size.Total stock transaction value to GDP measures the value of stock transactions in relation to the country's economic output. The ratio increases from 0.169 in 1986 to 0.577 in 2022. This indicates a substantial rise in the value of stock transactions concerning the overall economy, reflecting increased market activity. The peak values in the late 2000s and early 2010s suggest a period of heightened market participation, possibly influenced by economic factors and changes in investor behaviour.The all share index is a broad measure reflecting the performance of the entire stock market. The index values escalate from 127.3 in the base year to 51,251.06 in 2022. This remarkable growth implies significant appreciation in the value of listed stocks over the years. The sharp rise in the index, particularly in the 2000s, aligns with the periods of increased market transaction values, suggesting a correlation between market activity and stock prices.The trends in these indicators suggest a dynamic and evolving stock market in Nigeria. The rising stock market capitalization to GDP and total stock transaction value to GDP ratios indicate an increasing role of the stock market in the economy. This can have positive implications for capital formation, corporate financing, and investor wealth creation. The growth in all share index reflects the overall bullish trend in the market, which may attract both domestic and foreign investors.

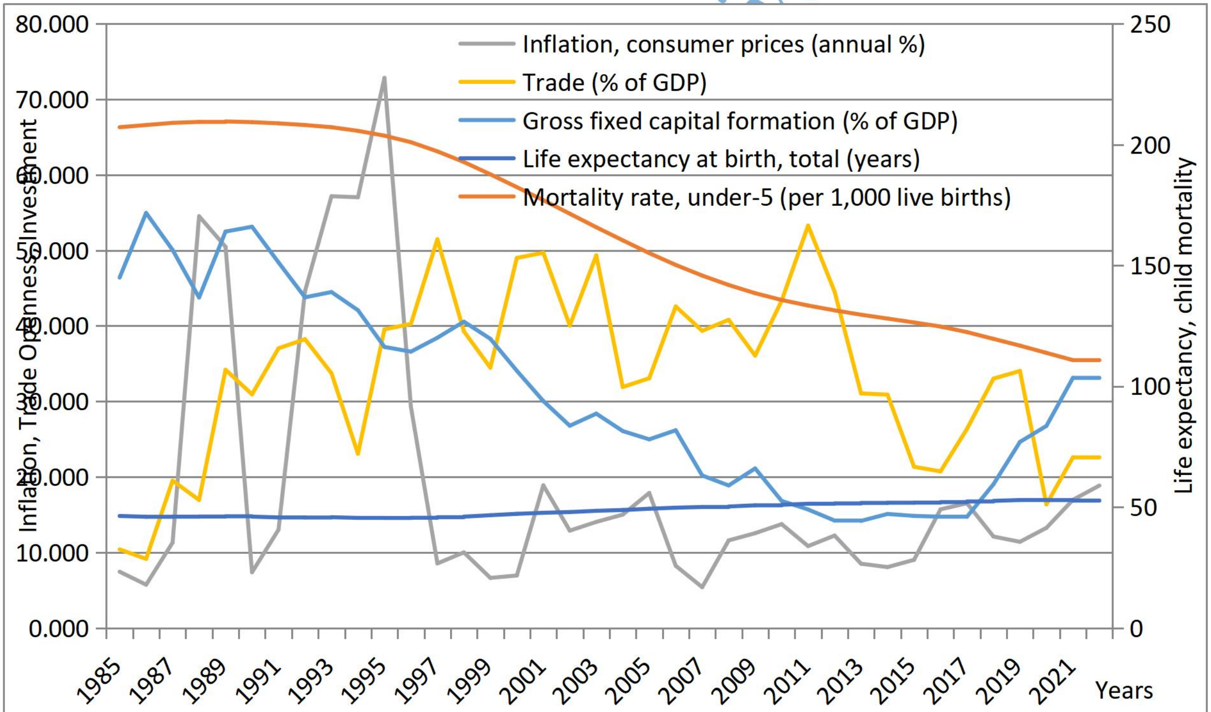

Figure 4.4: Investment, Trade, Inflation and health outcomes
Source: Auhor's computation (2023)

Figure 4.4 provides valuable insights into the evolution of Nigeria's inflation, investment, trade and health outcomes over the past few decades.Inflation rates fluctuated significantly over the years, with peaks observed in the early 1990s and mid-2000s. Notably, inflation increased from 7.435% in the base year (1985) to 18.847% in 2022. These fluctuations reflect various macroeconomic factors, including changes in global commodity prices, monetary policy decisions, and domestic economic conditions. High inflation, particularly during specific periods, could pose challenges to price stability, affecting consumer purchasing power and overall economic stability.Trade as a percentage of GDP witnessed notable variations throughout the years. Starting at 10.392% in 1985, the trade-to-GDP ratio increased to 22.577% in 2022. The upward trend suggests an expanding role of international trade in the Nigerian economy. The diversification of exports, changes in trade policies, and globalization trends may contribute to the observed fluctuations. A higher trade-to-GDP ratio signifies increased integration into the global economy, offering potential benefits such as access to new markets and technology transfer.Gross fixed capital formation (GFCF) as a percentage of GDP provides insights into the investment climate. The values in the table fluctuate over the years, ranging from 46.395% in the base year to 33.107% in 2022. The declining trend indicates a potential decrease in the share of investment in GDP. Factors influencing GFCF include government policies, business confidence, and infrastructure development. A lower GFCF-to-GDP ratio may raise concerns about the country's ability to sustain long-term economic growth and development.The interplay among inflation, trade, and investment is crucial for understanding Nigeria’s economic dynamics. High inflation rates may impact trade competitiveness and investment decisions, affecting both domestic and foreign investors. The increasing trade-to-GDP ratio signals a growing reliance on international markets, offering opportunities for economic diversification but also exposing the economy to global uncertainties. The declining trend in GFCF as a percentage of GDP raises concerns about the capacity for sustained economic development without adequate investment.

4.2.2 Correlation Analysis

Table 4.2 presents the correlation analysis of the variables. The coefficients demonstrate the degree to which the variables are related and help to understand the relationship among financial sector development and health outcomes in Nigeria. Following Table 4.2, all the measures of money market development (monetary policy rate, treasury bill rate and 12-month deposit rate) negatively correlate with life expectancy and positively associated with under-5 mortality rate. As to bank sector development instruments, liquidity ratio and domestic credit to private sector to GDP have positive correlation with life expectancy but negatively associated under-5 mortality rate. Loan to deposit ratio has an indirect level of association with life expectancy but directly correlate with child mortality. Concerning stock market development, the study found a positive level of association between stock market measures (stock market capitalization, total stock traded value and all share index) and life expectancy. However, they all have a negative correlation with child mortality rate.

Furthermore, the correlation matrix revealed that inflation, gross fixed capital formation, and trade opennessare inversely related to life expectancybut directly correlated with child mortality. Table 4.2 also provides the correlation coefficients for other controlling variables. The low correlation coefficients show no evidence of a multicollinearity issue. The signs and magnitudes of the variables are subject to confirmation using appropriate estimators as the correlation coefficients are just preliminary analysis.

Table 4.2: Correlation Matrix

	lexp	*un5m*	*mpr*	*tbr*	*mdr*	*lr*	*ldr*	*dcps*	*smk*	*tstv*	*asi*	*inf*	*topen*	*gfcf*
lexp	1													
un5m	-0.991	1												
mpr	-0.383	0.387	1											
tbr	-0.533	0.543	0.742	1										
mdr	-0.663	0.679	0.703	0.760	1									
lr	0.325	-0.313	0.063	-0.137	-0.207	1								
ldr	-0.128	0.113	-0.323	-0.328	-0.030	-0.072	1							
dcps	0.789	-0.769	-0.394	-0.490	-0.541	0.053	-0.131	1						
smk	0.750	-0.767	-0.456	-0.593	-0.649	0.165	0.017	0.729	1					
tstv	0.515	-0.538	-0.470	-0.436	-0.388	-0.087	0.163	0.485	0.739	1				
asi	0.781	-0.702	-0.374	-0.542	-0.642	0.243	0.017	0.707	0.768	0.667	1			
inf	-0.433	0.443	0.388	0.407	0.497	-0.271	-0.068	-0.301	-0.399	-0.369	-0.399	1		
topen	-0.075	0.001	0.132	0.234	0.083	-0.104	-0.147	-0.161	0.026	0.203	-0.011	-0.065	1	
gfcf	-0.725	0.756	0.401	0.388	0.589	-0.102	0.122	-0.730	-0.755	-0.657	-0.764	0.365	-0.267	1

Source: Author’s computation (2023).

4.3 Pre-Estimation Tests (Unit Root Test)

This section evaluates the stationarity level of the variables and also presents the results of the unit root test. It is used to determine whether a unit root exists, that is, whether the variables are not stationary at levels. The Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests are employed in conducting the unit root tests. The pre-estimation test is the initial test conducted before the co-integration analysis. The E-views statistical package is used to conduct the ADF and PP, and Table 4.3 shows the test's outcomes.

When applying the ADF and PP tests, the a'priori expectation is that a variable is stationary when the ADF and PP test statistics are greater than the critical values at 5%.From the test result reported in Table 4.3, monetary policy rate, treasury bill rate, 12-month deposit rate, liquidity ratio, loan to deposit ratio, and inflation rate were found not to accept the null hypothesis "they have unit root test" at 5% level. This suggests that the series (i.e., monetary policy rate, treasury bill rate, 12-month deposit rate, liquidity ratio, loan to deposit ratio, and inflation rate) are stationary at levels. Thus, these six series are integrated at order 0. Life expectancy, infant mortality rate, domestic credit to private sector by banks, stock market capitalization, total stock trade value, all share index, gross fixed capital formation and trade openness, however, are not stationary at levels but they are integrated of order one i.e. I(1). As a result, they were discovered not to reject the null hypothesis "no stationary" at level, but after multiple rounds depending on the quantity of lag length and differencing, the series were discovered to reject the null hypothesis at first difference. This suggests that these series' first-difference was stationary.

Table 4.3: ADF and PP Test Results [Trend and Intercept]

Variables	Augmented Dickey Fuller Test		Phillip-Perron Test		Remarks
	Stat at level	Stat at first diff.	Stat at level	Stat at first diff.	
lexp	-1.693(1)[-3.540]	-3.967**(0)[-4.235]	-2.404(4)[-3.537]	-3.933**(1)[-3.540]	I(1)
un5m	0.067(4)[-3.553]	-4.699***(1)[-4.244]	-2.461(5)[-3.537]	-4.605***(1)[-4.235]	I(1)
mpr	-3.592**(0)[-3.537]	–	-3.548**(3)[-3.537]	–	I(0)
tbr	-3.628**(0) [-3.537]	–	-3.632**(1)[-3.537]	–	I(0)
mdr	-3.816**(0)[-3.537]	–	-3.777**(3)[-3.537]	–	I(0)
lr	-4.069**(0)[-3.537]	–	-4.099**(1)[-3.537]	–	I(0)
ldr	-5.211***(3)[-3.549]	–	-5.178***(2)[-3.537]	–	I(0)
dcps	-3.159(1)[-3.540]	-5.532***(1)[-4.235]	-2.184(8)[-3.537]	-4.595***(3)[-3.5403]	I(1)
smk	-3.445*(0)[-3.537]	-6.736***(0)[-4.227]	-3.499*(1)[-3.527]	-8.929***(1)[-3.540]	I(1)
tstv	-2.579(0)[-3.537]	-6.445***(0)[-4.235]	-2.586(2)[-3.537]	-6.793***(3)[-4.235]	I(1)
asi	-3.432*(0)[-3.537]	-6.035***(1)[-4.244]	-3.388*(3)[-3.537]	-6.653***(3)[-4.235]	I(1)
inf	-4.431***(1)[-4.235]	–	-4.410***(1)[-4.227]	–	I(0)
topen	-2.923(0)[-3.537]	-7.833***(0)[-4.235]	-2.674(5)[-3.537]	-8.741***(3)[-4.235]	I(1)
gfcf	-0.213(0)[-3.537]	-6.689***(0)[-4.235]	-0.071(2)[-3.537]	-6.819***(3)[-4.235]	I(1)

Note: ***, ** and * signify significance level at 1%, 5% and 10% respectively.
Sources: Author's computation (2023).

4.4 Presentation of Empirical Results

4.4.1 Empirical Results of the Impact of Money Market Development on Health Outcomes

A) Cointegration Test Result

Before estimating the short-run and long-run parameters, the study uses the autoregressive distributed lag (ARDL) bound cointegration tests to examine the long-run relationships among money market development, health outcomes and other controllable variables in the context of the proposed hypotheses. The ARDL bound test is used for the model illustrating the relationship among money market development, health outcomes, and other controllable variables since it is appropriate for variables at various orders of integration. Table 4.4 provides the F-statistics estimate for examining the possibility of a long-term relationship among money market development, health outcomes, and other confounding factors in Nigeria.

According to the table, the normalized estimated F-statistics (Farb = 5.2176 and 9.3183) of the equations exceed both the lower and upper critical bounds at a 5% level of significance. This suggests that at a 5% significance level, the null hypothesis that there is no long-term association is rejected. In accordance with the estimation above, money market instruments, control variables (including gross fixed capital creation, trade openness, and inflation rate), and health outcomes all have equilibrium conditions that maintain them together throughout time. As a result, in Nigeria, there is a long-term connection between money market development and health outcomes.

Table 4.4: Existence of long-run between money market development and health outcomes

Test Statistics	Value	K
F-statistics (lexp| mpr, tbr, mdr, inf, topen, gfcf) (2, 1, 0, 3, 2, 3, 2)	5.2176	6
F-statistics (un5m| mpr, tbr, mdr, inf, topen, gfcf) (3, 1, 1, 3, 3, 3, 3)	9.3183	6
Critical Value Bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Author's computation (2023).

B) Short-run and Long-run Estimates of Money Market Development and Life Expectancy

The null hypothesis, that money market development has no significant impact on life expectancy in Nigeria, is addressed in this section. Using the estimated ARDL approach, which was fully discussed in the preceding chapter, it evaluates both the short-run and long-run relationship estimates of money market development indicators and other controllable factors in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Table 4.5 provides conclusive evidence for our empirical estimations based on data on money market development measures (monetary policy rate, 12-month deposit rate and treasury bill rate), gross fixed capital formation, trade openness, and inflation rate.

The findings of the short-run estimation demonstrate the error correction mechanism, which gauges the rate or intensity of adjustment. It measures the rate of adjustment at which the outcome variable adjusts to changes in the explanatory variables. The model's dynamic pattern is displayed in the short run analysis, which also checks to see if the model's dynamics haven't been restricted by erroneous lag length specifications. The model's lag length was set at three to ensure an adequate degree of freedom based on automatic selection of the Akaike Information Criterion, and the ARDL test automatically select the lag duration on all variables. Table 4.5 shows the short-term estimates of the correlation between public health spending and life expectancy. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.2071) implied that the model corrects its short-run disequilibrium by 20.71% speed of adjustment to return to the long run equilibrium.

Table 4.5: Results of estimated ARDL model of life expectancy

Dependent Variable: Life Expectancy (lexp)
Selected Model: ARDL(2, 1, 0, 3, 2, 3, 2)
Sample: 1985 2022 **Included observations:** 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Short-Run Estimates				
δ (LEXP(-1))	-0.190781	0.141158	-1.351541	0.1966
δ (MPR)	0.028931	0.006731	4.298370	0.0006
δ (MDR)	-0.006543	0.006370	-1.027110	0.3206
δ (MDR(-1))	-0.009630	0.005477	-1.758314	0.0991
δ (MDR(-2))	-0.015929	0.006244	-2.550897	0.0222
δ (INF)	-0.000928	0.001571	-0.590663	0.5635
δ (INF(-1))	0.014900	0.002587	5.759173	0.0000
δ (TOPEN)	0.018497	0.003427	5.396760	0.0001
δ (TOPEN(-1))	0.007620	0.002704	2.818416	0.0130
δ (TOPEN(-2))	0.004819	0.002551	1.888828	0.0784
δ (GFCF)	-0.001691	0.005938	-0.284823	0.7797
δ (GFCF(-1))	0.051078	0.011071	4.613812	0.0003
ECT(-1)	-0.207065	0.026464	-7.824319	0.0000
Long-Run Estimates				
MPR	0.211395	0.072117	2.931262	0.0103
TBR	-0.159087	0.048635	-3.271049	0.0052
MDR	0.012356	0.062218	0.198589	0.8453
INF	-0.080843	0.017186	-4.703895	0.0003
TOPEN	0.010190	0.025031	0.407115	0.6897
GFCF	-0.190126	0.016318	-11.65122	0.0000
C	55.85244	0.865659	64.52016	0.0000
R-squared	0.8893	**F-stat**		98.323 (0.0000)
Adj. R-squared	0.8290	**D-Watson**		2.0504

Source: Author's computation (2023).

At the 5% level, the short-run coefficient of the change in life expectancy at lag one isinsignificant and negative. The short-run coefficient of monetary policy rate has a positive and significant value at 5% level. It means that the increase in monetary policy rate results to high life expectancy in the short run. While the current and first lag are negative and statistically insignificant, the short-run parameter estimates of 12-month deposit rate at lag two werealso negative but statistically significant at 5%. It follows that 12-month deposit rate at lag two had a short-term negative influence on life expectancy. This shows that low12-month deposit rate guarantees an improvement in the anticipated mean years of an individual's life after birth. The first lag of gross fixed capital creation has a direct and significant impact on life expectancy while its current level is negative but not significant statistically. Except for its second lag, which is statistically insignificant at 5%, all the parameters relating to trade openness are positive and statistically significant. It was also discovered that, except for the current level, which was not significant at 5%, inflation at first lag significantly impacted life expectancy positively.

According to the long-term projections in Table 4.5, high monetary policy rate has a direct link with life expectancy in Nigeria. The indicator's parameter was not in line with theoretic assumptions, and the result is statistically significant at 5%. It implies that, if well managed by the apex bank, monetary policy rate has the potential to increase life expectancy. According to a scale of magnitude, a 10% increase in monetary policy rate will result in a 2.11% increase in life expectancy. The treasury bill rate has a negative and significant impact on life expectancy. It means that low treasury bill rate has a significant link with a high life expectancy. The study also shows that the positive effect of a 12-month deposit rate on life expectancy is not statistically significant.Low inflation has also been demonstrated to have a favorable and considerable impact on life expectancy. Thus, a 100% decline in inflation rate results in a 0.8% change in life expectancy. Trade openness was found to have a direct and significant impact on life expectancy in Nigeria.However, for the research years, gross fixed capital formation hasan indirect and insignificant effect on life expectancy.

The adjusted R^2 (coefficient of determination) is high (82.9%), meaning that the variables in the model accounted for around 82.9% of all variations in life expectancy. It only said that variations in money market development and other influencing factors accounted for 82.9%

of the range in changes in life expectancy. The model is properly described and statistically significant as shown by the overall test using the F-statistic (98.323), which is statistically significant at the 5% level of significance. Serial autocorrelation is not present in the model, as evidenced by the Durbin-Watson value of 2.0504.

Diagnostic Test

Heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality tests are all examined in the calculated ARDL model. Table 4.6 displays the outcomes of these examinations. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. It indicates that the error terms are not serially associated and have the same variances as their normal distribution. Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.5a and 4.5b are steady.

Table 4.6: Diagnostic tests of selected ARDL model

Results	
Serial Correlation: 1.9580 [0.1806]	**Normality Test:** 1.4967 [0.4732]
Functional Form: 0.5818 [0.5699]	**Heteroskedasticity Test:** 1.5255 [0.2053]

Source: Author's computation (2023).

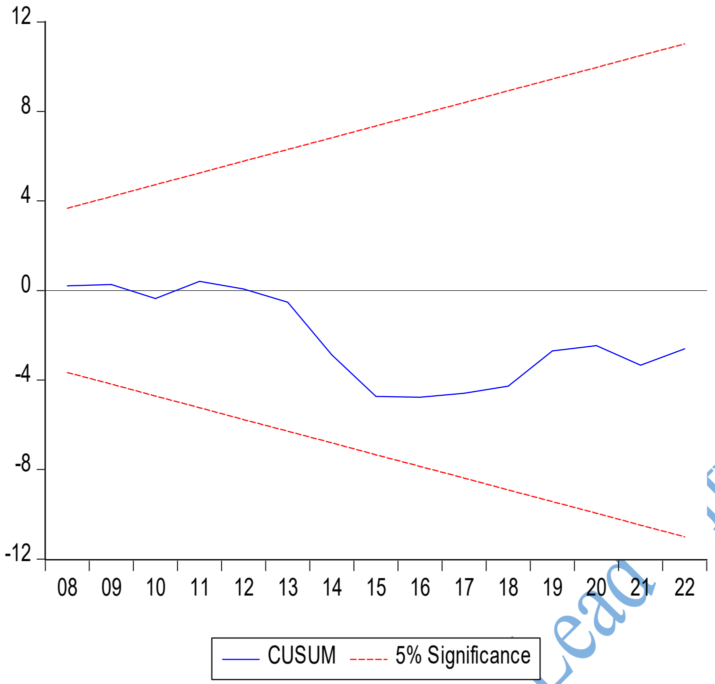

Figure 4.5a: Cumulative Sum (CUSUM)

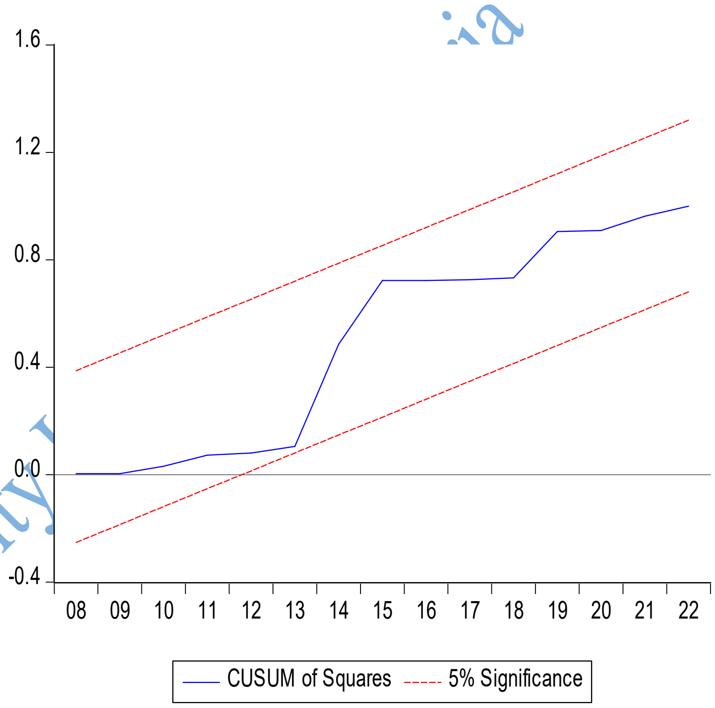

Figure 4.5b: Cumulative Sum of Square (CUSUMQ)

C) Short-run and Long-run Estimates of Money Market Development and Child Mortality

In this section, this study addressed the null hypothesis that money market development has no significant effect on under-5 mortality in Nigeria. Using the estimated ARDL approach, which was fully discussed in the preceding chapter, this study evaluates both the short-run and long-run relationship estimates of money market development and other controllable factors on child mortality in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Table 4.7 provides conclusive evidence for our empirical estimations based on data on money market development, gross fixed capital creation, trade openness, and inflation rate.

The results of the short-run estimation demonstrate the error correction mechanism, which gauges the rate or intensity of adjustment. It measures the rate of adjustment at which the outcome variable adjusts to changes in the explanatory variables. The model's dynamic pattern is displayed in the short run analysis, which also checks to see if the model's dynamics haven't been restricted by erroneous lag length specifications. The model's lag length was set at three to ensure an adequate degree of freedom based on automatic selection of the Akaike Information Criterion, and the ARDL test automatically select the lag duration on all variables. Table 4.7 shows the short-term estimates of the relationship between money market development and child mortality. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.0198) implied that the model corrects its short-run disequilibrium by 1.98% speed of adjustment to return to the long run equilibrium.

Table 4.7: Results of estimated ARDL model of child mortality

Dependent Variable: Child Mortality (un5m, log)

Selected Model: ARDL(3, 1, 1, 3, 3, 3,3)

Sample: 1985 2022 **Included observations:** 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Short-Run Estimates				
δLOG(UN5M(-1))	3.552319	0.208415	17.04446	0.0000
δLOG(UN5M(-2))	-3.669305	0.288259	-12.72918	0.0000
δ (MPR)	0.000211	0.000140	1.505717	0.1603
δ (TBR)	0.001234	0.000167	7.382933	0.0000
δ (MDR)	-0.000186	0.000125	-1.495520	0.1629
δ (MDR(-1))	0.002618	0.000242	10.83667	0.0000
δ (MDR(-2))	0.001452	0.000202	7.182237	0.0000
δ (INF)	0.000358	4.25E-05	8.416851	0.0000
δ (INF(-1))	-0.000495	5.59E-05	-8.853249	0.0000
δ (INF(-2))	-0.000439	4.92E-05	-8.915741	0.0000
δ (TOPEN)	0.000187	6.29E-05	2.967640	0.0128
δ (TOPEN(-1))	0.000238	4.57E-05	5.197214	0.0003
δ (TOPEN(-2))	-0.000105	4.48E-05	-2.340017	0.0392
δ (GFCF)	0.000401	0.000119	3.366106	0.0063
δ (GFCF(-1))	0.000628	0.000144	4.359399	0.0011
δ (GFCF(-2))	0.000436	0.000138	3.161068	0.0091
ECT(-1)	-0.019801	0.001793	-11.04466	0.0000
Long-Run Estimates				
MPR	-0.007801	0.025535	-0.305513	0.7657
TBR	0.096204	0.065785	1.462408	0.1716
MDR	-0.115379	0.087739	-1.315019	0.2153
INF	0.053650	0.041564	1.290782	0.2232
TOPEN	-0.013088	0.011926	-1.097484	0.2959
GFCF	0.023830	0.006987	3.410743	0.0058
C	3.271211	1.127921	2.900213	0.0144
R-squared	0.8866	**F-stat**		144.78 (0.0000)
Adj. R-squared	0.7746	**D-Watson**		2.0987

Source: Author's computation (2023).

At the conventional level, the short-run coefficients of the change in under-5 mortality at lags one and two are significantly positive and negative respectively. While its first and third lags are statistically significant, the overall short-run parameter estimates of previous infant mortality curtail to the current infant mortality in Nigeria. More so, the current monetary policy rate and treasury bill rate were determined to be positive, but only the latter is statistically significant at 5%. It implies that treasury bill rate had a short-term positive influence on under-5 mortality. Short-run child mortality is positively and significantly influenced by lag one and two of a 12-month deposit rate. The current, first and two lags of gross fixed capital formation had direct significant impact on child mortality respectively.Apart from the second lag that was negative and statistically significant at 5%, the parameters of trade openness are positive and significantly related to child mortality.Also, the table indicated that the current level of inflation rate significantly and positively impacted child mortality, while its first and second lags significantly influence under-5 mortality negatively.

In accordance with the long-term estimated reported in Table 4.7, all the money market instruments do not have significant influence on child mortality in Nigeria. The monetary policy rate and 12-month deposit rate were consistent with the theoretic expectation, although not statistically significant at 5% level. It implies that money market instruments do not have the potential to curtail child mortality for the periods understudy. In addition, for the research years, gross fixed capital formation and inflation rate have direct effects on under-5 mortality rate in Nigeria. The only factor that significantly impacted child mortality was investment at 5% level. As a result, child mortality increases by 0.24% with every 10% increase in gross fixed capital formation. Trade openness has also been shown to have an indirect impact on child mortality.

The adjusted R^2(coefficient of determination) is high (77.46%), meaning that the variables in the model accounted for around 77.46% of all variations in child mortality. It only said that variations in monetary market development and other influencing factors accounted for 77.46% of the range in changes in child mortality. The model is properly described and statistically significant as shown by the overall test using the F-statistic (144.78), which is statistically significant at the 5% level of significance. Serial autocorrelation is not present in the model, as evidenced by the Durbin-Watson value of 2.0987.

Diagnostic Test

Heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality tests are all examined in the calculated ARDL model. Table 4.8 displays the outcomes of these examinations. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. It indicates that the error terms are not serially associated and have the same variances as their normal distribution. Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.6a and 4.6b are steady.

Table 4.8: Diagnostic tests of selected ARDL model

Results	
Serial Correlation:3.4953 [0.0996]	**Normality Test:**0.031 [0.9847]
Functional Form: 1.4830 [0.2324]	**Heteroskedasticity Test:**2.1082 [0.0996]

Source: Author's computation (2023).

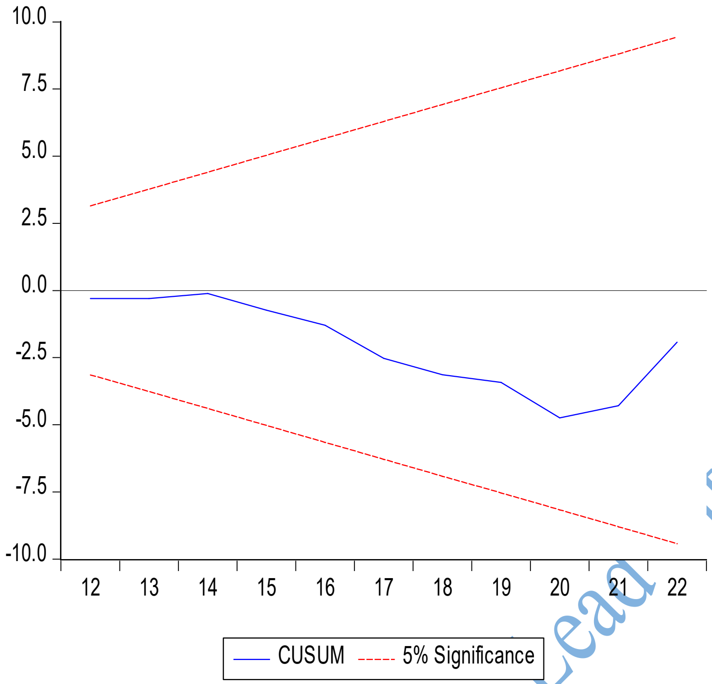

Figure 4.6a: Cumulative Sum (CUSUM)

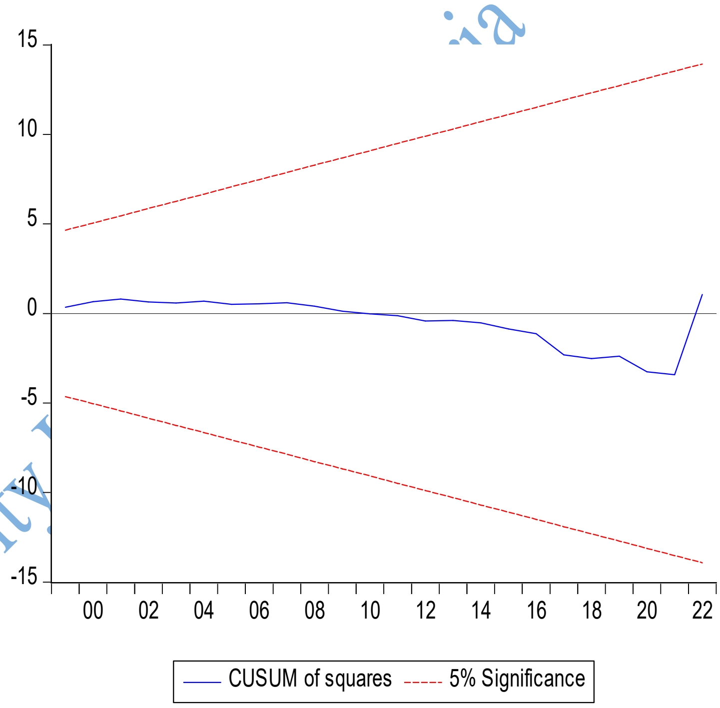

Figure 4.6b: Cumulative Sum of Square (CUSUMQ)

4.4.2 Empirical Results of the Effects of Bank Sector Development on Health Outcomes

A) Cointegration Test Result

Before estimating the short-run and long-run parameters, the study uses the autoregressive distributed lag (ARDL) bound cointegration tests to examine the long-run relationships among bank sector development, health outcomes and other controllable variables in the context of the proposed hypotheses. The ARDL bound test is used for the model illustrating the relationship among bank sector development, health outcomes, and other controllable variables since it is appropriate for variables at various orders of integration. Table 4.9 provides the F-statistics estimate for examining the possibility of a long-term relationship among bank sector development, health outcomes, and other confounding factors in Nigeria.

According to the table, the normalized estimated F-statistics (Farb = 5.4914 and 11.032) of the equations exceed both the lower and upper critical bounds at a 5% level of significance. This suggests that at a 5% significance level, the null hypothesis that there is no long-term association is rejected. In accordance with the estimation above, bank sector development, control variables (including gross fixed capital creation, trade openness, and inflation rate), and health outcomes all have equilibrium conditions that maintain them together throughout time. As a result, in Nigeria, there is a long-term connection between bank sector developmentand health outcomes.

Table 4.9: Existence of longrun between bank sector development and health outcomes

Test Statistics	Value	K
F-statistics (lexp| lr, ldr,dcps, inf, topen, gfcf) (2, 1, 2, 0, 2, 1, 2)	5.4914	6
F-statistics (un5m| lr, ldr,dcps, inf, topen, gfcf) (2, 2, 1, 2, 2, 0, 1)	11.032	6
Critical Value Bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Author's computation (2023).

B) Short-run and Long-run Estimates of Bank Sector Development and Life Expectancy

This section addresses the null hypothesis, which holds that bank sector development has no substantial impact on life expectancy in Nigeria. Using the estimated ARDL approach that was fully discussed in the preceding chapter, it evaluates both the short-run and long-run relationship estimates of bank sector developmentand other controllable factors in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Based on data on bank sector development, gross fixed capital creation, trade openness, and inflation rate, Table 4.10 provides conclusive evidence for our empirical estimates.

The short-run estimation results show the error correction mechanism, which measures the rate or intensity of adjustment. It quantifies the rate at which the outcome variable responds to changes in the explanatory variables. The dynamic pattern of the model is revealed in the short run analysis, which also checks to determine if the dynamics of the model have not been confined by incorrect lag length constraints. Based on the automatic selection of the Akaike Information Criterion, the model's lag length was set at three to ensure a sufficient degree of freedom, and the ARDL test automatically selected the lag duration on all variables. The short-run estimates of the association between bank sector development and life expectancy are shown in Table 4.10.The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.1420) implied that the model corrects its short-run disequilibrium by 14.2% speed of adjustment to return to the long run equilibrium.

Table 4.10: Results of estimated ARDL model of life expectancy

Dependent Variable: Life Expectancy (lexp)
Selected Model: ARDL(2, 1, 2, 0, 2, 1, 2)
Sample: 1985 2022 **Included observations:**36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Short-Run Estimates				
δ (LEXP(-1))	-0.144473	0.136000	-1.062295	0.3014
δ (LR)	0.003337	0.001314	2.540058	0.0200
δ (LDR)	-0.001212	0.001587	-0.763289	0.4547
δ (LDR(-1))	-0.003551	0.002029	-1.749858	0.0963
δ (INF)	-0.001187	0.001488	-0.797956	0.4348
δ (INF(-1))	0.009098	0.001791	5.079907	0.0001
δ (TOPEN)	0.009202	0.002066	4.454369	0.0003
δ (GFCF)	-0.002987	0.005908	-0.505646	0.6189
δ (GFCF(-1))	0.023350	0.007331	3.185080	0.0049
ECT(-1)	-0.142030	0.018318	-7.753500	0.0000
Long-Run Estimates				
LR	0.051415	0.015953	3.222861	0.0045
LDR	0.025535	0.019082	1.338205	0.1966
DCPS	-0.034480	0.083612	-0.412375	0.6847
INF	-0.059578	0.019811	-3.007274	0.0072
TOPEN	0.038902	0.034298	1.134219	0.2708
GFCF	-0.219829	0.039186	-5.609874	0.0000
C	53.09382	2.856288	18.58840	0.0000
R-squared	0.8614	**F-stat**		120.79 (0.0000)
Adj. R-squared	0.8134	**D-Watson**		2.1244

Source: Author's computation (2023).

The short-run coefficient of the change in life expectancy at lags one is significantly negative at the 5% level, respectively. Liquidity ratio positively and significant relate with life expectancy in the short run. As for loan to deposit ratio, its current and first lag have negative and significant coefficients. This means that the negative influence of loan to deposit ratio on life expectancy is not significant statistically at 5% level. While the current level is statistically insignificant and negative, the short-run parameter estimate of the first lag of inflation was found to be positive and statistically insignificant at 5%.As a result, the inflation rate had a short-run positive and significant impact on life expectancy at lag one. Life expectancy is directly and significantly affected by the current level of trade openness.The rise in trade openness had a beneficial and considerable impact on life expectancy.Except for its current level, which is negative and statistically insignificant at 5%, gross fixed capital formation at first lag is positive and statistically significant.

The long-term estimates in Table 4.10 show that liquidity ratio, loan to deposit ratio and trade openness have direct link with life expectancy in Nigeria. The parameter of the indicator was consistent with theoretical assumptions, but on the parameter of liquidity ratio is statistically significant at 5%.It implies that liquidity ratio haslong-term association with life expectancy. Similarly, low inflation rate has a significant impact on high life expectancy.Meanwhile, gross fixed capital formation and domestic credit to private sector by banks to GDP ratio have had a long-term negative impact on life expectancy. Only the negative impact of gross fixed capital formation to GDP ratio on life expectancy is significant at 5% level. As a result, a 10% change in investment results in a 2.2% drop in life expectancy.

The adjusted R^2 (coefficient of determination) is high (81.34%), indicating that the model variables accounted for approximately 81.34% of all differences in life expectancy. It merely stated that the changes in bank sector development and other contributing factors accounted for 81.34% of the variations in life expectancy. The overall test using the F-statistic (120.79), which is statistically significant at the 5% level of significance, demonstrates that the model is accurately specified and statistically significant. The model lacks serial autocorrelation, as demonstrated by the Durbin-Watson score of 2.1244.

Diagnostic Test

The estimated ARDL model examines heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality testing. The results of these tests are shown in Table 4.11.The calculated ARDL model passed the serial correlation, normality, and heteroskedasticity tests. It shows that the error terms are not serially related and have the same variances as their normal distribution. Furthermore, the ARDL model passes the Ramsey RESET test, indicating that it is evenly specified. Furthermore, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), as shown in Figures 4.7a and 4.7b, are stable.

Table 4.11: Diagnostic tests of selected ARDL model

Results	
Serial Correlation: 3.0762 [0.0724]	**Normality Test:** 5.5477 [0.0624]
Functional Form: 1.8811 [0.0762]	**Heteroskedasticity Test:** 0.3795 [0.9723]

Source: Author's computation (2023).

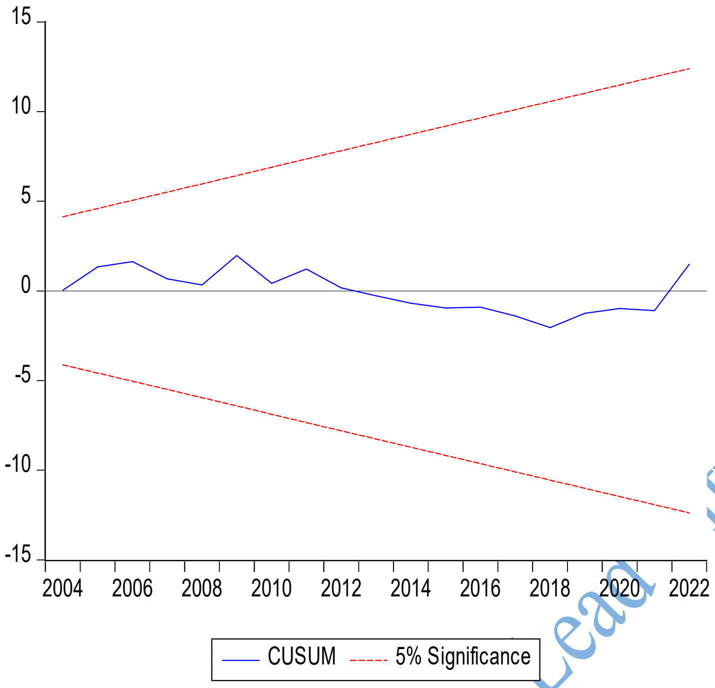

Figure 4.7a: Cumulative Sum (CUSUM)

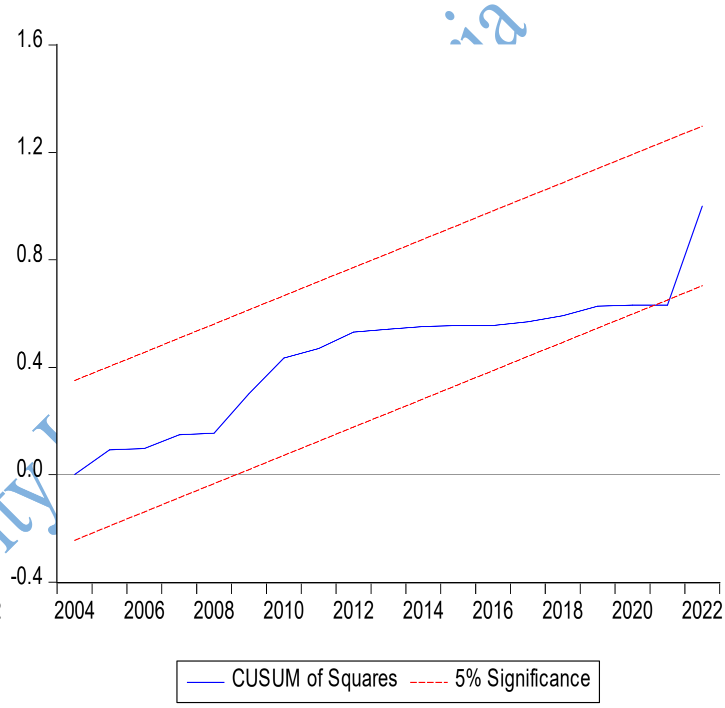

Figure 4.7b: Cumulative Sum of Square (CUSUMQ)

C) Short-run and Long-run Estimates of Bank Sector Development Quality and Child Mortality

In this section, this study examined the null hypothesis that bank sector development has no significant effect on child mortality in Nigeria. It assesses the short-run and long-run relationship estimates of bank sector development and other controllable factors on child mortality in Nigeria using the estimated ARDL approach, which was completely addressed in the preceding chapter. The calculated ARDL model is a combination of short-run and long-run estimates of the relationships among the series considered in this study. Based on statistics on bank sector development, gross fixed capital creation, financial sector development, trade openness, and inflation rate, Table 4.12 provides conclusive evidence for our empirical estimates.

The short-run estimation results show the error correction mechanism, which measures the rate or intensity of adjustment. It quantifies the rate at which the outcome variable responds to changes in the explanatory variables. The dynamic pattern of the model is revealed in the short run analysis, which also checks to determine if the dynamics of the model have not been confined by incorrect lag length constraints. Based on the automatic selection of the Akaike Information Criterion, the model's lag length was set at three to ensure a sufficient degree of freedom, and the ARDL test automatically selected the lag duration on all variables. The short-term estimates of the connection between institutional quality and newborn mortality are shown in Table 4.12.The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.0838) implied that the model corrects its short-run disequilibrium by 8.38% speed of adjustment in order to return to the long run equilibrium.

Table 4.12: Results of estimated ARDL model of child mortality

Dependent Variable: Child mortality (un5m)
Selected Model: ARDL(2, 2, 1, 2, 2, 0, 1)
Sample: 1985 2022 **Included observations:** 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		Short-Run Estimates		
δLOG(UN5M(-1))	0.864722	0.022311	38.75760	0.0000
δ (LR)	-0.000120	3.26E-05	-3.695332	0.0015
δ (LR(-1))	0.000156	3.67E-05	4.254955	0.0004
δ (LDR)	0.000125	3.78E-05	3.312637	0.0037
δ (DCPS)	8.31E-05	0.000197	0.420931	0.6785
δ (DCPS(-1))	0.000457	0.000205	2.232187	0.0378
δ (INF)	-3.41E-05	3.08E-05	-1.108008	0.2817
δ (INF(-1))	0.000128	3.05E-05	4.213501	0.0005
δ (GFCF)	-0.000246	0.000136	-1.801910	0.0874
ECT(-1)	-0.083786	0.007624	-10.98974	0.0000
		Long-Run Estimates		
LR	-0.005163	0.001119	-4.612869	0.0002
LDR	-0.000136	0.000575	-0.236587	0.8155
DCPS	-0.009854	0.004609	-2.138244	0.0457
INF	-0.000216	0.000664	-0.324660	0.7490
TOPEN	0.002520	0.000995	2.532994	0.0203
GFCF	0.011349	0.002214	5.125408	0.0001
C	4.997465	0.136213	36.68861	0.0000
R-squared	0.7676	**F-stat**		139.97 (0.0000)
Adj. R-squared	0.7564	**D-Watson**		1.8554

Source: Author's computation (2023).

The short-run coefficient of change in under-5 mortality at lags one is positive at the conventional level.While the first is negative and statistically significant, the short-run liquidity ratio negatively and significantly impact under-5 mortality in Nigeria. Furthermore, at 5%, the existing short run loan to deposit ratio was assessed to be positive and statistically significant. It means that the loan to deposit ratio had a short-term positive and significant impact on child mortality. The short-run domestic credit to private sector by banks to GDP at lag one has direct and significant effect on under-5 mortality rate in Nigeria. Although the current level of inflation rate has an indirect and insignificant impact on under-5 mortality, only its first lag is positive and significantstatistically. In addition, the findings showed that the current level of gross fixed capital formation had a significant and negative impact on under-5 mortality.

According to the long-term estimates presented in Table 4.12, liquidity ratio, loan to deposit ratio and domestic credit to private sector by banks to GDP ratio have a negative impact on child mortality in Nigeria. The seriesfollow the theoretical prediction, and only liquidity ratio and domestic credit to private sector by banks to GDP are statistically significant at 5%.It implies that liquidity ratio and domestic credit to private sector by banks to GDPhave a beneficial impact on child mortality reduction. In terms of magnitude, a 100% increase in liquidity ratio and domestic credit to private sector by banks to GDP results in 0.52% and 0.014% reduction in child mortality. Low inflation has also been linked to an increase in under-5 mortality. As a result, a 100% decrease in inflation resulted in a 0.022% decrease in child mortality. Furthermore, during the study period, gross fixed capital formation to GDP ratio and trade openness had a significant direct impact on child mortality at 5% level. As a result, for every 10% increase in gross fixed capital formation to GDP ratio and trade openness, child mortality rises by 0.25% and 1.14%, respectively.

The adjusted R^2 (coefficient of determination) is high (75.64%), indicating that the model variables accounted for approximately 75.64% of all variations in child mortality. It merely stated that changes in bank sector development and other contributing factors were responsible for 75.64% of the total variations in child mortality. The overall test using the F-statistic (139.97), which is statistically significant at the 5% level of significance, demonstrates that the model is accurately specified and statistically significant. The model lacks serial autocorrelation, as demonstrated by the Durbin-Watson score of 1.8554.

Diagnostic Test

The estimated ARDL model examines heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality testing. The results of these tests are shown in Table 4.13.The calculated ARDL model passed the serial correlation, normality, and heteroskedasticity tests. It shows that the error terms are not serially related and have the same variances as well as the normality distribution test. Furthermore, the ARDL model passes the Ramsey RESET test, indicating that it is evenly specified. In addition, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), as shown in Figures 4.8a and 4.8b, are stable.

Table 4.13: Diagnostic Tests of Selected ARDL Model

Results	
Serial Correlation: 1.5213 [0.2467]	**Normality Test:** 0.2179 [0.8968]
Functional Form: 0.3233 [0.7502]	**Heteroskedasticity Test:** 1.6597 [0.2106]

Source: Author's computation (2023).

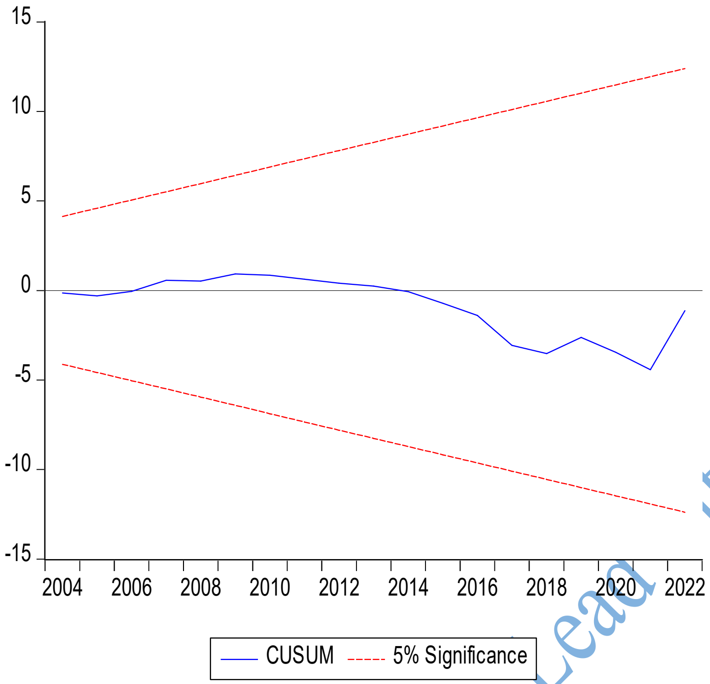

Figure 4.8a: Cumulative Sum (CUSUM)

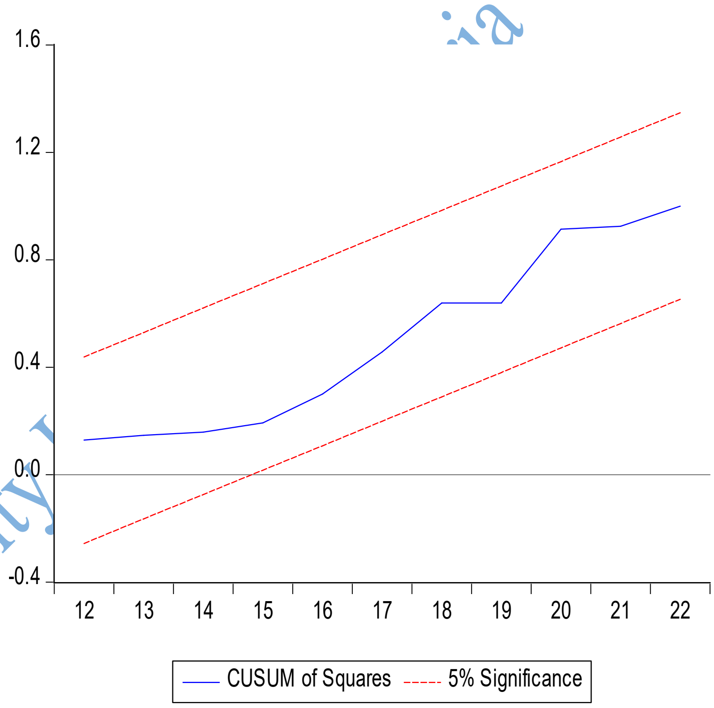

Figure 4.8b: Cumulative Sum of Square (CUSUMQ)

4.4.3 Empirical Results of the Effects of Stock Market Development on Health Outcomes

A) Cointegration Test Result

Before estimating the short-run and long-run parameters, the study uses the autoregressive distributed lag (ARDL) bound cointegration tests to examine the long-run relationships among stock market development, health outcomes and other controllable variables in the context of the proposed hypotheses. The ARDL bound test is used for the model illustrating the relationship among stock market development, health outcomes, and other controllable variables since it is appropriate for variables at various orders of integration. Table 4.14 provides the F-statistics estimate for examining the possibility of a long-term relationship among stock market development, health outcomes, and other confounding factors in Nigeria.

According to the table, the normalized estimated F-statistics (Farb = 7.2584 and 23.599) of the equations exceed both the lower and upper critical bounds at a 5% level of significance. This suggests that at a 5% significance level, the null hypothesis that there is no long-term association is rejected. In accordance with the estimation above, public health expenditure, institutional quality, control variables (including gross fixed capital creation, trade openness, and inflation rate), and health outcomes all have equilibrium conditions that maintain them together throughout time. As a result, in Nigeria, there is a long-term connection among stock market developmentand health outcomes.

Table 4.14: Existence of longrun between stock market development and health outcomes

Test Statistics	Value	K
F-statistics (lexp| smk,tstv, asi, inf, topen,gfcf) (2, 0, 2, 2, 2, 1, 2)	7.2584	6
F-statistics (un5m| smk,tstv, asi, inf, topen,gfcf) (4, 3, 3, 3, 0, 3, 2)	23.599	6
Critical Value Bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Author's computation (2023).

B) Short-run and Long-run Estimates of Stock Market Development and Life Expectancy

The null hypothesis, that stock market development has no significant effect on life expectancy in Nigeria, is addressed in this section. Using the estimated ARDL approach, which was fully discussed in the preceding chapter, it evaluates both the short-run and long-run relationship estimates of stock market development and other controllable factors in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Table 4.15 provides conclusive evidence for our empirical estimations based on data on stock market development measures, gross fixed capital creation, trade openness, and inflation rate.

The findings of the short-run estimation demonstrate the error correction mechanism, which gauges the rate or intensity of adjustment. It measures the rate of adjustment at which the outcome variable adjusts to changes in the explanatory variables. The model's dynamic pattern is displayed in the short run analysis, which also checks to see if the model's dynamics haven't been restricted by erroneous lag length specifications. The model's lag length was set at three to ensure an adequate degree of freedom based on automatic selection of the Akaike Information Criterion, and the ARDL test automatically select the lag duration on all variables. Table 4.15 shows the short-term estimates of the relationship betweenstock market development and life expectancy. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.1335) implied that the model corrects its short-run disequilibrium by 13.35% speed of adjustment in order to return to the long run equilibrium.

Table 4.15: Results of estimated ARDL model of life expectancy

Dependent Variable: Life Expectancy (lexp)
Selected Model: ARDL(2, 0, 2, 2, 2, 1, 2)
Sample: 1985 2022 **Included observations:** 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Short-Run Estimates				
δ (LEXP(-1))	0.241097	0.086376	2.791231	0.0121
δ (TSTV)	0.032121	0.038829	0.827241	0.4189
δ (TSTV(-1))	0.125216	0.030618	4.089612	0.0007
δ (ASI)	2.77E-06	2.59E-06	1.068033	0.2996
δ (ASI(-1))	-1.79E-05	3.35E-06	-5.334115	0.0000
δ (INF)	-0.001951	0.001233	-1.582580	0.1309
δ (INF(-1))	0.008346	0.001422	5.869643	0.0000
δ (TOPEN)	0.012355	0.001959	6.307433	0.0000
δ (GFCF)	-0.004948	0.005164	-0.958022	0.3507
δ (GFCF(-1))	0.016792	0.005740	2.925550	0.0090
ECT(-1)	-0.133470	0.014862	-8.980493	0.0000
Long-Run Estimates				
SMK	-0.037287	0.093586	-0.398428	0.6950
TSTV	-1.171321	0.442915	-2.644574	0.0165
ASI	0.000116	5.57E-05	2.086613	0.0514
INF	-0.068545	0.020173	-3.397803	0.0032
TOPEN	0.037947	0.031440	1.206982	0.2431
GFCF	-0.152624	0.032509	-4.694825	0.0002
C	54.02490	1.822913	29.63657	0.0000
R-squared	0.8872	**F-stat**		132.37 (0.0000)
Adj. R-squared	0.8421	**D-Watson**		1.8508

Source: Author's computation (2023).

At the 5% level, the short-run coefficients of the change in life expectancy at lag one is significant and positive. While the first lag is statistically insignificant and negative, the short-run parameter estimates of all share index were determined to be positive and statistically significant at 5%. It follows that all share index public health spending had a short-term positive influence on life expectancy. Also, the current and lag one of the total stocks traded value have a direct impact on life expectancy in the short run. The current and first lag of gross fixed capital formation to GDP ratio at lag one had a significant direct impact on life expectancy while the current level is not significant statistically. Life expectancy was positive and significantly impacted by the rise of e total trade to GDP ratio in the short run. Apart from the current level which is negative and statistically insignificant at 5%, the first lag of inflation rate is positive and statistically significant.

According to the long-run results in Table 4.15, stock market capitalization and total stock traded value negatively impacted life expectancy in Nigeria. The parameters werenot in line with theoretic assumptions, and only the result of total stocks traded value is statistically significant at 5%. Likewise, the study discovered that all share index have the potential to significantly impact life expectancy positivelyin the long run at 10% level. In magnitude terms, a 100% rise in all share index led to about 0.012% increase in life expectancy. Also, low inflation has demonstrated to have a positive and significant impact on life expectancy. Thus, a 100% decline in inflation rate results in a 6.86% change in life expectancy. However, for the research years, trade openness and gross fixed capital formation have direct and indirect effects on life expectancy in Nigeria respectively. As a result, life expectancy decreases by 1.53% with every 10% rise in gross fixed capital formation.

The adjusted R^2 (coefficient of determination) is high (84.21%), meaning that the variables in the model accounted for around 84.21% of all variations in life expectancy. It only said that variations in stock market development and other influencing factors accounted for 84.21%

of the range in changes in life expectancy. The model is properly described and statistically significant as shown by the overall test using the F-statistic (132.37), which is statistically significant at the 5% level of significance. Serial autocorrelation is not present in the model, as evidenced by the Durbin-Watson value of 1.8508.

Diagnostic Test

Heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality tests are all examined in the calculated ARDL model. Table 4.16 displays the outcomes of these examinations. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. It indicates that the error terms are not serially associated and have the same variances as their normal distribution. Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.9a and 4.9b are steady.

Table 4.16: Diagnostic Tests of Selected ARDL Model

Results	
Serial Correlation:1.1020 [0.3562]	**Normality Test:**2.0903 [0.3516]
Functional Form:0.5383 [0.5973]	**Heteroskedasticity Test:**0.3341 [0.9858]

Source: Author's computation (2023).

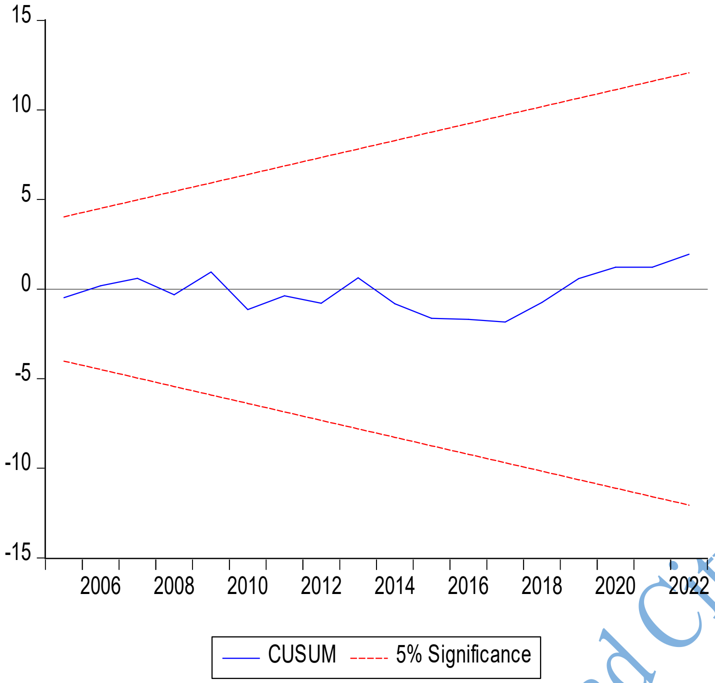

Figure 4.9a: Cumulative Sum (CUSUM)

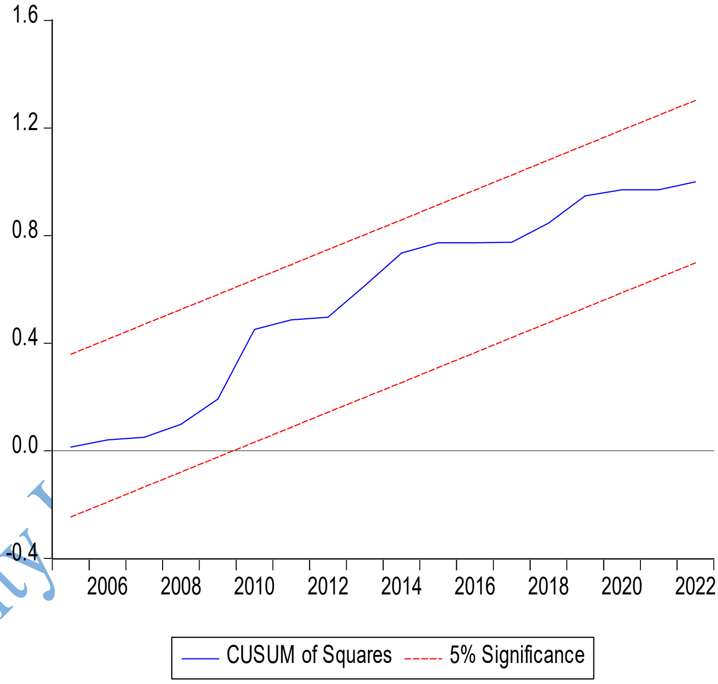

Figure 4.9b: Cumulative Sum of Square (CUSUMQ)

C) Short-run and Long-run Estimates of Stock Market Development and Child Mortality

In this section, this study addressed the null hypothesis that stock market development has no significant effect on infant mortality in Nigeria. Using the estimated ARDL approach, which was fully discussed in the preceding chapter, this study evaluates both the short-run and long-run relationship estimates of stock market development and other controllable factors on infant mortality in Nigeria. A combination of short-run and long-run estimates of the relationships among the series taken into consideration in this study makes up the estimated ARDL model. Table 4.17 provides conclusive evidence for our empirical estimations based on data on stock market development measures, gross fixed capital creation, trade openness, and inflation rate.

The results of the short-run estimation demonstrate the error correction mechanism, which gauges the rate or intensity of adjustment. It measures the rate of adjustment at which the outcome variable adjusts to changes in the explanatory variables. The model's dynamic pattern is displayed in the short run analysis, which also checks to see if the model's dynamics haven't been restricted by erroneous lag length specifications. The model's lag length was set at three to ensure an adequate degree of freedom based on automatic selection of the Akaike Information Criterion, and the ARDL test automatically select the lag duration on all variables. Table 4.17 shows the short-term estimates of the correlation between stock market development and infant mortality. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.0242) implied that the model corrects its short-run disequilibrium by 2.42% speed of adjustment to return to the long run equilibrium.

Table 4.17: Results of estimated ARDL model of child mortality

Dependent Variable: Child mortality (un5m)

Selected Model: ARDL(4, 3, 3, 3, 0, 3, 2)

Sample: 1985 2022 **Included observations:** 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Short-Run Estimates				
DLOG(UN5M(-1))	1.815828	0.166594	10.89975	0.0000
DLOG(UN5M(-2))	-0.462090	0.328870	-1.405083	0.1936
DLOG(UN5M(-3))	-0.660964	0.179607	-3.680051	0.0051
D(SMK)	-0.000742	0.000118	-6.302996	0.0001
D(SMK(-1))	-0.002106	0.000175	-12.01260	0.0000
D(SMK(-2))	-0.003143	0.000252	-12.45588	0.0000
D(TSTV)	-0.000176	0.000687	-0.256098	0.8036
D(TSTV(-1))	0.010553	0.001005	10.50162	0.0000
D(TSTV(-2))	0.002310	0.000488	4.731136	0.0011
D(ASI)	6.86E-07	9.30E-08	7.375924	0.0000
D(ASI(-1))	-8.24E-08	8.28E-08	-0.995057	0.3457
D(ASI(-2))	1.25E-06	9.50E-08	13.20058	0.0000
D(TOPEN)	9.31E-05	2.79E-05	3.335840	0.0087
D(TOPEN(-1))	0.000135	2.66E-05	5.078261	0.0007
D(TOPEN(-2))	5.11E-05	2.51E-05	2.035640	0.0723
D(GFCF)	0.000106	6.73E-05	1.571000	0.1506
D(GFCF(-1))	-0.000294	8.17E-05	-3.598124	0.0058
ECT(-1)	-0.024200	0.001321	-18.32039	0.0000
Long-Run Estimates				
SMK	-0.077409	0.029221	-2.649132	0.0265
TSTV	0.400891	0.140068	2.862121	0.0187
ASI	-1.37E-05	1.17E-05	-1.175047	0.2701
INF	-0.001107	0.001553	-0.712983	0.4939
TOPEN	0.001172	0.005071	0.231085	0.8224
GFCF	-0.026910	0.014048	-1.915616	0.0877
C	6.873027	0.831258	8.268221	0.0000
R-squared	0.8956	**F-stat**		35.422 (0.0000)
Adj. R-squared	0.7806	**D-Watson**		2.0221

Source: Author's computation (2023).

At the conventional level, the short-run coefficient of the change in child mortality at lag one is positive and significant statistically which its lags two and three are negative. More so, the current, lags one and twoof stock market capitalizationwas determined to be negative and statistically significant at 5%. It implies that stock market capitalizationhad a short-term negative influence on child mortality. Also, total stocks traded value negatively influenced under-5 mortality in the short run, but it lags one and two impacts on child mortality was positive and significant at 5% level. The current and lag two of all share index negatively influence child mortality in the short run. The current, first and second lags of trade openness had a direct and significant impact on under-5 mortality. With the exception of the current levelwhich is negative, the parameter of gross fixed capital formation at first lag is positive and significantly related to child mortality.

In accordance with the long-term estimated reported in Table 4.17, stock market capitalization has a negative and significant impact on under-5 mortality rate in the long run.However, total stock transaction value has a direct and significant effect on child mortality. It means that stock market capitalization played a deteriorating effect on child mortality while total stock transaction value amplifies the rate of under-5 deaths. The study discovered that all share index do not have a significant impact on child mortality rate.In addition, for the research years, gross fixed capital formation and inflation rate have an indirect effect on child mortality in Nigeria. The only cofounding factor that significantly impacted child mortality was gross fixed capital formation at 10% level. The positive impact of trade openness on child mortality is not significant statistically at 5% level.

The adjusted R^2(coefficient of determination) is high (78.06%), meaning that the variables in the model accounted for around 78.06% of all variations in child mortality. It only said that variations in stock market development and other influencing factors accounted for 78.06% of the range in changes in child mortality. The model is properly described and statistically significant as shown by the overall test using the F-statistic (35.422), which is statistically significant at the 5% level of significance. Serial autocorrelation is not present in the model, as evidenced by the Durbin-Watson value of 2.0221.

Diagnostic Test

Heteroscedasticity, serial correlation, functional form misspecification, parameter stability, and normality tests are all examined in the calculated ARDL model. Table 4.18 displays the outcomes of these examinations. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. It indicates that the error terms are not serially associated and have the same variances as their normal distribution. Additionally, the ARDL model passed the Ramsey RESET test, showing that the model is evenly specified. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ), respectively, as shown in Figures 4.10a and 4.10b are steady.

Table 4.18: Diagnostic Tests of Selected ARDL Model

Results	
Serial Correlation: 1.1284 [0.4365]	**Normality Test:** 0.7571 [0.6849]
Functional Form: 1.1765 [0.2732]	**Heteroskedasticity Test:** 0.4314 [0.9515]

Source: Author's computation (2023).

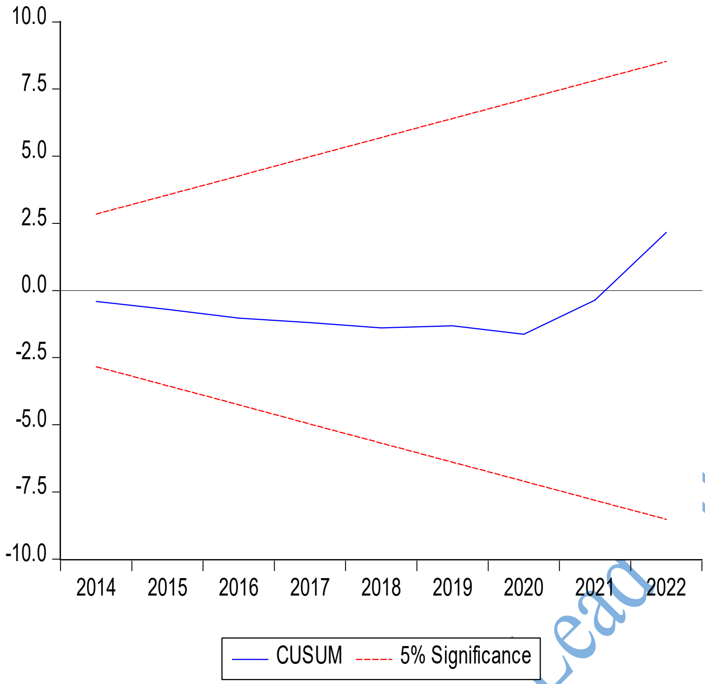

Figure 4.10a: Cumulative Sum (CUSUM)

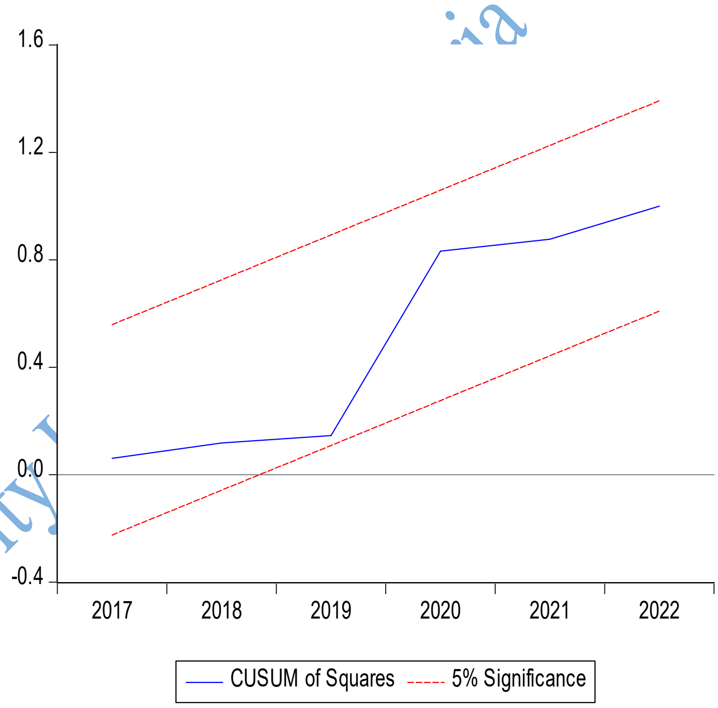

Figure 4.10b: Cumulative Sum of Square (CUSUMQ)

4.5 Discussion of Findings

Concerning the first objective, the study found that a long run relationship exists between money market development and health outcomes in Nigeria. The findings showed that monetary policy rate and 12-month deposit rate have negative impact on short-run life expectancy in Nigeria. It implies that tightening monetary policies may have adverse effects on the health outcomes of the population in the short term. Meanwhile, the study discovered that life expectancy positively reacted to monetary policy rate but negatively affected by treasury bill rate in the long run. The positive reaction of life expectancy to the monetary policy rate in the long run indicates that, over time, a well-managed monetary policy can contribute positively to overall life expectancy. However, the negative association with the treasury bill rate suggests that certain aspects of monetary policy, such as high treasury bill rates, may have detrimental effects on long-term life expectancy.

Furthermore, the study showed that treasury bill rate and 12-month deposit rate positively relate with child mortality rate in the short run. The positive relationship between treasury bill rate and 12-month deposit rate with child mortality in the short run underscores the importance of considering health outcomes when setting interest rates. High interest rates may impact families' abilities to access healthcare and other essential services, contributing to increased child mortality rates. The study does not find a significant link between money market development and child mortality in Nigeria.

Regarding the second objective, the study found a long run relationship between bank sector development and health outcomes in Nigeria. It discovers that liquidity ratio positively influences life expectancy both in the short and long run. It suggests that maintaining adequate liquidity in the banking sector can contribute to improved life expectancy. This indicates that a stable and liquid banking sector may have positive spillover effects on the overall health and well-being of the population. The impact of other measures of bank sector development on life expectancy is not significant statistically.

Concerning child mortality rate, the study found that under-5 mortality is positively and negatively influenced by bank sector development measures (liquidity ratio, loan to deposit ratio and domestic credit to private sector by banks to GDP) in the short and long run respectively. All the three measures are significant in the short run but only the liquidity ratio and domestic credit are significant in the long run. The finding that under-5 mortality is positively influenced by bank sector development measures (liquidity ratio, loan to deposit ratio) in the short run but negatively influenced in the long run suggests a nuanced relationship. Short-term impacts may indicate immediate challenges, while long-term effects may reflect sustainable improvements. The significance of liquidity ratio, loan to deposit ratio, and domestic credit to private sector by banks to GDP in the short run implies that these factors play a crucial role in influencing child mortality rates in the short term. In the long run, the significance of liquidity ratio and domestic credit suggests that sustained efforts in managing liquidity and facilitating credit to the private sector can contribute to reducing child mortality.

As to the third objective, it revealed that there is a long run relationship between stock market development and health outcomes in Nigeria. Total stocks transaction value influences life expectancy positively in the short run but negatively in the long run. The positive influence of total stocks transaction value on life expectancy in the short run suggests that increased stock market activity may have immediate positive effects on population health. However, the negative influence in the long run indicates a potential downside, highlighting the importance of considering sustained impacts. Also, all share index directly influence life expectancy both in the short and long run. The direct positive influence of the all-share index on life expectancy in both the short and long run suggests that a robust and growing stock market may contribute positively to overall life expectancy. This implies that a thriving stock market could be associated with broader economic well-being and improved public health.

Stock market capitalization negatively influences child mortality both in the short and long run. It implies that a larger stock market capitalization is associated with lower child mortality rates. This suggests that a well-developed and substantial stock market may contribute to overall economic stability and improved child health outcomes. However, total stock transaction value positively relates to under-5 mortality in the short and long run. The positive relationship between total stocks transaction value and under-5 mortality in both the short and long run is counterintuitive. This suggests that increased stock market activity may have adverse effects on child mortality, possibly due to economic volatility or other indirect factors. All share index has a direct influence on child mortality rate in the short run. The direct influence of the all-share index on child mortality in the short run suggests that immediate changes in stock market performance may have specific effects on child mortality rates. This aligns with the findings of previous studies that financial development has positive relationship between life expectancy[1]. This does not align with the study that the provision of facilities to the private sector has a statistically significant and beneficial impact on human capital[2,3,4,5,6].

Endnotes

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Chapter Five

Conclusion

5.1 Summary

In this study, the existing relationship between financial sector development and health outcomes in Nigeria is investigated in order to understand the impact of money market development (monetary policy rate, 12-month deposit rate, and treasury bill rate), bank sector development (liquidity ratio, loan to deposit rate, and domestic credit to private sector by banks to GDP ratio), and stock market development (stock market capitalization to GDP ratio, total stocks transaction value to GDP ratio, and all share index) on health outcomes (life expectancy and under-5 mortality rates) in Nigeria. Understudying this research study became necessary because it makes enquiries on the findings of past studies which can best be described as inconclusive. The study is conducted for developing countries in sub-Saharan countries such as Nigeria. The datasets employed were obtained from the World Development Indicators (2023), and CBN Statistical Bulletin (2022) which spans from 1985 to 2022. The autoregressive distributed lag (ARDL) estimator was used to evaluate the parameters based on the characteristics of the datasets.

For the first objective, a long-run relationship was found between money market development and health outcomes measured by life expectancy and infant mortality in Nigeria. For the shortrun, increase in monetary policy rate results to high life expectancy. A12-month deposit rate at lag two had a short-term negative influence on life expectancy. This shows that low 12-month deposit rate guarantees an improvement in the anticipated mean years of an individual's life after birth. In the long run, high monetary policy rate has a direct link with life expectancy in Nigeria.Low treasury bill rate has a significant link with a high life expectancy. Also, the positive effect of a 12-month deposit rate on life expectancy is not statistically significant. Concerning child mortality, the current monetary policy rate and treasury bill rate were determined to be positive, but only the latter is statistically significant at 5%. It implies that treasury bill rate had a short-term positive influence on short-run under-5 mortality. Short-run child mortality is positively and significantly influenced by lag one and two of a 12-month deposit rate. In the long run, all the money market instruments do not have significant influence on child mortality in Nigeria. Thus, money market instruments do not have the potential to curtail child mortality for the periods understudy.

Regarding the second objective, the results show that there exists a long-run relationship between bank sector development and health outcomes in Nigeria. Liquidity ratio positively and significant relate with life expectancy in the short run. As for loan to deposit ratio, its current and first lag have negative and significant coefficients. This means that the negative influence of loan to deposit ratio on life expectancy is not significant statistically at 5% level. In the long run, liquidity ratio, loan to deposit ratio and trade openness have direct link with life expectancy, but only the parameter of liquidity ratio is statistically significant at 5%.It implies that liquidity ratio haslong-term association with life expectancy.The short-run liquidity ratio negatively and significantly impacted under-5 mortality in Nigeria. Furthermore, the short-run loan to deposit ratio was assessed to be positive and statistically significant. It means that the loan to deposit ratio had a short-term positive and significant impact on child mortality. The short-run domestic credit to private sector by banks to GDP at lag one has direct and significant effect on under-5 mortality rate in Nigeria.In the long run, liquidity ratio, loan to deposit ratio and domestic credit to private sector by banks to GDP ratio have a negative impact on child mortality but only liquidity ratio and domestic credit to private sector by banks to GDP are statistically significant at 5%.It implies that liquidity ratio and domestic credit to private sector by banks to GDP have a positiveimpact on child mortality reduction.

Concerning the third objective, the study found that there is a long run relationship among stock market development and health outcomes in Nigeria. The short-run parameter estimates of all share index were determined to be positive and statistically significant at 5%. It follows that all share index public health spending had a short-term positive influence on life expectancy. Also, the current and lag one of the total stocks traded value have a direct impact on life expectancy in the short run. In the long run, stock market capitalization and total stock traded value negatively impacted life expectancy in Nigeria. Likewise, the study discovered that all share index have the potential to significantly impact life expectancy positively in the long run at 10% level. In the short run, stock market capitalization had a short-term negative influence on child mortality. Also, total stocks traded value negatively influenced under-5 mortality in the short run, but it lags one and two impacts on child mortality was positive and significant at 5% level. The current and lag two of all share index negatively influence child mortality in the short run. Further, stock market capitalization has a negative and significant impact on under-5 mortality rate in the long run. However, total stock transaction value has a direct and significant effect on child mortality. It means that stock market capitalization played a deteriorating effect on child mortality while total stock transaction value amplifies the rate of under-5 deaths. The study discovered that all share index do not have a significant impact on child mortality rate.

5.2 Conclusion

This study investigates the interrelationship between financial sector development and health outcomes in Nigeria over the periods of 1985 to 2022 using the ARDL bound testing approach. The findings showed that monetary policy rate and 12-month deposit rate have negative impact on short-run life expectancy in Nigeria. Meanwhile, the study discovered that life expectancy positively reacted to monetary policy rate but negatively affected by treasury bill rate in the long run.Furthermore, the study showed that treasury bill rate and 12-month deposit rate positively relate with child mortality rate in the short run. The study does not find a significant link between money market development and child mortality in Nigeria.

It discovers that liquidity ratio positively influences life expectancy both in the short and long run. The impact of other measures of bank sector development on life expectancy is not significant statistically. Concerning child mortality rate, the study found that under-5 mortality is positively and negatively influence by bank sector development measures (liquidity ratio, loan to deposit ratio and domestic credit to private sector by banks to GDP) in the short and long run respectively. All the three measures are significant in the short run but only liquidity ratio and domestic credit are significant in the long run.

In addition, total stocks transaction value influences life expectancy positively in the short run but negatively in the long run. Also, all share index directly influence life expectancy both in the short and long run. Stock market capitalization negatively influence child mortality both in the short and long run. However, total stock transaction value positively relates to under-5 mortality in the short and long run. All share index has a direct influence on child mortality rate in the short run.

5.3 Recommendations

Following the reported findings discussed in the subsequent parts of the chapter in this research study, the following policy recommendations are discussed below:

a) There is a need for the policymakers and government agencies to carefully consider the potential health implications when implementing measures that increase interest rates. Also, they should balance the long-term economic goals with the potential health consequences.

b) Apex bank should explore other factors beyond monetary policy and financial markets to address and improve child mortality rates in the country. In addition, they need to focus on liquidity management as a specific area of concern for public health.

c) Government should consider these nuanced relationships when formulating strategies to enhance public health outcomes through the development of the banking sector. Moreover, a targeted focus on liquidity management may yield positive spillover effects on overall population health.

d) They should consider the potential dual impact of stock market activities on life expectancy and child mortality rates. While a thriving stock market can positively influence life expectancy, certain aspects, such as increased transaction values, may have adverse effects on child mortality.

5.4 Contribution to Knowledge

This study makes a significant contribution to the existing body of knowledge by comprehensively examining the intricate relationship between financial sector development and health outcomes. The key contributions are outlined as follows:

a) Unlike many previous studies that focus on a singular aspect of financial sector development, this study takes a holistic approach by considering three distinct measures: money market development, bank sector development, and stock market development. This comprehensive analysis provides a nuanced understanding of the varied impacts these financial components have on health outcomes.

b) It considered diverse measures of financial sector development. The study considers three money market development measures: monetary policy rate, 12-month deposit rate, and treasury bill rate. Bank sector development measures, such as liquidity ratio, loan to deposit ratio, and domestic credit to the private sector by banks. Stock market development measures like stock market capitalization, total stocks transaction value, and all share index. The study bridges a critical gap in the literature, providing insights into the broader economic implications of financial market dynamics on public health.

c) The study decomposes health outcomes into life expectancy and under-5 mortality rate, allowing for a nuanced understanding of how different dimensions of financial sector development may impact distinct health indicators.

5.5 Suggestions for Further Study

Building on the insights gained from the study on the effects of financial sector development on health outcomes, several avenues for further research can be explored to deepen our understanding of this complex relationship. Here are some suggestions for further study:

a) Conduct a comparative study across countries to investigate how the impact of financial sector development on health outcomes varies in different economic and cultural contexts. This could involve selecting countries with diverse levels of financial development and health indicators to identify patterns and outliers.

b) Explore the gender-specific implications of financial sector development on health outcomes. Investigate whether there are differential effects on the health of men and women, considering factors such as access to financial services, employment opportunities, and health-seeking behavior.

c) Investigate the macroeconomic and microeconomic mechanisms through which financial sector development influences health outcomes. Explore how financial sector policies at the macro level translate into tangible health impacts at the individual and community levels, considering factors such as income distribution and healthcare accessibility.

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Appendix

Year	lecp Life expectancy at birth, total (years)	un5m Mortality rate, under-5 (per 1,000 live births)	mpr Monetary policy rate	tbr Treasury bill rate	mdr 12 months deposit rate	lr Liquidity Ratio	ldr Loan to Deposit Ratio	dcps Domestic credit to private sector to GDP	smk Stock market capitalization to GDP	tstv Total stock transaction value to GDP	asi All share index	inf Inflation, consumer prices (annual %)	topen Trade (% of GDP)	gfcf Gross fixed capital formation (% of GDP)
1985	46.317	207.2	10	8.5	9.750	65	66.9	6.959	3.514	0.169	127.3	7.435	10.392	46.395
1986	45.975	208.1	10	8.5	9.833	36.4	83.2	7.696	3.432	0.251	163.8	5.717	9.136	54.948
1987	46.018	209	12.75	11.75	13.617	46.5	72.9	8.617	3.351	0.156	190.9	11.290	19.495	50.050
1988	46.072	209.4	12.75	11.75	14.025	45	66.9	8.658	3.168	0.269	233.6	54.511	16.941	43.755
1989	46.182	209.6	18.5	17.5	16.417	40.3	80.4	7.329	3.085	0.147	325.3	50.467	34.183	52.487
1990	46.037	209.3	18.5	17.5	21.745	44.3	66.5	6.782	3.295	0.046	513.8	7.364	30.925	53.122
1991	45.691	208.8	15.5	15	16.540	38.6	59.8	7.008	3.915	0.041	783	13.007	37.022	48.400
1992	45.668	208.1	17.5	21	19.602	29.1	55.2	6.415	3.444	0.054	1107.6	44.589	38.227	43.774
1993	45.788	207.2	26	26.9	25.645	42.2	42.9	10.111	3.778	0.064	1543.8	57.165	33.720	44.476
1994	45.513	205.7	13.5	12.5	13.693	48.5	60.9	8.109	3.748	0.056	2205	57.032	23.059	42.068
1995	45.487	203.7	13.5	12.5	13.897	33.1	73.3	5.806	5.819	0.059	5092.2	72.836	39.528	37.206
1996	45.567	201	13.5	12.25	13.582	43.1	72.9	5.839	6.995	0.171	6992.1	29.268	40.258	36.582
1997	45.792	197.2	13.5	12	7.935	40.2	76.6	7.156	6.380	0.234	6440.5	8.530	51.461	38.422
1998	46.036	192.8	13.5	12.951	9.940	46.8	74.4	7.325	5.465	0.282	5672.7	9.996	39.279	40.553
1999	46.614	187.7	18	17	12.183	61	54.6	7.865	5.472	0.257	5266.4	6.618	34.458	38.278
2000	47.193	182.4	14	12	12.063	64.1	51	7.509	6.687	0.399	8111	6.933	48.996	34.049
2001	47.619	177	20.5	12.951	16.297	52.9	65.625	9.290	8.045	0.701	10963.1	18.874	49.681	30.038
2002	47.928	171.4	16.5	18.88	16.495	52.45	62.775	8.090	6.650	0.517	12137.7	12.877	40.035	26.769
2003	48.441	165.8	15	15.02	13.038	50.9	61.85	8.088	10.027	0.888	20128.94	14.032	49.335	28.371

2004	48.767	160.4	15	14.21	13.321	50.475	68.625	7.844	11.656	1.246	23844.5	14.998	31.896	26.063
2005	49.297	155.1	13	6.995	10.819	50.175	70.8	7.951	12.542	1.137	24085.8	17.863	33.059	24.966
2006	49.73	150.2	10	8.8	8.353	81.420	96.817	7.541	16.859	1.548	33189.3	8.225	42.567	26.166
2007	50.033	145.8	9.5	6.91	8.102	41.555	83.256	10.580	38.014	3.103	57990.2	5.388	39.337	20.180
2008	50.225	141.9	9.75	7.025	11.778	37.716	86.912	19.770	23.935	4.203	31450.78	11.581	40.797	18.860
2009	50.712	138.5	6	3.715	12.848	26.393	84.300	22.755	16.177	1.578	20827.17	12.538	36.059	21.115
2010	50.945	135.7	6.25	5.575	5.670	27.389	52.287	18.962	17.881	1.442	24770.52	13.740	43.321	16.815
2011	51.357	133.4	12	11.13	4.705	42.02	44.774	15.068	16.127	1.003	20730.63	10.826	53.278	15.676
2012	51.497	131.4	12	13.6	7.180	49.719	42.313	18.311	20.387	1.114	28078.81	12.224	44.532	14.211
2013	51.707	129.6	12	10.42	5.535	46.235	37.559	17.851	23.549	2.902	41329.19	8.496	31.049	14.169
2014	51.791	128	13	11.995	9.159	38.267	63.607	18.586	18.722	1.485	34657.15	8.047	30.885	15.084
2015	51.841	126.4	11	9.14	8.678	42.347	69.578	19.635	17.865	1.028	28642.25	9.009	21.333	14.827
2016	52.043	124.7	14	10.75	6.221	45.95	79.95	20.497	15.779	0.563	26874.62	15.697	20.723	14.725
2017	52.305	122.4	14	13.99	10.865	54.790	72.841	19.547	18.389	0.939	38243.19	16.502	26.348	14.716
2018	52.554	119.6	14	12.175	10.306	65.044	60.163	17.543	16.968	0.932	31430.5	12.095	33.008	19.018
2019	52.91	116.8	13.5	9.5	10.148	104.202	58.726	17.630	17.777	0.640	26842.07	11.396	34.024	24.625
2020	52.887	113.8	11.5	3.17	6.509	67.599	60.333	18.820	25.017	0.704	40270.72	13.246	16.352	26.744
2021	52.676	110.8	11.5	5.015	6.248	61.195	60.478	18.654	23.884	0.542	42716.44	16.953	22.577	33.107
2022	52.676	110.8	16.5	8.22	6.620	54.934	61.696	19.249	25.295	0.577	51251.06	18.847	22.577	33.107

Source: CBN statistical bulletin (2022), WDI (2023).

Unit root

Null Hypothesis: LEXP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.693391	0.7335
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEXP)
Method: Least Squares
Date: 11/15/23 Time: 12:33
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXP(-1)	-0.069455	0.041015	-1.693391	0.1001
D(LEXP(-1))	0.570117	0.130933	4.354279	0.0001
C	3.138638	1.803172	1.740620	0.0914
@TREND("1985")	0.017250	0.010863	1.588012	0.1221

R-squared	0.455437	Mean dependent var	0.186139
Adjusted R-squared	0.404385	S.D. dependent var	0.233517
S.E. of regression	0.180220	Akaike info criterion	-0.484842
Sum squared resid	1.039332	Schwarz criterion	-0.308895
Log likelihood	12.72715	Hannan-Quinn criter.	-0.423432
F-statistic	8.920918	Durbin-Watson stat	2.027377
Prob(F-statistic)	0.000193		

Null Hypothesis: D(LEXP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.966543	0.0152
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEXP,2)
Method: Least Squares
Date: 11/15/23 Time: 12:35
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXP(-1))	-0.393991	0.132811	-2.966543	0.0056
C	0.087090	0.065834	1.322871	0.1950
@TREND("1985")	-0.000410	0.003124	-0.131252	0.8964

R-squared	0.232692	Mean dependent var	0.009500
Adjusted R-squared	0.186188	S.D. dependent var	0.205350
S.E. of regression	0.185249	Akaike info criterion	-0.454576
Sum squared resid	1.132468	Schwarz criterion	-0.322616
Log likelihood	11.18237	Hannan-Quinn criter.	-0.408518
F-statistic	5.003744	Durbin-Watson stat	2.055973
Prob(F-statistic)	0.012647		

Null Hypothesis: LEXP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.404411	0.3714
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	0.045917
HAC corrected variance (Bartlett kernel)	0.118918

Phillips-Perron Test Equation
Dependent Variable: D(LEXP)
Method: Least Squares
Date: 11/15/23 Time: 12:39
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXP(-1)	-0.117900	0.045663	-2.581980	0.0143
C	5.264633	2.017396	2.609619	0.0134
@TREND("1985")	0.034377	0.011546	2.977438	0.0053

R-squared	0.220653	Mean dependent var	0.171865
Adjusted R-squared	0.174809	S.D. dependent var	0.246078
S.E. of regression	0.223537	Akaike info criterion	-0.080874
Sum squared resid	1.698941	Schwarz criterion	0.049741
Log likelihood	4.496162	Hannan-Quinn criter.	-0.034826
F-statistic	4.813133	Durbin-Watson stat	0.767503
Prob(F-statistic)	0.014435		

Null Hypothesis: D(LEXP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.933272	0.0166
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Residual variance (no correction)	0.031457
HAC corrected variance (Bartlett kernel)	0.030160

Phillips-Perron Test Equation
Dependent Variable: D(LEXP,2)
Method: Least Squares
Date: 11/15/23 Time: 12:40
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXP(-1))	-0.393991	0.132811	-2.966543	0.0056
C	0.087090	0.065834	1.322871	0.1950
@TREND("1985")	-0.000410	0.003124	-0.131252	0.8964

R-squared	0.232692	Mean dependent var	0.009500
Adjusted R-squared	0.186188	S.D. dependent var	0.205350
S.E. of regression	0.185249	Akaike info criterion	-0.454576
Sum squared resid	1.132468	Schwarz criterion	-0.322616
Log likelihood	11.18237	Hannan-Quinn criter.	-0.408518
F-statistic	5.003744	Durbin-Watson stat	2.055973
Prob(F-statistic)	0.012647		

Null Hypothesis: UN5M has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.067131	0.9955
Test critical values:	1% level	-4.262735	
	5% level	-3.552973	
	10% level	-3.209642	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UN5M)
Method: Least Squares
Date: 11/15/23 Time: 12:41
Sample (adjusted): 1990 2022
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UN5M(-1)	0.002777	0.041369	0.067131	0.9470
D(UN5M(-1))	1.774881	0.588138	3.017798	0.0056
D(UN5M(-2))	-1.043169	0.879581	-1.185983	0.2464
D(UN5M(-3))	0.290108	0.837195	0.346523	0.7317
D(UN5M(-4))	-0.068805	0.496527	-0.138572	0.8909
C	-1.175721	9.475973	-0.124074	0.9022
@TREND("1985")	0.030879	0.135908	0.227204	0.8220

R-squared	0.903179	Mean dependent var	-2.993939
Adjusted R-squared	0.880836	S.D. dependent var	1.712991
S.E. of regression	0.591327	Akaike info criterion	1.972936
Sum squared resid	9.091360	Schwarz criterion	2.290377
Log likelihood	-25.55345	Hannan-Quinn criter.	2.079746
F-statistic	40.42287	Durbin-Watson stat	1.266241
Prob(F-statistic)	0.000000		

Null Hypothesis: D(UN5M) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.698982	0.0063
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UN5M,2)
Method: Least Squares
Date: 11/15/23 Time: 12:42
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UN5M(-1))	-0.036963	0.052881	-0.698982	0.4898
D(UN5M(-1),2)	0.646037	0.249271	2.591709	0.0144
C	-0.439145	0.250988	-1.749671	0.0901
@TREND("1985")	0.019133	0.010514	1.819784	0.0785

R-squared	0.381001	Mean dependent var	-0.025714
Adjusted R-squared	0.321098	S.D. dependent var	0.670532
S.E. of regression	0.552488	Akaike info criterion	1.758442
Sum squared resid	9.462548	Schwarz criterion	1.936196
Log likelihood	-26.77274	Hannan-Quinn criter.	1.819803
F-statistic	6.360288	Durbin-Watson stat	1.247307
Prob(F-statistic)	0.001736		

Null Hypothesis: UN5M has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.460928	0.3444
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	2.879999
HAC corrected variance (Bartlett kernel)	13.36179

Phillips-Perron Test Equation
Dependent Variable: D(UN5M)
Method: Least Squares
Date: 11/15/23 Time: 12:46
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UN5M(-1)	-0.108792	0.040273	-2.701348	0.0107
C	23.16637	9.201523	2.517666	0.0167
@TREND("1985")	-0.405310	0.133999	-3.024725	0.0047

R-squared	0.240804	Mean dependent var	-2.605405
Adjusted R-squared	0.196145	S.D. dependent var	1.974553
S.E. of regression	1.770344	Akaike info criterion	4.057829
Sum squared resid	106.5600	Schwarz criterion	4.188444
Log likelihood	-72.06984	Hannan-Quinn criter.	4.103877
F-statistic	5.392102	Durbin-Watson stat	0.139575
Prob(F-statistic)	0.009247		

Null Hypothesis: D(UN5M) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.604974	0.0042
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Residual variance (no correction)	0.331363
HAC corrected variance (Bartlett kernel)	0.413828

Phillips-Perron Test Equation
Dependent Variable: D(UN5M,2)
Method: Least Squares
Date: 11/15/23 Time: 12:47
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UN5M(-1))	-0.024395	0.055922	-0.436231	0.6655
C	-0.625566	0.226255	-2.764872	0.0092
@TREND("1985")	0.027448	0.010362	2.648981	0.0123

R-squared	0.219686	Mean dependent var	-0.025000
Adjusted R-squared	0.172394	S.D. dependent var	0.660898
S.E. of regression	0.601238	Akaike info criterion	1.900002
Sum squared resid	11.92906	Schwarz criterion	2.031962
Log likelihood	-31.20004	Hannan-Quinn criter.	1.946060
F-statistic	4.645322	Durbin-Watson stat	0.933356
Prob(F-statistic)	0.016690		

Null Hypothesis: MPR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.591582	0.0444
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MPR)
Method: Least Squares
Date: 11/15/23 Time: 12:52
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR(-1)	-0.540900	0.150602	-3.591582	0.0010
C	8.742682	2.600424	3.362021	0.0019
@TREND("1985")	-0.065417	0.052275	-1.251420	0.2193

R-squared	0.275115	Mean dependent var	0.175676
Adjusted R-squared	0.232475	S.D. dependent var	3.657121
S.E. of regression	3.203949	Akaike info criterion	5.244250
Sum squared resid	349.0199	Schwarz criterion	5.374865
Log likelihood	-94.01863	Hannan-Quinn criter.	5.290298
F-statistic	6.451995	Durbin-Watson stat	2.080899
Prob(F-statistic)	0.004213		

Null Hypothesis: MPR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.547952	0.0488
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	9.432970
HAC corrected variance (Bartlett kernel)	8.962140

Phillips-Perron Test Equation
Dependent Variable: D(MPR)
Method: Least Squares
Date: 11/15/23 Time: 12:54
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR(-1)	-0.540900	0.150602	-3.591582	0.0010
C	8.742682	2.600424	3.362021	0.0019
@TREND("1985")	-0.065417	0.052275	-1.251420	0.2193

R-squared	0.275115	Mean dependent var	0.175676
Adjusted R-squared	0.232475	S.D. dependent var	3.657121
S.E. of regression	3.203949	Akaike info criterion	5.244250
Sum squared resid	349.0199	Schwarz criterion	5.374865
Log likelihood	-94.01863	Hannan-Quinn criter.	5.290298
F-statistic	6.451995	Durbin-Watson stat	2.080899
Prob(F-statistic)	0.004213		

Null Hypothesis: TBR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.627605	0.0410
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR)
Method: Least Squares
Date: 11/15/23 Time: 12:55
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TBR(-1)	-0.513192	0.141469	-3.627605	0.0009
C	8.653291	2.538662	3.408602	0.0017
@TREND("1985")	-0.134219	0.062904	-2.133723	0.0402

R-squared	0.283703	Mean dependent var	-0.007568
Adjusted R-squared	0.241568	S.D. dependent var	4.184579
S.E. of regression	3.644266	Akaike info criterion	5.501792
Sum squared resid	451.5429	Schwarz criterion	5.632407
Log likelihood	-98.78315	Hannan-Quinn criter.	5.547840
F-statistic	6.733181	Durbin-Watson stat	1.939204
Prob(F-statistic)	0.003440		

Null Hypothesis: TBR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.632071	0.0406
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	12.20386
HAC corrected variance (Bartlett kernel)	12.28221

Phillips-Perron Test Equation
Dependent Variable: D(TBR)
Method: Least Squares
Date: 11/15/23 Time: 12:56
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TBR(-1)	-0.513192	0.141469	-3.627605	0.0009
C	8.653291	2.538662	3.408602	0.0017
@TREND("1985")	-0.134219	0.062904	-2.133723	0.0402

R-squared	0.283703	Mean dependent var	-0.007568
Adjusted R-squared	0.241568	S.D. dependent var	4.184579
S.E. of regression	3.644266	Akaike info criterion	5.501792
Sum squared resid	451.5429	Schwarz criterion	5.632407
Log likelihood	-98.78315	Hannan-Quinn criter.	5.547840
F-statistic	6.733181	Durbin-Watson stat	1.939204
Prob(F-statistic)	0.003440		

Null Hypothesis: MDR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.815970	0.0268
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MDR)
Method: Least Squares
Date: 11/15/23 Time: 12:57
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MDR(-1)	-0.542745	0.142230	-3.815970	0.0005
C	9.557765	2.596645	3.680813	0.0008
@TREND("1985")	-0.173398	0.060993	-2.842941	0.0075

R-squared	0.305573	Mean dependent var	-0.084595
Adjusted R-squared	0.264725	S.D. dependent var	3.645243
S.E. of regression	3.125730	Akaike info criterion	5.194818
Sum squared resid	332.1864	Schwarz criterion	5.325433
Log likelihood	-93.10413	Hannan-Quinn criter.	5.240866
F-statistic	7.480627	Durbin-Watson stat	2.041136
Prob(F-statistic)	0.002031		

Null Hypothesis: MDR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.776786	0.0293
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	8.978011
HAC corrected variance (Bartlett kernel)	8.393797

Phillips-Perron Test Equation
Dependent Variable: D(MDR)
Method: Least Squares
Date: 11/15/23 Time: 12:59
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MDR(-1)	-0.542745	0.142230	-3.815970	0.0005
C	9.557765	2.596645	3.680813	0.0008
@TREND("1985")	-0.173398	0.060993	-2.842941	0.0075

R-squared	0.305573	Mean dependent var	-0.084595
Adjusted R-squared	0.264725	S.D. dependent var	3.645243
S.E. of regression	3.125730	Akaike info criterion	5.194818
Sum squared resid	332.1864	Schwarz criterion	5.325433
Log likelihood	-93.10413	Hannan-Quinn criter.	5.240866
F-statistic	7.480627	Durbin-Watson stat	2.041136
Prob(F-statistic)	0.002031		

Null Hypothesis: LR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.069396	0.0147
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LR)
Method: Least Squares
Date: 11/15/23 Time: 13:00
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LR(-1)	-0.608000	0.149408	-4.069396	0.0003
C	22.44520	7.397546	3.034141	0.0046
@TREND("1985")	0.372304	0.207454	1.794635	0.0816

R-squared	0.330796	Mean dependent var	-0.272052
Adjusted R-squared	0.291431	S.D. dependent var	15.13370
S.E. of regression	12.73903	Akaike info criterion	8.004823
Sum squared resid	5517.619	Schwarz criterion	8.135438
Log likelihood	-145.0892	Hannan-Quinn criter.	8.050871
F-statistic	8.403306	Durbin-Watson stat	1.873202
Prob(F-statistic)	0.001083		

Null Hypothesis: LR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.099379	0.0137
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	149.1248
HAC corrected variance (Bartlett kernel)	156.2904

Phillips-Perron Test Equation
Dependent Variable: D(LR)
Method: Least Squares
Date: 11/15/23 Time: 13:01
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LR(-1)	-0.608000	0.149408	-4.069396	0.0003
C	22.44520	7.397546	3.034141	0.0046
@TREND("1985")	0.372304	0.207454	1.794635	0.0816

R-squared	0.330796	Mean dependent var	-0.272052
Adjusted R-squared	0.291431	S.D. dependent var	15.13370
S.E. of regression	12.73903	Akaike info criterion	8.004823
Sum squared resid	5517.619	Schwarz criterion	8.135438
Log likelihood	-145.0892	Hannan-Quinn criter.	8.050871
F-statistic	8.403306	Durbin-Watson stat	1.873202
Prob(F-statistic)	0.001083		

Null Hypothesis: LDR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.210985	0.0009
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDR)
Method: Least Squares
Date: 11/15/23 Time: 13:02
Sample (adjusted): 1989 2022
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDR(-1)	-0.961451	0.184505	-5.210985	0.0000
D(LDR(-1))	0.521310	0.165300	3.153716	0.0038
D(LDR(-2))	0.416272	0.160824	2.588368	0.0151
D(LDR(-3))	0.508542	0.154825	3.284616	0.0027
C	65.52325	13.12504	4.992234	0.0000
@TREND("1985")	-0.113938	0.164002	-0.694733	0.4929

R-squared	0.496484	Mean dependent var	-0.153072
Adjusted R-squared	0.406571	S.D. dependent var	12.05672
S.E. of regression	9.287813	Akaike info criterion	7.454068
Sum squared resid	2415.377	Schwarz criterion	7.723426
Log likelihood	-120.7192	Hannan-Quinn criter.	7.545927
F-statistic	5.521799	Durbin-Watson stat	1.733227
Prob(F-statistic)	0.001165		

Null Hypothesis: LDR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.177891	0.0010
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	111.3573
HAC corrected variance (Bartlett kernel)	133.3239

Phillips-Perron Test Equation
Dependent Variable: D(LDR)
Method: Least Squares
Date: 11/15/23 Time: 13:05
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDR(-1)	-0.416048	0.139121	-2.990549	0.0051
C	29.03208	10.34607	2.806097	0.0082
@TREND("1985")	-0.090209	0.171389	-0.526340	0.6021

R-squared	0.208391	Mean dependent var	-0.140661
Adjusted R-squared	0.161826	S.D. dependent var	12.02413
S.E. of regression	11.00831	Akaike info criterion	7.712783
Sum squared resid	4120.221	Schwarz criterion	7.843398
Log likelihood	-139.6865	Hannan-Quinn criter.	7.758831
F-statistic	4.475253	Durbin-Watson stat	1.643139
Prob(F-statistic)	0.018823		

Null Hypothesis: DCPS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.158999	0.1087
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DCPS)
Method: Least Squares
Date: 11/15/23 Time: 13:21
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DCPS(-1)	-0.367456	0.116320	-3.158999	0.0034
D(DCPS(-1))	0.368178	0.161312	2.282396	0.0293
C	1.311877	0.823256	1.593523	0.1209
@TREND("1985")	0.170870	0.060598	2.819718	0.0082

R-squared	0.267803	Mean dependent var	0.320907
Adjusted R-squared	0.199159	S.D. dependent var	2.277900
S.E. of regression	2.038486	Akaike info criterion	4.366731
Sum squared resid	132.9736	Schwarz criterion	4.542678
Log likelihood	-74.60116	Hannan-Quinn criter.	4.428141
F-statistic	3.901354	Durbin-Watson stat	1.833770
Prob(F-statistic)	0.017538		

Null Hypothesis: D(DCPS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.531811	0.0004
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DCPS,2)
Method: Least Squares
Date: 11/15/23 Time: 13:22
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DCPS(-1))	-1.146553	0.207265	-5.531811	0.0000
D(DCPS(-1),2)	0.415909	0.163111	2.549847	0.0159
C	0.018155	0.807798	0.022475	0.9822
@TREND("1985")	0.017112	0.036115	0.473809	0.6390

R-squared	0.509350	Mean dependent var	-0.009323
Adjusted R-squared	0.461868	S.D. dependent var	2.935532
S.E. of regression	2.153432	Akaike info criterion	4.479213
Sum squared resid	143.7554	Schwarz criterion	4.656967
Log likelihood	-74.38623	Hannan-Quinn criter.	4.540574
F-statistic	10.72718	Durbin-Watson stat	2.100122
Prob(F-statistic)	0.000054		

Null Hypothesis: DCPS has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.183542	0.4843
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	4.229831
HAC corrected variance (Bartlett kernel)	3.526009

Phillips-Perron Test Equation
Dependent Variable: D(DCPS)
Method: Least Squares
Date: 11/15/23 Time: 13:23
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DCPS(-1)	-0.264292	0.113501	-2.328544	0.0260
C	1.170528	0.838928	1.395267	0.1720
@TREND("1985")	0.122120	0.058871	2.074342	0.0457

R-squared	0.139038	Mean dependent var	0.332163
Adjusted R-squared	0.088393	S.D. dependent var	2.247083
S.E. of regression	2.145472	Akaike info criterion	4.442201
Sum squared resid	156.5038	Schwarz criterion	4.572816
Log likelihood	-79.18072	Hannan-Quinn criter.	4.488249
F-statistic	2.745347	Durbin-Watson stat	1.458790
Prob(F-statistic)	0.078475		

Null Hypothesis: D(DCPS) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.594906	0.0040
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Residual variance (no correction)	4.845604
HAC corrected variance (Bartlett kernel)	3.037998

Phillips-Perron Test Equation
Dependent Variable: D(DCPS,2)
Method: Least Squares
Date: 11/15/23 Time: 13:24
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DCPS(-1))	-0.808283	0.170683	-4.735580	0.0000
C	0.068292	0.815491	0.083743	0.9338
@TREND("1985")	0.009761	0.036913	0.264419	0.7931

R-squared	0.404688	Mean dependent var	-0.003974
Adjusted R-squared	0.368609	S.D. dependent var	2.893470
S.E. of regression	2.299155	Akaike info criterion	4.582616
Sum squared resid	174.4417	Schwarz criterion	4.714575
Log likelihood	-79.48708	Hannan-Quinn criter.	4.628673
F-statistic	11.21657	Durbin-Watson stat	1.842535
Prob(F-statistic)	0.000192		

Null Hypothesis: SMK has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.444637	0.0608
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SMK)
Method: Least Squares
Date: 11/15/23 Time: 13:27
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SMK(-1)	-0.511797	0.148578	-3.444637	0.0015
C	0.188242	1.458245	0.129088	0.8980
@TREND("1985")	0.347083	0.116725	2.973524	0.0054

R-squared	0.259821	Mean dependent var	0.588689
Adjusted R-squared	0.216281	S.D. dependent var	4.908168
S.E. of regression	4.345099	Akaike info criterion	5.853579
Sum squared resid	641.9162	Schwarz criterion	5.984194
Log likelihood	-105.2912	Hannan-Quinn criter.	5.899627
F-statistic	5.967403	Durbin-Watson stat	1.878550
Prob(F-statistic)	0.006008		

Null Hypothesis: D(SMK) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.735568	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SMK,2)
Method: Least Squares
Date: 11/15/23   Time: 13:28
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SMK(-1))	-1.157902	0.171909	-6.735568	0.0000
C	0.339265	1.793505	0.189163	0.8511
@TREND("1985")	0.018328	0.081189	0.225741	0.8228

R-squared	0.578910	Mean dependent var	0.041460
Adjusted R-squared	0.553389	S.D. dependent var	7.568405
S.E. of regression	5.057887	Akaike info criterion	6.159430
Sum squared resid	844.2133	Schwarz criterion	6.291390
Log likelihood	-107.8697	Hannan-Quinn criter.	6.205487
F-statistic	22.68398	Durbin-Watson stat	2.095301
Prob(F-statistic)	0.000001		

Null Hypothesis: SMK has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.498694	0.0542
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	17.34909
HAC corrected variance (Bartlett kernel)	18.37881

Phillips-Perron Test Equation
Dependent Variable: D(SMK)
Method: Least Squares
Date: 11/15/23 Time: 13:33
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SMK(-1)	-0.511797	0.148578	-3.444637	0.0015
C	0.188242	1.458245	0.129088	0.8980
@TREND("1985")	0.347083	0.116725	2.973524	0.0054

R-squared	0.259821	Mean dependent var	0.588689
Adjusted R-squared	0.216281	S.D. dependent var	4.908168
S.E. of regression	4.345099	Akaike info criterion	5.853579
Sum squared resid	641.9162	Schwarz criterion	5.984194
Log likelihood	-105.2912	Hannan-Quinn criter.	5.899627
F-statistic	5.967403	Durbin-Watson stat	1.878550
Prob(F-statistic)	0.006008		

Null Hypothesis: D(SMK) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.928487	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Residual variance (no correction)	23.45037
HAC corrected variance (Bartlett kernel)	6.059036

Phillips-Perron Test Equation
Dependent Variable: D(SMK,2)
Method: Least Squares
Date: 11/15/23 Time: 13:34
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SMK(-1))	-1.157902	0.171909	-6.735568	0.0000
C	0.339265	1.793505	0.189163	0.8511
@TREND("1985")	0.018328	0.081189	0.225741	0.8228

R-squared	0.578910	Mean dependent var	0.041460
Adjusted R-squared	0.553389	S.D. dependent var	7.568405
S.E. of regression	5.057887	Akaike info criterion	6.159430
Sum squared resid	844.2133	Schwarz criterion	6.291390
Log likelihood	-107.8697	Hannan-Quinn criter.	6.205487
F-statistic	22.68398	Durbin-Watson stat	2.095301
Prob(F-statistic)	0.000001		

Null Hypothesis: TSTV has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.579305	0.2913
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TSTV)
Method: Least Squares
Date: 11/15/23 Time: 14:09
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TSTV(-1)	-0.347232	0.134622	-2.579305	0.0144
C	0.103358	0.218465	0.473109	0.6392
@TREND("1985")	0.010389	0.011487	0.904405	0.3721

R-squared	0.167071	Mean dependent var	0.011051
Adjusted R-squared	0.118075	S.D. dependent var	0.692991
S.E. of regression	0.650794	Akaike info criterion	2.056358
Sum squared resid	14.40012	Schwarz criterion	2.186973
Log likelihood	-35.04262	Hannan-Quinn criter.	2.102406
F-statistic	3.409901	Durbin-Watson stat	1.884449
Prob(F-statistic)	0.044703		

Null Hypothesis: D(TSTV) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.444696	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TSTV,2)
Method: Least Squares
Date: 11/15/23 Time: 14:10
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TSTV(-1))	-1.114813	0.172981	-6.444696	0.0000
C	0.100501	0.254935	0.394220	0.6960
@TREND("1985")	-0.004628	0.011539	-0.401092	0.6909

R-squared	0.557259	Mean dependent var	-0.001307
Adjusted R-squared	0.530426	S.D. dependent var	1.047129
S.E. of regression	0.717550	Akaike info criterion	2.253707
Sum squared resid	16.99098	Schwarz criterion	2.385667
Log likelihood	-37.56673	Hannan-Quinn criter.	2.299765
F-statistic	20.76784	Durbin-Watson stat	2.056012
Prob(F-statistic)	0.000001		

Null Hypothesis: TSTV has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.585500	0.2887
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	0.389192
HAC corrected variance (Bartlett kernel)	0.391391

Phillips-Perron Test Equation
Dependent Variable: D(TSTV)
Method: Least Squares
Date: 11/15/23 Time: 14:11
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TSTV(-1)	-0.347232	0.134622	-2.579305	0.0144
C	0.103358	0.218465	0.473109	0.6392
@TREND("1985")	0.010389	0.011487	0.904405	0.3721

R-squared	0.167071	Mean dependent var	0.011051
Adjusted R-squared	0.118075	S.D. dependent var	0.692991
S.E. of regression	0.650794	Akaike info criterion	2.056358
Sum squared resid	14.40012	Schwarz criterion	2.186973
Log likelihood	-35.04262	Hannan-Quinn criter.	2.102406
F-statistic	3.409901	Durbin-Watson stat	1.884449
Prob(F-statistic)	0.044703		

Null Hypothesis: D(TSTV) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.792522	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Residual variance (no correction)	0.471972
HAC corrected variance (Bartlett kernel)	0.280111

Phillips-Perron Test Equation
Dependent Variable: D(TSTV,2)
Method: Least Squares
Date: 11/15/23 Time: 14:12
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TSTV(-1))	-1.114813	0.172981	-6.444696	0.0000
C	0.100501	0.254935	0.394220	0.6960
@TREND("1985")	-0.004628	0.011539	-0.401092	0.6909

R-squared	0.557259	Mean dependent var	-0.001307
Adjusted R-squared	0.530426	S.D. dependent var	1.047129
S.E. of regression	0.717550	Akaike info criterion	2.253707
Sum squared resid	16.99098	Schwarz criterion	2.385667
Log likelihood	-37.56673	Hannan-Quinn criter.	2.299765
F-statistic	20.76784	Durbin-Watson stat	2.056012
Prob(F-statistic)	0.000001		

Null Hypothesis: ASI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.431468	0.0626
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ASI)
Method: Least Squares
Date: 11/15/23 Time: 14:13
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ASI(-1)	-0.524416	0.152825	-3.431468	0.0016
C	-2995.621	2573.734	-1.163920	0.2526
@TREND("1985")	725.6889	222.5662	3.260553	0.0025

R-squared	0.262329	Mean dependent var	1381.723
Adjusted R-squared	0.218936	S.D. dependent var	8087.761
S.E. of regression	7147.786	Akaike info criterion	20.66460
Sum squared resid	1.74E+09	Schwarz criterion	20.79521
Log likelihood	-379.2951	Hannan-Quinn criter.	20.71065
F-statistic	6.045497	Durbin-Watson stat	1.793060
Prob(F-statistic)	0.005671		

Null Hypothesis: D(ASI) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.034933	0.0001
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ASI,2)
Method: Least Squares
Date: 11/15/23 Time: 14:14
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ASI(-1))	-1.522299	0.252248	-6.034933	0.0000
D(ASI(-1),2)	0.366504	0.168889	2.170093	0.0378
C	574.7219	3018.879	0.190376	0.8503
@TREND("1985")	74.69586	134.7913	0.554159	0.5834

R-squared	0.611596	Mean dependent var	243.0720
Adjusted R-squared	0.574008	S.D. dependent var	12320.03
S.E. of regression	8041.044	Akaike info criterion	20.92972
Sum squared resid	2.00E+09	Schwarz criterion	21.10747
Log likelihood	-362.2700	Hannan-Quinn criter.	20.99108
F-statistic	16.27126	Durbin-Watson stat	1.935113
Prob(F-statistic)	0.000002		

Null Hypothesis: ASI has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.387961	0.0685
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	46948342
HAC corrected variance (Bartlett kernel)	44900368

Phillips-Perron Test Equation
Dependent Variable: D(ASI)
Method: Least Squares
Date: 11/15/23 Time: 14:15
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ASI(-1)	-0.524416	0.152825	-3.431468	0.0016
C	-2995.621	2573.734	-1.163920	0.2526
@TREND("1985")	725.6889	222.5662	3.260553	0.0025

R-squared	0.262329	Mean dependent var	1381.723
Adjusted R-squared	0.218936	S.D. dependent var	8087.761
S.E. of regression	7147.786	Akaike info criterion	20.66460
Sum squared resid	1.74E+09	Schwarz criterion	20.79521
Log likelihood	-379.2951	Hannan-Quinn criter.	20.71065
F-statistic	6.045497	Durbin-Watson stat	1.793060
Prob(F-statistic)	0.005671		

Null Hypothesis: D(ASI) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.652746	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Residual variance (no correction)	64141078
HAC corrected variance (Bartlett kernel)	39735873

Phillips-Perron Test Equation
Dependent Variable: D(ASI,2)
Method: Least Squares
Date: 11/15/23 Time: 14:16
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ASI(-1))	-1.113385	0.174497	-6.380526	0.0000
C	295.0695	2966.662	0.099462	0.9214
@TREND("1985")	64.52099	134.3288	0.480322	0.6342

R-squared	0.552564	Mean dependent var	236.0589
Adjusted R-squared	0.525447	S.D. dependent var	12142.83
S.E. of regression	8364.932	Akaike info criterion	20.98114
Sum squared resid	2.31E+09	Schwarz criterion	21.11310
Log likelihood	-374.6605	Hannan-Quinn criter.	21.02720
F-statistic	20.37679	Durbin-Watson stat	2.065338
Prob(F-statistic)	0.000002		

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.430492	0.0061
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 11/15/23 Time: 14:20
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.656270	0.148126	-4.430492	0.0001
D(INF(-1))	0.389095	0.155125	2.508271	0.0174
C	23.17716	6.566098	3.529823	0.0013
@TREND("1985")	-0.520807	0.224180	-2.323162	0.0267

R-squared	0.385671	Mean dependent var	0.364723
Adjusted R-squared	0.328078	S.D. dependent var	15.10885
S.E. of regression	12.38485	Akaike info criterion	7.975265
Sum squared resid	4908.306	Schwarz criterion	8.151211
Log likelihood	-139.5548	Hannan-Quinn criter.	8.036675
F-statistic	6.696462	Durbin-Watson stat	1.906031
Prob(F-statistic)	0.001233		

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.410346	0.0069
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	164.4281
HAC corrected variance (Bartlett kernel)	195.0820

Phillips-Perron Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 11/15/23 Time: 14:21
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.451060	0.138499	-3.256762	0.0026
C	15.26894	6.202275	2.461829	0.0191
@TREND("1985")	-0.333533	0.223161	-1.494588	0.1442

R-squared	0.238943	Mean dependent var	0.308428
Adjusted R-squared	0.194174	S.D. dependent var	14.90146
S.E. of regression	13.37671	Akaike info criterion	8.102513
Sum squared resid	6083.840	Schwarz criterion	8.233128
Log likelihood	-146.8965	Hannan-Quinn criter.	8.148561
F-statistic	5.337340	Durbin-Watson stat	1.590883
Prob(F-statistic)	0.009640		

Null Hypothesis: TOPEN has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.922781	0.1673
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOPEN)
Method: Least Squares
Date: 11/15/23 Time: 14:23
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOPEN(-1)	-0.354203	0.121187	-2.922781	0.0061
C	14.40826	4.699345	3.066015	0.0042
@TREND("1985")	-0.112565	0.125989	-0.893457	0.3779

R-squared	0.227732	Mean dependent var	0.329312
Adjusted R-squared	0.182305	S.D. dependent var	8.995255
S.E. of regression	8.134094	Akaike info criterion	7.107611
Sum squared resid	2249.558	Schwarz criterion	7.238226
Log likelihood	-128.4908	Hannan-Quinn criter.	7.153658
F-statistic	5.013095	Durbin-Watson stat	2.251892
Prob(F-statistic)	0.012361		

Null Hypothesis: D(TOPEN) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.832784	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOPEN,2)
Method: Least Squares
Date: 11/15/23 Time: 14:23
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOPEN(-1))	-1.297923	0.165704	-7.832784	0.0000
C	4.804140	3.167431	1.516731	0.1389
@TREND("1985")	-0.222049	0.143481	-1.547586	0.1313

R-squared	0.650263	Mean dependent var	0.034893
Adjusted R-squared	0.629067	S.D. dependent var	14.41795
S.E. of regression	8.781143	Akaike info criterion	7.262746
Sum squared resid	2544.580	Schwarz criterion	7.394706
Log likelihood	-127.7294	Hannan-Quinn criter.	7.308803
F-statistic	30.67835	Durbin-Watson stat	2.099475
Prob(F-statistic)	0.000000		

Null Hypothesis: TOPEN has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.673614	0.2527
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	60.79888
HAC corrected variance (Bartlett kernel)	37.57392

Phillips-Perron Test Equation
Dependent Variable: D(TOPEN)
Method: Least Squares
Date: 11/15/23 Time: 14:24
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOPEN(-1)	-0.354203	0.121187	-2.922781	0.0061
C	14.40826	4.699345	3.066015	0.0042
@TREND("1985")	-0.112565	0.125989	-0.893457	0.3779

R-squared	0.227732	Mean dependent var	0.329312
Adjusted R-squared	0.182305	S.D. dependent var	8.995255
S.E. of regression	8.134094	Akaike info criterion	7.107611
Sum squared resid	2249.558	Schwarz criterion	7.238226
Log likelihood	-128.4908	Hannan-Quinn criter.	7.153658
F-statistic	5.013095	Durbin-Watson stat	2.251892
Prob(F-statistic)	0.012361		

Null Hypothesis: D(TOPEN) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Used-specified) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.740681	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Residual variance (no correction)	70.68277
HAC corrected variance (Bartlett kernel)	40.42842

Phillips-Perron Test Equation
Dependent Variable: D(TOPEN,2)
Method: Least Squares
Date: 11/15/23 Time: 14:25
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TOPEN(-1))	-1.297923	0.165704	-7.832784	0.0000
C	4.804140	3.167431	1.516731	0.1389
@TREND("1985")	-0.222049	0.143481	-1.547586	0.1313

R-squared	0.650263	Mean dependent var	0.034893
Adjusted R-squared	0.629067	S.D. dependent var	14.41795
S.E. of regression	8.781143	Akaike info criterion	7.262746
Sum squared resid	2544.580	Schwarz criterion	7.394706
Log likelihood	-127.7294	Hannan-Quinn criter.	7.308803
F-statistic	30.67835	Durbin-Watson stat	2.099475
Prob(F-statistic)	0.000000		

Null Hypothesis: GFCF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.212788	0.9903
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GFCF)
Method: Least Squares
Date: 11/15/23 Time: 14:25
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCF(-1)	-0.021378	0.100465	-0.212788	0.8328
C	-0.739286	5.282424	-0.139952	0.8895
@TREND("1985")	0.055003	0.120421	0.456759	0.6507

R-squared	0.050720	Mean dependent var	-0.359138
Adjusted R-squared	-0.005120	S.D. dependent var	3.769163
S.E. of regression	3.778799	Akaike info criterion	5.574294
Sum squared resid	485.4969	Schwarz criterion	5.704909
Log likelihood	-100.1244	Hannan-Quinn criter.	5.620342
F-statistic	0.908314	Durbin-Watson stat	1.764039
Prob(F-statistic)	0.412764		

Null Hypothesis: D(GFCF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.688571	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GFCF,2)
Method: Least Squares
Date: 11/15/23 Time: 14:26
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFCF(-1))	-1.013628	0.151546	-6.688571	0.0000
C	-3.100617	1.220276	-2.540915	0.0159
@TREND("1985")	0.127636	0.054978	2.321573	0.0266

R-squared	0.579172	Mean dependent var	-0.237578
Adjusted R-squared	0.553667	S.D. dependent var	4.995325
S.E. of regression	3.337283	Akaike info criterion	5.327846
Sum squared resid	367.5361	Schwarz criterion	5.459806
Log likelihood	-92.90124	Hannan-Quinn criter.	5.373904
F-statistic	22.70843	Durbin-Watson stat	1.871908
Prob(F-statistic)	0.000001		

Null Hypothesis: GFCF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.070999	0.9958
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	13.12154
HAC corrected variance (Bartlett kernel)	11.07403

Phillips-Perron Test Equation
Dependent Variable: D(GFCF)
Method: Least Squares
Date: 11/15/23 Time: 14:26
Sample (adjusted): 1986 2022
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCF(-1)	-0.021378	0.100465	-0.212788	0.8328
C	-0.739286	5.282424	-0.139952	0.8895
@TREND("1985")	0.055003	0.120421	0.456759	0.6507

R-squared	0.050720	Mean dependent var	-0.359138
Adjusted R-squared	-0.005120	S.D. dependent var	3.769163
S.E. of regression	3.778799	Akaike info criterion	5.574294
Sum squared resid	485.4969	Schwarz criterion	5.704909
Log likelihood	-100.1244	Hannan-Quinn criter.	5.620342
F-statistic	0.908314	Durbin-Watson stat	1.764039
Prob(F-statistic)	0.412764		

Null Hypothesis: D(GFCF) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.818599	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

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

Residual variance (no correction)	10.20934
HAC corrected variance (Bartlett kernel)	8.776434

Phillips-Perron Test Equation
Dependent Variable: D(GFCF,2)
Method: Least Squares
Date: 11/15/23 Time: 14:27
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFCF(-1))	-1.013628	0.151546	-6.688571	0.0000
C	-3.100617	1.220276	-2.540915	0.0159
@TREND("1985")	0.127636	0.054978	2.321573	0.0266

R-squared	0.579172	Mean dependent var	-0.237578
Adjusted R-squared	0.553667	S.D. dependent var	4.995325
S.E. of regression	3.337283	Akaike info criterion	5.327846
Sum squared resid	367.5361	Schwarz criterion	5.459806
Log likelihood	-92.90124	Hannan-Quinn criter.	5.373904
F-statistic	22.70843	Durbin-Watson stat	1.871908
Prob(F-statistic)	0.000001		

First objectives

Life expectancy

Dependent Variable: LEXP
Method: ARDL
Date: 11/15/23 Time: 14:35
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): MPR TBR MDR INF TOPEN GFCF

Fixed regressors: C
Number of models evalulated: 16384
Selected Model: ARDL(2, 1, 0, 3, 2, 3, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LEXP(-1)	0.602154	0.215757	2.790884	0.0137
LEXP(-2)	0.190781	0.191948	0.993923	0.3360
MPR	0.028931	0.012495	2.315342	0.0352
MPR(-1)	0.014841	0.012310	1.205565	0.2467
TBR	-0.032941	0.011609	-2.837539	0.0125
MDR	-0.006543	0.009856	-0.663852	0.5169
MDR(-1)	-0.000529	0.010592	-0.049911	0.9609
MDR(-2)	-0.006299	0.010417	-0.604695	0.5544
MDR(-3)	0.015929	0.008813	1.807399	0.0908
INF	-0.000928	0.003195	-0.290429	0.7755
INF(-1)	-0.000911	0.002971	-0.306761	0.7632
INF(-2)	-0.014900	0.003594	-4.145636	0.0009
TOPEN	0.018497	0.005002	3.697778	0.0021
TOPEN(-1)	-0.008767	0.003822	-2.293784	0.0367
TOPEN(-2)	-0.002802	0.003362	-0.833322	0.4177
TOPEN(-3)	-0.004819	0.003599	-1.338818	0.2006
GFCF	-0.001691	0.008661	-0.195278	0.8478
GFCF(-1)	0.013401	0.013758	0.974016	0.3455
GFCF(-2)	-0.051078	0.014517	-3.518419	0.0031
C	11.56506	2.138937	5.406920	0.0001

R-squared	0.999198	Mean dependent var	49.07374
Adjusted R-squared	0.998181	S.D. dependent var	2.767109
S.E. of regression	0.118002	Akaike info criterion	-1.140677
Sum squared resid	0.208866	Schwarz criterion	-0.251907
Log likelihood	39.96185	Hannan-Quinn criter.	-0.833874
F-statistic	98.32257	Durbin-Watson stat	2.050406
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LEXP)
Selected Model: ARDL(2, 1, 0, 3, 2, 3, 2)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 14:36
Sample: 1985 2022
Included observations: 35

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.56506	2.138937	5.406920	0.0001
LEXP(-1)*	-0.207065	0.037596	-5.507660	0.0001
MPR(-1)	0.043772	0.016886	2.592186	0.0204
TBR**	-0.032941	0.011609	-2.837539	0.0125
MDR(-1)	0.002558	0.012858	0.198970	0.8450
INF(-1)	-0.016740	0.004104	-4.078637	0.0010
TOPEN(-1)	0.002110	0.005066	0.416493	0.6829
GFCF(-1)	-0.039368	0.007830	-5.028187	0.0001
D(LEXP(-1))	-0.190781	0.191948	-0.993923	0.3360
D(MPR)	0.028931	0.012495	2.315342	0.0352
D(MDR)	-0.006543	0.009856	-0.663852	0.5169
D(MDR(-1))	-0.009630	0.010554	-0.912416	0.3760
D(MDR(-2))	-0.015929	0.008813	-1.807399	0.0908
D(INF)	-0.000928	0.003195	-0.290429	0.7755
D(INF(-1))	0.014900	0.003594	4.145636	0.0009
D(TOPEN)	0.018497	0.005002	3.697778	0.0021
D(TOPEN(-1))	0.007620	0.003965	1.921684	0.0739
D(TOPEN(-2))	0.004819	0.003599	1.338818	0.2006
D(GFCF)	-0.001691	0.008661	-0.195278	0.8478
D(GFCF(-1))	0.051078	0.014517	3.518419	0.0031

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR	0.211395	0.072117	2.931262	0.0103
TBR	-0.159087	0.048635	-3.271049	0.0052
MDR	0.012356	0.062218	0.198589	0.8453
INF	-0.080843	0.017186	-4.703895	0.0003
TOPEN	0.010190	0.025031	0.407115	0.6897
GFCF	-0.190126	0.016318	-11.65122	0.0000
C	55.85244	0.865659	64.52016	0.0000

EC = LEXP - (0.2114*MPR -0.1591*TBR + 0.0124*MDR -0.0808*INF + 0.0102 *TOPEN -0.1901*GFCF + 55.8524)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.217610	10%	1.99	2.94

k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
Actual Sample Size	35		Finite Sample: n=35	
		10%	2.254	3.388
		5%	2.685	3.96
		1%	3.713	5.326

ARDL Error Correction Regression
Dependent Variable: D(LEXP)
Selected Model: ARDL(2, 1, 0, 3, 2, 3, 2)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 14:36
Sample: 1985 2022
Included observations: 35

ECM Regression
Case 2: Restricted Constant and No Trend

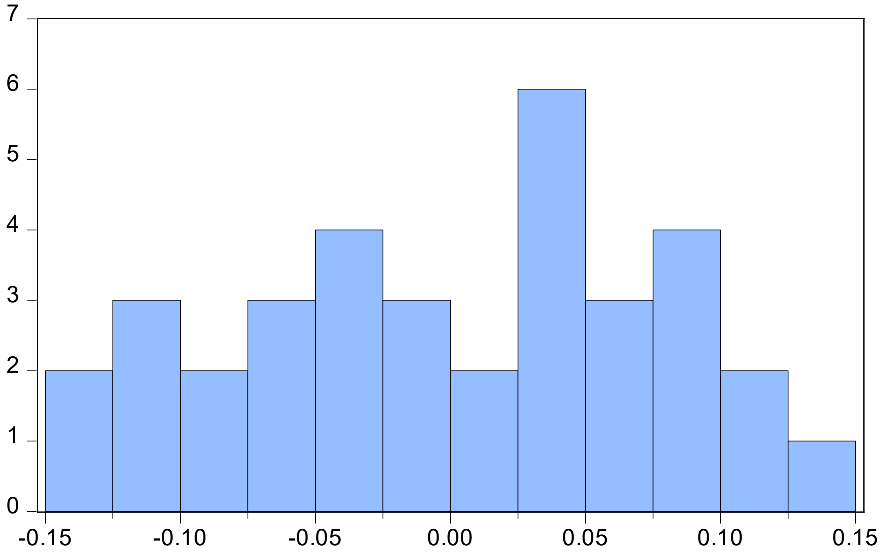
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXP(-1))	-0.190781	0.141158	-1.351541	0.1966
D(MPR)	0.028931	0.006731	4.298370	0.0006
D(MDR)	-0.006543	0.006370	-1.027110	0.3206
D(MDR(-1))	-0.009630	0.005477	-1.758314	0.0991
D(MDR(-2))	-0.015929	0.006244	-2.550897	0.0222
D(INF)	-0.000928	0.001571	-0.590663	0.5635
D(INF(-1))	0.014900	0.002587	5.759173	0.0000
D(TOPEN)	0.018497	0.003427	5.396760	0.0001
D(TOPEN(-1))	0.007620	0.002704	2.818416	0.0130
D(TOPEN(-2))	0.004819	0.002551	1.888828	0.0784
D(GFCF)	-0.001691	0.005938	-0.284823	0.7797
D(GFCF(-1))	0.051078	0.011071	4.613812	0.0003
CointEq(-1)*	-0.207065	0.026464	-7.824319	0.0000

R-squared	0.889342	Mean dependent var	0.190229
Adjusted R-squared	0.828983	S.D. dependent var	0.235615
S.E. of regression	0.097437	Akaike info criterion	-1.540677
Sum squared resid	0.208866	Schwarz criterion	-0.962976
Log likelihood	39.96185	Hannan-Quinn criter.	-1.341255
Durbin-Watson stat	2.050406		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.217610	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99



Series: Residuals	
Sample 1988 2022	
Observations 35	
Mean	-4.82e-15
Median	0.018156
Maximum	0.149622
Minimum	-0.136257
Std. Dev.	0.078378
Skewness	-0.086202
Kurtosis	2.001719
Jarque-Bera	1.496670
Probability	0.473154

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.958041	Prob. F(2,13)	0.1806
Obs*R-squared	8.102520	Prob. Chi-Square(2)	0.0174

Heteroskedasticity Test: Breusch-Pagan-Godfrey

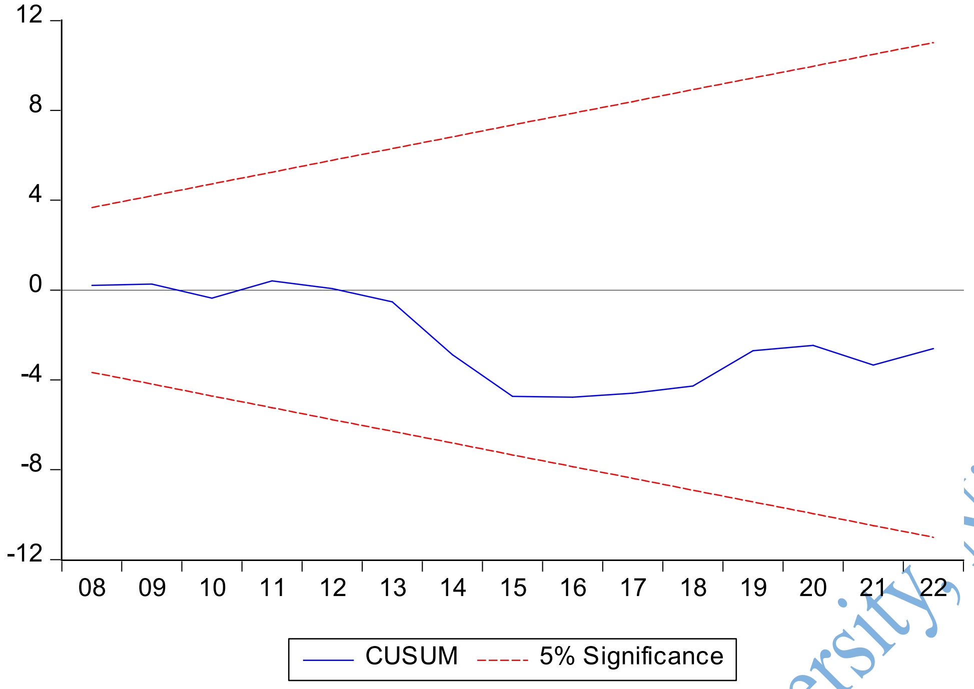
F-statistic	1.525520	Prob. F(19,15)	0.2053
Obs*R-squared	23.06408	Prob. Chi-Square(19)	0.2345
Scaled explained SS	2.121771	Prob. Chi-Square(19)	1.0000

Ramsey RESET Test
Equation: UNTITLED
Specification: LEXP LEXP(-1) LEXP(-2) MPR MPR(-1) TBR MDR MDR(-1) MDR(-2) MDR(-3) INF INF(-1) INF(-2) TOPEN TOPEN(-1) TOPEN(-2) TOPEN(-3) GFCF GFCF(-1) GFCF(-2) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.581827	14	0.5699
F-statistic	0.338523	(1, 14)	0.5699

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.004931	1	0.004931
Restricted SSR	0.208866	15	0.013924
Unrestricted SSR	0.203935	14	0.014567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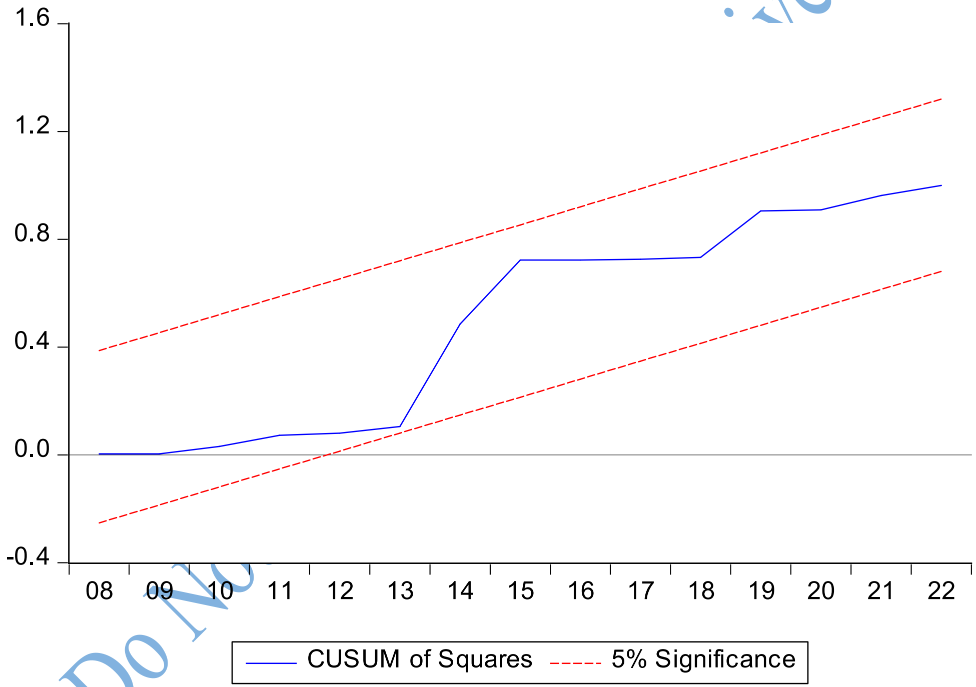
CUSUM
5% Significance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CUSUM of Squares
5% Significance

Child mortality

Dependent Variable: LOG(UN5M)
Method: ARDL
Date: 11/15/23 Time: 14:53
Sample (adjusted): 1988 2022
Included observations: 35 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): MPR TBR MDR INF TOPEN GFCF

Fixed regressors: C
Number of models evalulated: 12288
Selected Model: ARDL(3, 1, 1, 3, 3, 3, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(UN5M(-1))	4.532518	0.536625	8.446348	0.0000
LOG(UN5M(-2))	-7.221624	1.186384	-6.087088	0.0001
LOG(UN5M(-3))	3.669305	0.666462	5.505650	0.0002
MPR	0.000211	0.000307	0.686520	0.5066
MPR(-1)	-0.000365	0.000369	-0.990945	0.3430
TBR	0.001234	0.000331	3.725221	0.0034
TBR(-1)	0.000671	0.000289	2.325559	0.0402
MDR	-0.000186	0.000203	-0.919851	0.3774
MDR(-1)	0.000520	0.000236	2.207650	0.0494
MDR(-2)	-0.001166	0.000268	-4.354046	0.0011
MDR(-3)	-0.001452	0.000317	-4.574771	0.0008
INF	0.000358	9.39E-05	3.811886	0.0029
INF(-1)	0.000209	8.41E-05	2.490947	0.0300
INF(-2)	5.60E-05	7.74E-05	0.722777	0.4849
INF(-3)	0.000439	8.96E-05	4.897668	0.0005
TOPEN	0.000187	0.000125	1.490256	0.1643
TOPEN(-1)	-0.000208	0.000107	-1.956220	0.0763
TOPEN(-2)	-0.000342	8.45E-05	-4.050633	0.0019
TOPEN(-3)	0.000105	6.90E-05	1.520648	0.1566
GFCF	0.000401	0.000261	1.534586	0.1531
GFCF(-1)	0.000698	0.000286	2.439155	0.0329
GFCF(-2)	-0.000191	0.000353	-0.541137	0.5992
GFCF(-3)	-0.000436	0.000366	-1.193354	0.2578
C	0.064774	0.065376	0.990801	0.3431

R-squared	0.999967	Mean dependent var	5.056519
Adjusted R-squared	0.999898	S.D. dependent var	0.225193
S.E. of regression	0.002275	Akaike info criterion	-9.119308
Sum squared resid	5.70E-05	Schwarz criterion	-8.052783
Log likelihood	183.5879	Hannan-Quinn criter.	-8.751144
F-statistic	144.7825	Durbin-Watson stat	2.098709
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: DLOG(UN5M)
Selected Model: ARDL(3, 1, 1, 3, 3, 3, 3)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 14:54
Sample: 1985 2022
Included observations: 35

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.064774	0.065376	0.990801	0.3431
LOG(UN5M(-1))*	-0.019801	0.013289	-1.490035	0.1643
MPR(-1)	-0.000154	0.000562	-0.274814	0.7886
TBR(-1)	0.001905	0.000486	3.920963	0.0024
MDR(-1)	-0.002285	0.000418	-5.470497	0.0002
INF(-1)	0.001062	0.000194	5.482010	0.0002
TOPEN(-1)	-0.000259	0.000141	-1.838142	0.0932
GFCF(-1)	0.000472	0.000220	2.148436	0.0548
DLOG(UN5M(-1))	3.552319	0.527520	6.734001	0.0000
DLOG(UN5M(-2))	-3.669305	0.666462	-5.505650	0.0002
D(MPR)	0.000211	0.000307	0.686520	0.5066
D(TBR)	0.001234	0.000331	3.725221	0.0034
D(MDR)	-0.000186	0.000203	-0.919851	0.3774
D(MDR(-1))	0.002618	0.000460	5.691350	0.0001
D(MDR(-2))	0.001452	0.000317	4.574771	0.0008
D(INF)	0.000358	9.39E-05	3.811886	0.0029
D(INF(-1))	-0.000495	9.04E-05	-5.478841	0.0002
D(INF(-2))	-0.000439	8.96E-05	-4.897668	0.0005
D(TOPEN)	0.000187	0.000125	1.490256	0.1643
D(TOPEN(-1))	0.000238	9.38E-05	2.533363	0.0278
D(TOPEN(-2))	-0.000105	6.90E-05	-1.520648	0.1566
D(GFCF)	0.000401	0.000261	1.534586	0.1531
D(GFCF(-1))	0.000628	0.000444	1.412195	0.1856
D(GFCF(-2))	0.000436	0.000366	1.193354	0.2578

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR	-0.007801	0.025535	-0.305513	0.7657
TBR	0.096204	0.065785	1.462408	0.1716
MDR	-0.115379	0.087739	-1.315019	0.2153
INF	0.053650	0.041564	1.290782	0.2232
TOPEN	-0.013088	0.011926	-1.097484	0.2959
GFCF	0.023830	0.006987	3.410743	0.0058
C	3.271211	1.127921	2.900213	0.0144

EC = LOG(UN5M) - (-0.0078*MPR + 0.0962*TBR -0.1154*MDR + 0.0536*INF
-0.0131*TOPEN + 0.0238*GFCF + 3.2712)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)

			Asymptotic: n=1000	
F-statistic	9.318262	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
			Finite Sample:	
Actual Sample Size	35		n=35	
		10%	2.254	3.388
		5%	2.685	3.96
		1%	3.713	5.326

ARDL Error Correction Regression
Dependent Variable: DLOG(UN5M)
Selected Model: ARDL(3, 1, 1, 3, 3, 3, 3)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 14:57
Sample: 1985 2022
Included observations: 35

ECM Regression
Case 2: Restricted Constant and No Trend

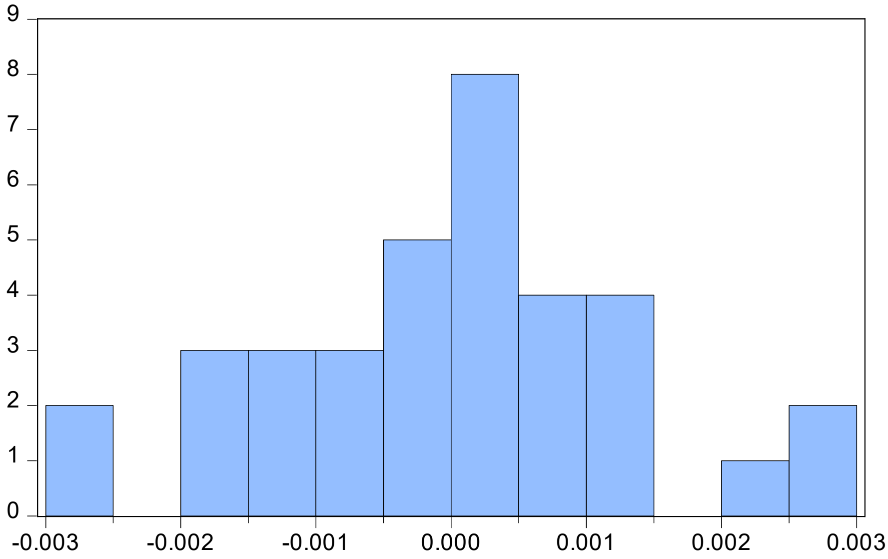
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(UN5M(-1))	3.552319	0.208415	17.04446	0.0000
DLOG(UN5M(-2))	-3.669305	0.288259	-12.72918	0.0000
D(MPR)	0.000211	0.000140	1.505717	0.1603
D(TBR)	0.001234	0.000167	7.382933	0.0000
D(MDR)	-0.000186	0.000125	-1.495520	0.1629
D(MDR(-1))	0.002618	0.000242	10.83667	0.0000
D(MDR(-2))	0.001452	0.000202	7.182237	0.0000
D(INF)	0.000358	4.25E-05	8.416851	0.0000
D(INF(-1))	-0.000495	5.59E-05	-8.853249	0.0000
D(INF(-2))	-0.000439	4.92E-05	-8.915741	0.0000
D(TOPEN)	0.000187	6.29E-05	2.967640	0.0128
D(TOPEN(-1))	0.000238	4.57E-05	5.197214	0.0003
D(TOPEN(-2))	-0.000105	4.48E-05	-2.340017	0.0392
D(GFCF)	0.000401	0.000119	3.366106	0.0063
D(GFCF(-1))	0.000628	0.000144	4.359399	0.0011
D(GFCF(-2))	0.000436	0.000138	3.161068	0.0091
CointEq(-1)*	-0.019801	0.001793	-11.04466	0.0000

R-squared	0.886555	Mean dependent var	-0.018132
Adjusted R-squared	0.774603	S.D. dependent var	0.011162
S.E. of regression	0.001779	Akaike info criterion	-9.519308
Sum squared resid	5.70E-05	Schwarz criterion	-8.763853
Log likelihood	183.5879	Hannan-Quinn criter.	-9.258525
Durbin-Watson stat	2.098709		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.318262	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99



Series: Residuals	
Sample 1988 2022	
Observations 35	
Mean	-8.99e-15
Median	0.000115
Maximum	0.002809
Minimum	-0.002726
Std. Dev.	0.001294
Skewness	0.053746
Kurtosis	2.901714
Jarque-Bera	0.030938
Probability	0.984650

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.495329	Prob. F(3,8)	0.0697
Obs*R-squared	19.85339	Prob. Chi-Square(3)	0.0002

Heteroskedasticity Test: Breusch-Pagan-Godfrey

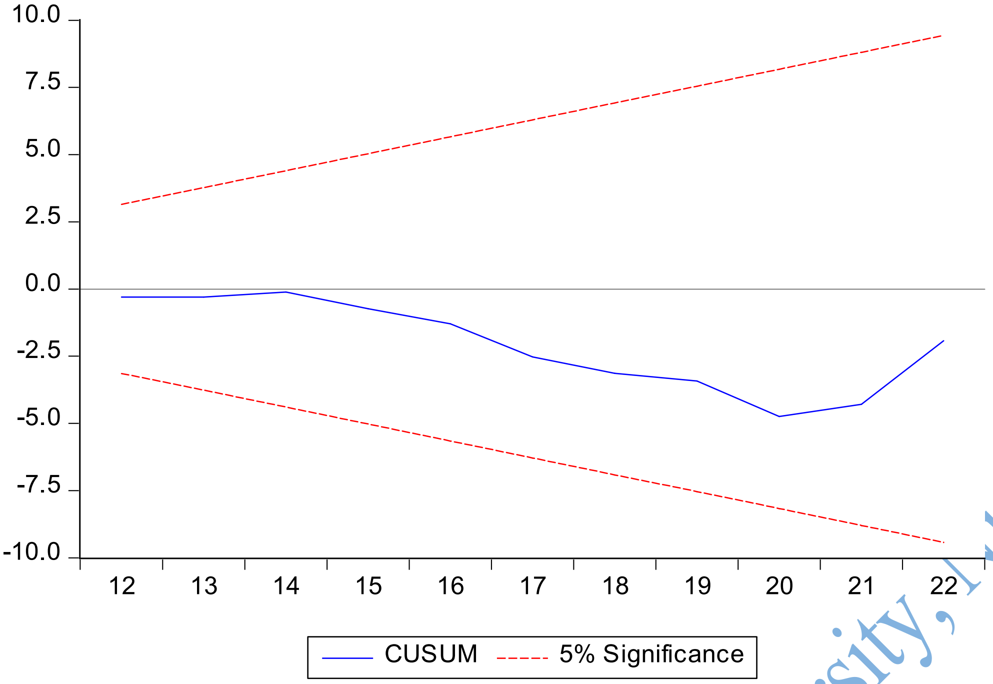
F-statistic	2.108221	Prob. F(23,11)	0.0996
Obs*R-squared	28.52822	Prob. Chi-Square(23)	0.1965
Scaled explained SS	2.679410	Prob. Chi-Square(23)	1.0000

Ramsey RESET Test
Equation: UNTITLED
Specification: LOG(UN5M) LOG(UN5M(-1)) LOG(UN5M(-2)) LOG(UN5M(-3)) MPR MPR(-1) TBR TBR(-1) MDR MDR(-1) MDR(-2) MDR(-3) INF INF(-1) INF(-2) INF(-3) TOPEN TOPEN(-1) TOPEN(-2) TOPEN(-3) GFCF GFCF(-1) GFCF(-2) GFCF(-3) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.483046	10	0.2324
F-statistic	3.165515	(1, 10)	0.2324

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	2.17E-05	1	2.17E-05
Restricted SSR	5.70E-05	11	5.18E-06
Unrestricted SSR	3.52E-05	10	3.52E-06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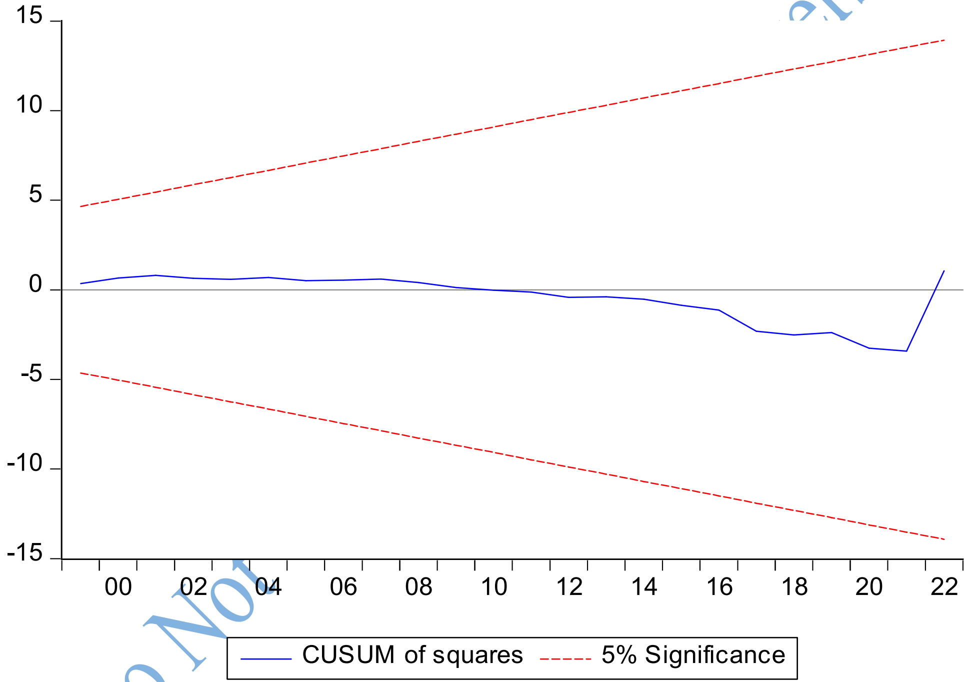
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CUSUM of squares
5% Significance

Second Objective

Life expectancy

Dependent Variable: LEXP
Method: ARDL
Date: 11/15/23 Time: 16:16
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LR LDR DCPS INF TOPEN GFCF
Fixed regressors: C
Number of models evalulated: 2187
Selected Model: ARDL(2, 1, 2, 0, 2, 1, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LEXP(-1)	0.713498	0.188202	3.791135	0.0012
LEXP(-2)	0.144473	0.173032	0.834945	0.4141
LR	0.003337	0.002170	1.537642	0.1406
LR(-1)	0.003965	0.002314	1.713599	0.1029
LDR	-0.001212	0.002399	-0.505085	0.6193
LDR(-1)	0.001288	0.003164	0.406907	0.6886
LDR(-2)	0.003551	0.003003	1.182344	0.2517
DCPS	-0.004897	0.011257	-0.435018	0.6685
INF	-0.001187	0.002550	-0.465564	0.6468
INF(-1)	0.001823	0.002657	0.686231	0.5009
INF(-2)	-0.009098	0.002264	-4.018526	0.0007
TOPEN	0.009202	0.003709	2.480661	0.0226
TOPEN(-1)	-0.003676	0.003244	-1.133428	0.2711
GFCF	-0.002987	0.008418	-0.354901	0.7266
GFCF(-1)	-0.004885	0.011964	-0.408294	0.6876
GFCF(-2)	-0.023350	0.011567	-2.018619	0.0579
C	7.540894	1.947275	3.872537	0.0010

R-squared	0.999018	Mean dependent var	48.98886
Adjusted R-squared	0.998191	S.D. dependent var	2.774437
S.E. of regression	0.118009	Akaike info criterion	-1.130742
Sum squared resid	0.264598	Schwarz criterion	-0.382969
Log likelihood	37.35336	Hannan-Quinn criter.	-0.869750
F-statistic	120.7922	Durbin-Watson stat	2.124439
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LEXP)
Selected Model: ARDL(2, 1, 2, 0, 2, 1, 2)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 16:17
Sample: 1985 2022
Included observations: 36

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.540894	1.947275	3.872537	0.0010
LEXP(-1)*	-0.142030	0.037026	-3.835980	0.0011
LR(-1)	0.007302	0.002730	2.674423	0.0150
LDR(-1)	0.003627	0.002439	1.487004	0.1534
DCPS**	-0.004897	0.011257	-0.435018	0.6685
INF(-1)	-0.008462	0.002322	-3.644714	0.0017
TOPEN(-1)	0.005525	0.004321	1.278742	0.2164
GFCF(-1)	-0.031222	0.007116	-4.387827	0.0003
D(LEXP(-1))	-0.144473	0.173032	-0.834945	0.4141
D(LR)	0.003337	0.002170	1.537642	0.1406
D(LDR)	-0.001212	0.002399	-0.505085	0.6193
D(LDR(-1))	-0.003551	0.003003	-1.182344	0.2517
D(INF)	-0.001187	0.002550	-0.465564	0.6468
D(INF(-1))	0.009098	0.002264	4.018526	0.0007
D(TOPEN)	0.009202	0.003709	2.480661	0.0226
D(GFCF)	-0.002987	0.008418	-0.354901	0.7266
D(GFCF(-1))	0.023350	0.011567	2.018619	0.0579

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LR	0.051415	0.015953	3.222861	0.0045
LDR	0.025535	0.019082	1.338205	0.1966
DCPS	-0.034480	0.083612	-0.412375	0.6847
INF	-0.059578	0.019811	-3.007274	0.0072
TOPEN	0.038902	0.034298	1.134219	0.2708
GFCF	-0.219829	0.039186	-5.609874	0.0000
C	53.09382	2.856288	18.58840	0.0000

EC = LEXP - (0.0514*LR + 0.0255*LDR -0.0345*DCPS -0.0596*INF + 0.0389 *TOPEN -0.2198*GFCF + 53.0938)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.491435	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Actual Sample Size	36		Finite Sample: n=40	
		10%	2.218	3.314
		5%	2.618	3.863
		1%	3.505	5.121
			Finite Sample: n=35	
		10%	2.254	3.388
		5%	2.685	3.96
		1%	3.713	5.326

ARDL Error Correction Regression
Dependent Variable: D(LEXP)
Selected Model: ARDL(2, 1, 2, 0, 2, 1, 2)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 16:19
Sample: 1985 2022
Included observations: 36

ECM Regression
Case 2: Restricted Constant and No Trend

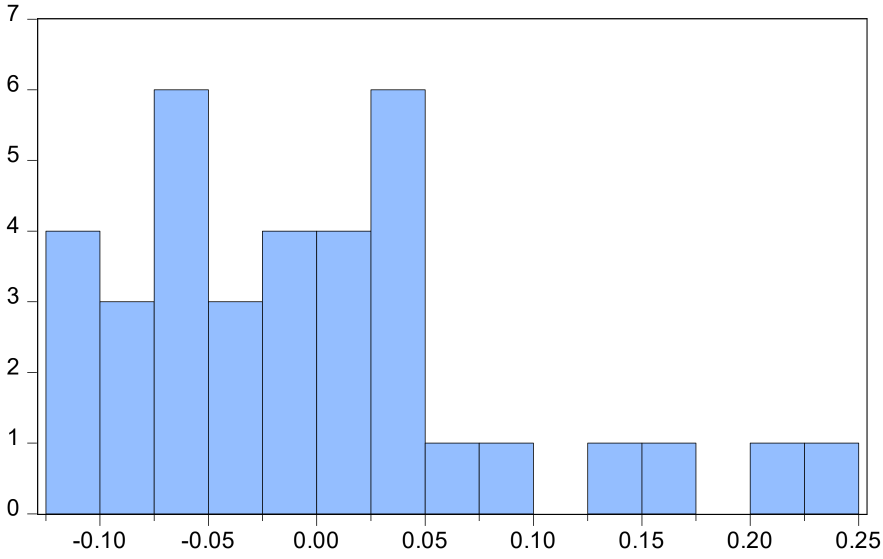
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXP(-1))	-0.144473	0.136000	-1.062295	0.3014
D(LR)	0.003337	0.001314	2.540058	0.0200
D(LDR)	-0.001212	0.001587	-0.763289	0.4547
D(LDR(-1))	-0.003551	0.002029	-1.749858	0.0963
D(INF)	-0.001187	0.001488	-0.797956	0.4348
D(INF(-1))	0.009098	0.001791	5.079907	0.0001
D(TOPEN)	0.009202	0.002066	4.454369	0.0003
D(GFCF)	-0.002987	0.005908	-0.505646	0.6189
D(GFCF(-1))	0.023350	0.007331	3.185080	0.0049
CointEq(-1)*	-0.142030	0.018318	-7.753500	0.0000

R-squared	0.861363	Mean dependent var	0.186139
Adjusted R-squared	0.813373	S.D. dependent var	0.233517
S.E. of regression	0.100880	Akaike info criterion	-1.519631
Sum squared resid	0.264598	Schwarz criterion	-1.079765
Log likelihood	37.35336	Hannan-Quinn criter.	-1.366106
Durbin-Watson stat	2.124439		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.491435	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99



Series: Residuals
Sample 1987 2022
Observations 36

Mean	-1.28e-14
Median	-0.010186
Maximum	0.233456
Minimum	-0.124554
Std. Dev.	0.086948
Skewness	0.922513
Kurtosis	3.542505
Jarque-Bera	5.547650
Probability	0.062423

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.076188	Prob. F(2,17)	0.0724
Obs*R-squared	9.566427	Prob. Chi-Square(2)	0.0084

Heteroskedasticity Test: Breusch-Pagan-Godfrey

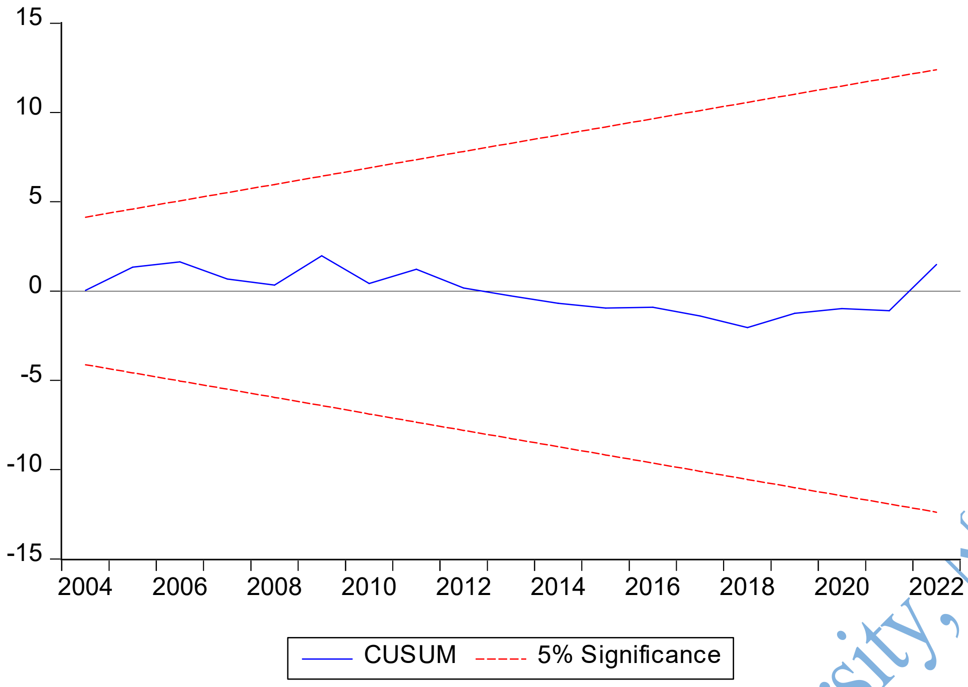
F-statistic	0.379519	Prob. F(16,19)	0.9723
Obs*R-squared	8.718895	Prob. Chi-Square(16)	0.9245
Scaled explained SS	3.087418	Prob. Chi-Square(16)	0.9998

Ramsey RESET Test
Equation: UNTITLED
Specification: LEXP LEXP(-1) LEXP(-2) LR LR(-1) LDR LDR(-1) LDR(-2) DCPS INF INF(-1) INF(-2) TOPEN TOPEN(-1) GFCF GFCF(-1) GFCF(-2) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.881101	18	0.0762
F-statistic	3.538541	(1, 18)	0.0762

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.043470	1	0.043470
Restricted SSR	0.264598	19	0.013926
Unrestricted SSR	0.221127	18	0.012285



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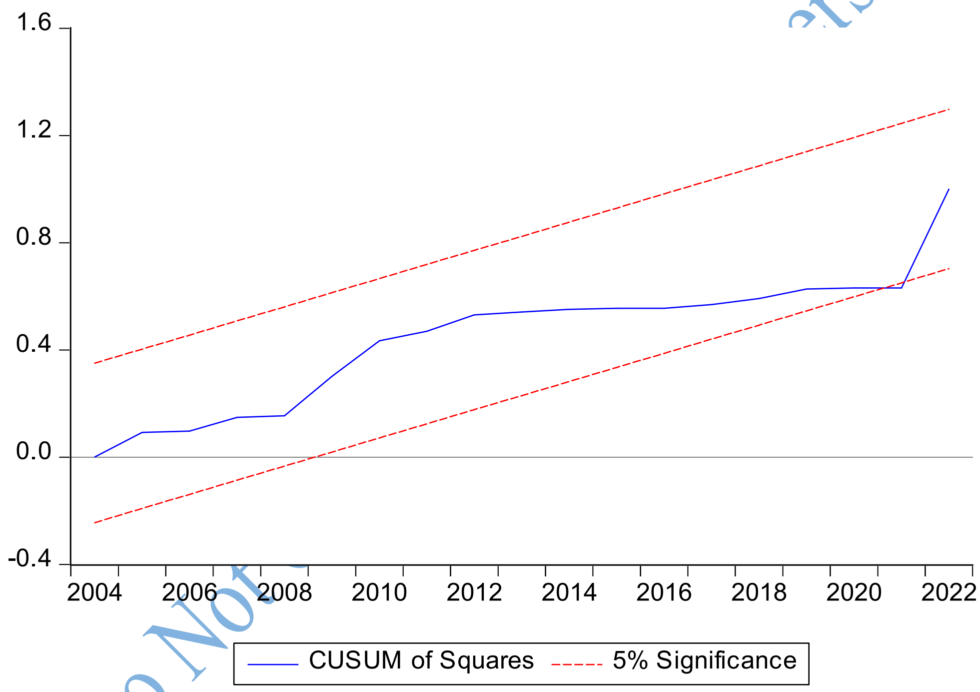
2022
CUSUM
5% Significance



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2020
2022
CUSUM of Squares
5% Significance

Child mortality

Dependent Variable: LOG(UN5M)
Method: ARDL
Date: 11/15/23 Time: 16:22
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LR LDR DCPS INF TOPEN GFCF

Fixed regressors: C
Number of models evalulated: 2187
Selected Model: ARDL(2, 2, 1, 2, 2, 0, 1)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(UN5M(-1))	1.780936	0.117862	15.11029	0.0000
LOG(UN5M(-2))	-0.864722	0.128111	-6.749794	0.0000
LR	-0.000120	4.88E-05	-2.466550	0.0233
LR(-1)	-0.000156	5.00E-05	-3.126214	0.0056
LR(-2)	-0.000156	5.09E-05	-3.066399	0.0064
LDR	0.000125	6.03E-05	2.077511	0.0516
LDR(-1)	-0.000137	5.42E-05	-2.522641	0.0207
DCPS	8.31E-05	0.000355	0.233640	0.8178
DCPS(-1)	-0.000452	0.000384	-1.176310	0.2540
DCPS(-2)	-0.000457	0.000446	-1.024769	0.3183
INF	-3.41E-05	4.95E-05	-0.687930	0.4998
INF(-1)	0.000144	5.69E-05	2.536479	0.0201
INF(-2)	-0.000128	4.70E-05	-2.733609	0.0132
TOPEN	0.000211	0.000101	2.099338	0.0494
GFCF	-0.000246	0.000198	-1.239833	0.2301
GFCF(-1)	0.001197	0.000227	5.267735	0.0000
C	0.418719	0.091359	4.583253	0.0002

R-squared	0.999915	Mean dependent var	5.064458
Adjusted R-squared	0.999844	S.D. dependent var	0.227007
S.E. of regression	0.002838	Akaike info criterion	-8.586209
Sum squared resid	0.000153	Schwarz criterion	-7.838436
Log likelihood	171.5518	Hannan-Quinn criter.	-8.325216
F-statistic	139.9674	Durbin-Watson stat	1.855396
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: DLOG(UN5M)
Selected Model: ARDL(2, 2, 1, 2, 2, 0, 1)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 16:22
Sample: 1985 2022
Included observations: 36

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.418719	0.091359	4.583253	0.0002
LOG(UN5M(-1))*	-0.083786	0.016830	-4.978420	0.0001
LR(-1)	-0.000433	8.36E-05	-5.174110	0.0001
LDR(-1)	-1.14E-05	4.82E-05	-0.236276	0.8157
DCPS(-1)	-0.000826	0.000528	-1.563589	0.1344
INF(-1)	-1.81E-05	5.52E-05	-0.327202	0.7471
TOPEN**	0.000211	0.000101	2.099338	0.0494
GFCF(-1)	0.000951	0.000124	7.697051	0.0000
DLOG(UN5M(-1))	0.864722	0.128111	6.749794	0.0000
D(LR)	-0.000120	4.88E-05	-2.466550	0.0233
D(LR(-1))	0.000156	5.09E-05	3.066399	0.0064
D(LDR)	0.000125	6.03E-05	2.077511	0.0516
D(DCPS)	8.31E-05	0.000355	0.233640	0.8178
D(DCPS(-1))	0.000457	0.000446	1.024769	0.3183
D(INF)	-3.41E-05	4.95E-05	-0.687930	0.4998
D(INF(-1))	0.000128	4.70E-05	2.733609	0.0132
D(GFCF)	-0.000246	0.000198	-1.239833	0.2301

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LR	-0.005163	0.001119	-4.612869	0.0002
LDR	-0.000136	0.000575	-0.236587	0.8155
DCPS	-0.009854	0.004609	-2.138244	0.0457
INF	-0.000216	0.000664	-0.324660	0.7490
TOPEN	0.002520	0.000995	2.532994	0.0203
GFCF	0.011349	0.002214	5.125408	0.0001
C	4.997465	0.136213	36.68861	0.0000

EC = LOG(UN5M) - (-0.0052*LR -0.0001*LDR -0.0099*DCPS -0.0002*INF + 0.0025*TOPEN + 0.0113*GFCF + 4.9975)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	11.03228	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Actual Sample Size	36		Finite Sample: n=40	
		10%	2.218	3.314
		5%	2.618	3.863
		1%	3.505	5.121
			Finite Sample: n=35	
		10%	2.254	3.388
		5%	2.685	3.96
		1%	3.713	5.326

ARDL Error Correction Regression
Dependent Variable: DLOG(UN5M)
Selected Model: ARDL(2, 2, 1, 2, 2, 0, 1)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 16:24
Sample: 1985 2022
Included observations: 36

ECM Regression
Case 2: Restricted Constant and No Trend

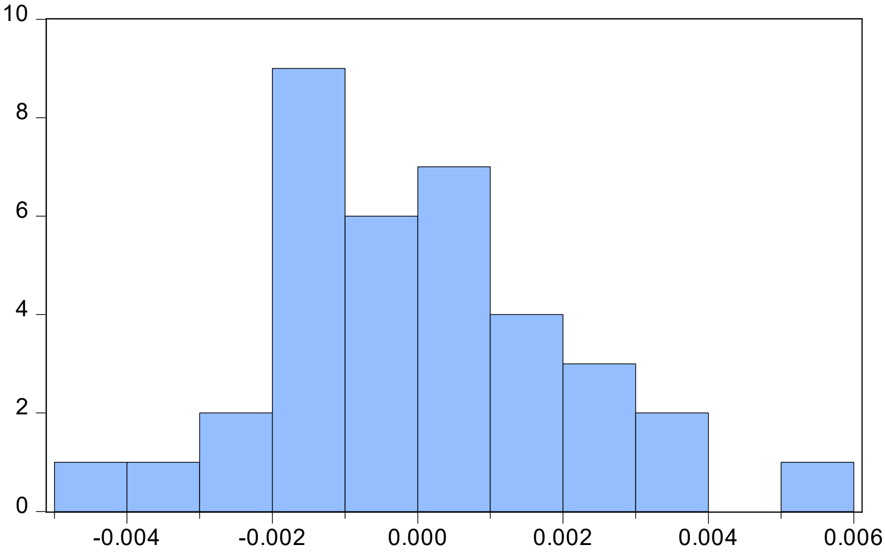
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(UN5M(-1))	0.864722	0.022311	38.75760	0.0000
D(LR)	-0.000120	3.26E-05	-3.695332	0.0015
D(LR(-1))	0.000156	3.67E-05	4.254955	0.0004
D(LDR)	0.000125	3.78E-05	3.312637	0.0037
D(DCPS)	8.31E-05	0.000197	0.420931	0.6785
D(DCPS(-1))	0.000457	0.000205	2.232187	0.0378
D(INF)	-3.41E-05	3.08E-05	-1.108008	0.2817
D(INF(-1))	0.000128	3.05E-05	4.213501	0.0005
D(GFCF)	-0.000246	0.000136	-1.801910	0.0874
CointEq(-1)*	-0.083786	0.007624	-10.98974	0.0000

R-squared	0.767623	Mean dependent var	-0.017508
Adjusted R-squared	0.756416	S.D. dependent var	0.011620
S.E. of regression	0.002426	Akaike info criterion	-8.975098
Sum squared resid	0.000153	Schwarz criterion	-8.535231
Log likelihood	171.5518	Hannan-Quinn criter.	-8.821573
Durbin-Watson stat	1.855396		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	11.03228	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99



Series: Residuals
Sample 1987 2022
Observations 36

Mean	2.71e-15
Median	-0.000196
Maximum	0.005156
Minimum	-0.004897
Std. Dev.	0.002091
Skewness	0.180189
Kurtosis	3.124100
Jarque-Bera	0.217909
Probability	0.896771

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.521261	Prob. F(2,17)	0.2467
Obs*R-squared	5.464920	Prob. Chi-Square(2)	0.0651

Heteroskedasticity Test: Breusch-Pagan-Godfrey

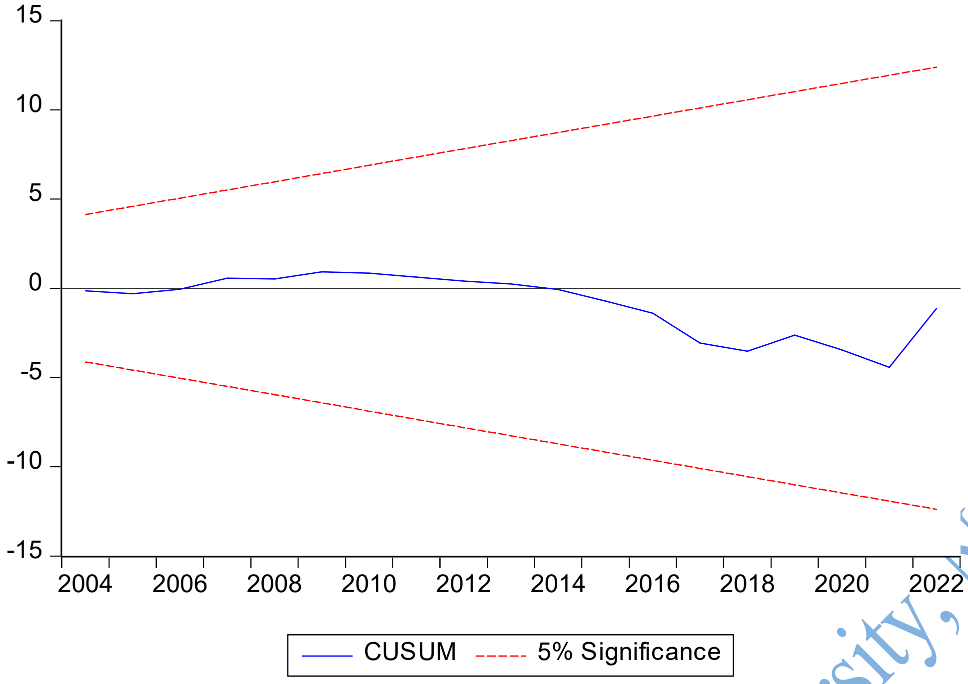
F-statistic	1.659699	Prob. F(16,19)	0.2106
Obs*R-squared	19.04561	Prob. Chi-Square(16)	0.1236
Scaled explained SS	8.592662	Prob. Chi-Square(16)	0.9292

Ramsey RESET Test
Equation: UNTITLED
Specification: LOG(UN5M) LOG(UN5M(-1)) LOG(UN5M(-2)) LR LR(-1) LR(-2) LDR LDR(-1) DCPS DCPS(-1) DCPS(-2) INF INF(-1) INF(-2) TOPEN GFCF GFCF(-1) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.323342	18	0.7502
F-statistic	0.104550	(1, 18)	0.7502

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	8.84E-07	1	8.84E-07
Restricted SSR	0.000153	19	8.05E-06
Unrestricted SSR	0.000152	18	8.45E-06


15
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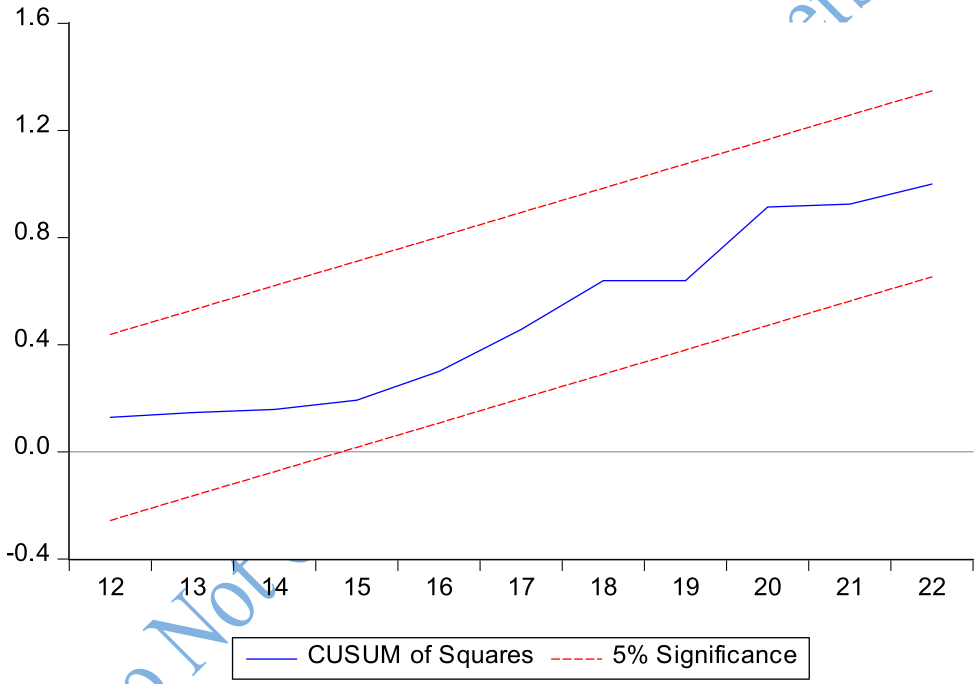
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
CUSUM
5% Significance


1.6
1.2
0.8
0.4
0.0
-0.4
12
13
14
15
16
17
18
19
20
21
22
CUSUM of Squares
5% Significance

Third Objective

Life expectancy

Dependent Variable: LEXP
Method: ARDL
Date: 11/15/23 Time: 16:55
Sample (adjusted): 1987 2022
Included observations: 36 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): SMK TSTV ASI INF TOPEN GFCF
Fixed regressors: C
Number of models evalulated: 2187
Selected Model: ARDL(2, 0, 2, 2, 2, 1, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LEXP(-1)	1.107626	0.126236	8.774234	0.0000
LEXP(-2)	-0.241097	0.118850	-2.028585	0.0576
SMK	-0.004977	0.011942	-0.416743	0.6818
TSTV	0.032121	0.058889	0.545447	0.5921
TSTV(-1)	-0.063241	0.052342	-1.208228	0.2426
TSTV(-2)	-0.125216	0.046343	-2.701972	0.0146
ASI	2.77E-06	6.20E-06	0.446283	0.6607
ASI(-1)	-5.14E-06	4.84E-06	-1.061843	0.3023
ASI(-2)	1.79E-05	4.98E-06	3.585137	0.0021
INF	-0.001951	0.002277	-0.856868	0.4028
INF(-1)	0.001148	0.002188	0.524734	0.6062
INF(-2)	-0.008346	0.001925	-4.336498	0.0004
TOPEN	0.012355	0.003295	3.749406	0.0015
TOPEN(-1)	-0.007291	0.002748	-2.652985	0.0162
GFCF	-0.004948	0.007858	-0.629654	0.5368
GFCF(-1)	0.001369	0.011283	0.121328	0.9048
GFCF(-2)	-0.016792	0.010152	-1.654124	0.1154
C	7.210723	1.809252	3.985472	0.0009

R-squared	0.999201	Mean dependent var	48.98886
Adjusted R-squared	0.998446	S.D. dependent var	2.774437
S.E. of regression	0.109373	Akaike info criterion	-1.281253
Sum squared resid	0.215324	Schwarz criterion	-0.489493
Log likelihood	41.06255	Hannan-Quinn criter.	-1.004908
F-statistic	132.3737	Durbin-Watson stat	1.850820
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LEXP)
Selected Model: ARDL(2, 0, 2, 2, 2, 1, 2)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 16:54
Sample: 1985 2022
Included observations: 36

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.210723	1.809252	3.985472	0.0009
LEXP(-1)*	-0.133470	0.034711	-3.845232	0.0012
SMK**	-0.004977	0.011942	-0.416743	0.6818
TSTV(-1)	-0.156337	0.064624	-2.419189	0.0264
ASI(-1)	1.55E-05	7.09E-06	2.186572	0.0422
INF(-1)	-0.009149	0.002212	-4.136194	0.0006
TOPEN(-1)	0.005065	0.003676	1.377800	0.1852
GFCF(-1)	-0.020371	0.005425	-3.755245	0.0014
D(LEXP(-1))	0.241097	0.118850	2.028585	0.0576
D(TSTV)	0.032121	0.058889	0.545447	0.5921
D(TSTV(-1))	0.125216	0.046343	2.701972	0.0146
D(ASI)	2.77E-06	6.20E-06	0.446283	0.6607
D(ASI(-1))	-1.79E-05	4.98E-06	-3.585137	0.0021
D(INF)	-0.001951	0.002277	-0.856868	0.4028
D(INF(-1))	0.008346	0.001925	4.336498	0.0004
D(TOPEN)	0.012355	0.003295	3.749406	0.0015
D(GFCF)	-0.004948	0.007858	-0.629654	0.5368
D(GFCF(-1))	0.016792	0.010152	1.654124	0.1154

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SMK	-0.037287	0.093586	-0.398428	0.6950
TSTV	-1.171321	0.442915	-2.644574	0.0165
ASI	0.000116	5.57E-05	2.086613	0.0514
INF	-0.068545	0.020173	-3.397803	0.0032
TOPEN	0.037947	0.031440	1.206982	0.2431
GFCF	-0.152624	0.032509	-4.694825	0.0002
C	54.02490	1.822913	29.63657	0.0000

EC = LEXP - (-0.0373*SMK -1.1713*TSTV + 0.0001*ASI -0.0685*INF + 0.0379 *TOPEN -0.1526*GFCF + 54.0249)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	7.258433	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61

		1%	2.88	3.99
Actual Sample Size	36		Finite Sample: n=40	
		10%	2.218	3.314
		5%	2.618	3.863
		1%	3.505	5.121
			Finite Sample: n=35	
		10%	2.254	3.388
		5%	2.685	3.96
		1%	3.713	5.326

ARDL Error Correction Regression
Dependent Variable: D(LEXP)
Selected Model: ARDL(2, 0, 2, 2, 2, 1, 2)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 16:58
Sample: 1985 2022
Included observations: 36

ECM Regression
Case 2: Restricted Constant and No Trend

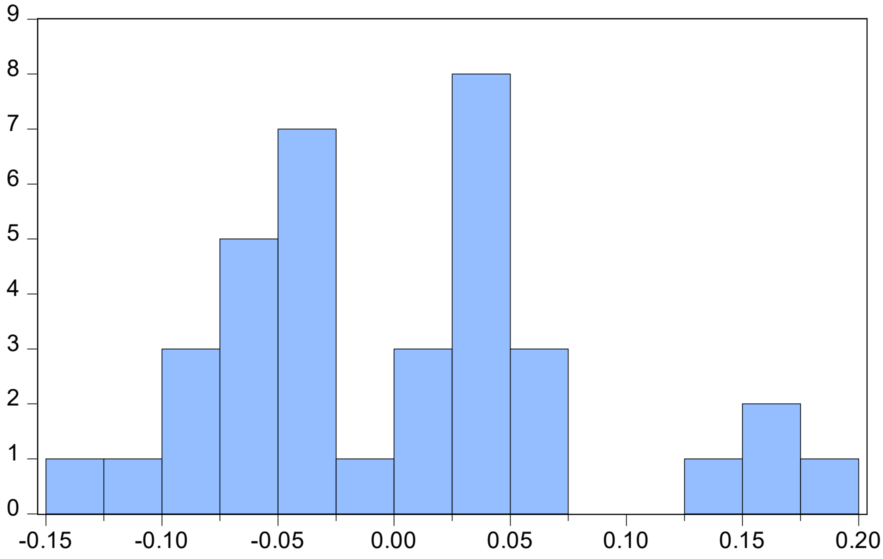
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXP(-1))	0.241097	0.086376	2.791231	0.0121
D(TSTV)	0.032121	0.038829	0.827241	0.4189
D(TSTV(-1))	0.125216	0.030618	4.089612	0.0007
D(ASI)	2.77E-06	2.59E-06	1.068033	0.2996
D(ASI(-1))	-1.79E-05	3.35E-06	-5.334115	0.0000
D(INF)	-0.001951	0.001233	-1.582580	0.1309
D(INF(-1))	0.008346	0.001422	5.869643	0.0000
D(TOPEN)	0.012355	0.001959	6.307433	0.0000
D(GFCF)	-0.004948	0.005164	-0.958022	0.3507
D(GFCF(-1))	0.016792	0.005740	2.925550	0.0090
CointEq(-1)*	-0.133470	0.014862	-8.980493	0.0000

R-squared	0.887180	Mean dependent var	0.186139
Adjusted R-squared	0.842052	S.D. dependent var	0.233517
S.E. of regression	0.092806	Akaike info criterion	-1.670142
Sum squared resid	0.215324	Schwarz criterion	-1.186289
Log likelihood	41.06255	Hannan-Quinn criter.	-1.501264
Durbin-Watson stat	1.850820		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	7.258433	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99



Series: Residuals
Sample 1987 2022
Observations 36

Mean	3.26e-15
Median	0.001716
Maximum	0.184735
Minimum	-0.132560
Std. Dev.	0.078435
Skewness	0.586572
Kurtosis	2.868676
Jarque-Bera	2.090271
Probability	0.351644

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.101952	Prob. F(2,16)	0.3562
Obs*R-squared	4.358435	Prob. Chi-Square(2)	0.1131

Heteroskedasticity Test: Breusch-Pagan-Godfrey

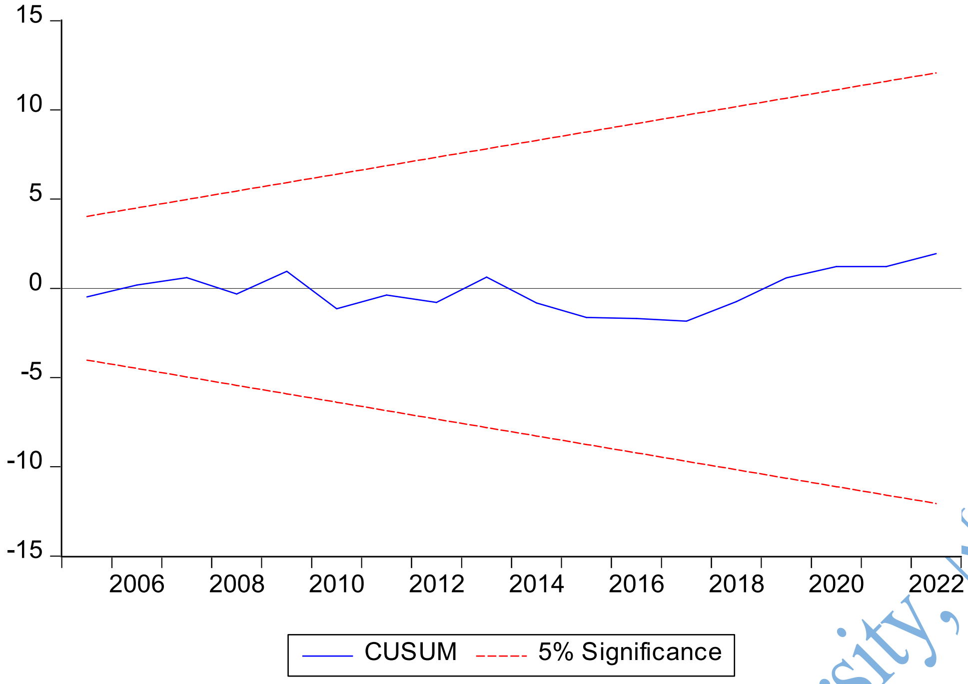
F-statistic	0.334137	Prob. F(17,18)	0.9858
Obs*R-squared	8.635518	Prob. Chi-Square(17)	0.9510
Scaled explained SS	2.017123	Prob. Chi-Square(17)	1.0000

Ramsey RESET Test
Equation: UNTITLED
Specification: LEXP LEXP(-1) LEXP(-2) SMK TSTV TSTV(-1) TSTV(-2) ASI ASI(-1) ASI(-2) INF INF(-1) INF(-2) TOPEN TOPEN(-1) GFCF GFCF(-1) GFCF(-2) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.538311	17	0.5973
F-statistic	0.289779	(1, 17)	0.5973

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.003609	1	0.003609
Restricted SSR	0.215324	18	0.011962
Unrestricted SSR	0.211715	17	0.012454


15
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-10
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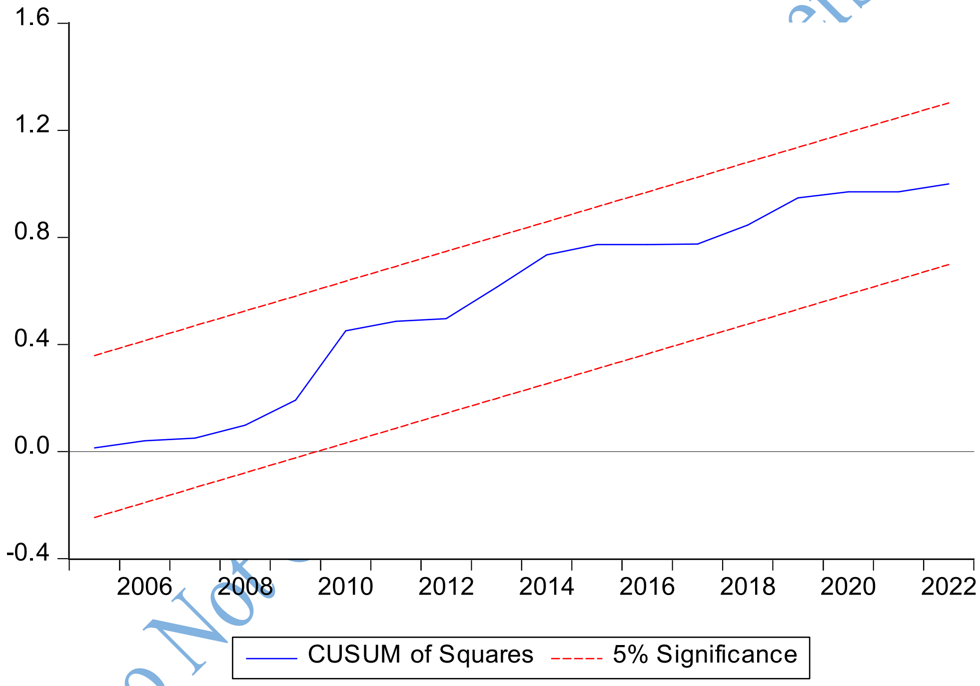
2006
2008
2010
2012
2014
2016
2018
2020
2022
CUSUM
5% Significance


1.6
1.2
0.8
0.4
0.0
-0.4
2006
2008
2010
2012
2014
2016
2018
2020
2022
CUSUM of Squares
5% Significance

Child mortality

Dependent Variable: LOG(UN5M)
Method: ARDL
Date: 11/15/23 Time: 17:04
Sample (adjusted): 1989 2022
Included observations: 34 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): SMK TSTV ASI INF TOPEN GFCF
Fixed regressors: C
Number of models evalulated: 16384
Selected Model: ARDL(4, 3, 3, 3, 0, 3, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(UN5M(-1))	2.840028	0.423598	6.704540	0.0001
LOG(UN5M(-2))	-2.277918	0.855471	-2.662764	0.0259
LOG(UN5M(-3))	-0.198874	0.744198	-0.267232	0.7953
LOG(UN5M(-4))	0.660964	0.365220	1.809769	0.1038
SMK	-0.000742	0.000277	-2.676085	0.0254
SMK(-1)	0.000509	0.000398	1.280354	0.2324
SMK(-2)	-0.001037	0.000393	-2.638539	0.0270
SMK(-3)	0.003143	0.000401	7.832527	0.0000
TSTV	-0.000176	0.001133	-0.155214	0.8801
TSTV(-1)	0.001027	0.001382	0.743606	0.4761
TSTV(-2)	-0.008243	0.002325	-3.545102	0.0063
TSTV(-3)	-0.002310	0.001446	-1.597808	0.1446
ASI	6.86E-07	2.37E-07	2.892350	0.0178
ASI(-1)	-4.37E-07	2.42E-07	-1.803192	0.1049
ASI(-2)	1.34E-06	2.17E-07	6.159761	0.0002
ASI(-3)	-1.25E-06	1.86E-07	-6.744541	0.0001
INF	2.68E-05	3.22E-05	0.831923	0.4270
TOPEN	9.31E-05	6.10E-05	1.526279	0.1613
TOPEN(-1)	1.35E-05	5.96E-05	0.226102	0.8262
TOPEN(-2)	-8.39E-05	4.93E-05	-1.702689	0.1228
TOPEN(-3)	-5.11E-05	4.92E-05	-1.037438	0.3266
GFCF	0.000106	0.000117	0.903275	0.3899
GFCF(-1)	0.000251	0.000172	1.459220	0.1785
GFCF(-2)	0.000294	0.000149	1.975896	0.0796
C	-0.166330	0.053497	-3.109128	0.0125

R-squared	0.999989	Mean dependent var	5.048056
Adjusted R-squared	0.999961	S.D. dependent var	0.222859
S.E. of regression	0.001389	Akaike info criterion	-10.17973
Sum squared resid	1.74E-05	Schwarz criterion	-9.057407
Log likelihood	198.0554	Hannan-Quinn criter.	-9.796987
F-statistic	35.42156	Durbin-Watson stat	2.022070
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: DLOG(UN5M)
Selected Model: ARDL(4, 3, 3, 3, 0, 3, 2)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 17:06
Sample: 1985 2022
Included observations: 34

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.166330	0.053497	-3.109128	0.0125
LOG(UN5M(-1))*	0.024200	0.010499	2.304962	0.0466
SMK(-1)	0.001873	0.000456	4.104720	0.0027
TSTV(-1)	-0.009702	0.003953	-2.454082	0.0365
ASI(-1)	3.32E-07	2.86E-07	1.158776	0.2764
INF**	2.68E-05	3.22E-05	0.831923	0.4270
TOPEN(-1)	-2.84E-05	0.000124	-0.228636	0.8243
GFCF(-1)	0.000651	9.99E-05	6.517524	0.0001
DLOG(UN5M(-1))	1.815828	0.418904	4.334706	0.0019
DLOG(UN5M(-2))	-0.462090	0.493262	-0.936805	0.3733
DLOG(UN5M(-3))	-0.660964	0.365220	-1.809769	0.1038
D(SMK)	-0.000742	0.000277	-2.676085	0.0254
D(SMK(-1))	-0.002106	0.000367	-5.741329	0.0003
D(SMK(-2))	-0.003143	0.000401	-7.832527	0.0000
D(TSTV)	-0.000176	0.001133	-0.155214	0.8801
D(TSTV(-1))	0.010553	0.003612	2.921712	0.0170
D(TSTV(-2))	0.002310	0.001446	1.597808	0.1446
D(ASI)	6.86E-07	2.37E-07	2.892350	0.0178
D(ASI(-1))	-8.24E-08	2.14E-07	-0.385563	0.7088
D(ASI(-2))	1.25E-06	1.86E-07	6.744541	0.0001
D(TOPEN)	9.31E-05	6.10E-05	1.526279	0.1613
D(TOPEN(-1))	0.000135	6.11E-05	2.209676	0.0545
D(TOPEN(-2))	5.11E-05	4.92E-05	1.037438	0.3266
D(GFCF)	0.000106	0.000117	0.903275	0.3899
D(GFCF(-1))	-0.000294	0.000149	-1.975896	0.0796

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SMK	-0.077409	0.029221	-2.649132	0.0265
TSTV	0.400891	0.140068	2.862121	0.0187
ASI	-1.37E-05	1.17E-05	-1.175047	0.2701
INF	-0.001107	0.001553	-0.712983	0.4939
TOPEN	0.001172	0.005071	0.231085	0.8224
GFCF	-0.026910	0.014048	-1.915616	0.0877
C	6.873027	0.831258	8.268221	0.0000

EC = LOG(UN5M) - (-0.0774*SMK + 0.4009*TSTV -0.0000*ASI -0.0011*INF + 0.0012*TOPEN -0.0269*GFCF + 6.8730)

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	23.59946	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
		Finite Sample: n=35		
Actual Sample Size	34			
		10%	2.254	3.388
		5%	2.685	3.96
		1%	3.713	5.326
		Finite Sample: n=30		
		10%	2.334	3.515
		5%	2.794	4.148
		1%	3.976	5.691

ARDL Error Correction Regression
Dependent Variable: DLOG(UN5M)
Selected Model: ARDL(4, 3, 3, 3, 0, 3, 2)
Case 2: Restricted Constant and No Trend
Date: 11/15/23 Time: 17:11
Sample: 1985 2022
Included observations: 34

ECM Regression
Case 2: Restricted Constant and No Trend

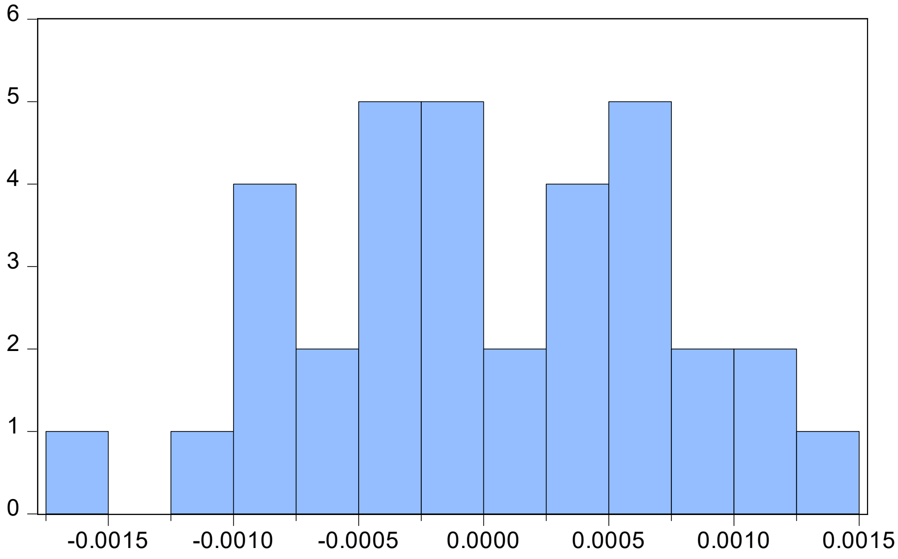
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(UN5M(-1))	1.815828	0.166594	10.89975	0.0000
DLOG(UN5M(-2))	-0.462090	0.328870	-1.405083	0.1936
DLOG(UN5M(-3))	-0.660964	0.179607	-3.680051	0.0051
D(SMK)	-0.000742	0.000118	-6.302996	0.0001
D(SMK(-1))	-0.002106	0.000175	-12.01260	0.0000
D(SMK(-2))	-0.003143	0.000252	-12.45588	0.0000
D(TSTV)	-0.000176	0.000687	-0.256098	0.8036
D(TSTV(-1))	0.010553	0.001005	10.50162	0.0000
D(TSTV(-2))	0.002310	0.000488	4.731136	0.0011
D(ASI)	6.86E-07	9.30E-08	7.375924	0.0000
D(ASI(-1))	-8.24E-08	8.28E-08	-0.995057	0.3457
D(ASI(-2))	1.25E-06	9.50E-08	13.20058	0.0000
D(TOPEN)	9.31E-05	2.79E-05	3.335840	0.0087
D(TOPEN(-1))	0.000135	2.66E-05	5.078261	0.0007
D(TOPEN(-2))	5.11E-05	2.51E-05	2.035640	0.0723
D(GFCF)	0.000106	6.73E-05	1.571000	0.1506
D(GFCF(-1))	-0.000294	8.17E-05	-3.598124	0.0058
CointEq(-1)*	-0.024200	0.001321	-18.32039	0.0000

R-squared	0.895461	Mean dependent var	-0.018721
Adjusted R-squared	0.780638	S.D. dependent var	0.010762
S.E. of regression	0.001041	Akaike info criterion	-10.59150
Sum squared resid	1.74E-05	Schwarz criterion	-9.783423
Log likelihood	198.0554	Hannan-Quinn criter.	-10.31592
Durbin-Watson stat	2.022070		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	23.59946	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99



Series: Residuals	
Sample 1989 2022	
Observations 34	
Mean	3.90e-15
Median	-6.44e-05
Maximum	0.001491
Minimum	-0.001539
Std. Dev.	0.000725
Skewness	-0.048996
Kurtosis	2.275547
Jarque-Bera	0.757115
Probability	0.684849

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.128399	Prob. F(2,7)	0.4365
Obs*R-squared	2.595075	Prob. Chi-Square(2)	0.2310

Heteroskedasticity Test: Breusch-Pagan-Godfrey

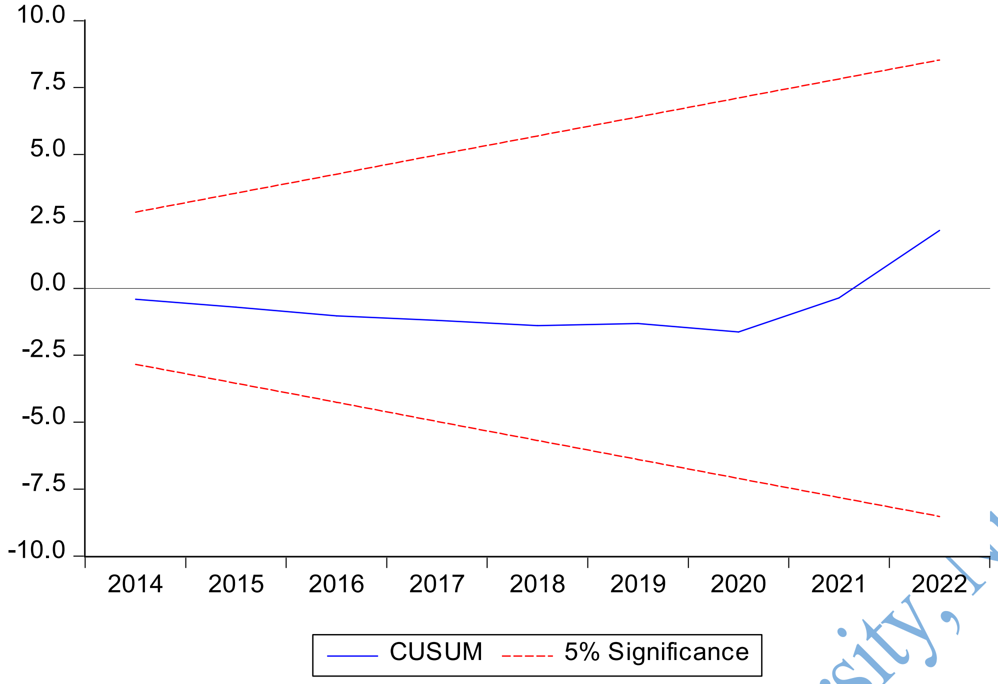
F-statistic	0.431361	Prob. F(24,9)	0.9515
Obs*R-squared	18.18823	Prob. Chi-Square(24)	0.7938
Scaled explained SS	0.812801	Prob. Chi-Square(24)	1.0000

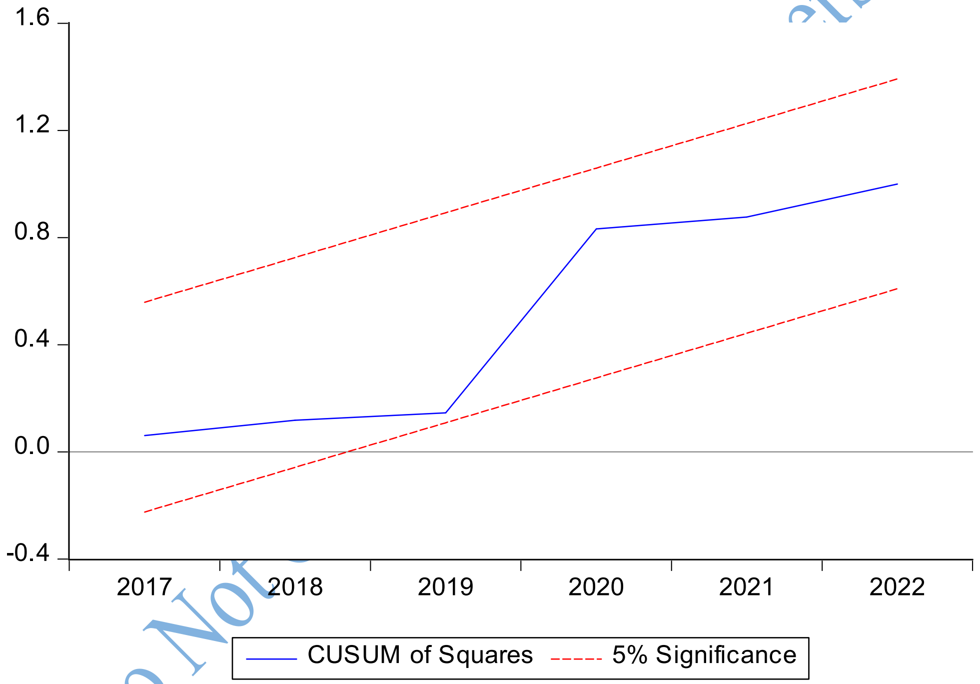
Ramsey RESET Test
Equation: EQ03
Specification: LOG(UN5M) LOG(UN5M(-1)) LOG(UN5M(-2)) LOG(UN5M(-3)) LOG(UN5M(-4)) SMK SMK(-1) SMK(-2) SMK(-3) TSTV TSTV(-1) TSTV(-2) TSTV(-3) ASI ASI(-1) ASI(-2) ASI(-3) INF TOPEN TOPEN(-1) TOPEN(-2) TOPEN(-3) GFCF GFCF(-1) GFCF(-2) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.176503	8	0.2732
F-statistic	1.384160	(1, 8)	0.2732

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	2.56E-06	1	2.56E-06
Restricted SSR	1.74E-05	9	1.93E-06
Unrestricted SSR	1.48E-05	8	1.85E-06


10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
-10.0
2014
2015
2016
2017
2018
2019
2020
2021
2022
CUSUM
5% Significance


1.6
1.2
0.8
0.4
0.0
-0.4
2017
2018
2019
2020
2021
2022
CUSUM of Squares
5% Significance

Biodata

A. Personal information

1. Full name: Ibrahim SAMAILA
2. Address: No.38 TudunWada Premier Road, Gusau, Zamfara state, Nigeria.
3. Date and Place of Birth: 26/12/1985, Gusau
4. Nationality: Nigeria

B. Name and Address of Next of Kin: Fatima Ibrahim Aliyu

No.38,Tudun Wada Premier Road Gusau.

C. Educational Background

Lead City University,Ibadan, Oyo State (MScEconomics)	Inview
National open University of Nigerian (BSc Economics)	2017-2021
Abdu Gusau Polytechnic Talata	2005-2007
Abdu Gusau Polytechnic,TalataMafara,Zamfara state (National Diploma in Banking and Finance)	2002-2004
Sambo Secondary School,Gusau(SSCE)	1996-2002
Army Children Primary School,Gusau (First School Leaving Certificate)	1991-1996

D. Working Experience with Dates

Central Bank of Nigeria, Senior Security Supervisor, Security Services Dept.	2017-till date
JifatuGeneral Enterprises, Head Electronics Department	2013-2015
Sokoto Hotel Sokoto, Billing Cashier	2011-2012

E. Aword and Fellowship:NIL

F. Membership of Academic Professional Body:NIL

G. Publications (if any): NIL

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Signature Date

University Compliance Certification

This is to certified that this thesis written by Ibrahim SAMAILA with Matric No: LCU/PG/002779 in the Department of Economics, Faculty of Management and Social Sciences, Lead City University, Ibadan, is in full compliance with the approved University format and style.

Signature	Date