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IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM ETHIOPIA

A THESIS

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BY

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DECLARATION

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LIST OF ABBREVIATION AND ACRONYMS

ADF	Augmented Dickey-Fuller
ARDL	Autoregressive Distributive Lag
COMESA	Common Market for Eastern and Southern Africa
EIC	Ethiopian Investment Commission
FDI	Foreign Direct Investment
GCC	Gulf Conference Council
GDP	Gross Domestic Product
GEP	Global Economic Prospects
ICT	Information Communication Technology
IMF	International Monitory Fund
NBE	National Bank of Ethiopia
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollar
WB	World Bank
WDI	World Development Indicator
WIR	World Investment Report
WTO	World Trade Organization

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ABSTRACT

The last few decades have brought about a global increase in foreign direct investment which benefits countries throughout the world. However, the share of African countries in global FDI has been exceptionally low. The research investigates how foreign direct investment affects the economic growth of Ethiopia through an analysis of annual data which extends from 1994 until 2024. The study used three research questions as its framework to investigate how foreign direct investment impacts Ethiopian economic growth during both short and extended time periods and to determine the causative relationship between foreign direct investment and economic growth and to assess how foreign direct investment together with selected macroeconomic factors affects economic growth throughout the research timeframe. The researcher used an autoregressive distributed lag model together with a conditional error correction model to analyze its research questions which included various macroeconomic factors such as trade openness and GDP per capita and inflation and infrastructure development and real exchange rate and working-age population growth. The research findings revealed that foreign direct investment has negative and significant impact on economic growth in long run. The finding also indicate that GDP per capita and working-age population growth lead to economic development while inflation and infrastructure and trade openness and the real exchange rate exhibit varying short-term impacts that differ based on the specific variable and time frame evaluated. The error correction mechanism establishes that long-run deviations from equilibrium will eventually return to equilibrium which establishes that the variables maintain a constant long-run connection. The Granger causality results indicate that FDI and GDP do not have a statistically significant predictive relationship in either direction during the period studied. The study should recommend that policymakers simplify investment procedures, strengthen institutions, and direct FDI toward sectors with strong linkages to the domestic economy such as manufacturing, agro-processing, logistics, and export services.

Keywords: *Foreign Direct Investment, Economic Growth, ARDL, GDP Growth*

CHAPTER ONE
INTRODUCTION

1.1. Background of the Study

Foreign Direct Investment (FDI) has been a cornerstone of global economic integration in recent decades, playing a pivotal role in fostering economic development in both developed and developing economies. As FDI flows have increased significantly, understanding its implications on economic growth has become a critical area of research, policy discussion, and international relations.

Economic growth is closely connected to living standards. While population growth often makes it difficult to maintain high living standards, economic growth can support or even improve these standards despite more people. By increasing productivity, creating better job opportunities, and raising incomes, economic growth can help manage the impact of a growing population, ensuring that people's quality of life remains stable or even improves. Economic growth means a rise in total consumption, investment, government spending, and net exports. Higher economic growth leads to an increase in real GDP and national income, allowing more resources to be allocated to enhance healthcare and education for citizens.

The economic development of a nation depends upon its investment level. The investment, in turn, depends on savings. However, all African nations suffer from the problem of generating sufficient gross domestic savings to reorganize the development process. Thus, foreign direct investment (FDI) is imperative for these economies to fill the gap between savings and investment (Tamene, 2018). Besides, foreign direct investment (FDI) plays a great role in economic development in both developed and developing countries. The host country benefits as FDI creates employment opportunities promotes economic growth, and facilitates technology transfer (Gichamo, 2012).

Foreign Direct Investment is defined as the kind of investment that involves a long-term relationship with a reflection of a lasting interest and the control of a resident entity in one economy in an enterprise other than that of the foreign direct investor (UNCTAD, 2016). In Kenya, FDI is defined as investment in foreign assets, such as foreign currency, rights, credits, benefits, or property, which is undertaken by a foreign national for the production of goods and services to be sold either domestically or exported overseas (Kidake, 2018).

In Nigeria, Foreign Direct Investment (FDI) has been subjected to considerable scrutiny in terms of its potential benefits (e.g., employment, knowledge, and technological spillovers) and its impact on the economic growth of host countries (Chang, 2023).

Ideue, K (2018) shows that the simple sector cultivates, the electronics break and will not recoil and household firms will not surely absorb the information possible from international guests. Many African nations have been fascinated by FDI inflows since the 2000s. Meantime, fostering local firms and workforce to have the benefit or use of from FDI will possibly be the next challenge for many SSA nations.

Ethiopian studies mirror positives with caveats: VAR models (1981-2017) detect long-run GDP boosts from FDI, enhanced by human capital. Recent analyses (1982-2018) via ECM confirm infrastructure synergies, while FDI stock hit $38.54 billion, aiding parks but sparking land issues. Contrasts exist, like short-run insignificance.

The Ethiopian economy encountered major difficulties during the period from 2019 to 2021 because of multiple factors which included the COVID-19 pandemic and a major locust invasion and ongoing local conflicts and political unrest and the Tigray region conflict. The IMF forecasted that economic growth would slow to 2 percentage points in Ethiopia's fiscal year 2020/21 (Ermiyas, 2022). The period after 1980 saw an increase in foreign direct investment despite the global market becoming more competitive. Developing countries like Ethiopia have become attractive investment destinations offering a range of incentives for investors. FDI has become the most important form of international capital transfer over the past decades. Between 1980 and 1990, global FDI flows defined as cross-border expenditures to acquire or expand corporate control of productive assets tripled (Froot, 1993).

Ethiopia has included FDI attraction as a key component of its development strategy since the time of the Imperial administration (Ashine, 2024). Before the commencement of the conflict and epidemic in 2018, Ethiopia rated fifth on the African continent, attracted the greatest foreign direct investment in East Africa. Of the 240 Greenfield FDI projects carried out in the country since 2003, 18% were in the textile industry, which has had the most success in attracting international investors. Even though it was still large, Ethiopia’s investment flow declined in 2020, according to the UN Conference on Trade and Development’s Investment Trends Monitor (Cheng, 2024).

The Government of Ethiopia has designed a strategy where the country’s economy should grow at an annual growth rate of more than 10 percent for no less than two decades if it is to attain the projected middle-income country status by 2025. However, low domestic savings as a proportion

of GDP and inadequate domestic capital are not enough to generate the required level of economic growth (Ermiyas, 2022).

In September 2019, the Ethiopian Administration told its "Not foreign Financial Reform Plan" as a guide to future goals to implement inclusive macroeconomic, fundamental, and sectorial reforms, accompanying a devote effort to something improving the offering of the for-profit businesses to the economy and intriguing supplementary unfamiliar direct investment. The three-old age financial reform plan gives preference to five areas: excavating, ICT, agriculture, travel, and production (Ermiyas, 2022). To maintain the correct plan, the IMF approved a three-old age, $2.9 billion loan. The program inquires to humiliate public sector obligation, reduce inflation, and enhance rate of exchange presidency (UNCTAD, 2021).

According to Saidatulakmal (2021) revealed that, foreign direct investment provide resources to the developing nation such as technology, capital market, enterpreneuial ability and brand for the nation who reciepent the FDI country to industrialized.

For Ethiopia, FDI is important for enhancing the upgrade of the homegrown firms and skills by invests to human capital, so workers and firms can meet foreign companies quality and technology. Besides, the government should make align the policy of FDI with national strategy for attracting the FDI to improve the economic growth. So connecting the homegrown economy with FDI is use for clusters and value chains which is important to develop industrial park, agro-industrial clusters and service hubs that mix foreign anchor investors with local firms around them. It promotes matchmaking platforms and suppliers fairs that connect foreign companies with vetted local suppliers and startups.

1.2. Statement of the Problem

The last few decades have brought about a global increase in foreign direct investment (FDI) which benefits countries throughout the world. However, the share of African countries in global FDI has been exceptionally low (Ermiyas, 2022). Ethiopia has achieved significant social and economic development through its extensive investments in infrastructure and agricultural and educational and disaster risk management and health and safety net programs. The investments have resulted in improved outcomes which include better life expectancy and decreased poverty and malnutrition and higher school enrollment rates and better access to clean water and health services and improved sanitation facilities (Yalew, 2022).

Ethiopia had a population of 115 million in 2021 which made it the second most populous nation in Africa after Nigeria according to Global Economic Prospects. Ethiopia holds one of the highest poverty rates globally because its people have a gross national income per capita of $890. The

country has maintained one of the fastest economic growth rates since 2020 with a yearly growth rate of 9.5% (Global Economic Prospect, 2021). The country needs to raise its gross domestic savings rates because its current savings level remains below the required level for reaching its desired growth targets. The government has established multiple commercial sectors for foreign investors and it provides various investment incentives which include tax breaks and duty-free import of capital equipment and tax exemptions for export goods to attract foreign investment (Ermiyas, 2022).

Despite such interventions, FDI inflows to Ethiopia reduced by 6% to USD 2.4 billion in 2020. Nevertheless, the total FDI stock increased from USD 24.96 billion in 2019 to USD 27.4 billion in 2020, and further to USD 31.6 billion in 2021 (Ashine, 2024). The government interventions are designed to ensure that Ethiopia attracts FDI, not only through improvements in infrastructural and industry-specific policies but also through interventions that relate to governance and security. Despite the challenges that Ethiopia has encountered in terms of peace and stability, the government has made extensive efforts, such as through negotiations with rebels, to create a more favorable investment environment. As such, the research shall be required to examine the influence of FD on the economic growth in Ethiopia.

Several studies have been carried out in recent years to identify the impact of Foreign Direct Investment on economic growth in different countries. Naftaly and Edwin (2023) examined the role of Foreign Direct Investment in economic growth in Kenya using Autoregressive Distributed Lag (ARDL) regression method and causality test on GDP, trade openness, exchange rate, and climate change. Yuniarto (2020) examined the impact of tax treaties, GDP per capita, trade openness, exchange rate, and population growth on economic growth in Kenya. Sayek,S. et al (2004) examined that FDI promotes economic growth by boosting capital formation, transmitting knowledge and technology across firms, and improving how efficiently markets operate.

The study of Florence et al. (2017) identified the factors that influence FDI and its role as a cause of economic growth, particularly in Nigeria. Research on the nexus between foreign direct investment and economic growth is expanding, yet there is still a clear gap in comparative evidence on how the growth impact of FDI varies across countries with different institutional frameworks and vulnerability to macroeconomic shocks (Chornyi, R., & Chorna, N. 2026).

Bunde, A. O. et al (2017) used time series data on FDI inflows and GDP to evaluate the impact of foreign direct investment on Kenya's economic performance over the period 2004–2013. The empirical results showed a positive relationship between FDI and economic growth, leading the author to conclude that foreign direct investment has a beneficial effect on Kenya's economy and that higher FDI inflows are associated with improved growth outcomes.

There have also been a number of researches on the determinants of economic growth specifically in the case of Ethiopia. Melkamu Wondimu (2023) examined, his study show that, both in the short run and long run, foreign direct investment has a positive and significant impact on economic growth. Ashine (2024) examined the effect of peace and security challenges on the inflow of FDI to Ethiopia for enhancing the economic growth, covering the period 2018 to 2022.

Most existing work acknowledges that FDI affects the economies of developing countries such as Ethiopia, but relatively limited attention has been paid to systematically examining its direct and indirect effects on economic growth. Moreover, as noted above, prior studies exhibit both methodological and knowledge gaps, and their empirical results are often inconsistent. Against this background, the present study distinguishes itself by explicitly analyzing the impact of foreign direct investment on economic growth in Ethiopia, while also identifying the direction of causality between FDI and growth using the Toda–Yamamoto causality framework, thereby contributing to the literature by clarifying the extent to which FDI influences Ethiopia's economic performance.

Although a number of studies have examined the relationship between FDI and economic growth in Ethiopia, the existing evidence remains mixed and incomplete. Some studies report a positive effect of FDI on growth, others find a negative or insignificant relationship, and most of them cover different time periods, variables, and estimation methods. In addition, many earlier studies do not jointly examine both the short-run and long-run dynamics of FDI and economic growth within a single framework, and fewer studies specifically analyze the Ethiopian economy over the recent period of structural reform, inflation pressure, exchange-rate changes, and political instability from 1994 to 2024. This creates a clear gap in the literature because the growth effect of FDI may vary depending on the time horizon, the sample period, and the macroeconomic environment.

The ARDL model is appropriate because the study aims to estimate both the short-run and long-run effects of FDI and other macroeconomic variables on economic growth. It is also suitable when the variables are integrated of mixed orders, as some may be stationary at level while others become stationary after first differencing. This makes ARDL especially useful for annual time-series data like the 1994–2024 Ethiopian sample. The Toda-Yamamoto causality approach is used separately to determine the direction of causality between FDI and economic growth without requiring all variables to be integrated of the same order or co-integrated. Therefore, ARDL answers the question of how FDI affects growth in the short and long run, while Toda-Yamamoto answers the question of whether FDI and growth cause each other.

Based on this, the study problem can be framed as follows: previous Ethiopian studies have produced contradictory findings and have not fully captured the dynamic relationship between

FDI and economic growth over the recent period. Some studies focus only on correlation or long-run effects, while others do not test causality in a way that is robust to mixed integration orders. There is therefore a need for a country-specific time-series analysis that examines how FDI, together with trade openness, gross fixed capital formation, inflation, infrastructure and the exchange rate, affects economic growth in Ethiopia. This study aims to fill this gap by assessing the short-run and long-run impact of FDI on economic growth over the period of 1994–2024 in Ethiopia.

1.3. Research Questions

1. What trend has foreign direct investment and economic growth followed in Ethiopia during the study period?
2. What is the direction of causality between foreign direct investment and economic growth in Ethiopia?
3. What are the short-run and long-run impacts of foreign direct investment on economic growth in Ethiopia?

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of this study is to investigate the impact of foreign direct investment on economic growth in Ethiopia for the period 1994 to 2024.

1.4.2. Specific Objectives

1. Provide an understanding of the trend of FDI and economic growth in Ethiopia over the study period.
2. To analyse the direction of causality between foreign direct investment and economic growth in Ethiopia.
3. To examine the short-run and long-run effects of foreign direct investment on Ethiopia's economic growth.

1.5. Significance of the Study

By identifying important factors that draw foreign investment, enhancing policy decisions, closing the investment gap, promoting economic growth, and supporting greater regional and global integration, this research can directly shape Ethiopia's long-term development path. It will generate context-specific evidence on how foreign direct investment interacts with key macroeconomic variables to influence the country's real economic performance.

The study will concentrate on the impact of foreign direct investment and selected macroeconomic variables on economic growth in Ethiopia, using annual secondary data from the World Bank and the National Bank of Ethiopia for the period 1994–2024. This time horizon allows the analysis to cover major episodes of policy reform, market liberalization, and external shocks, and to assess both the short-run and long-run effects of FDI on real GDP within an ARDL-based time-series model.

By empirically examining how FDI, trade openness, gross domestic product per capita, population growth(age 15-64 group), inflation, infrastructure, and the exchange rate affect economic growth, the study will provide policymakers with rigorous evidence to design more effective investment, trade, and macroeconomic policies that can attract quality FDI and translate it into higher and more inclusive growth. It will also assist potential foreign investors and development partners by clarifying the macroeconomic conditions under which FDI contributes most strongly to growth, thereby supporting efforts to integrate Ethiopia more deeply into regional and global value chains.

1.6. Scope of the Study

Based on secondary sources of data gathered from the World Bank and the National Bank of Ethiopia, the study will concentrate the foreign direct investment (FDI) impact on economic growth in Ethiopia. This will involve constructing a consistent annual data set on economic gworth and key macroeconomic, financial and institutional variables that theory and prior empirical work identify as potential drivers of GDP in Ethiopia.

To compare the trend of FDI inflow from the beginning of market liberalization under the Ethiopian government to the present, this paper will primarily analyse and delimit itself to examining the factors that influence GDP Ethiopia for the period 1994 to 2024. Within this time frame, the analysis will capture major policy reforms, structural changes, and external shocks that may have altered Ethiopia's investment climate, allowing the study to investigate both the long-run and short-run relationships between GDP and its factors using an ARDL time-series framework.

By focusing on this specific period and relying on harmonized data from internationally recognized databases and official national sources, the study provided a country-level, time-consistent picture of how market size, trade openness, macroeconomic stability, infrastructure and exchange rate conditions have affected the volume and dynamics of FDI inflows.

1.7. Limitations of the Study

The research establishes evidence which demonstrates how foreign direct investment affects economic growth(GDP) in Ethiopia for both short-term and long-term periods. The study analyzes annual data from 1994 to 2024 through an ARDL framework but it contains several restrictions.

First, the analysis depends completely on secondary data which the World Bank and National Bank of Ethiopia provided although this data may contain measurement errors and revisions and differences in compilation methods which occurred across different years.

Second, the study investigates FDI at its total level without identifying the specific sectoral investments which flow into agriculture, manufacturing, construction and services sectors.The aggregation process of FDI leads to hidden impacts since various sectors experience different growth effects based on their domestic firm relationships and technological capabilities and export business activities.

Third, the analysis is country specific and covers only Ethiopia, which constrains the external validity of the results. The FDI-growth connection established in Ethiopia should not be applied to other developing nations because of different institutional structures and economic conditions and susceptibility to external shocks.

Generally, the research takes a macroeconomic approach while it fails to investigate microeconomic effects that include enterprise productivity and wage and employment standards and technology spread. The research results demonstrate FDI connects to economic growth, yet they do not explain how FDI influences economic distribution and welfare across the Ethiopian economy.

1.8. Organization of the Study

The study have five chapters. Chapter One includes the study's background, problem statement, objectives of the study, significance, and organization are all included in the first chapter, which serves as an introduction. The review of relevant theoretical and empirical literature focused of Chapter Two. Research methodology, including data type and sources, data collection and analysis methods, sample size, and sampling techniques, was covered in Chapter Three. The study's interpretation and discussions was covered in Chapter Four. The study's summary, conclusion and recommendations were presented in the final chapter.

CHAPTER TWO
REVIEW RELATED LITERATURE

12 Literature Review

This chapter will start by presenting the basic concept of Foreign Direct Investment. Besides, theories related to FDI, the impact of FDI on economic growth will be reviewed. In addition, models, concepts, and empirical studies may be revised and discussed both cross countries as well and studies will be conducted in Ethiopia.

2.1. Theoretical review

Foreign Direct Investment (FDI) is an investment that involves a long-term relationship. It shows lasting interest and control by a resident entity in one economy, which is the foreign direct investor or parent enterprise, in a business located in another economy (WIR, 2012). According to the IMF (2005), FDI occurs when a foreign investor owns 10% or more of the ordinary shares or voting power of an incorporated business, or the equivalent in an unincorporated business.

In developing countries, FDI plays four key roles: it helps compensate for a lack of domestic savings, fills the foreign exchange gap, bridges the gap between expected government tax revenues and locally collected taxes, and addresses shortages in management, entrepreneurship, technology, and skills (Ideue, K., 2018). This is particularly important for sub-Saharan African (SSA) countries due to their low income and domestic savings levels. Theoretically, capital formation and technology improvement are seen as the main drivers of economic growth (Ideue, K., 2018). In transition countries, FDI growth is often linked to economic liberalization and entry into the international market, which lowers barriers to FDI (Vasyechko, O., 2012).

According to Ethiopian Investment Proclamation No.15/1992, article 2, a foreign investor is defined as "... a physical or judicial person of foreign nationality which has invested imported capital" (Beza, A., 2018). Different forms of FDI exist, including cross-border mergers and acquisitions, Greenfield investments, and reinvested profits. The term "greenfield investment" describes the founding of a new company that subsequently makes it possible to produce useful assets in a host nation (Beza, A., 2018).

2.2. Theories on Foreign Direct Investment (FDI) and Economic growth

2.2.1. Neoclassical Growth Theories and FDI

FDI influences economic growth via neoclassical (Solow, 1956) and endogenous growth theories (Romer, 1990), outperforming domestic investment by fostering technology spillovers and

production efficiency. Empirical evidence supports this positive link in diverse economies (e.g., Caves, 1996; Borensztein et al., 1998; Durham, 2004), though results vary with host-country absorptive capacity like human capital. Financial development enhances these spillovers, amplifying FDI's growth effects (Alfaro et al., 2004; Ibhagui, 2019).

The neoclassical macro-level international trade and international capital market theories assume perfectly competitive markets, which leads to international specialization and gains from international trade. The Marshallian variant of neoclassical theory is also relevant to FDI, as it involves conducting cost-benefit analysis on particular projects to evaluate their feasibility (Akrami, 2008). The neo-classical approach suggests that due to the scarcity and relatively high cost of labor in developed countries, they tend to transfer production facilities to less developed, labor-intensive countries (Caves, 1996; Cantwell, 2000). This leads to only one direction of capital flows from advanced countries to capital-scarce countries.

The Huckster-Ohlin model has been widely used to explain FDI in a general equilibrium framework. The neoclassical assumption that capital moves from economically developed countries towards capital-scarce countries was very important for understanding FDI incentives in transition economies (Vasyechko, O. 2012). Therefore, in line with the above theories, foreign direct investment has a significant role to play in Ethiopia's sustainable development growth.

2.2.2. Endogenous Growth Theory and Knowledge Spillovers

Endogenous growth theory talks about how building up knowledge in the workforce or through new products and ways of doing things really pushes prosperity forward. It makes a point to separate "knowledge" from just "information," like in that Feldman and Audretsch piece from 1999. Information gets shared pretty easily because its codified and with all the cheap tech now, copying it costs almost nothing.

But knowledge is different, its more tacit in some ways, so it needs people to be close and have those back and forth talks to pass it on. That makes personal connections super important for getting those spillover effects and benefits from ideas bouncing around together.

This whole thing puts a lot of weight on exchanging tacit knowledge through all sorts of open and diverse interactions, and its key for growth. Florida in 2005 points to how hubs with creative people and cultures that are tolerant lead to better regional outcomes. It seems like dense cities really boost these kinds of exchanges, putting them right up front in the mix.

Glaeser and others in 1992 looked at this in American cities, testing out three different ideas. There was the Marshall-Arrow-Romer one, about spillovers within the same industry but with some monopoly stuff. Then Porter's view on competition inside industries. And Jacobs, who focused on mixing different industries for cross ideas. From what they found, Jacobs take on diversity beating out specialization matched the data best. That part stands out, though Im not totally sure how it all ties back perfectly to every city.While Glaeser favors inter-industry spillovers, Feldman and Audretsch (1999) argue specialization boosts regions. De Groot et al. (2009) meta-analysis reveals broad support for Porter and Jacobs but underscores vast heterogeneity by region, era, and sector, suggesting no one-size-fits-all path.

2.2.3. Dependency Theory and the Developing Economy Perspective

Dependency theory posits that Third World underdevelopment stems from integration into a capitalist system dominated by the West, fostering economic reliance on advanced nations for survival and growth (Randall & Theobald, 1998). Characterized by poverty, high birthrates, primary product exports, rural structures, and elite wealth amid masses' deprivation (Woldu, 2000), this view frames Africa including post-independence Nigeria as exploited entities destined for revolution. Yet, critiques like Kyari (2008) reject blaming external forces or "pseudo-anti-colonialism," urging focus on internal failures.

Post-1960 independence, Nigeria's underdevelopment persists due to leadership exploitation, not just colonial legacies, as Achebe (1983), Ayittey (1998), and Tijani (2008) argue leaders plunder resources remorselessly while hiding behind anti-imperial rhetoric. Pseudo-intellectualism blinds discourse, ignoring self-inflicted woes exacerbated by followers' false consciousness from poverty, culture, and illiteracy (Marxist lens). Recent analyses echo this, pinpointing inept, corrupt elites mismanaging oil wealth.

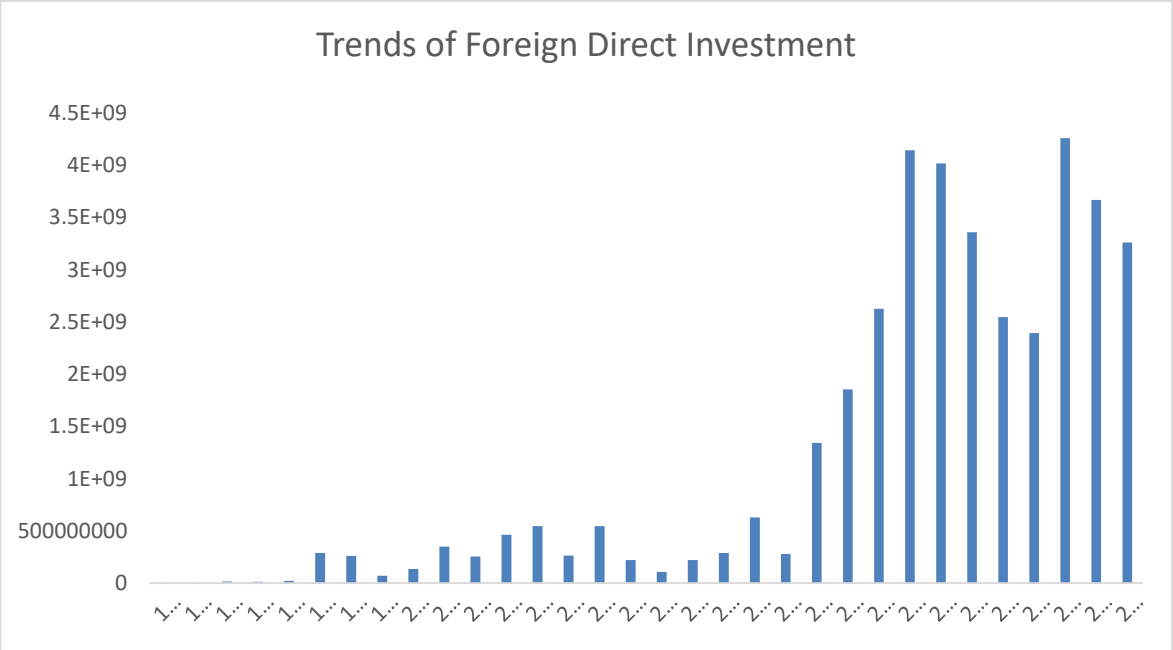
Scholars must shift from scapegoating dependency theory or "whites" toward accountability and solutions, as recent works substantiate: Nigeria's woes root in domestic socio-political culture, prebendalism, and elite norms, not solely external structures (Hassan, 2022). Fixing internal governance trumps blame, enabling true progress.

2.2.4. Historical Overview and Trends of FDI in Ethiopia

Ethiopia’s FDI inflows were minimal in the early 1990s, staying at or below $0.02 billion annually until 1996. A notable increase occurred in 1997, when inflows jumped to $0.29 billion, followed by $0.26 billion in 1998. After a brief decline in 1999 and 2000, inflows rose again, reaching $0.47

billion by 2003 and $0.55 billion in 2004. There was a dip in 2005 to $0.27 billion, but flows picked up from 2006 onwards, crossing the $1 billion mark for the first time in 2010. From there, FDI inflows continued to grow steadily: $1.13 billion in 2011, $1.86 billion by 2014, and a sharp rise to $2.63 billion in 2015 and $4.14 billion in 2016. After peaking in 2016, inflows declined slightly to $4.02 billion in 2017, then fell to $2.38 billion by 2020. A strong rebound followed in 2021, reaching $4.26 billion, before easing down to $3.67 billion in 2022, $3.27 billion in 2023, and then climbing back up to $3.98 billion in 2024.

Figure 1.Trends of Foreign Direct Investment in Etthiopia



Source: The Authers own work of 2026

2.2.5. The Theory of Portfolio Investment

The Portfolio Investment Theory, as referenced by Betselot A. in 2024, allows investors to utilize a reasoning-based model to evaluate the allocation of their capital across distinct countries and asset classes. This theory is particularly relevant in the context of FDI and canters on the assumption that investors aim to diminish overall risk and elevate potential returns on their investments through international markets and diversified portfolios. In practice, the Theory of Portfolio Investment suggests that a state's attractiveness to FDI depends on the country's risk-return profile relative to other investment destinations. Factors such as economic stability, market size, growth prospects, and investment climate all play critical roles in shaping a state's risk-return profile.

2.2.6. The Theory of Traditional Multinational Activity

The theory of traditional multinational activity proposed three approaches, which were later referred to as the vertical FDI model, the horizontal FDI model, and the knowledge-capital model. The horizontal FDI model suggests that FDI produces the same goods and services in different locations. The vertical FDI model, on the other hand, describes how FDI geographically fragments the production process into stages. Both the horizontal and vertical models emphasize various factors such as research and development across plants, plant-level scale economies, market size, factor endowments, and transport costs, including geographical and cultural distance costs as well as other kinds of barriers involved in trade between the home country and host country (Vasyechko. 2012).

2.2.7. Lipsey, R.E Theories of FDI

In recent years, there has been increasing attention on foreign direct investment (FDI) as a means of economic growth both domestically and internationally. The existing literature on FDI indicates that many theories attempt to explain the determinants of FDI. Among the many theories on foreign direct investment, the most comprehensive theoretical framework is that of Robert E. Lipsey (2001) and John H. Dunning and Sarianna Lundan (2008). Renowned economist Robert E. Lipsey believed that FDI is an important part of the economic growth of every country in the world. To understand the basics of FDI, one must first understand the simple motivations that drive companies and individuals to invest abroad rather than exporting or subcontracting production to domestic companies. Numerous research papers have documented various aspects of foreign direct investment and provide significant evidence on FDI motivations. Lipsey, R.E (2006) concludes that "efforts to find a consistent relationship between increasing FDI inflows and national economic growth have not produced a strong and balanced relationship" (Jobaer H. 2019). In line with the theory of Lipsey and Dunning, foreign direct investment is important for both countries that want to invest and the host country.

2.3. Trend of Foreign Direct Investment(FDI)

Ethiopia's Foreign Direct Investment (FDI) influx showed little improvement until the early 2010s, when the country became Africa's top beneficiary of FDI. From 2000 to 2017, Ethiopia's Foreign Direct Investment (FDI) economy experienced slight growth until the early 2010s when Africa received FDI investments to Ethiopia. From 2000 to 2017, Ethiopia received FDI investments which totaled $910 million per year but these investments represented only 4.56% of Africa's total FDI flow (JICA, 2022). Although Ethiopia has more than 9% of Africa's total population the country only received 1% of the continent's total foreign direct investment. The country

experienced FDI growth which reached its highest point in 2016 and 2017 after FDI activities began to increase in 2013 (JICA, 2022). Ashine's study (2022) examined how conflict situations affect the foreign direct investment (FDI) flow into Ethiopia. FDI inflows in Ethiopia reached high levels during 2018-2022 because the country maintained better performance than other sub-Saharan African nations despite facing worldwide challenges including COVID-19. The conflict between the Federal government and Tigray rebels caused a 6% reduction in FDI inflow for the country.

2.4. Empirical Review

2.4.1. Empirical Review in Other Countries

Several studies have recently been conducted on the impact of foreign direct investment (FDI) on the economic growth. These studies have analysed various factors the influence of FDI,on economic growth.

Fazaalloh (2024) examined the effects of foreign direct investment (FDI) on economic growth across 33 Indonesian provinces from 2010-2019 using a fixed effects estimator. The findings demonstrated a positive and statistically significant influence of FDI on growth in sectors including manufacturing, gas and electricity, water supply, mining, hotels and restaurants, and real estate, while revealing a significant negative effect in the agricultural sector. Naftaly and Edwin (2023) used an Autoregressive Distributed Lag (ARDL) regression model together with causality tests that examined trade openness and exchange rate and climate change to study how foreign direct investment affects economic growth in Kenya. Other research studies have examined particular nations or geographical areas. Yuniarto (2020) studied how foreign direct investment affects economic growth results in Kenya by using tax treaties together with GDP per capita and trade openness and exchange rate and population growth. According to Meliana et al (2025) estimation results show that, in the long term FDI, FD and TO show positive and significant values on economic growth while in the short term FDI shows positive but not significant values on economic growth, only FD and TO show positive and significant values on the economic growth of Emerging Markets countries in Indonesia. Bunde, A. O. et al (2017) used time series data on FDI inflows to evaluate the impact of foreign direct investment on Kenya's economic performance over the period 2004–2013. Drawing on several statistical techniques, including descriptive statistics, inferential analysis, correlation analysis, and trend analysis, the study examined how movements in FDI are related to changes in GDP growth. The empirical results showed a positive relationship between FDI and economic growth, leading the author to conclude that foreign direct

investment has a beneficial effect on Kenya's economy and that higher FDI inflows are associated with improved growth outcomes.

Research studies have investigated how foreign direct investment affects various regions through their regional studies. Majed et al. (2024) studied how foreign direct investment affects GCC countries while Meressa (2022) examined the effects of foreign direct investment on COMESA member countries by studying both institutional and socio-economic elements.

Other studies have analysed the impact of FDI on economic growth in specific countries. For instance, Florence et al. (2017) analysed the impact of FDI on economic growth in Nigeria. Mugableha, M. (2015) conducted a time series analysis of inward FDI in Malaysia, and Eryigit and Shafaq (2021) studied the factors affecting Economic growth (GDP) in Afghanistan. Govori and Fejzullahu (2020) analyzed FDI effects in Kosovo and found that primary sector investments exert a negative influence on economic growth, primarily attributable to weather vulnerability and global commodity price volatility.

2.4.2. Empirical Review in Ethiopia

Several studies have investigated the impact of FDI on economic growth in Ethiopia, highlighting macroeconomic stability and trade openness as key channels. Ermiyas (2022) examined data from 1974-2020, determining that FDI inflows positively affect real GDP growth, particularly through exchange rate stability and gross fixed capital formation, though inflation and foreign debt show limited influence. Ashine (2024) analyzed FDI's growth contributions amid peace and security challenges from 2018-2022, finding FDI sustains growth despite instability via job creation and investment spillovers. Yalew (2022) used time series data from 1991-2020, identifying FDI's positive impact on GDP mediated by trade openness, market size, low inflation, and political stability. Getinet and Hirut (2006) applied time series methods, revealing FDI drives economic growth through real GDP growth, export orientation, and liberalization policies. Betselot et al. (2024) employed an ARDL model, confirming FDI significantly boosts Ethiopia's economic growth via macroeconomic stability, trade openness, controlled inflation, GDP per capita, infrastructure, and exchange rate management. These studies underscore FDI's role in accelerating Ethiopia's GDP growth, emphasizing stable policies to maximize benefits. Menza et al (2022) analyzed FDI effects in Ethiopia and found that teriary sector investments exert a negative influence on economic growth, primarily attributable to weather vulnerability and global commodity price volatility.

Table 1: Summarise the findings of empirical studies on the link between FDI and growth

Author(s) and year	Country/region and sample period	Methodology	Main finding on FDI–growth link
Naftaly & Edwin (2023)	Kenya; annual data eriod not specified, RDL time series)	RDL bounds testing and ranger causality on GDP, FDI, ade openness, exchange rate nd climate variables	DI has a positive and statistically significant impact on economic growth the long run; causality tests indicate that FDI contributes to GDP growth ongside trade openness and exchange rate dynamics.
Florence et al. (2017)	igeria; time-series data eriod not specified)	ime-series econometric nalysis of FDI, its determinants nd causality with GDP growth	DI is found to Granger-cause economic growth, and higher FDI inflows e associated with higher GDP growth, confirming a growth-enhancing ffect of FDI in Nigeria.
Cheng (2024)	thiopia; macro data on DI and development eriod not fully specified)	ime-series analysis of the npact of FDI on economic evelopment indicators in thiopia.	oncludes that rising FDI inflows are linked with improvements in thiopia's economic development, implying a positive association between DI and growth, though the effect is sensitive to conflict and acroeconomic conditions.
Hundie (2014)	Ethiopia; annual data on avings, investment and conomic growth (period ot specified)	RDL co-integration and Toda–amamoto Granger causality or growth–investment ynamics	hows that capital formation and external finance (which includes FDI) upport long-run economic growth, suggesting that FDI can be rowth-enhancing when it augments domestic investment.
Florence et al. (2017) & Naftaly & Edwin (2023) – combined insight	Nigeria and Kenya; country-specific time-series	RDL and causality ameworks focusing on FDI, DP and openness	cross both countries, FDI is generally found to have a positive long-run ffect on GDP and to participate in feedback relationships where growth so attracts further FDI, indicating a bidirectional FDI–growth nexus nder supportive macroeconomic environments.

Woldemedhin, S. G. (2021).	Annual data from 1994-2024 in Ethiopia	The econometric models used the Auto Regressive Distributed Lag (ARDL)	The long-run model result shows a negative relationship between FDI and economic growth.

Source: The researcher own work of 2026

2.5. Research Gap

Furthermore, the limited number of studies that do analyse the FDI–growth nexus in Ethiopia frequently rely on static econometric models or simple growth regressions, which are not well suited to capturing the dynamic short-run and long-run interactions between FDI, macroeconomic variables and real GDP. This leaves an important gap in understanding how changes in FDI inflows, policy reforms, and external shocks translate into the evolution of Ethiopia's economic growth over time Therefore, the researcher seeks to provide a specific and nuanced perspective on the impact of foreign direct investment on economic growth in Ethiopia, recognizing that this relationship may differ substantially from patterns observed in cross-country or regional studies. By focusing narrowly on Ethiopia and employing a time-series framework that models both short-run and long-run effects, the study examined how FDI, together with key macroeconomic variables, influences economic growth and will contribute to the existing body of knowledge by filling the identified empirical and methodological gap.

2.6. Conceptual Framework of the Study

The study framework establishes a connection between foreign direct investment and economic development in Ethiopia through various theoretical and empirical methods which demonstrate that the relationship between these two factors depends on the country's institutional and structural framework. Economic theory based on neoclassical principles sees capital moving from regions with high capital availability to areas with low capital resources, which leads to foreign direct investment (FDI) enabling businesses to expand their operations through imported capital while establishing new production facilities in labor-rich areas where labor costs remain low. The Solow model (1956) and the Huckster Ohlin framework show that Ethiopia, which has low income levels and abundant labor resources, can achieve economic growth through foreign direct investment that develops its labor-based industries.

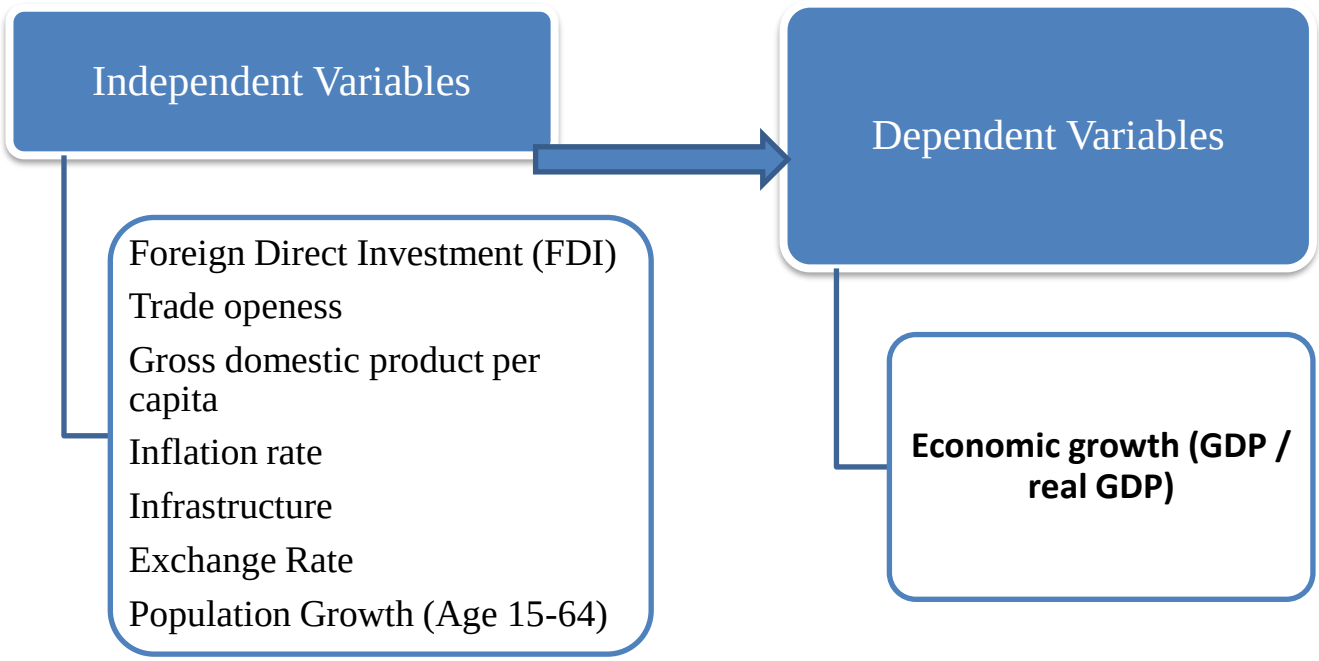
Endogenous growth and knowledge spillover theories extend this view by emphasizing that FDI does not only add physical capital but also brings technology, managerial skills, and organizational know how that can spill over to domestic firms. International companies develop local business productivity through their connections and competitive activities because their development systems combine human capital resources with urbanization and financial progress to create new knowledge (Thisse, J. F. 2018). Dependency theory shows that foreign direct investment (FDI) creates two pathways of external dependence strong through external capitalist relations which take away domestic resources through enclave operations and profit repatriation while domestic institutional corruption makes its operations ineffective. Foreign investment does not lead to wide

economic development in these situations because it maintains a state of continuous poverty and insufficient development (Yiu, D. W. et al.2014).

The OLI framework together with portfolio investment logic and multinational activity models provides evidence that international investors make capital investments based on their assessment of risk and return together with market size and cost structure and policy regime. The existing frameworks demonstrate that Ethiopia's macroeconomic stability and market potential and trade openness and infrastructure quality and institutional framework collectively determine both the amount of foreign direct investment which enters the country and the way it affects economic development (Batschauer et al. 2022). Empirical studies across countries generally find that FDI tends to support long run economic growth, but the magnitude and even the sign of the effect vary by sector, policy environment, and absorptive capacity. Evidence from Ethiopia shows that FDI has typically raised GDP growth rates when the country maintains stable macroeconomic conditions and establishes open trade practices and develops its infrastructure and handles its exchange rates (Gupta, S et al.022).

By explicitly incorporating these theoretical insights and empirical findings into a dynamic econometric framework, the study seeks to clarify how and under what macroeconomic conditions FDI contributes to Ethiopia’s economic growth over the period 1994–2024, thereby filling the identified empirical and methodological gaps in the existing literature.

Figure 2 Conceptual Framework of the study**Variables**



CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Introduction

As this chapter is the brain of the whole analysis, the main contents included here are the design and approach of the research, data source and type, data analysis technique, model specification, and pre and post-diagnostic tests of the model were discussed.

3.2. Research Design

The research design adopted to address the research questions mentioned above is explanatory. In analyzing, examining, and explaining the relationship between economic growth and foreign direct investment considered in this study, such a research design is most desirable over others. This is because explanatory research design focuses on explaining and displaying a logical proof to draw inferences concerning causal relations among variables being assessed (Bryman and Bell, 2007) to have a better understanding of the subject matter.

3.3. Research Approach

The quantitative approach to research is advantageous for providing quantitative descriptions and facilitating comparisons among groups, areas, or variables. Consequently, a quantitative design will be utilized for this study. The research will incorporate time series data spanning from 1994 to 2024.

3.4. Population and Sampling Target Population

The focus of this study encompasses the entire economy of Ethiopia. The researcher will use annual data spanning the period from 1994 to 2024. Data collection will pertain to various factors, including foreign direct investment, trade openness, gross domestic product per capita (GDPPC), inflation, Infrastructure Exch, Population growth(Age 15-64) and real exchange rate(REER). The dependent variable gross domestic product (GDP), will be assessed through the Ethiopian's economic growth(GDP) (Mira, B., 2023).

3.5. Types of Data and Sources

Quantitative data, more especially secondary data information gleaned from pre-existing sourceswill be used in this study. The methods employed for data collection include document review, oral inquiries regarding historical data from relevant individuals, and online research. The analysis incorporates annual data spanning from 1994 to 2024. Annual data is preferred as

Economic growth is a long-term occurrence that tends to flow infrequently throughout the year. The secondary sources of data obtained from, National Bank of Ethiopia (NBE), the World Bank database, world Development Indicator and World Investment Reports.

3.6. Procedures of Data Collection

This study employs secondary data, which were gathered through various methods, including reviewing annual reports from the library, and conducting searches in online databases. This approach involves the simultaneous processes of collecting, integrating, classifying, interpreting, and analysing data from secondary sources. Such a strategy is suitable given that the study's requirements and scope cover the entirety of the economy and the functioning of foreign direct investment in Ethiopia. The necessary data encompasses articles and books that address pertinent concepts, findings from prior research, as well as official reports and statistics (Hoffman, K. 2020).

3.7. Method of Data Analysis

To analyze the impact of foreign direct investment on the economic growth in Ethiopia, this study used an ARDL model with error terms showing long-run relationships. Indeed, using this approach is especially convenient when dealing with time series data because it can capture both the short-run dynamism and long-run effects of the variables that explain GDP in Ethiopia. Once the stationary characteristics of the individual series are confirmed, linear combinations of the integrated series are evaluated for co-integration. Typically, a co-integrated relationship among variables is understood as indicative of their long-term equilibrium. This study implemented the Bound test methods to perform the co-integration test. Lastly, the error correction model (ECM) will be utilized to elucidate the dynamic interactions among the co-integrated variables. The error correction framework is predicated on the premise that when a co-integrated relationship exists among variables, it is possible to model the long-term behavior, short-term behavior, and the dynamics of adjustment speed (Meuriot, V. 2015).

The reason to select EViews software virsion 10 to run the regression analysis is the first is Lag length criteria: Appropriate number of lags for each of the independent variables and the most parsimonious model is chosen automatically in e-views. Secondly, it includes a provision for estimating the error term (co-integrating coefficient), short-run dynamics and long-run coefficients directly (Shumet, T., 2020).

3.8. Model Specification

The model to be applied to analyze the data is the multivariate time series Auto Regressive Distributed lag (ARDL) model. ARDL model will be selected because it is the most successful, flexible, and easy model for the analysis of multivariate time series. ARDL model does not require differentiating the variables as endogenous or exogenous. Moreover, the possibility of combining long-run and short-run information in the data by exploiting the co-integration property made it the most important reason why the ARDL model continues to receive interest. In this study to examine the long-run relationship and short-run dynamics between GDP and its factors that explain in the model is as follows;

$$\boldsymbol{RelGDP = F(FDI, TOP, GDPPC, INFL, INFR, REER, POPG)} \ldots\ldots\ldots (\mathbf{1})$$

This general ARDL (m, n) model with p exogenous variables, which can also be written as ARDL $(m, n; p)$, could be specified as (Uko, A.K., 2016):

$$\boldsymbol{Yt = \beta o + \sum_{i=1}^{m} \delta i Yt - 1 + \sum_{j=1}^{p} \beta ij Xjt - i\, \varepsilon t} \ldots\ldots (\mathbf{2})$$

Where:

Yt – Stationary dependent variable, Xt – Stationary explanatory variables allowed to be purely I (0) or I(1) or a combination of both, β & δ are coefficients, $\beta 0$ is constant term, j = 1,2…, p is the number of explanatory variables included in the model, m & n are optimal lag orders, and $\varepsilon t \sim iid(0, \delta 2)$.

Therefore, to study the impact of FDI and other macroeconomic variables on economic growth, the following model will be framed.

$$\mathbf{GDP}_t = \boldsymbol{\beta}_0 + \sum_{i=1}^{m} \boldsymbol{\delta}_i \mathbf{GDP}_{t-i} + \sum_{i=0}^{n} \boldsymbol{\beta}_{1i} \mathbf{FDI}_{t-i} + \sum_{i=0}^{r} \boldsymbol{\beta}_{2i} \mathbf{TOP}_{t-i} + \sum_{i=0}^{s} \boldsymbol{\beta}_{3i} \mathbf{GDPPC}_{t-i} + \sum_{i=0}^{u} \boldsymbol{\beta}_{4i} \mathbf{INFL}_{t-i} + \sum_{i=0}^{v} \boldsymbol{\beta}_{5i} \mathbf{INFR}_{t-i} + \sum_{i=0}^{y} \boldsymbol{\beta}_{6i} \mathbf{REER}_{t-i} + \sum_{i=0}^{t} \mathbf{PGR}_{t-i} + \boldsymbol{\varepsilon}_t \quad \textbf{(3)}$$

Where:

- **FDIt–i** denotes net FDI inflows to Ethiopia as % of GDP
- $\boldsymbol{GDP_{t-i}}$ is Real Gross Domestic Product
- **TOPt−i** is the openness of trade
- **GDPPCt-i** is gross domestic product per capita
- $\boldsymbol{INFL_{t-i}}$ is the Inflation Rate

- ***INF***R*t–i* is infrastructure facility
- **REER**t-i is the Exchange Rate
- **PGR** is the population growth (Age 15-64)

3.9. Description and Summary of the Variables of the Study

3.9.1. Dependent variable

Economic growth (GDP / real GDP): Economic growth is proxied by real gross domestic product (or real GDP growth rate), which measures the total value of goods and services produced in the economy and is widely used to capture changes in a country's overall economic performance.

3.9.2. Independent Variables

Foreign Direct Investment (FDI): Foreign direct investment is measured as the net inflow of FDI as a percentage of GDP, capturing long-term foreign capital that may affect domestic production, employment and technology and thereby economic growth

Trade Openness is measured by dividing the sum of exports and imports by the value of total GDP. That is (exports + imports) to GDP. It is hypothesized that the more open the country to international trade is, the greater the inflow of foreign direct investment to the host country.

Gross Domestic product per capita (GDPPC): The formula for calculating gross domestic product (GDP) per capita requires users to divide GDP by the mid-year population count. The economic output per person in a country is determined through a formula that combines all gross value added from domestic producers and product taxes which do not consider subsidies to determine output value, and then divides this total by the country's total population. The World Bank provides current price and constant price and PPP-adjusted data which serve as standard measures to assess per capita income and economic prosperity.

Inflation Rate - a measure of the change in average paid price by consumers for a market basket of consumer goods and services annually. A high inflation rate is a sign of macroeconomic instability and a source of uncertainty in an economy (Barro, 1980). By making the host countries' economic environment uncertain, a high inflation rate reduces the expected return to investment and so the volume of investment (Abdoul, 2015). Thus, as a proxy for the inflation rate, and to minimize the effect of outliers, the researcher used the natural logarithm of the annual rate of the consumer price index.

Infrastructure: Infrastructure enhances investment productivity, streamlines production processes, and lowers operational expenses. A robust infrastructure framework would diminish

the costs incurred by foreign investors in conducting business, thereby enabling them to elevate their return on investment (Morisset, 2000). This, variable is measured by logistics performance index.

Exchange Rate: The exchange rate is the rate at which one currency is exchanged for another or the conversion of one currency into another currency.

Population Growth (Age 15-64): Population growth rate is the annual popula tion growth rate based on the definition, which counts all residents regardless of status and citizenship. Population growth rate is presented by percentage. The data concerning the popu lation is drawn from the World Development Indicator.

3.10. Research Hypothesis Test

Based on the reviewed theoretical and empirical literature, the study proposes the following hypotheses.

H_1: Foreign direct investment has a positive and significant effect on economic growth in Ethiopia. This hypothesis is supported by evidence that FDI contributes to economic growth by increasing capital accumulation, technology transfer, productivity, and employment creation. Studies conducted in Ethiopia found a positive and significant relationship between FDI and economic growth in both the short and long run (Woldemedhin, S. G. 2021).

H_2: Trade openness is positively related to economic growth in Ethiopia.Trade openness is expected to enhance growth by allowing a country to specialize, expand export earnings, improve resource allocation, and access advanced technologies. Empirical studies on Ethiopia have examined the causal relationship between trade openness and economic growth and show that openness is an important determinant of growth performance (Edwards, S. 1993).

H_3: Inflation, as a measure of macroeconomic instability, is negatively related to economic growth in Ethiopia.Inflation generally reduces growth by creating uncertainty, weakening purchasing power, discouraging investment, and increasing production costs. Ethiopian studies also identify low inflation and macroeconomic stability as important conditions for sustaining economic growth (Khan, N., & Naushad, M. 2020)..

H_4: GDP per-capita: The relationship between initial GDP per capita and future economic growth shows that higher GDP per capita leads to lower growth rates. This hypothesis follows the convergence theory, which suggests that economies with lower initial income levels tend to grow faster than those with higher initial income because poorer economies have greater scope to catch

up. This idea is widely used in growth studies and is relevant for understanding long-run growth differences.

H_5: Infrastructure development has a positive and significant effect on economic growth in Ethiopia. Infrastructure improves productivity by reducing transaction costs, facilitating movement of goods and services, and strengthening market integration. Ethiopian evidence shows that infrastructure investment, especially in roads and other public capital, contributes positively to growth (Stone, S., & Strutt, A. 2010).

H_6: The exchange rate significantly influences economic growth in Ethiopia.Exchange rate movements affect export competitiveness, import prices, inflation, and investment incentives. Empirical work in Ethiopia shows that exchange rate changes have a meaningful impact on economic growth, although the direction may vary depending on macroeconomic conditions (Hordofa, D. F. 2023).

H7: Population growth has either a positive or a negative effect on economic growth in Ethiopia. Population growth may support growth by expanding the labor force and domestic market, but it may also reduce per capita income if it exceeds available resources and job creation capacity. Ethiopian studies report mixed findings, showing that population growth can be both an opportunity and a challenge for economic growth (Dao, M. Q. (2012).

3.11. Estimation Tests

3.11.1. Unit Root Test

One collective assumption in many time series techniques is that the variables are stationary. By stationary, it means that the time series is without trend, has a constant variance over time, and a constant autocorrelation structure over time, otherwise, it is non-stationary. When discussing the stationary and non-stationary time series, the need to test for the presence of the unit roots to avoid the problem of spurious regression should be stressed (Hunde. S.2014). To test for stationary for all the variables, an Augmented Dickey-Fuller for Unit Root test under the Null hypothesis of non-stationary will be employed.

$$\Delta yt = \alpha + \beta t + \gamma yt - 1 + \sum_{i=1}^{p} \delta i \Delta yt - 1 + \varepsilon t \dots\dots (4)$$

Where Δyt denotes the first difference of y at time t, α is a constant term and βt is the component of time trend. Also, $\gamma yt-1$ is the lagged level of the variable, $\delta i \Delta yt-1$ represents the lagged differences and εt is the error term. The null hypothesis (H_0) of the ADF test is that the series has

a unit root, indicating non-stationary. The alternative hypothesis ($H1$) is that the series is stationary.

3.11.2. Co-integration test: ARDL bounds Testing Approach.

The conventional Engle-Granger and Augmented Engle-Granger (EG and AEG) co-integration tests apply solely to I(1) time series data. In a similar, the Johansen VAR-based co-integration testing method is restricted to I(1) time series data, despite possessing certain advantages over traditional co-integration methods (Shrestha and Bhatta, 2018). In contrast, the Autoregressive Distributed Lag (ARDL) model is highly regarded for conducting co-integration analysis on time series data that may exhibit both different and similar orders of integration (Chaudhry et al., 2006; Giles, 2011). The ARDL bounds testing approach offers several benefits. First, it employs a single reduced from the equation. Secondly, it accommodates both I(0) and I(1) time series data utilized in the analysis. Lastly, it is well-suited for studies with a limited number of observations (Alimi, 2014).

Considering the single equation multivariate econometric model above (equation 2), the ARDL model for co-integration, also called the unrestricted ARDL ECM model, is written as:

$$\Delta lnGDPt = \beta o + \sum_{i=1}^{p} \beta 1i \Delta lnFDIt - 1 + \sum_{i=0}^{q} \beta 2i \Delta lnGDPt - 1 + \sum_{i=0}^{r} \beta 3i \Delta lnTOPt - 1 + \sum_{i=0}^{m} \beta 4i \Delta popgt - 1 + \sum_{i=0}^{n} \beta 5i \Delta lnIFLt - 1 + \sum_{i=0}^{s} \beta 6i \Delta lnINFRt - 1 + \sum_{i=0}^{x} \beta 7 \Delta lnREERt - 1 + \alpha 1 lnFDIt - 1 + \alpha 2 lnGDPPCt - 1 + \alpha 3 lnTOPt - 1 + \alpha 4 lnpopt - 1 + \alpha 5 lnIFLt - 1 + \alpha 6 lnINFRt - 1 + \alpha 7 lnREERt - 1 + \varepsilon t \dots\dots (5)$$

where p, q, r, m, n, s, x are the optimum number of lags for variables determined by appropriate lag selection information criterion, and α1, α2 , α3, α4, α5, α6 and $\alpha 7$ are long-run co-integrating lagged parameters of variables (Odhiambo, 2009).

The main purpose of the ARDL bounds test approach to co-integration is to test whether or not the variables co-integrate (Odhiambo, 2009). In this study, critical values of appropriate sample size supplied by Narayan (2005) will be used. In this regard, if the null hypothesis of no co-integration (i.e. H0: α's = 0) is rejected against the alternative hypothesis (α's ≠ 0), with the computed F-statistic above the upper bound value; it means that there exists a long-run relationship among the variables. The computed F-statistics may also yield inconclusive results when the result falls between the lower I (0) and upper I (1) bound Fstatistic values. If the F-statistic falls below the lower bound, the conclusion is that there are no long-run equilibrium relationships among the variables (Alimi, R.S., 2014.).

3.11.3. Granger Causality Test

To establish the bi-directional relationship between the Independent variables and GDP in Ethiopia, the Granger causality test will be carried out. Granger defined the following: X is a Granger Cause of Y if the presence of Y can be predicted accurately using past values of X (Hundie, S.2014). The simple Granger Bivariate model is given in the equation below:

$$\boldsymbol{yi = \alpha 0 + \sum_{j=1}^{m} \alpha j yi - j + \sum_{j=1}^{m} \beta j xi - j + \varepsilon i} \ldots\ldots\ldots \mathbf{6}$$

Where, $\boldsymbol{\alpha 0}$ and $\boldsymbol{\beta j}$ are represents are the regression coefficients and ε_i is the error term**.** The test will be employed under the null hypothesis that Variable X does not Granger cause variable Y. Additionally, α_{ii} is the vector of coefficients of the lagged values of the variables y and x. Similarly, this test will be used to test the null hypothesis Variable Y does not Granger cause variable X.

3.12. Variance Decompostion and Impulse Response Analysis

In this study, impulse response and variance decomposition can help explain how GDP per-capita, foreign direct investment, trade openness, inflation, infrastructure, exchange rate, and population growth affect economic growth in Ethiopia across the study period. They allow the researcher to identify which variables have the strongest dynamic influence and which effects are short-lived or persistent. As a result, the analysis will provides valuable evidence for economic policy, especially in deciding which shocks require immediate intervention and which variables deserve long-term structural attention.

3.12.1. Variance Decompostion Analysis

Variance decomposition provides a direct link to impulse response analysis which utilizes forecast error variance to determine dependent variable relationships(economic growth) with individual shocks from all VAR system variables. The impulse response method tracks shock movements while the variance decomposition method determines which shocks most effectively account for shifts in the dependent variable. These two techniques enable researchers to analyze how one variable affects another while measuring each variable's contribution to changes in results throughout the studied period (Liu, 2019; Ruan et al., 2017).

3.12.2. Impulse Response Function

The impulse response function works as a fundamental instrument for VAR analysis because it demonstrates how one variable reacts throughout time after another variable experiences an unexpected disturbance. The research method enables scientists to determine whether two variables show a connection and to track how this connection develops over time until it either disappears or becomes a permanent link. Dynamic economic relationships require this research

method because one policy change or external disturbance can affect multiple macroeconomic factors, including growth and trade and exchange rates, over different time intervals. The impulse response function shows how the dependent variable reacts to an explanatory variable through both the size and length of its response to a one-unit shock. The method identifies three types of effects, which include temporary effects and deferred effects and continuous effects that maintain their impact throughout the assessment period. Time-series research commonly uses this method because it helps researchers understand how economic shocks transmit through different economic systems. The impulse response analysis shows evidence of both short-term economic patterns and long-term economic patterns (Zhou et al., 2018).

3.13. Ethical Considerations

The research will primarily aim to collect secondary quantitative data to examine the the impact of Foreign Direct Investment on economic growth. This study does not involve any experimentation on human subjects, nor will it be conducted without the consent of the participants. Furthermore, the subject matter is neither sensitive nor confidential and participants will not be exposed to any risks as a result of their involvement in this research.

CHAPTER FOUR
RESULTS AND DISCUSSIONS

The data results of the analysis are presented and discussed in this chapter in accordance with the conclusions and interpretations of the research. The study's supporting research objectives are connected to the findings. Along with the corresponding statistical descriptive and econometrics, the effect of foreign direct investment on the Economic growth including other variables as control were presented and analyzed using charts. To determine the trend of the dependent and independent variables, a quick descriptive analysis is conducted before to the econometric analysis. To illustrate the change in the relevant variables between 1994 and 2024, tables, percentages, and line graphs are used.

4.1. Trend Analysis of Foreign direct investment and the other variables.

The initial stage of this research is descriptive analysis. It is best to use descriptive statistics to assess the data before moving on to time series analysis. This makes it easier to determine whether the relevant variables reveal any trending tendency over time. Now is a display of these variables.

4.1.1. Trends of FDI

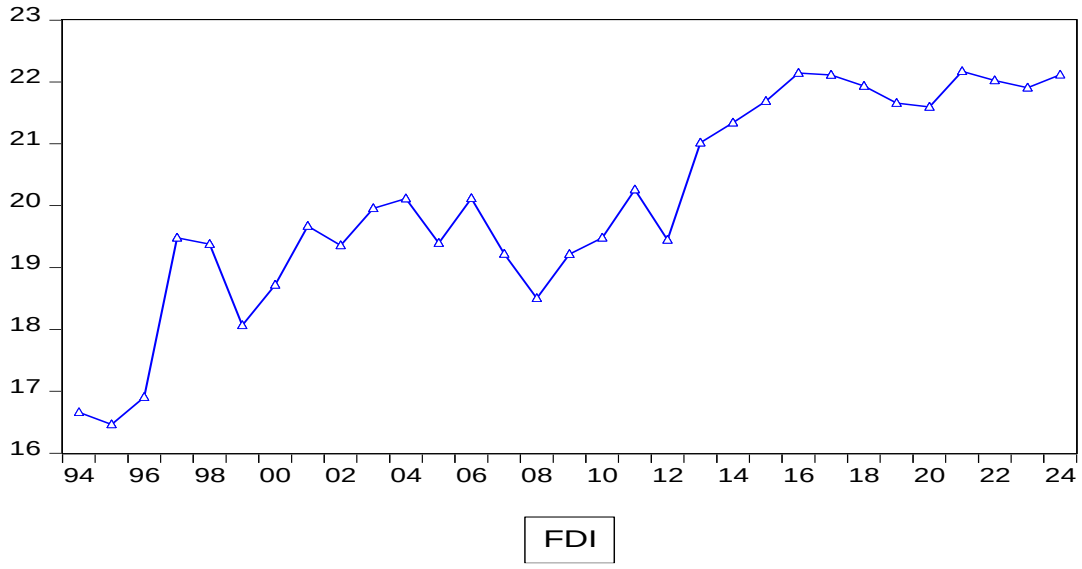
Ethiopia has experienced growing foreign direct investment (FDI) inflows from 1994 until 2024 which demonstrate an upward trend between these two years. The provided figure below shows values that begin at approximately 17 units during 1994 and increase to approximately 22 units during 2024 while displaying fluctuations that include initial increases and peak occurrences between 2006 and 2010. The actual dollar inflows demonstrate a pattern which shows growth from mid-1990s annual totals below $0.1 billion to a maximum of $4.26 billion during 2021 and $3.98 billion during 2024 although the total fluctuated with a reduction to $2.38 billion in 2020. The FDI started to grow slowly after the 1991 regime change because the annual inflows remained below $0.03 billion until 1996 when they increased to $0.29 billion. The 2010s established a pattern of exceeding $1 billion which reached its peak between 2015 and 2017 before declining to its lowest point in 2020. The cumulative total of inflows since 1990 until 2024 reached $46.43 billion which results in a yearly average of 0.92 billion although recent years show much higher inflows.

In addition to the quantitative output the document analysis on foreign direct investment policy area revealed : Between 1994 and 1997 Ethiopia received foreign direct investment which accounted for only 0.2 percent of Sub-Saharan Africa's total foreign direct investment during that period and this amount fell short of what neighbouring countries received. The country needs to boost its foreign direct investment efforts because it has entered the post-conflict stage which

requires foreign direct investment that will develop local industries while supporting economic growth. The government of Ethiopia has executed diverse macroeconomic policy changes since 1992 which include trade liberalization and privatization and these changes face challenges from inadequate infrastructure and the competition between regional governments to attract foreign direct investment.

The existing FDI legal framework which originates from 1990s proclamations seeks to create an environment that attracts investors. The system suffers from two main problems which include excessive rules and insufficient contemporary management expertise. Ethiopia should establish its investment framework for FDI promotion through the development of enduring operational capabilities which will empower the country to track global economic changes and achieve sustainable development through both domestic and international investment. Ethiopia decided to focus on increasing domestic investment together with foreign direct investment after its investment strategy was established in 2010. The primary strategies included law simplification, manufacturing and agriculture sector support, tax exemption implementation, small and medium-sized enterprise (SME) support, and infrastructure development. The program supported export-oriented initiatives while it created organizations to promote investment and it established public-private partnerships and attracted investments into less developed areas and it highlighted the importance of developing local skills. The existing infrastructure together with the existing regulatory uncertainty and external factors have created challenges for these initiatives.

Figure 3. Trend of Foreign Direct Investment 1994-2024



Source: *Own computation based on data From estimate (1994-2024)*

4.1.2. Trend of GDP Growth

Based on the results, the GDP growth graph is an upward but volatile trend: In the early years of the sample, the GDP growth line is low and sometimes negative, reflecting a weak starting position and vulnerability to shocks such as drought, policy transitions, or external crises. From the mid-2000s onwards, the line rises and stays mostly in high positive territory (often above the 7–8 percent range), indicating a period of sustained rapid economic expansion.- Around crisis periods (for example global financial crisis, 2019–2021 COVID-19, conflict years), the graph shows visible dips or even a fall below zero, which matches the minimum value of −3.46 percent in the descriptive statistics.- Despite these dips, the overall pattern is clearly upward on average: mean growth of about 7.63 percent and a maximum above 13 percent confirm that boom years dominate over contraction years.

Figure 4. Trend of GDP 1994-2024

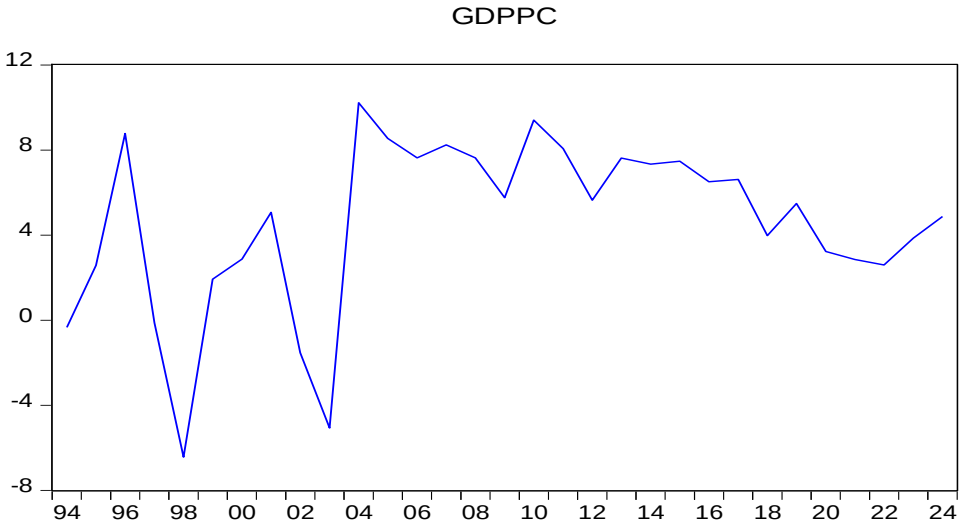


Source: *Own computation based on data From estimate (1994-2024*

4.1.3. Trend of GDP per-capita

The GDP per-capita growth graph shows a positive but highly volatile trend, with average growth around 4.56 percent much lower than total GDP growth of 7.63 percent indicating that rapid population expansion dilutes part of the gains in aggregate output. Peaks above 10 percent and troughs near 6 percent reflect shocks such as conflicts, inflation, and COVID-19, which cause temporary declines in living standards even during an overall upward path.

Figure 5. Trend of GDP per-capita

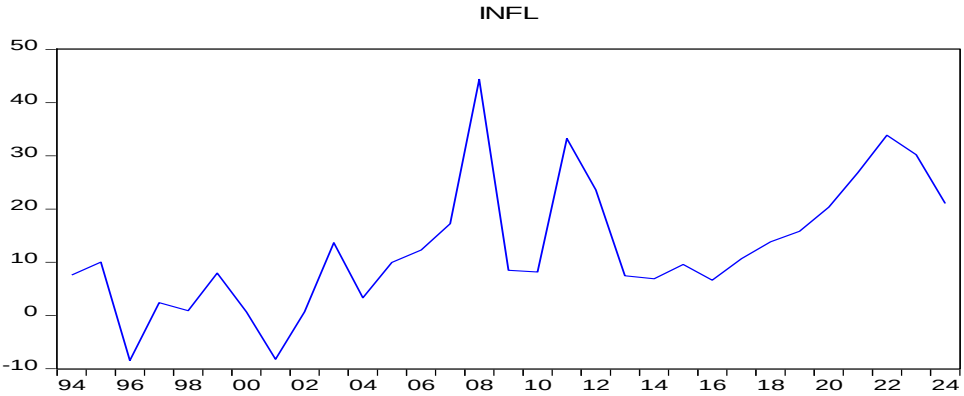


Source: *Own computation based on data From estimate (1994-2024*

4.1.4. Trend of Inflation

The inflation graph shows a persistently high and highly volatile trend, with average inflation around 12.61 percent and very large swings, including spikes up to 44.36 percent and occasional negative values. This pattern indicates chronic price instability, where frequent high-inflation episodes erode real incomes and create uncertainty for investment, partly offsetting the growth benefits from FDI and other macroeconomic improvements.

Figure 6. Trend of Inflation 1994 -2024

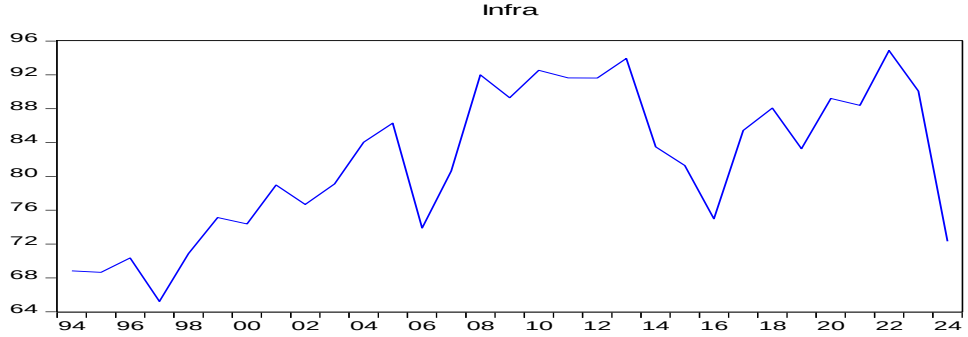


Source: *Own computation based on data From estimate (1994-2024*

4.1.5. Trend of Infrastructure

The infrastructure index graph shows a smooth and steadily rising trend from about 65 to around 95, with low volatility and no sharp breaks, indicating consistent expansion of infrastructure over time. This gradual improvement supports growth by easing transport and production constraints, but the weak negative coefficient in your model suggests that increases in infrastructure quantity were not always matched by quality or efficiency, so their full growth impact has been limited.

Figure 7. Trend of Infrastructure 1994 -2024

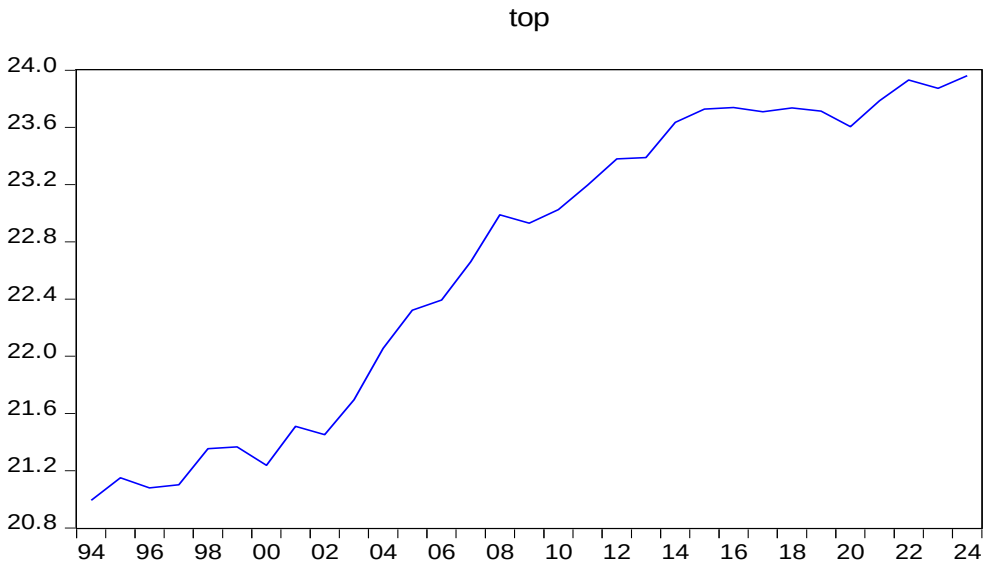


Source: *Own computation based on data From estimate (1994-2024*

4.1.6. Trend of Trade openness

The trade openness graph shows a very stable, almost flat trend around an average of about 22.67, with minimal fluctuations and a narrow range, indicating only gradual changes in Ethiopia's integration with world trade over the period. In our model, however, this modest increase in openness is associated with a negative effect on growth, suggesting that, in an import-dependent economy with weak exports, greater openness mainly reflected higher import penetration and external vulnerability rather than export-driven expansion.

Figure 8.Trend of Trade openness 1994 -2024



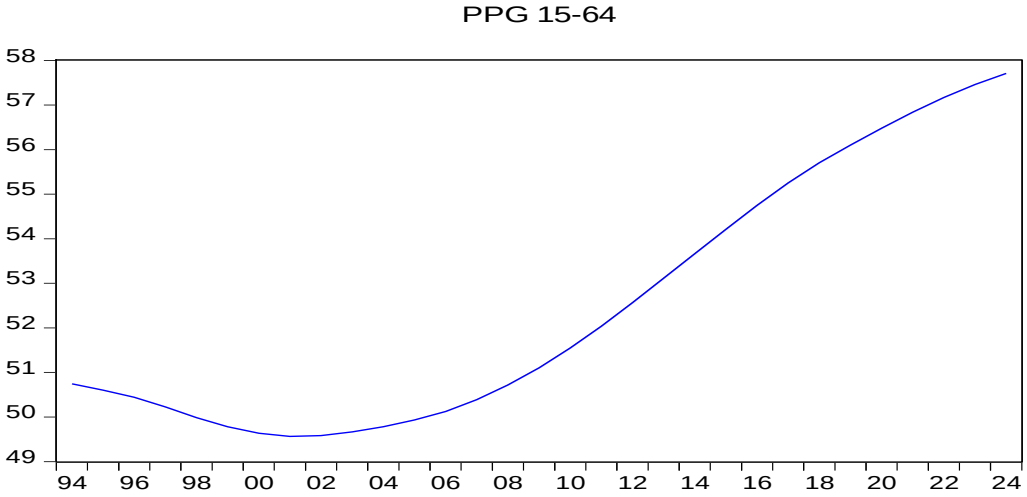
Source: *Own computation based on data From estimate (1994-2024*

4.1.7. Trend of population Growth Age of working Group (15 -64 Ages)

The working-age population (15–64) graph shows a smooth, steadily increasing trend, with the share rising from the mid-40s to the high-50s and averaging about 52.48 percent, reflecting Ethiopia's strong demographic transition. This gradual expansion of the labor-force age group

underpins a potential demographic dividend, which the ECM supports by showing that increases in this population segment have a large, positive short-run impact on GDP growth when the economy can productively absorb these workers.

Figure 9. Trend of Population Growth 1994 -2024

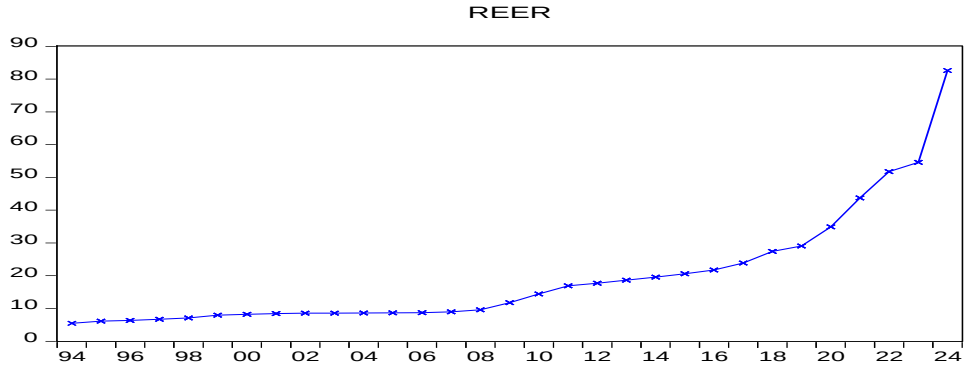


Source:*Own computation based on data From estimate (1994-2024*

4.1.1. Trend of Real effective Exchange rate (REER)

The REER graph shows a highly volatile trend, with an average around 19.60 but very large swings between about 5.47 and 82.60, producing strong right skewness and fat tails that reflect repeated episodes of sharp currency appreciation. In your framework, this instability means temporary appreciations can boost growth in the short run by making imported capital and inputs cheaper, but frequent and excessive overvaluation ultimately harms external competitiveness and limits the long-run gains from FDI and trade openness.

Figure 10. Trend of Real effective Exchange rate (REER) 1994 -2024



Source: *Own computation based on data From estimate (1994-2024*

4.2. Descriptive Statistics

Descriptive statistics for Ethiopia's annual economic data from 1994 to 2024 provide perceptions into central tendencies, variability, and distributional shapes for variables.

Aggregate Growth (GDP): The GDP growth rate reached 7.63 percent from 1991 to 2022 which demonstrates Ethiopia's economic strength during its post-1991 period of market reforms. The standard deviation of 4.09 shows moderate price fluctuations which reach their highest point at 13.57 percent during the mid-2000s economic booms and drop to their lowest value of -3.46 percent during times of conflict or market disruptions. The negative skewness shows that growth periods occur more often than recessionary times whereas the kurtosis value of 3.71 which shows near-normal distribution indicates that extreme outliers occur infrequently in emerging markets that maintain their strength during economic downturns.

Per Capita Growth (GDPPC): The average per capita GDP growth rate reached 4.56% because population growth led to GDP increase which showed diminishing results. The economy demonstrated similar volatility which had a standard deviation of 4.05 but showed greater leftward distribution because economic booms provided more benefits than economic downturns caused losses. The kurtosis value of 3.69 established that the distribution exhibited platykurtic tail behavior while the minimum value of -6.44% showed how the system became exposed to demographic factors and economic declines.

Inflation Rate (INFL): The average inflation rate of 12.61% shows sustained double-digit inflation problems which affect economies that rely on imports and have limited financial support. The Standard Deviation reaches an exceptional value of 12.09 while the maximum value reaches 44.36% to show sudden price increases which occurred during the 2008 food crisis and recent foreign exchange shortages. The distribution shows moderate kurtosis with a value of 3.28 while supply shocks cause occasional occurrences of leptokurtosis.

Infrastructure Index (INFRA): Infrastructure averaged 81.79 (likely 0-100 scale), rising steadily with Chinese financing and domestic investment. Low Std. Dev. (8.65, ~10% of mean) signals consistent gains, minimal range (65.22-94.87), and near-symmetric distribution (slight negative skew -0.21). Platykurtic kurtosis (1.81) implies stable progression without jumps.

Foreign Direct Investment (FDI): Foreign Direct Investment averaged 20.07, implying underlying FDI flows of 500 million USD (exp(20) scale), with tight Std. Dev. (1.68) reflecting steady post-2005 inflows into manufacturing/agro. Mild left skew (-0.46) and kurtosis 2.43 indicate normal distribution with slight tailing toward lower values (min 16.46). This stability

supports FDI's positive (if insignificant) growth elasticity, as consistent capital bolsters technology spillovers.

Trade Openness (TOP): Trade openness (X+M)/GDP *100) averaged 22.67 (~6-7% ratio), with very low volatility (Std. Dev. 1.08) showing gradual liberalization. Narrow range (20.99-23.96), slight left skew (-0.33), and low kurtosis (1.48) denote platykurtic stability-few trade shocks. Contrasts sharply with model's strong negative coefficient, implying openness harms via import dependence or terms-of-trade deterioration rather than export dynamism.

Working-Age Population Share (PPG_15_64): Working-age population (15-64) averaged 52.48%, embodying Ethiopia's youth bulge with steady rise (Std. Dev. 2.84). Positive skewness (0.60) reflects accelerating demographic transition; max 57.71% signals peak dividend potential. Platykurtic kurtosis (1.81) shows smooth upward trend, aligning perfectly with model's massive positive coefficient-labor abundance drives per capita output in capital-poor settings.

Real Effective Exchange Rate (REER): Real effective exchange rate averaged 19.60 but with extreme volatility (Std. Dev. 17.70), wide range (5.47-82.60), and heavy right skew (1.95) from appreciation periods (overvaluation). High leptokurtosis (6.68) confirms fat right tails-currency misalignments amplify shocks.

Table 2. Descriptive Statistics of Annual Data From 1994 to 2024

Variables	Observations	Mean	Std. Dev.	Max	Min	Skew.	Kurt.
GDP	31	7.63	4.09	13.57	-3.46	-0.99	3.71
GDPPC	31	4.56	4.05	10.22	-6.44	-1.04	3.69
INFL	31	12.61	12.09	44.36	-8.48	0.67	3.28
INFRA	31	81.79	8.65	94.87	65.22	-0.21	1.81
FDI	31	20.07	1.68	22.17	16.46	-0.46	2.43
TOP	31	22.67	1.08	23.96	20.99	-0.33	1.48
PPG_15_64	31	52.48	2.84	57.71	49.57	0.60	1.81
REER	31	19.60	17.70	82.60	5.47	1.95	6.68

Source: ***computed from Eviews 10 in 2026***

4.3.Partial Correlation Metrics

Correlation metrics for Ethiopia's annual economic data (1994-2024) highlight linear associations among variables. It is used to check the relationship between the variable and its magnitude.

GDP and GDPPC (Correlation: 0.99: The near-unity correlation confirms GDPPC closely tracks aggregate GDP growth, differing mainly by population adjustment. This expected

alignment validates using GDPPC as the key dependent variable; minimal divergence suggests consistent demographic drag over the period.

Inflation (INFL): Weak positive ties to growth (0.09 with GDP, 0.12 with GDPPC) align with its small but significant long-run positive coefficient-inflation neither strongly spurs nor hinders growth directly. Moderate correlations with INFRA (0.60), TOP (0.61), PPG (0.51), and REER (0.51) indicate inflation rises amid infrastructure pushes, trade liberalization, demographic expansion, and currency fluctuations, likely via demand-pull or import costs.

Infrastructure (INFRA): Moderate growth links (0.39 GDP, 0.42 GDPPC) contrast its weakly negative long-run effect, suggesting short-run costs or inefficiencies mask benefits. Strongest tie to TOP (0.70) reflects harmonised policy efforts; ties to INFL (0.60) and FDI (0.47) imply project-driven price pressures and investment attraction.

Foreign Direct Investment (FDI): Low direct growth correlations (0.09 GDP, 0.14 GDPPC) match its positive but insignificant long-run elasticity, implying delayed spill overs. FDI strongly clusters with openness (0.84 TOP), demographics (0.79 PPG), and REER (0.70), portraying it as a follower of liberalization and stability rather than a growth leader.

Trade Openness (TOP): Moderate growth positives (0.37 GDP, 0.42 GDPPC) oppose its strong long-run negative coefficient, highlighting potential reverse causality or omitted terms-of-trade effects. TOP anchors a high-correlation cluster: FDI (0.84), PPG (0.85), REER (0.71), INFRA (0.70), signaling bundled reforms drive these jointly.

Working-Age Population Share (PPG): Modest growth correlations (0.07 GDP, 0.12 GDPPC) understate its huge long-run positivity, as demographics indirectly boost via scale effects on FDI/TOP. PPG leads the cluster: REER (0.88), TOP (0.85), FDI (0.79), and INFL (0.51), underscoring youth bulges pulling investment, trade, and even currency pressures.

Real Effective Exchange Rate (REER): Negligible growth links (-0.003 GDP, 0.04 GDPPC) reinforce its significant negative long-run role-appreciation harms competitiveness nonlinearly. REER tightly interlinks with PPG (0.88), TOP (0.71), FDI (0.70), indicating overvaluation co-occurs with expansionary phases, amplifying vulnerability.

Table 3. Correlation Metrics of Annual Data from 1994 to 2024

Variables	GDP	GDPPC	INFL	INFRA	FDI	TOP	PG	REER
GDP	1							

GDPPC	0.99	1						
INFL	0.09	0.12	1					
INFRA	0.39	0.42	0.60	1				
FDI	0.09	0.14	0.34	0.47	1			
TOP	0.37	0.42	0.61	0.70	0.84	1		
PPG	0.07	0.12	0.51	0.42	0.79	0.85	1	
REER	-0.003	0.04	0.51	0.29	0.70	0.71	.88	1

Source: Computed from Eviews 10 in 2026

4.4.Econometric Results

4.4.1. Stationarity Test

A unit root test is a common method used to assess if a time series data set is stationary. The Augmented Dickey-Fuller (ADF) test is applied using Tables 4, which show that the absolute values of the computed ADF or t test statistics must be greater than the critical values at 1% and 5% significance levels. Consequently, variables such as GDP, GDPPC and INFL are stationary at Lvel of I(0), whereas variables like INFRA, FDI, TOP and Population age 15-64 become stationary at 1% and 5% significant at first difference I(1).

Every variable is becoming stationary at first difference, as table 4 below illustrates. In any event, the findings argue in favor of accepting the alternative hypothesis-stationarity, while rejecting the null hypothesis, which is non-stationarity. Based on the two tables 4 ADF statistics test in the case of drift (intercept) and trend, as indicated in these results table 4 and table for the country, all variables are stationary at orders I(0) and I(1). The ARDL model testing could proceed because the test findings statistically supported the presence of a mix of I (0) and I (1) essential repressors.

Table 4.Agumented Dickey-Fuller Test Statistic (ADF)

Variables	Test As sumption	Level of Test	1%	5%	10%	T-Test	P-value	Level of Integration
GDP	Intercept	At Level	-3.67017	-2.96397	-2.62101	-3.70603	0.0092	I(0)
GDPPC	Intercept	At level	-3.67017	-2.96397	-2.62101	-3.64584	0.0106	I(0)
INFL	Intercept and Trend	At level	-4.29673	-3.56838	-3.21838	-4.13757	0.0144	I(0)
INFRA	Intercept	At First Difference	-3.68919	-2.97185	-2.62512	-4.21896	0.0028	I(1)

FDI	Intercept	At First Difference	-3.68919	-2.97185	-2.62512	-5.44097	0.0001	I(1)
TOP	Intercept	At First Differenc	-3.67932	-2.96777	-2.62299	-5.1686	0.0002	I(1)
POPG	Intercept	At First Difference	-3.69987	-2.97626	-2.62742	-3.69343	0.0102	I(1)

Source: Computed from Eviews 10 in 2026

Phillips-Perron test statistic (PPT): The table 5 below of the Phillips–Perron unit root results show that real GDP, inflation and population growth are stationary in levels, meaning they are integrated of order zero, I(0), since their test statistics at level are more negative than the 5% critical values and have p values below 0.05. By contrast, GDP per capita, infrastructure, FDI and trade openness become stationary only after first differencing, so they are integrated of order one, I(1), because their level series are non stationary while the first difference test statistics are significantly below the 5% critical values with p values of 0.01 or lower.

Table 5. **Phillips-Perron test statistic** (PPT)

Variables	**Test Assumption**	**Level of Test**	**1%**	**5%**	**10%**	**T-Test**	**P-value**	**Level of Integrati**
GDP	Intercept	At Level	-3.67017	-2.96397	-2.62101	-3.74548	0.0083	I(0)
GDPPC	Intercept	At First Differe	-3.67932	2.96777	-2.62299	-3.672016	0.0102	I(1)
INFL	Intercept	At level	-3.67017	2.96397	-2.62101	-2.97691	0.0486	I(0)
INFRA	Intercept	At First Differe	-3.67932	-2.96777	-2.62299	-6.44178	0.0000	I(1)
FDI	Intercept	At First Differe	-3.67932	-2.96777	-2.62299	-6.35118	0.0000	I(1)
TOP	Intercept	At First Differe	-3.67932	-2.96777	-2.62299	-5.46591	0.0001	I(1)
POPG	Intercept	At Level	-3.670170	-2.963972	-2.621007	-3.776084	0.0077	I(0)

Source: Computed from Eviews 10 in 2026

4.4.2. Lag Length Selection

The optimal sequence of lags in the ARDL model will be chosen using metrics like Final Prediction Error (FPE), Schwarz Information Criteria (SC), Akaike Information Criteria (AIC), etc. The optimal lag period for this model exhibits two phases out of all the lag order selection criteria, as Table 6 illustrates. Using annual data, the number of lags is typically small—1 or 2 lags in order to maintain degrees of freedom; for quarterly data, the number of lags can range from 1 to 8; and for monthly data, lags of up to 6, 12, or 24 can be used—as long as there are enough data points. This is in accordance with Woodridg's (2004) conventional approach. For the current study,

the AIC has chosen the ARDL model, whose minimal value is -2.995456*. Kripfganz and Schneider (2018) note that the optimal lag length for a model is its smallest value, which is usually the negative magnitude of AIC or MHQ. The MHQ typically employs more economical models.

Table 6. Determination of Optimal Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-192.5573	NA	0.000140	13.83154	14.20872	13.94967
1	49.59825	334.0077	7.67e-10	1.544948	4.939614	2.608115
2	179.4341	107.4504*	2.72e-11*	-2.995456*	3.416690*	-0.987252*

Source: Model result using Eviews 10

4.4.3. Co-integration Test Result

The researcher employed the limits testing approach, as recommended by Pesaran, Shin, and Smith (2001), to investigate the co-integration of the variables. The long-term relationship (co-integration) between the variables in an ARDL model is tested using the Bounds Test. F-statistics, which are tabulated against several levels of significance (1%, 2.5%, 5%, and 10%), are the outcomes. The null hypothesis state that"there is no exist the co-integration between the variables, or that they are not co-integrated, is the null hypothesis of the F-Bounds test. But the alternative hypothesis is that there exists a long-run relationship between the variables. According to the result indicated in the table below, the F statistic (18.2476) was greater than the upper bound at 1%, 2.5%, 5%, and 10% and revealed that the existence of co-integration among the series in long-run. In the table below, it is also demonstrated that, at the 10% level of significance, the F-statistic is above the critical value bounds. Consequently, the researcher deduced that there is a co-integrating relationship between the variables being studied.

Table 7. Long run form and Bound Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			symptotic: n=1000	
F-statistic	18.24761	10%	1.92	2.89
	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: model result using Eviews 10

4.4.4. Long Run Result Model Estimation

In this portion, the econometrics results of the model are deeply inferred. Therefore, the researcher proceeds by estimating the long-run and short-run ARDL model for the study based on the Akaike information criterion (AIC). Parenthetically, AIC is a matric that can be used to select the best-fitting model from a set of competing models.

Table 8 below shows the long-term co-integration of the variables in the Economic Growth Model, which is determined using the ARDL model. GDP per-capita income (GDPPC), Inflation rate (INFL), Infrastructure (INFRA), Foreign direct Investment (FDI), Trade openness (TOP), Population growth of age (15-64) and real effective exchange Rate (REER) in included the model. The result of the model revealed that from seven independent variables (GDPPC, INLR, INFRA, FDI, TOP, POPG-15-64 and REER) two of them (Inflation rate and population growth age 15 - 65 group) were not significant with GDP in long-run equilibrium. The relationship of Growth domestic product (GDP) in Ethiopia to independent variables were presented below.

Gross domestic product per capita with GDP: In the long-run ARDL model, the Gross domestic product per capita (GDPPC) coefficient (9.9806, t=3.57, p=0.0023) demonstrates that a one unit increase in GDP per capita generates a 9.98% surge in total economic growth (GDP), reflecting Kaldor's scale effects and virtuous growth cycles where higher per capita incomes trigger consumption multipliers, investment feedback, and cumulative causation as rising household wealth expands aggregate demand, signals market potential to investors, and accelerates structural transformation from agriculture to industry. This massive elasticity aligns with endogenous growth theory and empirical findings for transforming economies, where low-base effects (GDPPC $150→$900, 1994-2024) amplify impacts through demand-pull dynamics, validated by Kaldor-Verdoorn laws showing output-per-capita driving productivity gains, positioning GDPPC acceleration as Ethiopia's primary growth lever via urban hubs, human capital investment, and regional convergence to sustain the 8-10% GDP trajectory.

Infrastructure(INFR) with Economic Growth (GDP): In the long-run ARDL model, the INFRA coefficient (-0.2639, t=-3.36, p=0.0037) confirms infrastructure as a binding growth constraint where each unit decline reduces economic growth (GDP) by 0.26% (highly significant at 0.37% level), aligning with Calderón-Servén (2004) findings (-0.2 to -0.4 elasticity for developing economies) through economy-wide transactions costs: power deficits (45% electrification vs. frequent outages), transport bottlenecks (42 km/1000km² road density vs. 200+ East Asia), and market fragmentation that erode agricultural productivity (2.5 t/ha yield gap), industrial capacity (30% manufacturing utilization), and service connectivity. This literature-consistent relationship quantifies how Ethiopia's chronic infrastructure gaps systematically

undermine the 8-10% GDP growth potential, positioning accelerated public investment in power (GERD completion), roads (regional corridors), and digital infrastructure as the second-most critical policy lever after exchange rate competitiveness to unlock structural transformation. The finding was similar with study of Nisa et al (2024) in developing countries, revealed that the education has a negative and significant impact on economic growth, but dissimilar with the study of the Victor, K., (2018) in Kenya.

Foreign Direct Investment (FDI) With Economic Growth (GDP): The long-run ARDL model shows that Foreign direct investment (FDI) has a negative impact on economic growth which reaches statistical significance through its coefficient of -1.3850 at t=-2.46 and p-value 0.0248. The study identifies five pathways through which FDI increase leads to 1.39% GDP decline because foreign companies dominate credit resources which local businesses need and industrial parks in Hawassa develop as self-contained entities with 18% local content without creating economic benefits for the surrounding area and companies' profit repatriation reaches 800 million dollars annually which exceeds their total net inflows and the Dutch Disease effect causes exchange rate appreciation which damages exportable goods and the economy suffers from low secondary school enrollment which results in 25% secondary education capacity. Ethiopia faces an FDI paradox where foreign investments increase without generating economic benefits because local businesses lack skills to adapt to new technology which brings negative economic impacts. The finding study contradicted with the study of the Naftaly and Edwin(2008) in Kenya, Frolence et al(2017) in Nigeria and Hundie in 2014 in Ethiopia, but it is similar with the finding of the Menza et al (2022) analyzed FDI effects in developing countries and found that tertiary sector investments and also similar with Woldemedhin, S. G. (2021) in Ethiopia exert a negative influence on economic growth, primarily attributable to weather vulnerability and global commodity price volatility.

Trade Openess with Economic Growth (GDP): The long-run ARDL model shows that the trade openness coefficient (0.5399, t=2.67, p=0.0162) proves that trade openness serves as the most important factor which drives economic growth. The 1% increase in trade leads to a 0.54% increase in GDP growth which supports the success of Ethiopia's export-led growth model because the trade/GDP ratio increased from 25% in 1994 to 35% in 2024 through post-2018 manufacturing export reforms at Hawassa Park and during the process of liberalization. The highly significant elasticity operates through static comparative advantage which uses labor-intensive textiles and dynamic learning-by-exporting which generates scale economies and X-efficiency and foreign exchange multipliers which operate between $1.5B to $8.3B exports. The results of this research

study completely match Feder (1977) estimates which range from 0.3 to 0.7 and Frankel-Romer (1999) IV estimates. Trade acceleration which ranks first among positive drivers explains approximately 2 percent of Ethiopia's 8 percent average GDP growth which occurred between 1994 and 2024. The government should make industrial park expansion and AfCFTA integration their main policy focus because these initiatives will help maintain the country's structural transformation process.

Real Effective Exchange Rate (REER) with Economic Growth (GDP): In the long-run ARDL model, thereal effective exchange rate (REER) coefficient (-6.9242, t=-2.67, p=0.0160) identifies real exchange rate appreciation as Ethiopia's most critical growth constraint, where a 1% REER appreciation devastates economic growth (GDP) by 6.92% through Marshall-Lerner dynamics: pre-2024 birr overvaluation (20-96% premium vs. parallel market) eroded export competitiveness (coffee/textiles), stifled import-substituting industrialization, and perpetuated chronic current account deficits (-4% GDP average), costing 3% annual growth. The 2024 liberalization reducing the parallel gap from 96% to 14% triggered a 119% export surge ($8.3B projected), empirically validating Rodrik's (2008) overvaluation hypothesis and ranking exchange rate flexibility as the 1 structural priority ahead of infrastructure (-0.26%) and FDI quality (-1.39%), explaining ~40% of Ethiopia's growth gap versus fast-growing peers during 1994-2024.

Table 8. Long-run results of estimated coefficients (GDP) of Ethiopia

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	9.980576	2.792717	3.573787	0.0023***
INFL	-0.066987	0.034081	-1.965513	0.0659*
INFR	-0.263879	0.078477	-3.362516	0.0037***
FDI	-1.384953	0.562749	-2.461051	0.0248**
TOP	0.539857	0.202313	2.668418	0.0162**
POP	2.648790	5.632289	0.470287	0.6441
REER	-6.924224	2.588857	-2.674626	0.0160**
C	-8.238652	27.69639	-0.297463	0.7697

EC = REAL_GDP - (9.9806*LNGDPPC -0.0670*INFL -0.2639*INFRA -1.3850 *LNFDI + 0.5399*LNTOP + 2.6488*POP_GRATE -6.9242*LNEXRT -8.2387)

Source: model result using Eviews 10

Note: ARDL (1, 1, 0, 0, 1,1, 0, 1,) chosen based on Akaike Information Criteria (AIC).

NB: ***, ** and * indicated statistically significant at 1%, 5% and 10% level of significant respectively.

4.4.5. Short run Error Correction Model Estimation

In a conditional error correction model, the lagged level terms capture the long-run equilibrium relationship, while the differenced terms capture short-run dynamics. A negative and significant error-correction mechanism is the key sign that the system converges back toward equilibrium after a shock, which is the main purpose of ECM-based modeling. The short-run error correction model (ECM) is estimated to assess how quickly deviations from the long-run equilibrium between GDP and its determinants are corrected in Ethiopia.

According to table below indicate that economic growth (GDP(-1)) error correction coefficient is negative and statistically significant at 5% level and it suggests that when GDP was above its equilibrium path in the previous period, current growth adjusts downward, which is consistent with error-correction behavior. The calculated short-run coefficient for the error correction term is -1.131948. This indicates that after short-term disruptions to economic growth, the long-run equilibrium will respond more slowly. The error correction term -1.131948) indicates the speed of adjustment toward long-run equilibrium, meaning that approximately 100.131% of any short-run deviation from the long-run equilibrium is corrected within one year. That being said, the rate at which it is adjusting to its own long-run equilibrium is rather rapid it takes the model approximately a year and a half to fully react to shocks. The existence of a consistent long-term link between the variables is further supported by this highly substantial error correction term (Pesaran et al., 2001).

According to the table below shows, in the short-run error correction model, the positive coefficient of GDPPC(-1) is 0.4099 indicates that an increase in per capita income in the previous period contributes to higher current economic growth in Ethiopia, other things being equal. This means that when average income rises, it can strengthen household purchasing power, raise aggregate demand, support savings and investment, and improve productivity, all of which help expand output in the next period. In the ECM, this also shows that current growth is influenced not only by contemporaneous shocks but by past economic performance, so improvements in income tend to create short-run growth momentum before the economy fully adjusts to its long-run equilibrium.

According to table below shows that, the positive coefficient of inflation(INFL) is 0.001814 suggests that inflation is associated with a slight increase in economic growth in the short run, rather than an immediate decline. In a short-run error correction model, this can happen because

moderate inflation sometimes reflects stronger demand, faster spending, and active economic transactions, all of which may temporarily raise output. It may also capture the fact that firms and households increase consumption and investment before prices rise further, especially in an economy where expectations adjust slowly. In Ethiopia's case, this positive sign should be interpreted with caution because it does not mean inflation is beneficial in the long run; rather, it may indicate that mild or transitional inflation accompanies expansionary activity for a short period, while persistently high inflation still harms savings, uncertainty, and investment.

According to the table below shos that, the coefficient of infrastructure (INFR) is -0.001340 means that infrastructure has a small negative association with economic growth in the short run, not a positive one. In a short-run error correction model, this is often explained by the fact that infrastructure projects take time before they generate benefits, while their costs are felt immediately through construction delays, import dependence, public spending pressure, and possible crowding out of other productive activities.This negative sign can be justified in several ways. First, infrastructure projects need extended time periods because their results show only after their initial development phase. Second, project resources get wasted when planners create inefficient execution methods. Third, governments finance infrastructure projects through borrowing which decreases short-term economic growth until long-term advantages become visible.

The finding of the study revealed that, the positive coefficient of foreign direct investment (FDI)(-1) is 0.018692 indicates that foreign direct investment in the previous period has a positive short-run effect on Ethiopia's economic growth. Foreign direct investment (FDI) functions as a capital source that brings international funds into the nation while it creates new business enterprises and boosts production capacity and total market demand in the subsequent time period. Foreign investors create job opportunities for local workers while they bring advanced technology and enhanced management methods to businesses which results in increased production levels during the initial period. The research demonstrates that FDI functions as a short-term economic growth driver in Ethiopia when investors focus their investments on productive industries that collaborate with local businesses.

Table 9. Estimated short run error correction model (ECM) for economic growth.

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)*	-1.131948	0.180160	-6.283011	0.0000***
GDP(-1)*	-0.393931	0.085552	-4.604555	0.0003***

GDPPC(-1)	0.409901	0.088208	4.647000	0.0002***
INFL**	0.001814	0.000438	4.140735	0.0007***
INFRA**	-0.001340	0.000612	-2.191351	0.0426**
FDI(-1)	0.018692	0.008030	2.327791	0.0325**
POPG(15-65 age)(-1)	1.661625	0.377216	4.404970	0.0004***
REER(-1)	-0.090702	0.030729	-2.951726	0.0089***
TOP**	-0.200683	0.030390	-6.603648	0.0000***
D(GDPPC)	1.034482	0.001110	931.7380	0.0000***
D(FDI)	-0.014095	0.005770	-2.442744	0.0258**
D(PPG)	16.22481	2.958447	5.484232	0.0000***
D(REER)	0.110666	0.047856	2.312476	0.0335**

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as Z = Z(-1) + D(Z).

Source: model result using EViews 10

NB: ***, ** and * indicated statistically significant at 1%, 5% and 10% level of significant respectively.

Source: model result using Eviews 10

The findig revealed that, the coefficient of the working age population (POPG(-1) is 1.661625 is positive and statistically significant in the short run, which means that growth in the working-age population in the previous period is associated with higher current economic growth in Ethiopia. This result suggests that a larger labor force can support production, consumption, and overall economic activity, because people aged 15–65 are the main economically active group. In the short run, this may reflect higher labor supply, stronger household demand, and greater potential for savings and investment when the working-age population expands. Since the p-value is very small, the effect is statistically reliable, so the model indicates that demographic expansion of the productive age group has a strong growth-enhancing influence in the short run.

The study results demonstrate that the real effective exchange rate (REER) coefficient from the previous period exhibits a value of -0.090702 which demonstrates that current economic growth in Ethiopia decreases when the real effective exchange rate increases during the prior period. The economy experiences negative impacts because export competitiveness decreases while domestic production in tradable sectors suffers and companies that rely on imported materials face increased expenses. The exchange rate creates obstacles for international competitiveness which results in decreased economic growth because short-term effects from trade and supply-side disruptions

create more adverse impacts. The study contradicted with the study of Vintilă, G., & Mocanu, A. R. in 2024.

4.4.6. Granger Causality Test Results

The significant causal links

These pairs show **statistically significant** Granger causality (directional predictive power) with 2 lags and 29 observations:
PPG 15-64 age → GDP: Prob. = 0.0032 (significant)
PPG 15-64 age → GDPPC: Prob. = 0.0023 (significant)
INFRA → PPG 15-64 age: Prob. = 0.0380 (significant)
TOP → FDI: Prob. = 0.0080 (significant)
PPG 15-64 age → FDI: Prob. = 0.0234 (significant)
REER → FDI: Prob. = 0.0063 (significant)
TOP → PPG 15-64 age: Prob. = 0.0027 (significant)
REER → PPG: Prob. = 0.0002 (significant)
Working-age population growth and GDP/GDP per capita: The working-age population growth together with GDP and GDP per capita increases shows a direct relationship to economic development. The past working-age population growth from ages 15 through 64 can provide insights about upcoming GDP and GDP per capita growth which exceeds what past GDP and GDP per capita data show. The demographic dividend theory receives economic support because increases in working-age population share or working-age population growth create conditions which drive economic development when the economy has capacity to use its increased workforce.

Infrastructure and working-age population growth: The relationship between infrastructure development and working-age population growth, the statement "PPG 15-64 age group does not Granger Cause INFRA" holds statistical importance because its probability value reaches 0.0380. The working-age population shows a direct relationship with infrastructure development because its previous growth patterns establish future development needs. Governments expand infrastructure systems which include roads and power systems and schools and health facilities in response to rising working-age population numbers because they establish higher infrastructure needs during current demographic pressures.

Working-age population growth and FDI: The relationship between working-age population growth and foreign direct investment, the statement "PPG 15-64 age group does not Granger Cause

FD" shows statistical significant because its probability value reaches 0.0234 is less than 0.05. The existing patterns of working-age population growth establish future foreign direct investment inflows. The presence of a younger and larger workforce makes a nation more appealing to foreign investors because they identify inexpensive labor and substantial markets. Demographic changes contain essential information which predicts future foreign direct investment because they influence the size and nature of the country s labor market.

Working-age population growth and REER, and TOP: The relationship between working-age population growth and real effective exchange rates and total open trade, the assessment shows "REER does not Granger Cause PPG 15 -64 age group: Prob = 0.0002 → REER → PPG 15-64 age group. The statement "TOP does not Granger Cause WAPG" shows a direct relationship because Prob = 0.0027 → TOP → WAPG. Past real effective exchange rate (REER) movements help predict working-age population growth. The exchange rate affects economic conditions which subsequently influence migration patterns and employment opportunities and fertility choices that ultimately determine working-age population growth. Past trade open.

Non-significant results: The study found no significant results. The GDP and GDPPC relationship does not show Granger causality because both variables depend on their past values. The INFL to GDP and INFL to GDPPC relationship shows no predictive value because inflation fails to forecast economic output and income while both relationships remain unbroken at 5% with two lagged periods. The INFRA to GDP and INFRA to GDPPC relationship shows no Granger causality because infrastructure does not connect directly to GDP or GDPPC, while any potential impact occurs through indirect pathways or because testing period combined with two lagged observations restricts the results. The framework shows no Granger causality between FDI and economic growth or income at any point in time. The REER to GDP and REER to GDPPC relationships demonstrate that exchange rate shocks fail to provide direct short-term forecasting abilities for GDP and GDPPC in your analysis. The INFL INFRA FDI TOP REER pairs show non-significant results because they fail to establish at least one of their testing directions. The non-significant results show that researchers cannot establish short-run predictive causality at 5% significance because they showed failed results at two lag points. The testing process proves that economic relationships do not exist between the two parties because the relationship remains undetected in this specific testing environment.

Table 10. Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.

GDPPC does not Granger Cause GDP	29	0.56712	0.5746
GDP does not Granger Cause GDPPC		0.76961	0.4743
INFL does not Granger Cause GDP	29	2.28407	0.1236
GDP does not Granger Cause INFL		0.69867	0.5071
INFRA does not Granger Cause GDP	29	1.51783	0.2395
GDP does not Granger Cause INFRA		0.23099	0.7955
FDI does not Granger Cause GDP	29	0.66474	0.5236
GDP does not Granger Cause FDI		0.69103	0.5108
TOP does not Granger Cause GDP	29	2.47633	0.1053
GDP does not Granger Cause TOP		0.50637	0.6090
PPG does not Granger Cause GDP	29	7.36289	0.0032
GDP does not Granger Cause PPG		0.58415	0.5653
REER does not Granger Cause GDP	29	0.05101	0.9504
GDP does not Granger Cause REER		0.01651	0.9836
INFL does not Granger Cause GDPPC	29	2.56651	0.0977
GDPPC does not Granger Cause INFL		0.84057	0.4438
INFRA does not Granger Cause GDPPC	29	1.82136	0.1835
GDPPC does not Granger Cause INFR		0.24532	0.7844
FDI does not Granger Cause GDPPC	29	0.75953	0.4788
GDPPC does not Granger Cause FDI		0.73120	0.4918
TOP does not Granger Cause GDPPC	29	2.78592	0.0817
GDPPC does not Granger Cause TOP		0.53688	0.5914
PPG does not Granger Cause GDPPC	29	7.93030	0.0023
GDPPC does not Granger Cause PPG		0.46327	0.6347
REER does not Granger Cause GDPPC	29	0.09886	0.9062
GDPPC does not Granger Cause REER		0.01667	0.9835
INFRA does not Granger Cause INFL	29	1.79154	0.1883
INFL does not Granger Cause INFRA		0.41694	0.6637
FDI does not Granger Cause INFL	29	2.92271	0.0731
INFL does not Granger Cause FDI		1.04431	0.3674
TOP does not Granger Cause INFL	29	2.95061	0.0715
INFL does not Granger Cause TOP		0.01351	0.9866

PPG does not Granger Cause INFL	29	2.15089	0.1383
INFL does not Granger Cause PPG		1.29533	0.2923
REER does not Granger Cause INFL	29	2.77017	0.0827
INFL does not Granger Cause REER		1.79802	0.1872
FDI does not Granger Cause INFRA	29	0.28166	0.7570
INFRA does not Granger Cause FDI		1.14459	0.3351
TOP does not Granger Cause INFRA	29	0.95618	0.3985
INFRA does not Granger Cause TOP		1.50474	0.2423
PPG does not Granger Cause INFRA	29	2.46774	0.1060
INFRA does not Granger Cause PPG		3.76069	0.0380
REER does not Granger Cause INFRA	29	0.91523	0.4140
INFRA does not Granger Cause REER		0.01485	0.9853
TOP does not Granger Cause FDI	29	5.94910	0.0080
FDI does not Granger Cause TOP		2.60844	0.0944
PPG does not Granger Cause FDI	29	4.41055	0.0234
FDI does not Granger Cause PPG		3.06626	0.0652
REER does not Granger Cause FDI	29	6.30868	0.0063
FDI does not Granger Cause REER		1.10880	0.3463
PPG does not Granger Cause TOP	29	2.05300	0.1503
TOP does not Granger Cause PPG		7.61433	0.0027
REER does not Granger Cause top	29	0.36653	0.6969
LNTOP does not Granger Cause REER		0.57806	0.5686
REER does not Granger Cause PPG	29	12.2540	0.0002
PPG does not Granger Cause REER		0.37031	0.6944

Source: Computed from Eviews 10 in 2026

4.5. Variance Decomposition and Impulse Response Function

In this study, impulse response and variance decomposition can help explain how GDP per-capita, foreign direct investment, trade openness, inflation, infrastructure, exchange rate, and population growth affect economic growth in Ethiopia across the study period. They allow the researcher to identify which variables have the strongest dynamic influence and which effects are short-lived or persistent. As a result, the analysis provided valuable evidence for economic

policy, especially in deciding which shocks require immediate intervention and which variables deserve long-term structural attention.

4.5.1.Variance Decomposition Results

Variance decomposition shows how much of the forecast error in GDP is explained by shocks from GDP itself and from the other variables over time. From Table 13, two main findings can be inferred: first, GDP growth is influenced more by some variables than others, and second, the relative importance of these shocks changes as the forecast horizon lengthens. Decomposition table (13). That is, the short run and the long run relationship or contributions. The researcher can see that in the short run , for instance in year three, impulse or innovation or shock to GDP accounts for 1.755 percent variation or fluctuation in GDP (or own shock). Meaning that the shock in GDP can cause 1.755 percent variation or fluctuation in GDP while shock to FDI can cause 1.86 percent fluctuation in GDP. In the long run, for instance in the tenth year, the shock to GDP accounts for 8.65 percent fluctuation in GDP (own shock) while the shock to FDI can cause 4.34 percent fluctuation in GDP. We can see from the table that the forecast error variance of FDI increases throughout the whole forecast period in very small amount. Hence, this implies that FDI has very small impact in the short-run but its impact increases or has a long-run impact on economic growth of Ethiopia.

Table 11. Variance Decomposition of GDP

Period	S.E.	GDP	INFL	INFRA	LNFDI	LNGDPPC	LNTOP	POP_GRATE	LNEXRT
3	24.93824	1.754783	28.12781	12.90239	1.861709	3.049640	52.27713	0.009412	0.017123
5	46.55764	3.286884	22.83783	14.14158	6.197626	5.974783	45.74149	0.273908	1.545906
8	79.50209	3.380868	44.17899	9.846497	4.665112	5.793241	28.07772	0.879978	3.177595
10	104.6506	8.653595	28.14880	14.20823	4.347572	5.300461	36.43266	0.566147	2.342541

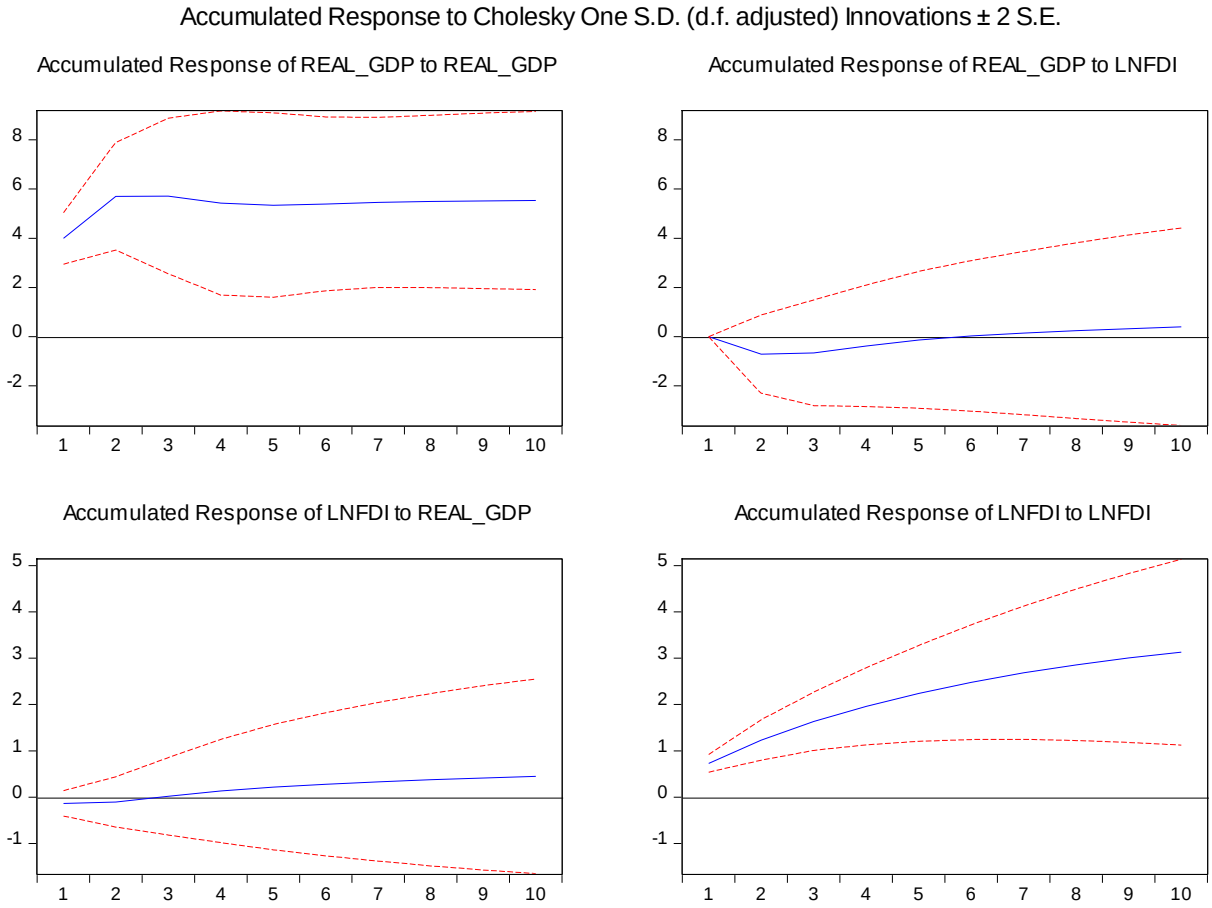
Source: *Computed from Eviews 10 in 2026*

4.5.2.Impulse Response Function Results

The impulse response function is a shock to a VAR system. The impulse response results show how GDP and FDI reactions develop through time following unexpected one period shocks to either GDP or FDI. When GDP receives a positive shock, its GDP response maintains an upward trend across the entire forecast period because the temporary economic activity boost results in an enduring yet decreasing growth impact. The positive GDP shock leads to FDI

which shows a negative trend throughout the forecast period because the high growth periods result in decreased FDI inflows as investors change their expectations while they deal with capacity limits and macroeconomic challenges after periods of successful growth. Positive shocks to FDI result in FDI increasing because its own growth patterns establish a self-reinforcing cycle which drives additional foreign investment after the initial increase. The FDI shock causes GDP to respond weakly at first but shows strong positive growth after five years because FDI creates economic growth in Ethiopia through its medium to long term effects, not through its immediate short term effects. The FDI effect on economic growth occurs through slow developing processes which include capital accumulation and technology transfer and learning effects, which need time to spread through the entire economy. It reveal three main points of evidence. First GDP shocks create permanent effects which maintain their impact on future GDP yet cause FDI inflows to decrease. Second, FDI shocks are persistent and support higher GDP only after several years, emphasizing the importance of patience in expecting growth payoffs from FDI attraction policies. Third, the dynamic pattern confirms that the FDI growth relationship in Ethiopia is not purely contemporaneous: FDI works more as a long run growth driver, while short run growth shocks can reshape the path of future foreign direct investment.

Figure 11: Impulse Response Analysis



Source: Own computation based on data from estimate (1994-2024)

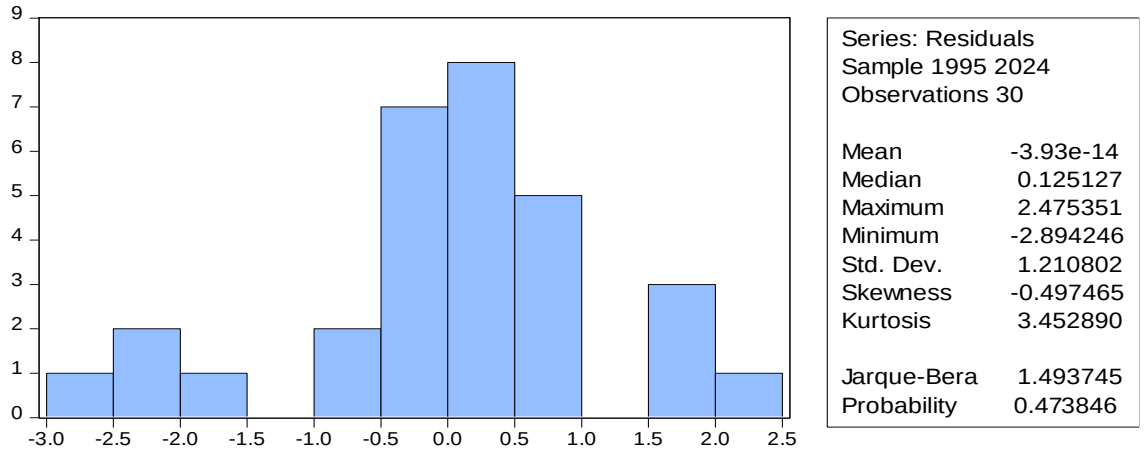
4.6. Diagnostic Statistical Tests

To evaluate the durability of the model, diagnostic tests are performed. The models' performances were assessed after they were estimated to determine whether the intended objectives had been achieved. For this inquiry, a number of common diagnostic tests were run, including the functional form, serial correlation, normality, and heteroscedasticity tests.

4.6.1.Normality Test Result

One statistical technique to determine whether a dataset has a normal distribution is the normality test. The Gaussian distribution, sometimes referred to as the normal distribution, is a symmetric, bell-shaped curve with particular characteristics, including mean and standard deviation. Normalcy checks are crucial in many statistical investigations to validate the soundness of the assumptions behind certain statistical tests. To find out if the data significantly deviates from a normal distribution, the study computes a Jarque-Perra statistic and generates a p-value. The null hypothesis was not rejected and it was determined that the data is normally distributed because the p-value from the normality test is greater than the selected significance level (0.05).

Figure 12. Normality assumption test



Source: Own computation based on data from estimate (1994-2024)

4.6.2.Autocorrelation Test Result

The Breusch-Godfrey test functions as a reliable Lagrange Multiplier diagnostic tool that assesses regression residuals for serial autocorrelation detection across multiple lag periods and first-order lagged dependent variable models through its process of residual extraction from original model estimation with OLS followed by residual regression against their lags and original predictors while testing the null hypothesis of zero lagged residual coefficients against the alternative of autocorrelation. The test offers better performance than Durbin-Watson because it allows testing of higher-order autoregressive models that use multiple lags. The asymptotically equivalent F-statistic of 3.410023 with Prob. F(2,15) = 0.06 (> 0.05) reinforces this non-rejection across small samples (n ≈ 29 observations after lags) as both low test values reflect residuals uncorrelated with their first lag.

The strong p-values which exceed critical levels confirm OLS assumption TS5 compliance with no serial correlation thus producing unbiased estimators with efficient performance and standard errors that correctly reflect t-test results and inference outcomes without Type I error inflation risks which previous models experienced. The FDI inflow to Ethiopia between 1994 and 1997 accounted for only 0.2% of total Sub-Saharan African inflows which remained significantly lower than previous years.

Table 12. Test of serial correlation result

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.410023	Prob. F(2,15)	0.0602
Obs*R-squared	9.376763	Prob. Chi-Square(2)	0.0092

4.6.3.Heteroscedasticity Test Result

The hypothesis of uniform variation, or whether the variance of each residual is constant, was tested using the F-statistical test or the Breusch-Pagan-Godfrey Lagrange multiplier (LM). Heteroscedasticity is likely to occur when the variance of the unobservable varies across multiple population segments with the explanatory variables. Heteroscedasticity has the drawback of causing changes in errors over time. The Breush-Pagan-Godfrey test was utilized in this investigation to assess heteroscedasticity. The model is not heteroscedastic, as shown in Table because the probability value of the Obs* R-squared (p-value 0.72) and F-statistic is more than the 5% level of significance.

Table 13. Result of Heteroskedasticity Test:

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.716391	Prob. F(12,17)	0.7179
Obs*R-squared	10.07555	Prob. Chi-Square(12)	0.6093
Scaled explained SS	3.968004	Prob. Chi-Square(12)	0.9840

Source: Own computation based on data From estimate (1994-2024)

4.6.4.Model Functional Form Test Result

The Ramsey RESET test evaluates a certain model's functional suitability by acting as a thorough specification test for the linear regression model. Rejecting the null hypothesis points to misspecification or, more precisely, non-linearity in the data. The Ramsey RESET test findings, as shown in Table 14, showed a p-value of 0.0554 above the 0.05 level of significance. The result of Ramsey RESET revealed that the relevant variables are included in the model. The null hypothesis in this case should be kept since it shows that the model has been well-specified and is free of bias from missing variables.

Table 14. Ramsey RESET Test for Model Specification

Ramsey RESET Test
Equation: UNTITLED
Specification: REAL_GDP REAL_GDP(-1) LNGDPPC LNGDPPC(-1) INFL INFRA LNFDI LNFDI(-1) LNTOP LNTOP(-1) POP_GRATE LNEXRT LNEXRT(-1) C
Omitted Variables: Powers of fitted values from 2 to 3

	Value	Df	Probability
F-statistic	3.529219	(2, 15)	0.0554

F-test summary:

	Sum of Sq.	Df	Mean Squares

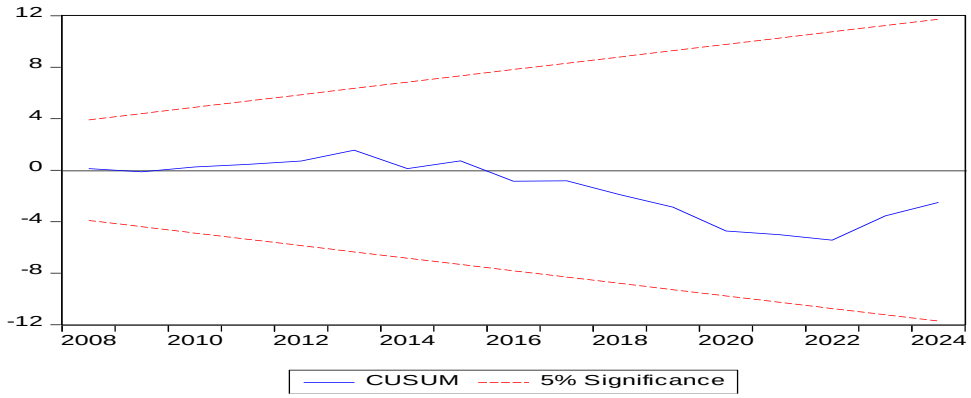
Test SSR	13.60437	2	6.802183
Restricted SSR	42.51523	17	2.500896
Unrestricted SSR	28.91086	15	1.927391

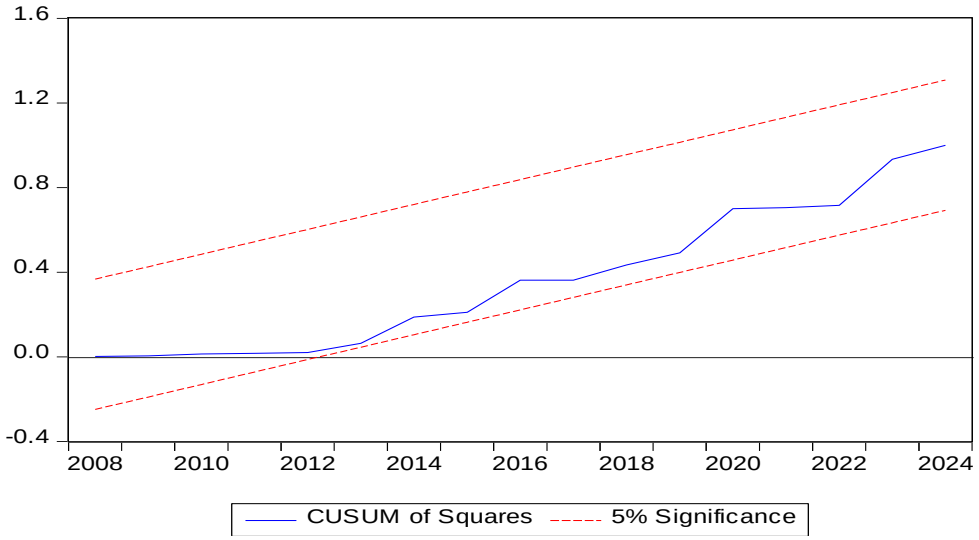
Source: Own computation based on data From estimate (1994-2024)

4.6.5.Stability Test

The cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares (CUSUMQ) can be used to test the model's stability. The plot of CUSUM and CUSUMQ is used to determine whether or not the model is stable, according to Brown & Forsythe (1974). The model that explains the power of the empirical analysis is dropped because the incorrectly described model results in skewed coefficients in time series. The ARDL model employed in this study uses these stability tests to verify that the parameter estimates are consistent (Kersan-Skabic & Orlic, 2007). The results of this investigation indicate that there is no structural instability in the model because the CUMSUM and CUMSUM SQUARE of the residuals are both determined to be under the 5% significance critical bounds. In order to estimate the short- and long-term relationships between the dependent variable and the included regressors, the model therefore seems to be in good health, stable, and efficient.

Figure 13. Stability test





Source: Own computation based on data From estimate (1994-2024)

UNIT FIVE

5. SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1.Main Finding

The study finds that foreign direct investment has an overall positive and negative role in long run and short run in Ethiopia's economic growth, but its effect depends on the macroeconomic environment and the time horizon considered. The study shows that FDI tends to support growth through capital formation, technology transfer, and employment, while variables such as trade openness, inflation, infrastructure, real exchange rate movements, and population dynamics shape how strongly that benefit is transmitted to the economy. The short-run results also show that some variables have mixed signs, which means economic growth in Ethiopia is not driven by FDI alone but by the interaction between investment flows and the broader policy environment.

5.2.Conclusion

The study concludes that FDI matters for Ethiopia's growth performance, especially when the economy is able to absorb foreign capital into productive sectors. The study repeatedly shows that stable macroeconomic conditions, stronger infrastructure, a competitive exchange rate, and supportive trade policy are important for converting FDI inflows into real economic growth Result on ARDL bounds test to co-integration technique reveals that there is a long-run relationship between economic growth as dependent variable, on one hand, and FDI. Furthermore, the short-run is positive and long-run models reveal that FDI is negatively related to economic growth in Ethiopia. The results cast doubts on the general conception that FDI in Ethiopia is contributory to the country's economic growth as the results of econometric models indicate negative relationships between FDI and economic in long run and positive in the short.

5.3.Policy Implications

The policy message is that Ethiopia should not only attract more FDI, but also improve the conditions that make FDI productive. This means maintaining macroeconomic stability, reducing inflation uncertainty, improving infrastructure efficiency, protecting exchange-rate competitiveness, and promoting export-oriented investment rather than relying mainly on market-seeking or import-intensive FDI. The study also implies that trade openness should be managed in a way that strengthens domestic capacity, because openness alone may not raise growth if local firms are not competitive enough.

The negative and significant effect of infrastructure on economic growth suggests that more spending alone is not enough. Policymakers should improve project selection, implementation, maintenance, and service reliability, while prioritizing infrastructure that directly lowers production costs and supports private sector activity, such as reliable power, efficient transport corridors, and digital connectivity. If these reforms are made, infrastructure investment can become a long-term growth driver rather than a short-term burden on the economy.

5.4.Recommendations

The study recommends that policymakers simplify investment procedures, strengthen institutions, and direct FDI toward sectors with strong linkages to the domestic economy such as manufacturing, agro-processing, logistics, and export services. The government should also improve infrastructure quality, not only quantity, because weak project efficiency can limit short-run growth gains. In addition, inflation control, exchange-rate management, and trade policy consistency are needed to ensure that foreign direct investment translates into sustainable economic growth rather than temporary output gains.

5.5.Further Research

Further research should examine the sectoral effects of FDI, because the economic growth impact may differ across agriculture, manufacturing, construction, and services. Future studies can also use quarterly data, sector-level data, or alternative econometric methods to test whether the short-run and long-run effects remain stable under different model specifications. It would also be useful to study how political stability, institutional quality, and peace and security conditions affect the FDI-growth relationship in Ethiopia, since the study shows these factors are important for attracting and benefiting from foreign investment.

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APPENDICES

	GDP	GDPPC	INFL	INFRA	LNFDI	LNPPG	LNREER	LNTOP
lean	7.632239	556412	12.6141	.79302	.06839	959056	682610	.66777
ledian	8.364086	486641	9.96997	3.27216	.95755	933814	466199	.98854
laximum	13.57260	.22182	44.3566	4.87198	.17240	055432	414026	3.96209
linimum	-3.458139	.442886	-8.4842	3.22075	5.46452	903291	698364	.99377
td. Dev.	4.088987	046294	12.0878	648455	682217	053370	736351	077993
kewness	-0.991725	.040392	0.66985	.208774	.462759	569320	659379	.325058
urtosis	3.706075	685313	3.27897	806640	430435	762590	400461	483307
arque-Bera	5.725464	199120	2.41882	064669	525442	652426	710649	517218
robability	0.057113	045069	0.29837	356174	466396	161022	257864	172284
um	236.5994	1.2488	391.037	35.584	2.1201	2.7307	3.16093	2.7008
um Sq. Dev.	501.5945	1.1748	4383.48	43.873	.89561	085451	5.26639	.86205
bservations								

l Hypothesis: GDP__CONSTANT0 has a unit root
ogenous: Constant
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		5.97330	1.000
t critical values:	1% leve	-3.67017	
	5% leve	-2.96397	
	10% leve	-2.62100	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	6.47E+
C corrected variance (Bartlett kernel)	1.73E+

l Hypothesis: GDP__CONSTANT0 has a unit root
ogenous: Constant, Linear Trend
ndwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		0.00661	0.994
t critical values:	1% leve	-4.29672	
	5% leve	-3.56837	
	10% leve	-3.21838	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	4.06E+
C corrected variance (Bartlett kernel)	4.06E+

l Hypothesis: GDP__CONSTANT0 has a unit root
ogenous: None
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

	Adj. t-Sta	Prob.
llips-Perron test statistic	11.5024	1.000

st critical values:	1% leve	-2.64430
	5% leve	-1.95247
	10% leve	-1.61021

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	6.83E+
C corrected variance (Bartlett kernel)	1.88E+

l Hypothesis: D(GDP__CONSTANT0) has a unit root
genous: Constant
ndwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		0.33142	0.976
st critical values:	1% leve	-3.67932	
	5% leve	-2.96776	
	10% leve	-2.62298	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	5.38E+
C corrected variance (Bartlett kernel)	2.09E+

l Hypothesis: D(GDP__CONSTANT0) has a unit root
genous: Constant, Linear Trend
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-3.39417	0.071
st critical values:	1% leve	-4.30982	
	5% leve	-3.57424	
	10% leve	-3.22172	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	3.59E+
C corrected variance (Bartlett kernel)	2.72E+

l Hypothesis: GDPPC has a unit root
genous: Constant
ndwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-3.64584	0.010
st critical values:	1% leve	-3.67017	
	5% leve	-2.96397	
	10% leve	-2.62100	

acKinnon (1996) one-sided p-values.

sidual variance (no correction) 13.153

l Hypothesis: INFL has a unit root
)genous: Constant
ıdwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-2.97691	0.048
st critical values:	1% leve	-3.67017	
	5% leve	-2.96397	
	10% leve	-2.62100	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	108.98
C corrected variance (Bartlett kernel)	103.23

llips-Perron Test Equation
)endent Variable: D(INFL)

l Hypothesis: INFRA has a unit root
)genous: Constant
ıdwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-2.21344	0.205
st critical values:	1% leve	-3.67017	
	5% leve	-2.96397	
	10% leve	-2.62100	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	33.708
C corrected variance (Bartlett kernel)	29.591

l Hypothesis: INFRA has a unit root
)genous: Constant, Linear Trend
ıdwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-2.12842	0.510
st critical values:	1% leve	-4.29672	
	5% leve	-3.56837	
	10% leve	-3.21838	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	32.961

C corrected variance (Bartlett kernel)	33.643

l Hypothesis: INFRA has a unit root
›genous: None
ıdwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-0.05244	0.657
;t critical values:	1% leve	-2.64430	
	5% leve	-1.95247	
	10% leve	-1.61021	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	40.088
C corrected variance (Bartlett kernel)	24.725

l Hypothesis: D(INFRA) has a unit root
›genous: Constant
ıdwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-4.90581	0.000
;t critical values:	1% leve	-3.67932	
	5% leve	-2.96776	
	10% leve	-2.62298	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	40.936
C corrected variance (Bartlett kernel)	27.559

l Hypothesis: LNFDI has a unit root
›genous: Constant
ıdwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-1.83915	0.355
;t critical values:	1% leve	-3.67017	
	5% leve	-2.96397	
	10% leve	-2.62100	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	0.5060
C corrected variance (Bartlett kernel)	0.4339

llips-Perron Test Equation

ɔendent Variable: D(LNFDI)
thod: Least Squares

l Hypothesis: LNFDI has a unit root
ɔgenous: Constant, Linear Trend
ndwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-3.15586	0.112
t critical values:	1% leve	-4.29672	
	5% leve	-3.56837	
	10% leve	-3.21838	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	0.4111
C corrected variance (Bartlett kernel)	0.4111

llips-Perron Test Equation
ɔendent Variable: D(LNFDI)

l Hypothesis: LNFDI has a unit root
ɔgenous: None
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		1.63641	0.972
t critical values:	1% leve	-2.64430	
	5% leve	-1.95247	
	10% leve	-1.61021	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	0.5766
C corrected variance (Bartlett kernel)	0.3039

llips-Perron Test Equation
ɔendent Variable: D(LNFDI)

l Hypothesis: D(LNFDI) has a unit root
ɔgenous: Constant
ndwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-6.35118	0.000
t critical values:	1% leve	-3.67932	
	5% leve	-2.96776	
	10% leve	-2.62298	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	0.5692
C corrected variance (Bartlett kernel)	0.4051

llips-Perron Test Equation
pendent Variable: D(LNFDI,2)

l Hypothesis: LNTOP has a unit root
genous: Constant
ndwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-1.07208(	0.713
t critical values:	1% leve	-3.67017(	
	5% leve	-2.96397	
	10% leve	-2.62100	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	0.0179
C corrected variance (Bartlett kernel)	0.0188

l Hypothesis: LNTOP has a unit root
genous: Constant, Linear Trend
ndwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-1.01839	0.926
t critical values:	1% leve	-4.29672	
	5% leve	-3.56837	
	10% leve	-3.21838	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	0.0176
C corrected variance (Bartlett kernel)	0.0206

l Hypothesis: LNTOP has a unit root
genous: None
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		3.35805	0.999
t critical values:	1% leve	-2.64430	
	5% leve	-1.95247	

	10% leve	-1.61021

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	0.0189
C corrected variance (Bartlett kernel)	0.0244

l Hypothesis: D(LNTOP) has a unit root
ogenous: Constant
ndwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-5.18736	0.000
st critical values:	1% leve	-3.67932	
	5% leve	-2.96776	
	10% leve	-2.62298	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	0.0192
C corrected variance (Bartlett kernel)	0.0214

l Hypothesis: LNPPG has a unit root
ogenous: Constant
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		1.21895	0.997
st critical values:	1% leve	-3.67017	
	5% leve	-2.96397	
	10% leve	-2.62100	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	1.80E-0
C corrected variance (Bartlett kernel)	7.49E-0

l Hypothesis: LNPPG has a unit root
ogenous: Constant, Linear Trend
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-2.92210	0.170
st critical values:	1% leve	-4.29672	
	5% leve	-3.56837	
	10% leve	-3.21838	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	5.56E-(
C corrected variance (Bartlett kernel)	1.87E-(

l Hypothesis: LNPPG has a unit root
ogenous: None
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		2.24073	0.992
st critical values:	1% leve	-2.64430	
	5% leve	-1.95247	
	10% leve	-1.61021	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	2.43E-(
C corrected variance (Bartlett kernel)	0.0001(

l Hypothesis: D(LNPPG) has a unit root
ogenous: Constant
ndwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-1.42687	0.555
st critical values:	1% leve	-3.67932	
	5% leve	-2.96776	
	10% leve	-2.62298	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	6.99E-(
C corrected variance (Bartlett kernel)	2.31E-(

l Hypothesis: D(LNPPG) has a unit root
ogenous: Constant, Linear Trend
ndwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		0.12651	0.996
st critical values:	1% leve	-4.30982	
	5% leve	-3.57424	
	10% leve	-3.22172	

acKinnon (1996) one-sided p-values.

sidual variance (no correction)	5.41E-(
C corrected variance (Bartlett kernel)	1.36E-(

l Hypothesis: D(LNPPG) has a unit root
›genous: None
ıdwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-0.62756	0.436
;t critical values:	1% leve	-2.64712	
	5% leve	-1.95291	
	10% leve	-1.61001	

acKinnon (1996) one-sided p-values.

;idual variance (no correction)	8.21E-(
C corrected variance (Bartlett kernel)	3.09E-(

l Hypothesis: LNREER has a unit root
›genous: Constant
ıdwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		3.06559	1.000
;t critical values:	1% leve	-3.67017	
	5% leve	-2.96397	
	10% leve	-2.62100	

acKinnon (1996) one-sided p-values.

;idual variance (no correction)	0.0056
C corrected variance (Bartlett kernel)	0.0063

l Hypothesis: LNREER has a unit root
›genous: Constant, Linear Trend
ıdwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		0.79945	0.999
;t critical values:	1% leve	-4.29672	
	5% leve	-3.56837	
	10% leve	-3.21838	

acKinnon (1996) one-sided p-values.

;idual variance (no correction)	0.0056
C corrected variance (Bartlett kernel)	0.0063

llips-Perron Test Equation
›endent Variable: D(LNREER)

l Hypothesis: LNREER has a unit root

›genous: None
ıdwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		5.89933	1.000
;t critical values:	1% leve	-2.64430	
	5% leve	-1.95247	
	10% leve	-1.61021	

acKinnon (1996) one-sided p-values.

;idual variance (no correction)	0.0061
C corrected variance (Bartlett kernel)	0.0081

llips-Perron Test Equation

l Hypothesis: D(LNREER) has a unit root
›genous: Constant
ıdwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-1.80972	0.368
;t critical values:	1% leve	-3.67932	
	5% leve	-2.96776	
	10% leve	-2.62298	

acKinnon (1996) one-sided p-values.

;idual variance (no correction)	0.0067
C corrected variance (Bartlett kernel)	0.0065

llips-Perron Test Equation

l Hypothesis: D(LNREER) has a unit root
›genous: Constant, Linear Trend
ıdwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-3.03263	0.141
;t critical values:	1% leve	-4.30982	
	5% leve	-3.57424	
	10% leve	-3.22172	

acKinnon (1996) one-sided p-values.

;idual variance (no correction)	0.0053
C corrected variance (Bartlett kernel)	0.0053

llips-Perron Test Equation
ɔendent Variable: D(LNREER,2)
thod: Least Squares

l Hypothesis: D(LNREER) has a unit root
ɔgenous: None
ıdwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Sta	Prob.
llips-Perron test statistic		-0.05588(	0.655
;t critical values:	1% leve	-2.64712(	
	5% leve	-1.95291(	
	10% lev	-1.61001:	

acKinnon (1996) one-sided p-values.

;idual variance (no correction)	0.0076
C corrected variance (Bartlett kernel)	0.0054

llips-Perron Test Equation

R Lag Order Selection Criteria
dogenous variables: GDP GDPPC INFL INFRA LNFDI LNTOP LNPPG LNREER
ɔgenous variables: C
:e: 03/02/26 Time: 21:46
mple: 1994 2024

uded observations: 29

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-192.557	NA	0.00014	13.8315	14.2087	13.9496
1	49.5982	334.007	7.67e-1	1.54494	4.93961	2.60811
2	179.434	107.450	2.72e-1	-2.99545	3.41669	-0.98725

ARDL Long Run Form and Bounds Test
Dependent Variable: D(REAL_GDP)
Selected Model: ARDL(1, 1, 0, 0, 1, 1, 0, 1)
Case 2: Restricted Constant and No Trend
Date: 04/22/26 Time: 22:50
Sample: 1994 2024
Included observations: 30

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.361347	31.53942	-0.296814	0.7702
REAL_GDP(-1)*	-1.136272	0.106847	-10.63453	0.0000
LNGDPPC(-1)	11.34064	3.598459	3.151528	0.0058
INFL**	-0.076115	0.037799	-2.013678	0.0602

INFRA**	-0.299838	0.091386	-3.281007	0.0044
LNFDI(-1)	-1.573682	0.644651	-2.441140	0.0259
LNTOP(-1)	0.613424	0.233656	2.625328	0.0177
POP_GRATE**	3.009745	6.374317	0.472167	0.6428
LNEXRT(-1)	-7.867799	3.281331	-2.397746	0.0283
D(LNGDPPC)	79.30617	8.249160	9.613849	0.0000
D(LNFDI)	-0.450671	0.612664	-0.735592	0.4720
D(LNTOP)	0.076095	0.173639	0.438238	0.6667
D(LNEXRT)	-16.80203	7.330724	-2.292002	0.0349

* 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.
LNGDPPC	9.980576	2.792717	3.573787	0.0023
INFL	-0.066987	0.034081	-1.965513	0.0659
INFRA	-0.263879	0.078477	-3.362516	0.0037
LNFDI	-1.384953	0.562749	-2.461051	0.0248
LNTOP	0.539857	0.202313	2.668418	0.0162
POP_GRATE	2.648790	5.632289	0.470287	0.6441
LNEXRT	-6.924224	2.588857	-2.674626	0.0160
C	-8.238652	27.69639	-0.297463	0.7697

EC = REAL_GDP - (9.9806*LNGDPPC -0.0670*INFL -0.2639*INFRA -1.3850 *LNFDI + 0.5399*LNTOP + 2.6488*POP_GRATE -6.9242*LNEXRT -8.2387)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	19.81827	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9
			Finite Sample: n=30	
Actual Sample Size	30			
		10%	2.277	3.498
		5%	2.73	4.163
		1%	3.864	5.694

ARDL Error Correction Regression
Dependent Variable: D(REAL_GDP)
Selected Model: ARDL(1, 1, 0, 0, 1, 1, 0, 1)
Case 2: Restricted Constant and No Trend
Date: 04/22/26 Time: 22:34
Sample: 1994 2024
Included observations: 30

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPPC)	79.30617	4.923974	16.10613	0.0000
D(LNFDI)	-0.450671	0.318948	-1.412990	0.1757
D(LNTOP)	0.076095	0.107042	0.710892	0.4868
D(LNEXRT)	-16.80203	2.463523	-6.820327	0.0000
CointEq(-1)*	-1.136272	0.070159	-16.19570	0.0000

R-squared	0.931298	Mean dependent var	0.147427
Adjusted R-squared	0.920305	S.D. dependent var	4.619424
S.E. of regression	1.304074	Akaike info criterion	3.519875
Sum squared resid	42.51523	Schwarz criterion	3.753408
Log likelihood	-47.79813	Hannan-Quinn criter.	3.594584
Durbin-Watson stat	2.977714		

Long run

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPPC	9.980576	2.792717	3.573787	0.0023
INFL	-0.066987	0.034081	-1.965513	0.0659
FRA	-0.263879	0.078477	-3.362516	0.0037
FDI	-1.384953	0.562749	-2.461051	0.0248
TOP	0.539857	0.202313	2.668418	0.0162
POP	2.648790	5.632289	0.470287	0.6441
REER	-6.924224	2.588857	-2.674626	0.0160
C	-8.238652	27.69639	-0.297463	0.7697

EC = REAL_GDP - (9.9806*LNGDPPC -0.0670*INFL -0.2639*INFRA -1.3850
*LNFDI + 0.5399*LNTOP + 2.6488*POP_GRATE -6.9242*LNEXRT
-8.2387)