



**Addis Ababa University**

**College of Business and Economics**

**Masters of Business Administration**

**Factors Affecting Investment in Real Estate in Ethiopia**

**A Thesis Submitted to Addis Ababa University in Partial Fulfillment of  
the Requirements of the Award of a Master of Business Administration**

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**Addis Ababa, Ethiopia**

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# DECLARATION

As the signatory, I thus declare that this research effort is entirely unique. The Addis Ababa University College of Business and Economics is the only place it has been submitted to meet a portion of the requirements for a master's degree in business administration.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

ADFAugmented Dickey-Fuller

ADLI Agricultural development lead industrialization

AICAkaike information criteria

ARCH Autoregressive conditional heteroskedasticity

ARDL Autoregressive distributed lag model

CUSUM Cumulative sum control chart

DFDickey-Fuller

ECAEconomic Commission for Africa

ECM Error Correction Model

EGARCH Exponential generalized autoregressive conditional heteroskedasticity

EIC Ethiopia Investment Commission

GDP Gross Domestic Product

GNP Gross National Product

IHDP Integrated development Program

OLS Ordinary Least Square

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## ABSTRACT

*This study aims to investigate the variables influencing real estate investment in Ethiopia. To help investors, clients, and managers make the best possible investment decisions in Ethiopia's real estate market, the researcher offers fundamental information. Five factors were chosen by the researcher with the expectation that they would influence real estate investing. In addition to using time series data from 1996 to 2023, the secondary data utilized for analysis was sourced from the World Bank, the Ethiopian Investment Commission, the National Bank of Ethiopia, and Census reports. Eviews 10 was utilized for a fast and precise data analysis. For the study variables, the Autoregressive Distributed Lag Model (ARDL) and Error Correction Model (ECM) are suggested and used in the research. The findings of the research indicate that there is a statistically positive relation between GDP growth, urban population growth and real estate investment in short term, but not significant in a long-term one. Conversely, in the short term, real estate investment is negatively impacted by inflation and exchange rates, which is significant. The lending interest rate exhibits an insignificant negative impact over the short term, but a positive statistically significant effect in the long term. According to the study's findings, every period, the system will be adjusted to return to equilibrium by 71.68% of its initial deviation. Long-term causal relationships have been demonstrated between real estate investment and GDP growth, interest rates, inflation rates, and exchange rates, as well as urban population growth.*

*Keywords: real estate investment, urban population, GDP growth, lending interest rate, inflation rate, exchange rate*



## CHAPTER ONE

### INTRODUCTION

The goal of this study is to examine how Ethiopian real estate investment is affected by factors such as urban population growth, GDP growth, interest rates, inflation rates, and Exchange rates.

Background of the study, statement of the problem, research question, objective of the study, significance of the paper, scope of the paper, limitation of the paper, and organization of the paper are all contained under this chapter

#### 1.1.BACKGROUND OF THE STUDY

Varied economists have given varied definitions of the word "investment," Investment, according to Bodie, Kane, and Marcus (2004), is existing resources commitment with the hope of gaining more resources later. Investment, according to Levene (2010), is anything done with savings to increase it over time. Before you can invest, you must first save. Both saving and investing are possible, but investing is only possible after having saved up some money to do so.

Actual, physical property is referred to as real estate. The term "real" comes from the Latin word "res," meaning "things." Some say it comes from the Latin word rex, which means "royal," since in the past, kings ruled over the entirety of the territory that made up their domains. Real estate is the property, land, buildings, air rights above the land and underground rights below the land (Amadeo, 2019). According to Amadeo (2019), there are several sorts of real estate investments, including land, commercial, industrial, and residential real estate. Real estate investment involves different activities ranging from management, ownership, purchase, rental or sale of real estate for profit (Okumu, 2010). According to Mark (2003), Property development is quite risky, with numerous risks seen throughout the property development process.

Private public (direct ownership), publicly traded equity (indirect ownership claim), private debt (direct mortgage lending), and publicly traded debt (securitization mortgages) are the four main types of real estate investments. (CFA Institute, 2023)

Real estate investment refers to the business of renting, selling or buying building, housing or land, it is also defined as a branch of finance that deal with investing money or wealth in property for the purpose of generating return (Cummings, 2005). Ekenta (2009) defined that real estate investing, a capital investment is made in land and any permanent structures or improvements that are permanently affixed to the land with the hope of receiving a return in the form of a regular income, a gain from a value increase, or both.

Ethiopia's real estate market is rapidly growing and presents a number of opportunities for investors and homebuyers. With over 110 million people living in the nation and an urban population that is rising at a rapid pace, there is an increasing demand for residential and commercial real estate. The government's emphasis on urbanization and the creation of new cities is one of the main forces driving the Ethiopian real estate market. To support the growth of new cities, the government is investing in infrastructure, transportation, and other public facilities, which in turn draws real estate investment. The growing number of foreign investors is another factor driving the growth of Ethiopian real estate. Ethiopia saw \$2.2 billion in foreign direct investment in 2020, according to the World Bank, a sizable portion goes toward the real estate development. It's market also expanding through the favorable microeconomic and demographic trends in the nation. According to the IMF, Ethiopia's economy will expand by 7.5% in 2023. Affordable residential housing is in extremely high demand in Ethiopia (World Bank, 2020).

DiPascal and Wheaton's model (1992) concludes a demand for real estate assets is affected by productive economy positively.

According to survey data, Chin, Dent, and Roberts (2006) in Southeast Asian cities find that a region's capacity to attract international real estate investments is regarded to be largely dependent on having a good economic structure and an expected robust and stable economy.

Currently, Ethiopia has 630 real estate investments totaling 3.5 billion birr in investment capital. Approximately 117 companies have applied for investment licenses to invest in 56 different real estate projects since 2015, according to data from the Ethiopian Investment Commission. One hundred and ninety-nine percent of the 117 are owned by Ethiopians or are joint ventures with foreign investors. Some remained wholly foreign-owned. (Endeshaw, 2007)

One of the areas of Ethiopia's economy that is expanding the fastest is the real estate industry. It has lately grown at a rate of 10% annually, which considerably boosts the nation's GDP. In actuality, services sector's grant from real estate and related business activities is more than 11% of the services sector and have the highest growth rate.

The author of this study aims to present factors affecting real estate investment in Ethiopia. This paper demonstrates the factors affecting investors' opinions on the surge in real estate investment. This particular research may be used as an input for academics and comparison by government agencies, real estate investors, and newcomers.

## 1.2.STATEMENT OF THE PROBLEM

In both industrialized and developing countries, housing plays a critical role in defining the degree of development of a nation, both in urban and rural regions. In order to guarantee that every member of a society has a place to live, housing can be seen as having both social and economic responsibility. Housing contributes significantly to a country's wealth and is essential for economic growth and sustainable development (Aluko, 2004).

A particular economy's average price of its goods and services rising over a predetermined time period is referred to as its inflation rate. Property is worth more in demand it is. The deposit and lending interest rates continue to be part of the official rates set by the central bank in the credit activities between financial institutions, businesses, and residents.

When the value of the local currency is increasing, foreign investors usually flood the real estate market. This is so that, should the value of foreign currency start to rise relative to that of a target country, foreign investors will have greater purchasing power and be able to buy more real estate..

Ethiopia had a population of 126,527,060 as of July 1, 2023. The population density in the nation is 126.5271 people per square kilometer. With a year-over-year population growth rate of 2.513%. The most recent statistics indicate that Ethiopia's population will grow by 3,205,715 people the following year. By 2024, Ethiopia will have 129,719,719 people in its population. There is a constant need for housing in Ethiopia due to the country's growing urban

population. To meet the growing demands of the populace one way to supply for the increasing demand is to highlight real estate.

There has been different studies that address the factors that affect real estate investment. Eyerusalem (2021) studies in Ethiopia, concludes that inflation has no significant impact on real estate investment. Using OLS multiple regression to analyze data from 1994 to 2019, it is found that however lending interest rates have a negative impact on real estate investment. Urban population, GDP, and exchange rate have positive effects. On the other hand, inflation has little bearing on the capital growth of real estate investments. Furthermore, research indicates that one of the key factors influencing real estate investment is the rate of inflation.

Richard U., Dr. Sunday S., Dr. Valliappan R (2019) made an article about the demographic effect on real estate performance by applying OLS multiple regressions to analyze data from 1980-2017 in Nigeria, suggest that inflation and GDP have a significant positive impact on the real estate sector's performance while exchange rate has significant negative effect. A. O. Diala, I. U. Kalu, A. Igwe-Kalu (2017), when they apply the EGARCH model to a study conducted from 2000 to 2010, they find that while exchange rate volatility has a significant positive impact on low income residential real estate investment returns in Nigeria

Nzalu (2012) in Nigeria, conclude that GDP is the most significant factor that affect real estate investment. Similarly interest rate and inflation rate have a positive effect while population growth has insignificantly negative effect. Athukorala (1998) draws the conclusion that an increase in interest rates promotes investment and saving based on data from India.

The above listed findings of previous research had a conflict finding, therefore the overall objective of this study is to clarify this and to investigate the major determinants of real estate investment utilizing the advice and guidelines from more current studies. Therefore, these elements are chosen as the independent variables, along with urban population growth, GDP growth, interest rate, inflation rate, and exchange rate, all of which show how each affects the dependent variable, which is real estate investment. Additionally, this study uses time series data from 1996 to 2023 to examine its effects on real estate investment using these particular characteristics.

### 1.3.RESEARCH QUESTION

- What is the effect of urban population growth on investors to invest in real estate in Ethiopia?
- What is the effect of economic growth (GDP growth) on investors to invest in real estate in Ethiopia?
- What is the effect of interest rate on investors to invest in real estate in Ethiopia?
- What is the effect of inflation rate on investors to invest in real estate in Ethiopia?
- What is the effect of exchange rate on investors to invest in real estate in Ethiopia?

### 1.4.OBJECTIVE OF THE STUDY

#### 1.4.1. GENERAL OBJECTIVE

The general objective of the study is to determine factors that affect investment in real estate in Ethiopia.

#### 1.4.2. SPECIFIC OBJECTIVES

- To determine the effect of urban population growth on investors to invest in real estate in Ethiopia
- To determine the effect of GDP growth on investors to invest in real estate in Ethiopia
- To determine the effect of interest rate on investors to invest in real estate in Ethiopia
- To determine the effect of inflation rate on investors to invest in real estate in Ethiopia
- To determine the effect of exchange rate on investors to invest in real estate in Ethiopia

### 1.5.SIGNIFICANCE OF THESTUDY

Since it could offer details on variables influencing real estate investment in Ethiopia, this research study is quite advantageous to the government and real estate sectors in that country. The study's findings give information on real estate investment determinants and explain how those aspects may influence real estate investment. Brokers and real estate investment companies will use the study's findings to better understand the variables influencing the real estate market.

The results are a source of knowledge for scholars. The findings hold great significance for scholars as they establish a basis for subsequent inquiries into the real estate sector. If research groups and academics want to conduct additional research in this topic and adjacent fields, background information has been provided.

Lending institutions benefit from the study's findings on mortgage availability and interest rates, which influence real estate businesses' decisions to invest in buildings. The study raises public knowledge of the government and helps people comprehend how it influences the real estate sector. This makes it easier to create effective policies. In order to improve upon existing studies and close any gaps, it can also be utilized to supplement them.

#### 1.6.SCOPE OF THE STUDY

Urban population growth, GDP growth, interest rates, inflation, and exchange rate are five independent factors that the study specifies in order to demonstrate their influence on real estate investment. For the sectorial research of the macroeconomic elements and the demographic statistics, data was collected from the Ethiopian Investment Commission, National Bank of Ethiopia, census report, and World Bank using time series data from 1996 to 2023.

Using real estate investment data obtained from the Ethiopian Investment Commission between 1996 and 2023, the study period was chosen. Analysis is then carried out over a 28-year period to capture the effects of all the influential components given all the information available for the Ethiopian case.

#### 1.7.ORGANIZATION OF THE STUDY

There are five chapters in this paper. The first chapter will cover introduction, the problem statement, the objective, the study's scope, and the paper's significance, while chapter two will cover the entire literature review, which is broken down into empirical and theoretical reviews and includes conceptual framework and research gaps. The third chapter provides a general overview of the study process, outlining the research strategy, methodology, data gathering techniques, and tools employed. The fourth chapter covers the study's execution procedure, the results of the analysis of the data that was gathered, and a discussion of the study. The final section of the paper's conclusion and recommendations found in the fifth chapter.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1.THEORETICAL REVIEW

In this section, the study's theoretical components are discussed. The idea of real estate investment is covered by a lot of theories.

Rising demand for housing in Ethiopia, particularly in Addis Ababa, has proven problematic. The government has implemented several housing techniques and regulations, such as the integrated development Program (IHDP), as a response to the increased housing demand. Whether or not it works as planned, the IHDP is the government of Ethiopia's most well-known current strategy for addressing the housing crisis facing low- and middle-income groups in society. For almost a century, the rapidly growing capital of Ethiopia has faced challenges in providing adequate and appropriate housing, particularly for its lower- and middle-class citizens. Early 2000s surveys carried out in the context of Addis Ababa's proposed reform mirrored the city's broader housing history, exposing a severe housing scarcity, mostly for low-income households, and the general bad state of the city's existing housing stock. In a similar vein, single-story shelters made up more than 95% of all dwelling units, which indicates severe deficiencies in amenities for cooking, cleaning, and personal hygiene (Paul and Emily, 2010). The disparity between Ethiopia's supply and demand for high-quality housing may even present a business opportunity for the private sector interested in the substantial real estate, typically residential construction. Kesto D. (2015)

As revealed in 2019 by the UN Economic Commission for Africa (ECA), Urbanization in Ethiopia is increasing and is estimated to triple, with the urban population projected to exceed 42.3 million by 2037. This increase in urbanization in the country in general and in Addis Ababa in particular has created a housing shortage. Addis Ababa's housing sector has been an old challenge. The rapid growth of Ethiopia's capital, Addis Ababa, has long made it a challenge to provide adequate housing, especially for its poor residents. Surveys conducted under the first planning reform of Addis Ababa in the 21st century, which reflected the overall housing history of the city, revealed that the housing shortage is endless.

The degree of risk that investors accept is greatly influenced by a variety of demographic parameters, including age, marital status, educational background, employment, and the like (Dhiraj Jain & Nikhil Mandot, 2012). Research by Chi-Wei Su, Hsu-Ling Chang, Tie-Ying Liu, and Chien-Chi Chu (2018) Real estate development and urbanization in China are favorably associated. The author employed urban population growth as an independent variable to examine its impact on the dependent variable.

The country's housing supply is not keeping up with the demand for brand-new homes. Ethiopia has one of the highest percentages of urban residents living in informal settlements when compared to other sub-Saharan African nations (World Bank, 2015).

According to Dejene (2015), the fulfillment of one's primary human right—the right to housing—is a prerequisite for the enjoyment of all other rights.

Worldwide, real estate investing is one of the investments that yields enormous returns for investors (Baum and Crosby, 1998). With about 461 real estate businesses, the USA is a global leader in real estate investment (UN-HABITAT, 2018). The nation's economic production benefited from \$1.15 trillion in real estate building. That amounts to 6.2% of the GDP of the United States (Amadeo, 2019). The growing global population is driving up demand for real estate globally on a daily basis (Knight Frank, 2012).

As Jose Camilo Otorola Castro (2008) so eloquently puts it, real estate investment is turning into a global concern since it addresses the shortage of housing in cities. Furthermore, the swift urbanization occurring in certain states, such as Ethiopia, is drawing foreign real estate.

Between half and three quarters of the developed world's national wealth is made up of real estate (WB, 2011). In developing nations, investments in it account for between 10 and 30 percent of gross capital creation, and 2 to 8 percent of the GNP (Sisay, 2006).

Due to its crucial function and contribution to the national economy and socioeconomic growth of the country, real estate investment receives significant attention. (Sunday S. Akpan, Richard Ugochukwu Elile, & Liappan Raju, 2019). The real estate industry has a positive impact on the economy because it creates jobs, provides housing, raises incomes, and—most importantly—lowers poverty. et al., Mukhtar (2016). The real estate market is not significantly impacted by actual GDP (Bouchouicha and Ftiti, 2012). Growth and higher production are the outcomes of increased real output (Ewing and Payne 2003). A robust economy will boost the real estate market. Vietnam's economic growth is impacted by the real estate industry (Nguyen My-Linh Thi et al., 2019).

According to UN-Habitat, estimation, Ethiopian cities advanced close to 40 percent of the national GDP but the role of the principal sector in the urban areas so-called real estate sector did not have a significant contribution (MUDHCo, 2015). Ethiopia did not place much attention on the real estate industry, despite the fact that it has a multifaceted impact on the economy.

Ethiopia is among the developing nations that devotes a relatively small portion of their national income roughly 2.5 percent to the housing sector due to practical issues with housing investment. This amount is less than the 6 percent GDP minimum criterion that the UN has established for developing nations (Esayas, 2008).

As Eshete and Teshome (2015) explained, under the socialist regime, government spending in the real estate sector accounted for only 8.3 percent of economic services. Not only in this system but also under the current government, from 1992 to 2004, the sector expenditure is 8.8 percent, showing only a measly 5 percent growth in 12 years. However, the housing problem has very recently become one of the focal points due to natural growth, migration, economic policies, industrialization of agricultural development (ADLI) due to industrial momentum and other factors (mainly political motives). Government as a result, the government recently paid attention to urbanization and the development of housing for city dwellers.

Solnik (1999) asserts that investors who try to make investments abroad encounter ownership restraints based on particular government policies, management and commercial activity limitations, and legislative constraints. D'Arcy and Keogh (1998) posit that the real estate market in each country is influenced by several factors, including planning legislation, urban policy, and the landlord-tenant relationship. Active management of assets can be difficult due to different administrative and fiscal regimes, valuation standards, and practices within the real estate market, as discovered by D'Arcy and Keogh (1998).

Interest rate fluctuation has a significant impact on investment. Among other investments, real estate is regarded as a low-liquidity asset that relies primarily on cash flow and requires a sizable initial investment before gaining access to additional financing. A. M. Masika (2010). It is found that there is a substantial positive correlation between the depository interest rate and real estate performance. Anthony B. Sanders, Patric Hendershott, and K.C. Chan (1990). Based on specific characteristics, interest rates are the most important macroeconomic variables for explaining the average fluctuation in REIT returns.

The IMF reported that there is a negative correlation between interest rates and real estate prices (2003). The price of real estate and interest rates are found to be negatively correlated. According to Bioreri (2015), interest rates have a major positive impact on Kenyan real estate performance. The cost of buying a house is influenced by interest rates (Andrew, 2004).

Inflation is essentially a major concern for investors, and because of this, many investors look for investments that will shield them from inflation. Real estate is one of the most well-known and well-known inflation hedges because it protects investors from the consequences of inflation. (Jack Rubens, James Webb, and Michael Bond, 1989).

A study carried out in China, Singapore, and Japan found a negative correlation between real estate investment and inflation. Hao Fang and associates (2016). Domestic inflation rate, macroeconomic instability as measured by econometric analysis, and political instability as measured by survey do not significantly affect private investment.

Inflation has a detrimental impact on Ghana's real estate market. 2019; Kwame et al. study at 2019 by Sunday et al., increasing real estate investment is a complex and challenging goal. According to David et al. (1997), the rate of inflation has an impact on real estate return. According to Bradley et al. (2003), an inflation shock reduces the expected return on real estate investments.

In Nigeria, the return on real estate investments is positively correlated with fluctuations in exchange rates (A.O. Diala, I.O. Kalu & I. Igwe-Kalu, 2017).

Real estate prices are impacted by exchange rates (Chitty, 2015). The real estate industry is greatly impacted negatively by exchange rates (Gunjan 2013). The impact of a foreign currency on Ethiopia's economy is considerable. Alam Minhaj Additionally, according to studies by Karsten Lieser et al. (2013), the exchange rate is proven to be influential. Gedifew Sewenet Yigzaw, (2020) states that the exchange rate has no effect on real estate housing (Kwame Adu Jack, Frimpong Okyere, and Emmanuel K. S. Amoah, 2019). (Noor Ul Haq Sookia 2020; Warren Moraghen, Boopen Seetanah, and Hwee L. Loh (2005) and Kwame Addae-Dapaah.

## 2.2.EMPIRICAL REVIEW

Numerous research was done in an effort in advance of identify the variables that influence real estate investing. The examined issue, which is a real estate investment factor in Ethiopia, is related to these studies in one way or another. Ethiopia is one of the nations that is rapidly urbanizing worldwide. With the rise and development of Addis Ababa and other cities in recent years, urbanization has reached previously unheard-of levels of growth (Mathewos asfaw, 2011).

Despite the various social and economic issues associated with urbanization, the lack of housing in developing nations has reached previously unheard-of levels, contributing to an exceptionally high proportion of slum dwellers who live in unapproved housing without permission or property rights (UNFPA, 2007). Ethiopia must create a formal housing system with integrated housing development and real estate development in order to meet the demands of this informal increase. One of the areas of the Ethiopian economy that has grown the fastest is the real estate sector.

The Addis Ababa residential real estate market is changing, with a big number of government-built condominiums (which seem to be for lower-class groups), housing cooperatives' mid-market constructions, and mostly high-end properties constructed by developers or homeowners. Most real estate developers only engage with high-income clients because there are little incentives to build low-income properties. Still, there is a severe housing shortage in Addis Ababa.

Encouraging a diverse range of people to find housing is the aim of real estate development. The rise in urban population will result in higher demand for commercial or residential real estate. Increasing urbanization, according to Sirya (2017), has a favorable impact on real estate investment decisions due to increasing demand for commercial space, homes, and workplaces.

With 73,918,505 people living in the nation overall, its population is growing at a pace of 2.6%. Only 16% of the country has become urbanized, which is quite low when compared to other nations. The population of the primate city of Addis Ababa is 2,738,248 and its growth rate is 2.1% (census result 2007). From everywhere in Ethiopia, there is an enormous influx to Addis Ababa. In an effort to live better, people keep moving to Addis. Given that more individuals are searching for homes, as more and more people search for real estate for sale or rental, Addis Ababa's real estate market benefits.

The overall growth or decrease of a nation's economy is significantly influenced by the real estate sector's growth or decline.(Gaspareniene *et al.*, 2014). The real estate market with dramatic multiplier effect is a key economic indicator plays a very important role in any economy (Golob *et al.*, 2013). Since real estate is typically a household's largest investment in most nations, real estate price risk may be seen as the main risk they face. (Glindro *et al.*, 2011).

To ascertain the determinants of commercial real estate investments, Lieser and Groh (2011) carried out the research using a particular set of panel data series for 47 nations from 2007 to 2009. The study examined time series and cross-sectional analytic approaches to look at how institutional, social-economic, and demographic factors affected commercial real estate investment activity. This study's findings suggest that rising economic activity, urbanization, and

associated demographic traits encourage real estate investment. Additionally, it was noted that the desire of real estate investors is reduced by issues with social and cultural problems, administrative hurdles, and political instability of nations.

Muli (2013) did research on the factors influencing the growth of real estate investment in Kenya. The analysis examined variables such as GDP growth, the effect of interest rates, inflation rates, and population increase. Both a quantitative and a descriptive research approach were employed in the study. Real estate investors made up the study demographic, while both private and public property investors made up the study's target audience. Data from several Economic Surveys and Kenya Statistical Abstracts Issues were used to study the rental and real estate markets. The data was examined using SPSS. The investigation's results, as assessed by Pearson correlation coefficients, showed that the GDP had the highest percentage at 83%, followed by a growth in inflation at 78% and interest rates at 75%. With a value of 29%, population growth had the least impact on the rise in real estate investment.

### 2.3.SUMMARY OF LITERATURE REVIEW AND KNOWLEDGE GAP

The number of individuals has increased as a result of a growing middle class and improved standards of living looking to buy a home in order to meet this demand, developers are building townhouse and apartment complexes as well as other affordable housing projects in the major cities. Ethiopia's commercial real estate market is growing as well, thanks to the nation's growing economy and business population. To meet the rising demand for commercial properties, major cities are developing office buildings, shopping malls, and hotels.

More than ever, the government must meet a basic human need as a result of the civil war and COVID-related mass migration to Addis Ababa. The construction of condominiums for people with lower incomes is a government priority, but the pace it is getting built is not quick enough to meet demand.

Investors are unable to make the expected profits due to inflation. Investors' value of corporate earnings declines as inflation rises. In addition, borrowers benefit from inflation because debt repayments are made with less money. A study on housing returns, real estate investment returns, and inflation in the US, UK, and Korea was conducted in 2013 by Hong, Khil, and Lee. Different methods were used in the study to determine the positive and negative effects of inflation on housing returns.

The research findings showed that housing returns had an impact on inflation and that this impact was generally determined to be highly positive in all three nations. Investments in real estate are significantly impacted by inflation. Due to a rise in the property's resale value over time, high inflation, particularly in Ethiopia, makes real estate investments more alluring. Rents rise in tandem with an increase in property value brought on by inflation, allowing real estate companies to maximize their income as prices rise overall. As the country's economic hub, Zanzibar Town and the surrounding region attracts the majority of businesses.

The use of literature reviews revealed that various studies on the factors influencing real estate investment had been conducted. To the best of the researcher's knowledge, not many comprehensive studies examining the factors influencing real estate investment have been carried out in developing countries. The majority of these studies, which have been done in developing nations, have produced inconsistent results. To bridge this gap and address the conflicting findings, this study will focus on the variables influencing investment in Ethiopia's real estate market. In order to get new, accurate information on the factors impacting real estate investment in Ethiopia, this study will employ five variables.

#### 2.4.STATEMENT OF HYPOTHESIS

In order to investigate the conflicting findings of these studies, and combining a theoretical and empirical review, the purpose of this paper study is to test the following hypothesis.

H1: Urban population growth improves the value of real estate investments by increasing the demand for housing. This particular study examines Ethiopia's urban population growth using time series data from 1996 to 2023 to examine how it influences real estate investment capital growth.

H2: Growth of real estate investment capital is positively impacted by GDP growth. As a result, the analysis of Ethiopia's GDP growth data from 1996 to 2023 is used in the study to determine how it may have an impact on real estate investment capital.

H3: The increase of capital in real estate investments is negatively impacted by lending interest rates. This is taken into consideration when determining the impact of interest rates on real estate investment in Ethiopia using time series data from 1996 to 2023.

H4: The growth of capital in real estate investments is negatively impacted by inflation. In order to ascertain the impact of inflation rate on real estate investment in Ethiopia, the study analyzes time series data on inflation from 1996 to 2023.

H5: The growth in capital for real estate investments is negatively impacted by exchange rates. Thus, the impact of exchange rates on real estate investment is ascertained using data from 1996 to 2023 for analysis.

## 2.5.CONCEPTUAL FRAME WORK

The conceptual framework demonstrates how each influencing factor relates to the other and how it affects the dependent variable, which is real estate investment. Based on empirical research done with a theoretical undertone, the relationship is developed.



Figure 2.1 Conceptual framework

## CHAPTER THREE

### RESEARCH METHODOLOGY

The research design and methodology used to accomplish the research objective are described in this section. As a result, it includes data sources, data collection techniques, sampling techniques, and data analysis techniques.

#### 3.1.1. RESEARCH DESIGN

Study design, according to Babbie (2002), is the setting up of criteria for data gathering and analysis with the intention of striking a balance between relevance to the study purpose and procedural economy. For the investigation of the determinants of real estate investment, a quantitative research technique was found to be most appropriate in order to quantify the effects that each independent variable had on real estate investment (the dependent variable). The main objective of this study is to determine the factors that affect real estate investment in Ethiopia.

Because this research has a cause and effect link, the author employed an explanatory research design to meet the study's objectives. According to Saunders et al. (2007), explanatory investigations establish causal links between variables.

#### 3.1.2. DATA SCOPE AND APPROACH

A population is a group of items or individuals from whom a specific sample is selected for analysis or measurement. Kothari (2004). The study uses sector-specific data on real estate investors from the Ethiopian Investment Commission for its secondary data. In Ethiopia, the real estate industry started formally in 1992. Consequently, the analysis of the secondary data covered the years 1996 through 2023. The information is based on the capital that will be available from EIC, National Bank of Ethiopia and the World Bank for 28 years.

### 3.1.3. DATA SOURCE AND ANALYSIS

The World Bank, the Ethiopian Investment Commission, the National Bank of Ethiopia, and census reports provide secondary data for sectorial analysis. The <https://www.macrotrends.net/global-metrics/countries/ETH/ethiopia/urban-population> official government websites, and inquiries made by physical visit are how the secondary data are gathered. In accordance with the analysis, Eviews'10 is used to quickly and accurately analyze the data. The study employs the proposed and utilized autoregressive distributed lag model (ARDL) for the study variables.

### 3.1.4. EMPERICAL MODEL

The long-run relationship between non-stationary series and their reparametrization to the Error Correction Model (ECM) can now be found in applied econometrics using the Granger (1981), Engle and Granger (1987), Autoregressive Distributed Lag (ARDL) cointegration technique or bound test of cointegration (Pesaran and Shin 1999 and Pesaran et al. 2001), and Johansen and Juselius (1990) cointegration techniques. The long-term relationship and short-run dynamics are provided by the reparametrized result of the listed variables.

The ARDL model is used in this study, because real estate investment and its factors are likely to be non-stationary time series data. Therefore the model is suitable for analyzing such data as it allows for the inclusion of non-stationary variables and the use of differencing to achieve stationary. Moreover the model allows analysing the long run relationship between the variables, as it can estimate the long run coefficients and test for cointegration among the variables.

### 3.1.5. MODEL SPECIFICATION

Simachew Mulugeta (2017) notes that real estate investment is a growing industry because it significantly addresses the issue of housing supply, particularly in Ethiopia where urbanization is on the rise. The researcher will examine this factor as a dependent variable in contrast to factors that influence investment in the real estate sector. For these reasons, the study uses the capital

investment of Ethiopia's annual real estate operating investment as a stand-in for funds received from the EIC between 1996 and 2023.

The short- and dynamic long-run link between real estate investment (INV) as a target variable and specific factors such as urban population growth (POP), economic growth (GDP), interest rate (INT), inflation rate (INF), and exchange rate (ECX) is examined using the ARDL limits test, which was first presented by Pesaran et al. (2001).

Here, ARDL model is tested:

$$\Delta INV = \alpha_0 + \sum_{i=0}^n \alpha_i \Delta LINV_{t-1} + \sum_{i=0}^n \beta_i \Delta LPOP_{t-1} + \sum_{i=0}^n \gamma_i \Delta LGDP_{t-1} + \sum_{i=0}^n \delta_i \Delta LINT_{t-1} + \sum_{i=0}^n \theta_i \Delta LINF_{t-1} + \sum_{i=0}^n \vartheta_i \Delta LECX_{t-1} + \varphi_1 LPOP_{t-1} + \varphi_2 LGDP_{t-1} + \varphi_3 LINT_{t-1} + \varphi_4 LINF_{t-1} + \varphi_5 LECX_{t-1} + \varepsilon_t$$

Where;

$\alpha_i, \beta_i, \gamma_i, \delta_i, \theta_i, \vartheta_i$ .....Short run coefficients

$\varphi_1, \varphi_2, \varphi_3, \varphi_4, \varphi_5$ .....ARDL long run coefficients

$\varepsilon_t$ .....the error term vector serially uncorrelated.

INV.....investment in real estate

$INV_{t-1}$ .....investment in real estate for previous year

POP.....urban population growth for present year

$POP_{t-1}$ .....urban population growth for previous year

GDP.....economic growth for the year

$GDP_{t-1}$ .....economic growth for previous year

INT.....lending interest rate for the year

$INT_{t-1}$ .....lending interest rate for previous year

INF.....inflation rate for the year

$INF_{t-1}$ .....inflation rate for previous year

ECX.....exchange rate for the year

$ECX_{t-1}$ .....exchange rate for previous year

Data that has been properly collected is coded into Eviews'10 a program that makes it easier to analyze the data. To identify how each independent variable affects the investor's decision to invest in Ethiopian real estate.

### III. CHAPTER FOUR

#### 4. DATA ANALYSIS

The data analysis section includes all independent variables and real estate investment capital records. It also includes secondary data analysis using time series analysis to gather data from 1996 to 2023. The ARDL model is developed over time, using both short- and long-term study. Post-test estimations are then performed to determine the significant level, and the corresponding conclusion is also derived from the data.

##### 4.1. ANALYSIS OF INDEPENDENT VARIABLE

Time series data covering the years 1996 to 2023 G.C. are used for the analysis. The ARDL program receives this secondary data and is used to analyze it.

##### 4.1.1. REAL ESTATE INVESTMENT CAPITAL

From 1996 to 2023 G.C., real estate investment capital, which comprises of licensed investors' real estate investments based on their investment type and status is the dependent variable taken from EIC. The graph below illustrates the increase and decrease in real estate investment capital over the given year.

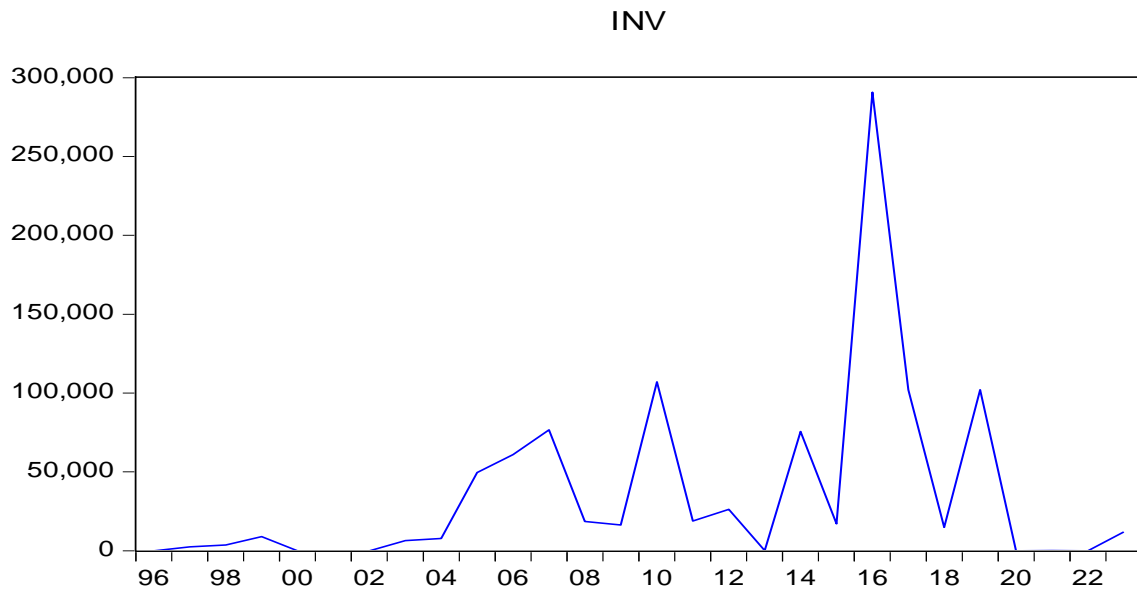


Figure 4.1.1 Real estate investment capital (number of licensed investors)

The fluctuation of real estate investment capital is depicted in the above graph. As can be seen, both high and low levels of investment capital were reported during the relevant years. There is a peak value in the years 2007, 2010, 2014, 2016, and 2019. This suggests that throughout those years, a larger number of investors made significant capital allocations to real estate. This increase may result from a shift in government policies that favor various investment strategies. The picture illustrates how a shift in government affects administrative policies; the figure's conclusion is expressed in terms of strengthening investment-promoting policy directives.

When the government imposes higher taxes on higher earners, individuals often seek avenues to mitigate these taxes, prompting a strategic shift towards investing in the real estate market. One significant policy change regarding real estate investment in Ethiopia occurred in 2010 with the enactment of the Ethiopian investment proclamation No.769/2012. The goal of this declaration was to promote and liberalize foreign direct investment across a range of industries, including real estate.

It allowed for foreign investors to engage in real estate development projects in Ethiopia, subject to certain conditions and restrictions. This policy change marked a shift towards opening up the real estate sector to foreign investment and stimulating economic growth in the country.

The lowest points also indicate that real estate investing has not been done by investors this year. For a variety of causes, political unrest drives innovators away, dissuades them, and ends their investment ventures. The fluctuations in capital investment can be attributed to a multitude of influencing causes.

Investment is the main driver of increased capital stock, improved technology, and higher literacy rates (Nwankwo and Allison, 2021).

The real estate market's expansion provides the foundation for economic growth by increasing household wealth and credit capacity as well as promoting investment and expenditure in the economy (Miller et al. 2015; Schmalz and colleagues. 2016). But a recession in the real estate market causes a decline in investment and consumption, which impedes economic growth (Nneji, Brooks, & Ward, 2013).

Due to the uncertainty surrounding expected returns, most risk-averse investors tend to avoid the residential real estate market, which contributes to its high volatility. Omondi and Olweny (2011). Therefore this study aims to identify the influential factor for real estate investment.

#### 4.1.2. URBAN POPULATION GROWTH

Urban population growth is clearly a major factor influencing investors' decisions to invest on real estate. The Ethiopian urban population growth from 1996 to 2023 G.C is depicted in the graph below.

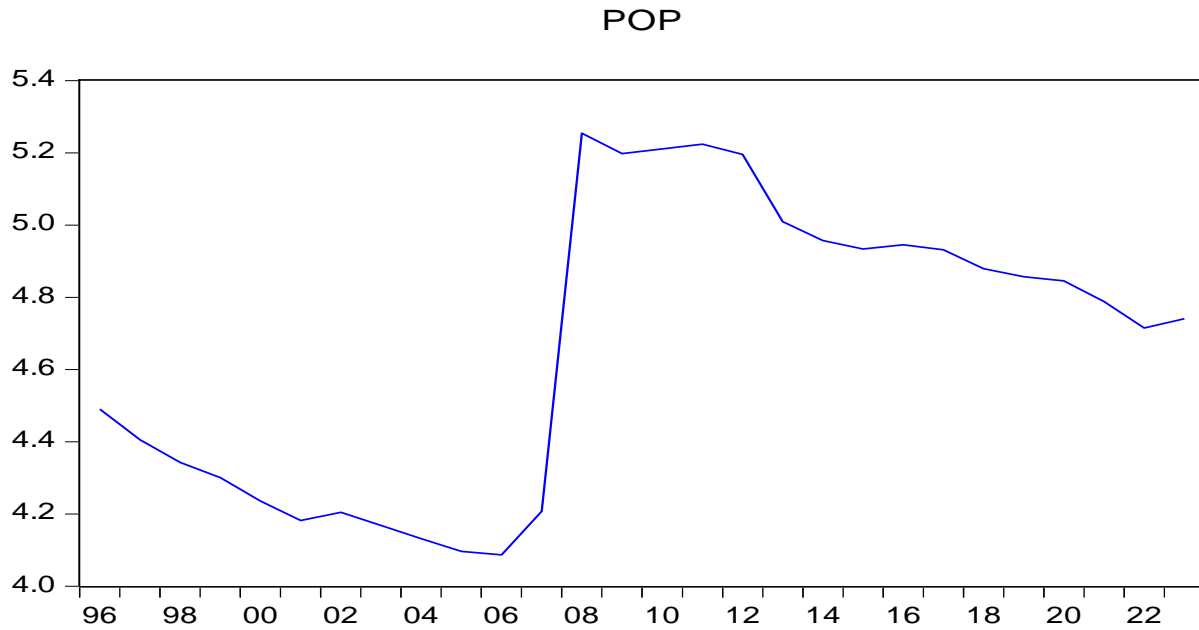


Figure 4.1.2 urban population growth

For five years in a row, the population flow from rural to urban areas decreased, as seen in the above figure. Nonetheless, the record saw a small increase in 2002 before declining once more over the following four years. It indicates an increase in 2007; however, in 2008, the increase was substantial. Following that year, records for the studied year were both upward and downward. Therefore, the peak point suggests that there is a significant movement from rural to urban areas due to high rates of urban population growth.

According to the United Nations (2014), urbanization is the process by which people move from being dispersed throughout small rural settlements where agriculture is the main economic activity to being concentrated in larger, denser urban settlements with an emphasis on industrial and service activities. High transportation efficiency, agricultural productivity, technological advancements, commercial revolutions, and demographic shifts may be the cause of urbanization. The peak in population growth can also be attributed to the growth of urban areas. Possible explanations for this growth include the availability of jobs, the need for a higher standard of living, and an improved healthcare system.

Low fertility rates and family planning may be the cause of the population's sluggish migration from rural to urban areas.

As cities expand and urbanization picks up speed, the swift pace and scope of urbanization have put a strain on nations' ability to fund the significant capital outlays required to supply housing, infrastructure, and services (World Bank 2013).

In fact, many researchers report that urbanization may lessen the gap between rural and urban areas and even overall income inequality, but the researcher is trying to figure out how this growth affects real estate investment decisions. (Kanbur and Zhuang 2013, Wu and Rao 2016).

The researcher is trying to figure out how this growth affects real estate investment decisions.

### 4.1.3. GDP GROWTH.

The GDP growth rate shown below from 1996 to 2023 G.C.

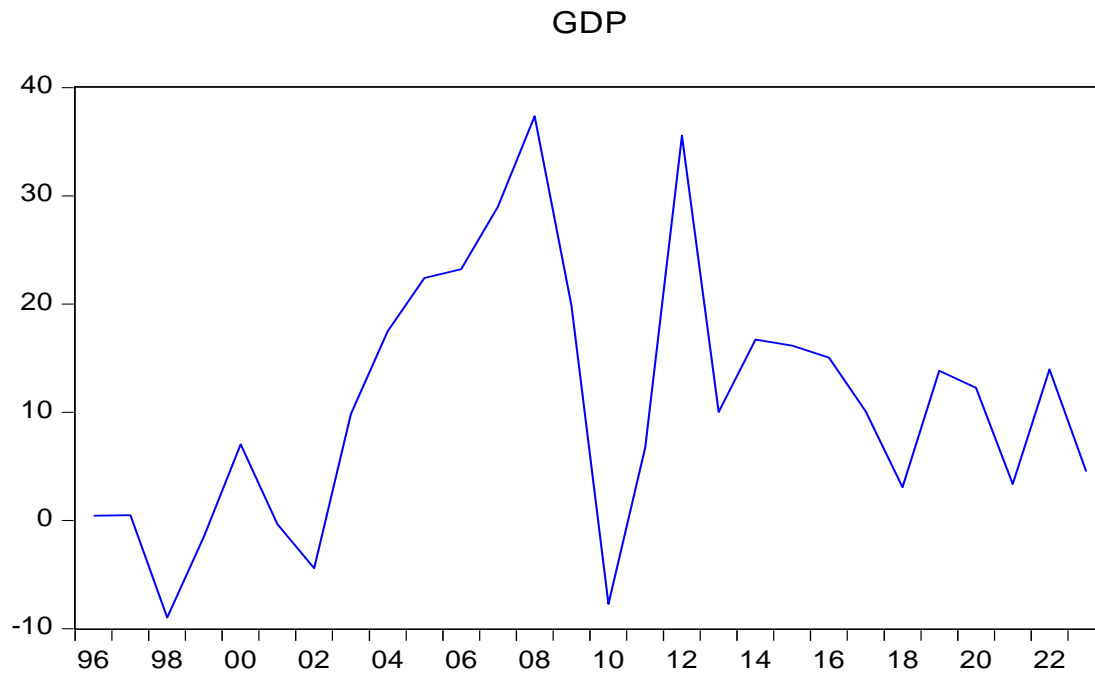


Figure 4.1.3. GDP growth

The GDP growth rate result over the study period is displayed in the above graph.

The GDP grew at its fastest rate in 2008 and 2012. The years 1998 and 2010 also saw the lowest GDP growth rates. The strong GDP indicates a robust economy, high standard of living, and economic growth during those years. The lowest values also suggest that these years did not see sustainable economic growth.

Economic growth, according to Sukirno (2017), is the increase in GDP (Gross Domestic Product) that occurs independently of population growth. Developed countries typically use this term to explain GDP growth, whereas developing countries use economic development to explain GDP growth.

There is a strong correlation between the business or economic cycle and the real estate market. This strong correlation indicates that real estate performs very well when vacancies decline and can easily raise rent with strong conviction when the economy moves toward the expansion phase of the cycle (Otegbulu, 2022).

According to Van Doorn's 2003 research, real estate assets are strategically allocated based on GDP per capital as a means of evaluating a nation's economic performance. The increase in GDP is also a result of real estate investment. One of the activities that drive the GDP is real estate.

As a society's output rises in proportion to its income, demand is created through greater investment and consumption, which ultimately has a positive effect on prices for products and services, according to Blanchard's (2010) theory.

The growth of real estate in a region or country is one of the many other factors that depends on changes in the degree of economic activity and prosperity in that area or country. A productive economy has a beneficial effect on the demand for real estate assets, as previously shown by DiPasquale, D., and Wheaton, W. (1992). Thus, the researcher demonstrates in a clear manner how GDP affects real estate investment decisions.

#### 4.1.4. INTEREST RATE

Interest rate fluctuation from 1996 to 2023 G.C. shown below.

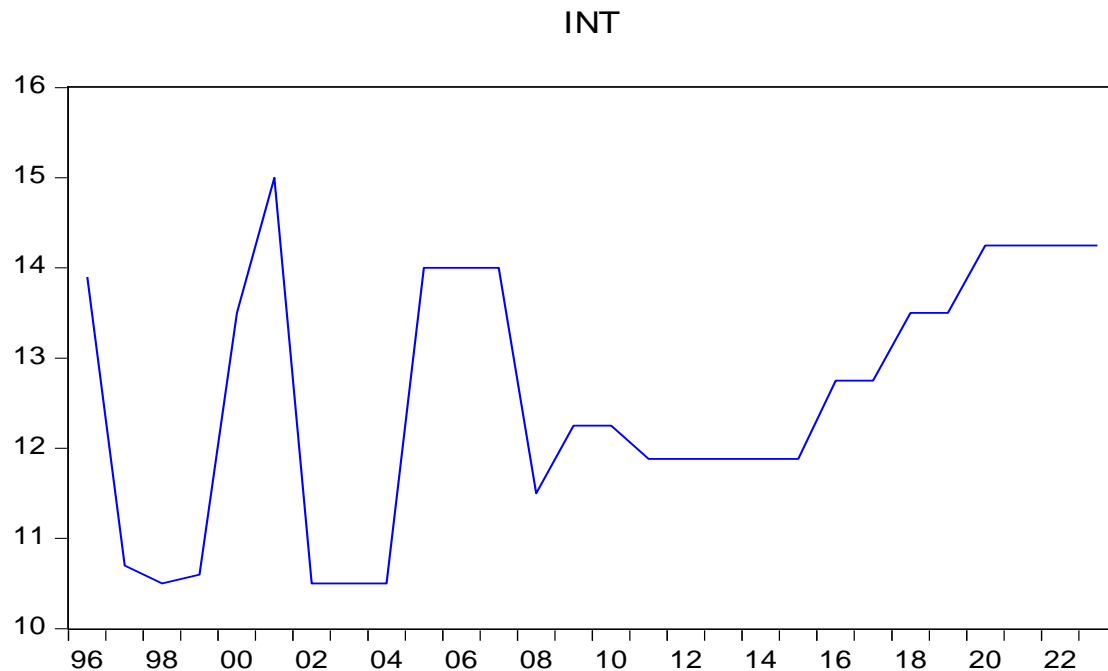


Figure 4.1.4 Interest rate

The graph above illustrates a high lending interest rate in 2001 and a subsequent decline in 2002. The lending rate was steady from 2002 to 2004 before increasing once more in 2005 and remaining that way for the next three years. As a result, changes in government policy and the supply and demand for credit are indicated by fluctuations in interest rates. Nonetheless, the author makes an effort to ascertain how interest rates affect real estate investment decisions.

According to Amadeo's (2012) research, interest rates are the percentage that must be paid or charged for using money. It is paid when the money is lent and charged when it is borrowed.

A person's capacity to purchase a home may be significantly impacted by changes in interest rates. This is because obtaining a mortgage for a home becomes less expensive when interest rates drop, which boosts demand for real estate and raises prices. However, as interest rates

climb, obtaining a mortgage becomes more costly, which lowers demand for the value of real estate.

Various research works, such as those conducted by Sanders (1997), He, Webb, and Myer (2003), and Bredin, O'Reilly, & Stevenson (2007), have indicated that interest rates affect the performance of capital market real estate investments.

#### 4.1.5. INFLATION RATE

The below graph indicates the inflation rate fluctuation from 1996 to 2023 G.C.

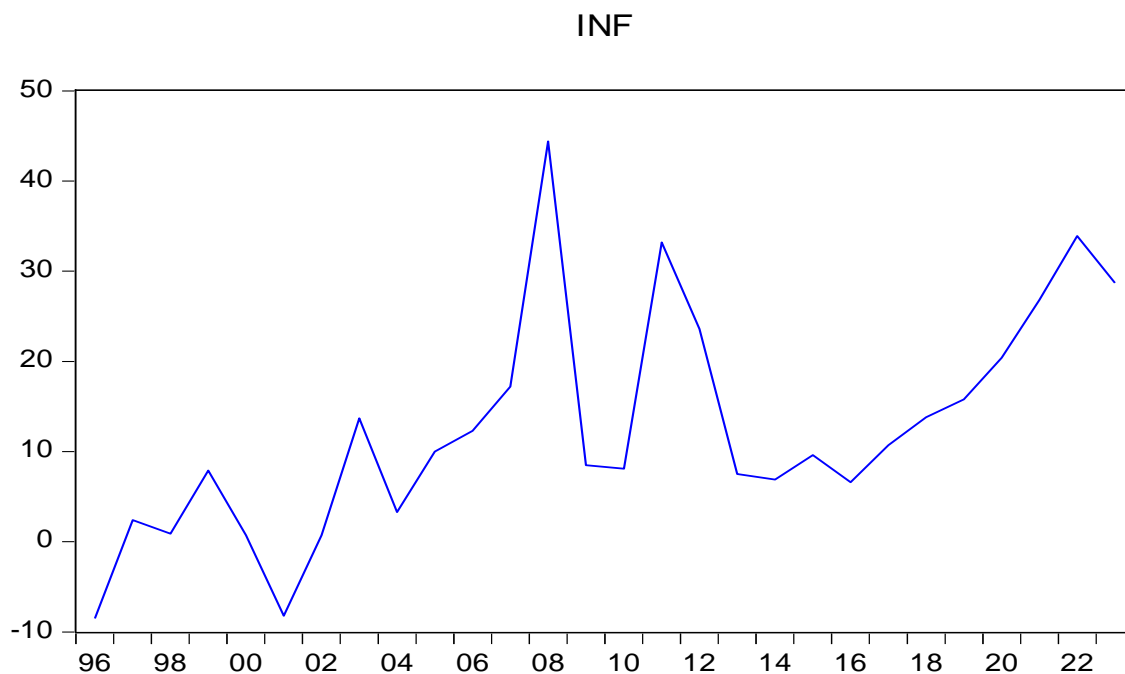


Figure 4.1.5. Inflation rate fluctuation

In this graph, the year 2008 represents the highest rate, while the years 1996 and 2001 record the lowest rates. This variation lowers a nation's GDP and raises the unemployment rate. On the other hand, the high rent payment encourages real estate investors to invest.

According to the study, inflation significantly impacts real estate annual returns, which in turn impacts investment performance. According to the study's findings, real estate investments perform worse in higher inflationary environments.

Furthermore, a continuous rise in inflation reduces the buying power of local money, leading to the devaluation of that currency. It is a general claim that inflation affects real estate since it tends to influence the real worth of income and the total return.

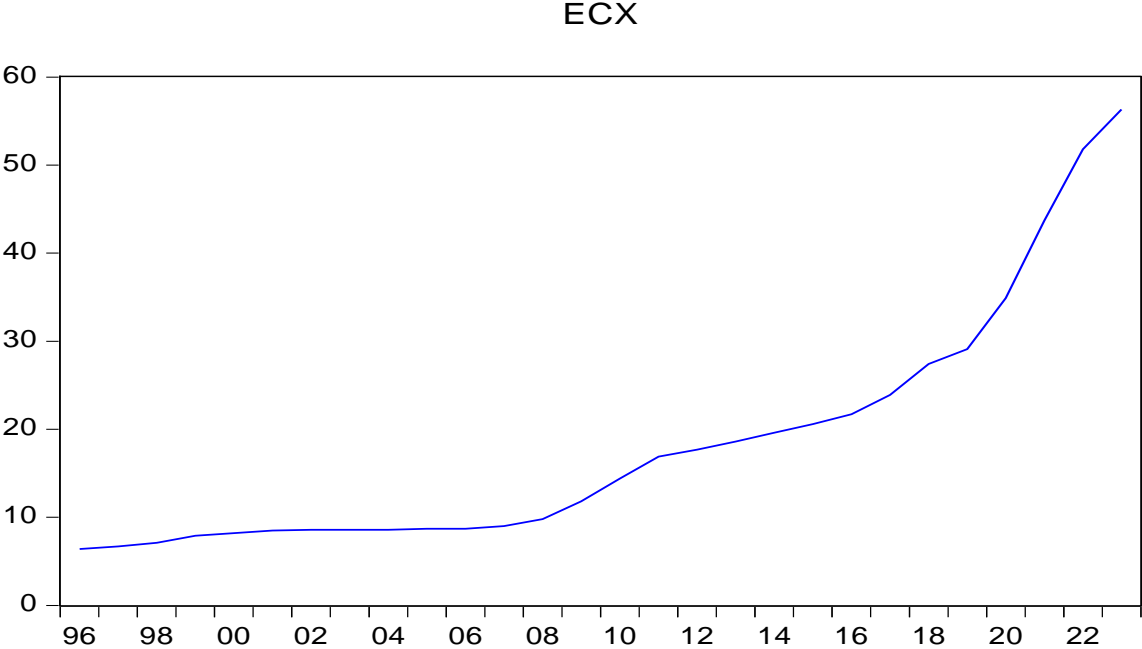
From an investor's perspective, inflation appears to be negative because it reduces the present value of the investment's potential future income return, favoring assets that can act as a hedge against inflation. Put differently, prudent and logical investors will find assets that provide a noticeable hedge against inflation to be surprisingly appealing (Salmon, 2021).

Moreover, rising inflation-induced currency depreciation or devaluation has detrimental effects on a country's economy across many sectors, particularly the stock and real estate markets (Al-Smadi, A. W; along with others, 2023). We ten during inflationary times.

Inflationary times are typically accompanied by rising real estate values, rising rents and house prices, rising mortgage rates, declining debt, an influx of tenants, a shortage of rental housing, and rising property values. As a result, the study takes into account how the rate of inflation affects investors' decisions to buy real estate.

4.1.6. EXCHANGE RATE

The graph will depict an exchange rate during the year 1996 to 2023 G.C.



#### Figure 4.1.6. Exchange rate

The exchange rate's lowest value in 1996 and highest value in 2023 are displayed in the graph above. A small increase occurred between 1996 and 2008, followed by a significant shift until 2011. Once more, the increase is happening slowly until 2018.

Every nation aspires to have stable currency rates because they enable entrepreneurs to proceed without concern over constantly shifting expenses and pricing for products and services (Joseph and Akhanonu, 2011). Omolara (2010) asserts that exchange rates determine how much one currency is worth in another.

Because it can change the benefits of diversification associated with real estate investments, exchange rate volatility thus has an impact on a nation's economy, particularly on the real estate sector. This fluctuation is a measure of the future uncertainty that investors must deal with, which makes it a crucial consideration for investors when making an investment.

The general economic realities of a country may be negatively impacted by exchange rate fluctuations or volatility, since it may negatively impact a number of economic sectors or areas (Gbadebo, 2023) However, the author makes an effort to determine how real estate investment decisions are impacted by currency rates.

The currency rate and its volatility were also mentioned by Osinubi and Amaghionyeodiwe (2009) as factors affecting the flow of capital into emerging markets or economies.

#### 4.2. DESCRIPTIVE STATISTICS

It is best to examine the variables' descriptive statistics first, rather than jumping straight to the econometrics estimation. This is significant because these statistics enable for the rapid explanation of some of the series' behavior by condensing the statistical properties of the series in the model.

The logarithm of the variables is displayed in the table below, along with descriptive statistics. The normality of the variable distribution can be assessed using two main tests. The first is called a skewness test, and it measures how much the probability distribution deviates from symmetry in a positive or negative way. Each and every variable has a positive tail. The second test measures how much the distribution tends to have a relatively higher number of observations in the center, and it is called the kurtosis test.

The kurtosis test, which is the second test, gauges how much the distribution tends to have a comparatively higher proportion of observations near the center. In this instance, LINF is nearly three and LECX is less than three, indicating that they are thinner than usual. LPOP, LGDP, and LINT are all greater than three. All of the data have been converted to a natural logarithm in order to approximate normality.

	LPOP	LGDP	LINT	LINF	LECX
Mean	1.599487	2.797428	14.12857	12.92500	2.689001
Median	1.576116	2.996481	12.87500	9.800000	2.567664
Maximum	2.077577	3.856933	23.50000	44.40000	4.031050
Minimum	1.407640	0.000000	10.50000	-8.500000	1.856298
Std. Dev.	0.181150	0.855832	4.027540	12.51144	0.655583
Skewness	1.034870	1.637764	1.354854	0.572187	0.554825
Kurtosis	3.343746	5.881108	3.585759	3.073269	2.115246
Jarque-Bera	5.135648	22.20152	8.966570	1.534123	2.349796
Probability	0.076702	0.000015	0.011296	0.464376	0.308850
Observation	28	28	28	28	28

Table 4.2.1 Descriptive statistics for all variables

### 4.3. THE METHODOLOGY

#### 4.3.1. UNIT ROOT TEST

Testing for stationary characteristics of real estate investment determinants is the initial step towards determining whether or not a series is stationary before starting an empirical investigation. Due to the fact spurious regression occurs when relationships involving non-stationary variables are estimated using traditional estimating techniques (Gujarati et al., 2004). We use an estimate derived from a linear regression if all of the variables exhibit level stationary behavior. However, our findings are based on an estimate of the ARDL model if all the variables are stationary into the first difference (Pesaran et al., 2001).

A non-stationary time series is a stochastic process that has unit roots or structural breakdowns. However, unit roots are a major contributor to non-stationarity. A time series under consideration is probably non-stationary when a unit root is present; it is probably stationary when it is absent. To find out if a single time series is stationary, the most popular techniques are the Dickey Fuller or Augmented Dickey Fuller tests. On the other hand, the Augmented Dickey-Fuller (ADF) test is thought to be better due to its extensive application and popularity. The ADF test adds the lag difference term of the dependent variable to the DF test in order to correct for possible autocorrelation in the error terms.

The study uses the Augmented Dickey-Fuller (ADF) unit root test to check for stationarity. Table 4.3.1 presents the findings of the stationarity tests at first difference and in levels for each variable.

Hypotheses are;

Null hypothesis  $H_0$ : the variable is not stationary (has a unit root)

Alternative Hypothesis  $H_1$ : the variable is stationary (lacks a unit root)

If the p-values are less than 0.05, which suggests that the data are stationary, the null hypothesis is rejected. Furthermore, in the event that the t-statistic exceeds the critical values, the null hypothesis is also rejected. Table 4: Point 3. With the exception of two variables, LPOP and LECX, which have unit root tests at both levels and at I(0), respectively, 1 demonstrates that all of the variables at their level are stationary. As a result, the outcome permits the author to employ the ARDL model without including the exchange rate, which is the only independent variable.

Variable	P-value of I(0)	Status	P-value of I(1)	Status
LNV	0.0433	Stationary	0.0002	Stationary
LPOP	0.7512	Has unit root	0.0100	Stationary
LGDP	0.0268	Stationary	0.0000	Stationary
LINT	0.0080	Stationary	0.0000	Stationary
LINF	0.0011	Stationary	0.0004	Stationary
LECX	0.0048	Stationary	0.0002	Stationary

\*P-values rejection of the null hypothesis at 1% and 5%.

Table 4.3.1 Unit Root Test

#### 4.3.2. OPTIMAL LAG SELECTION

Since the cointegration test is influenced by the number of lags in the ARDL model, it is typically preceded by an optimal lag length selection test (Smith, 2001). Since the majority of empirical investigations have demonstrated the superiority of this method over alternative tests, the maximum lag duration for this study was determined using the Akaike information criterion (AIC).

The values denoted by the astrix (\*) demonstrate the lag order chosen at the five percent significance level according to the criteria. Because the lag order that has many number of astrix is more optimal than few astrix (Pesaran et al., 2001).

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-59.54407	NA	1.20e-05	5.699485	5.995701	5.773982
1	60.54192	167.0762*	9.05e-09	-1.612341	0.461170*	-1.090859
2	111.8313	44.59949	5.24e-09*	-2.941855*	0.908951	-1.973388*

Table 4.3.2 Lag selection

#### 4.3.3. ARDL COINTEGRATION BOUND TEST

There is a long-run relationship among all the variables at the time of their F-statistic values are greater than the upper-bound critical value at the 5% level (Pesaran et al., 2001). A boundaries test was performed to ascertain whether or not there is a long-run relationship. It is possible to define this as follows: Long-term coefficients for ARDL:  $\phi_1, \phi_2, \phi_3, \phi_4, \phi_5$ .

The hypothesis:

$$H_0: \phi_1, \phi_2, \phi_3, \phi_4, \phi_5 = 0$$

$$H_1: \phi_1 \neq \phi_2 \neq \phi_3 \neq \phi_4 \neq \phi_5 \neq 0$$

The null hypothesis of no cointegration is rejected if the F-statistic is greater than the upper critical value bound.

Critical values (unrestricted intercept and no trend) are given for the upper bound I(1) and lower bound I(0) by Pesaran et al. (2001). According to Pesaran et al. (2001, page 300), the bound levels are as follows: for 1%, the lower bound is 3.41 and the higher bound I(1) is 4.68; for 2.5%, the lower bound I(0) is 2.96 and the upper bound I(1) is 4.18; and for 5%, the lower bound I(0) is 2.62 and the upper bound I(1) is 3.79. But the long-term coefficients of the model,  $\phi_1, \phi_2, \phi_3, \phi_4, \phi_5$  have been tested jointly by the Wald test.

The Wald test result indicates that the p value (1.946943) is greater than 5 percent, or it can be expressed as follows. Consequently, it is possible to reject the null hypothesis, demonstrating the existence of a long-term relationship between the variables.

Test Statistic	Value	df	Probability
t-statistic	1.395329	23	0.1762
F-statistic	1.946943	(1, 23)	0.1762
Chi-square	1.946943	1	0.1629

Table 4.3.3 Wald test

#### 4.3.4. ERROR CORRECTION MODEL (ECM)

In order to examine the short- and long-term equilibrium relationship between real estate investment and the selected variables, ECM was developed to assess the pace of adjustment. Since it is hard to estimate a dynamic equation in the levels of the variables and differencing the variables is not an answer, any information about the long run is eliminated. The more acceptable approach is to convert the dynamic model into an error correction model (ECM). Disequilibrium is a process of adjusting to the long-run model, and it is demonstrated that this contains information on both the short-run and long-run aspects of the model (Harris and Sollis, 2003).

the following equation can measure ECM:

$$\Delta INV = \alpha_0 + \sum_{i=0}^n \alpha_i \Delta LINV_{t-1} + \sum_{i=0}^n \beta_i \Delta LPOP_{t-1} + \sum_{i=0}^n \gamma_i \Delta GDP_{t-1} + \sum_{i=0}^n \delta_i \Delta INT_{t-1} + \sum_{i=0}^n \theta_i \Delta INF_{t-1} + \sum_{i=0}^n \vartheta_i \Delta ECX_{t-1} + \omega ECT_{t-1} + \varepsilon_{it}$$

Where:

The short run coefficients are  $\alpha_i, \beta_i, \gamma_i, \delta_i, \theta_i, \vartheta_i$ .

The speed adjustment parameter, represented by  $\omega$ , requires a substantial negative sign. The long run model yields ECT, which is a representation of the Error Correction Term.

When there is an error-correction term among many cointegrated variables, it is inferred that changes in the dependent variable are a function of both the degree of disequilibrium in the cointegration relationship (represented by the ECM) and the changes in other explanatory variables. This indicates that any departure from the long-term equilibrium will compel the dependent variable to alter in a way that will push the system back toward the long-term equilibrium (Faras and Ghali, 2009).

Table 4.3.4 shows a significant negative speed of adjustment (-0.716882) at the 5% level, bolstering the long-term association between independent factors and real estate investment. Every time there is a deviation from equilibrium, the system will be adjusted by 71.68%. Real estate investment and the urban population, GDP, interest rates, inflation, and exchange rates have been shown to be causally related over an extended period of time.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	47.71185	10.85425	4.395684	0.0004
D(INV(-1))	-0.238684	0.100022	-2.36324	0.0361
D(LPOP(-1))	42.00463	11.41834	3.678700	0.0036
D(LGDP(-1))	2.412735	0.759397	-3.177172	0.0055
D(LINT(-1))	-4.977732	6.233083	-0.798599	0.4355
D(LINF(-1))	-5.748835	1.502576	-3.825986	0.0028
D(ECX(-1))	-5.536168	8.598204	6.235742	0.0001
CointEq(-1)*	-0.716882	0.163226	-4.391950	0.0004
R-squared	0.528988	F-statistic	5.896216	
Adjusted R-squared	0.439272	Durbin-Watson stat	2.379814	

Table 4.3.4: Result of the ECM

#### 4.3.4. LONG RUN BOUND TEST

The ARDL cointegration test confirms a long-term relationship, and further significance testing was done through long-run form and bound test. The short-term effects can be seen in the error correction model shown in the table.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPOP	10.47128	7.641138	1.370383	0.1979
LGDP	0.097598	1.692973	0.057649	0.9551
LINT	16.89803	7.708389	2.192161	0.0500
LINF	-15.44731	5.543859	-2.786381	0.0177
LECX	-0.422022	2.228725	-0.189356	0.8533

$$EC = LINV - (10.4713*LPOP + 0.0976*LGDP + 16.8980*LINT -15.4473 *LINF -0.4220*LECX)$$

Table: 4.3.4.1 Long run effect

These findings highlight the importance of factors in boosting economic growth, and policy makers should focus on promoting development in these areas.

Therefore from the software analysis result;

- Urban population growth have a positive effect on investors to invest on real estate but significant @5% significant level in short run relation while insignificant in long run association.

This information is helpful in predicting future property demand brought on by the process of urbanization and in understanding how the real estate industry is developing sustainably. The next generation of infrastructure, which is more people-centric and welcomes investors with a plethora of investment opportunities that draw investors from various fields, has been made possible by real estate and the urbanization process. Therefore, the enhancement of infrastructure brought about by urbanization benefits real estate and encourages more investment in it.

- GDP growth also have a significant positive effect on investors to invest on real estate @5% significant level in short run relationship, however it have an insignificant positive effect in long run relation.

Consequently, a rise in real GDP would result in higher economic incomes for individuals, which would enhance demand for real estate through higher prices for both primary residences and rental properties. Consequently, it would appear that GDP has some effect on real estate performance because a high GDP increases a country's residents' disposable income and allows them to buy homes and real estate services.

The forces of supply and demand, as well as GDP, have all had a substantial impact on real estate prices and rental income. A rise in real GDP would raise people's incomes within the economy, which would raise demand for real estate through higher primary property and rental prices.

- Lending interest rate have an insignificant negative effect on investors to invest on real estate in short run relation, moreover it have a significant positive effect @5% significant level in long run relationship.

The real estate market may slow down as a result of investors becoming more cautious amid rising interest rates. On the other hand, a lower interest rate might promote more investment activity and a more cutthroat market. Interest rates are a major factor in the real estate market's expansion. It is likely that people won't invest in it if there is a high tax burden. Additionally, it is up to the banks to provide consumers with easy loans and flexible payment schedules.

- Inflation has a substantial detrimental impact on real estate investments at a 5% significant level in both the short and long term.

The performance of real estate investments declines with increasing inflation, and the ongoing increase in inflation lowers the purchasing power of local currency, resulting in devaluation of that currency.

As inflation decreased, real estate investment would increase and vice versa. The author concurred that growing inflation raises the cost of capital acquisition, which lowers national capital formation and has a detrimental effect on investment.

The price range in the real estate market is constantly being adjusted to balance with the supply. As a result, increases in property prices are attributed to low supply and high demand. However, as inflation increases, supply may fall short of demand, which would result in losses in the real estate market. This indicates explicitly that there is a negative correlation between inflation and real estate performance.

- Exchange rate have a significant positive effect on investors to invest on real estate, however it have an insignificant negative effect @5% significant level in short run and long run respectively.

In short run fluctuations in exchange rates are common, and they react strongly to shifts in monetary policy, political developments, and consumer expectations. Reduced real estate performance in terms of annual returns is caused by higher exchange rates. Over time, the relative costs of goods determine exchange rates.

Significant variations in exchange rates can cause substantial losses for an investor's portfolio of assets because investment returns are unpredictable. This is so because fluctuations in foreign exchange rates affect the costs of both domestic and imported goods, which in turn affects the value of real estate in developing countries.

<b>Independent variable</b>	<b>Short run effect</b>	<b>Long run effect</b>	<b>Theory Expectation</b>
Urban population	+/Significant	+/Insignificant	+
GDP growth	+/Significant	+/Insignificant	+
Interest rate	-/Insignificant	+/Significant	-
Inflation rate	-/Significant	-/Significant	-
Exchange rate	-/Significant	+/Insignificant	-
<b>Dependent Variable</b>	<b>Real estate Investment</b>		

Table 4.3.4.2 Variable Description

#### 4.4. RESULTS OF POST- ESTIMATION DIAGNOSTIC TEST

To determine whether the suggested model has a statistically significant fit, the econometric assumptions must be tested. The study performed post-estimation tests, such as serial correlation, heteroscedasticity, free from ARCH effect, normality, and model stability for checking, in order to accept this model as a good one.

##### 4.4.4. SERIAL CORRELATION

The Breusch-Godfrey serial correlation LM test was run to see if the model had a serial correlation or not. The following are the hypotheses:

Ho: there is no serial correlation between the variables.

H1: there is a serial correlation between the variables.

F-statistic	3.451288	Prob. F(2,15)	0.0585
Obs*R-squared	8.193876	Prob. Chi-Square(2)	0.0166

\*Significant >0.05.

Table 4.4.4 Breusch-Godfrey Serial Correlation LM Test

There is no serial correlation in the model, as Table 4.4.4 demonstrates. Since the null hypothesis cannot be ruled out, the P-value is more than 0.05, namely at 0.0585. There is no evidence of a serial association in this model.

#### 4.4.5. HETEROSCEDASTICITY TEST

To ascertain heteroscedasticity, perform the Breusch-pagan Godfrey test. A p value greater than 5% in the result then implies that the model does not exhibit heteroscedasticity.

F-statistic	2.256182	Prob. F(8,17)	0.0755
Obs*R-squared	3.38925	Prob. Chi-Square(8)	0.0991
Scaled explained SS	5.889942	Prob. Chi-Square(8)	0.6596

Table: 4.4.5 Heteroskedasticity Test: Breusch-Pagan-Godfrey

#### 4.4.6. ARCH EFFECT

Use the heteroscedasticity ARCH test to determine if the model is free of the ARCH effect. The table that follows demonstrates that the p value is higher than 5%.

F-statistic	3.035641	Prob. F(1,23)	0.0948
Obs*R-squared	2.914890	Prob. Chi-Square(1)	0.0878

Table 4.4.6: Heteroskedasticity Test: ARCH

#### 4.4.7. NORMALITY

The data are regularly dispersed, as seen in the image below. P value is 0.906907, which is more than 5% as can be seen.

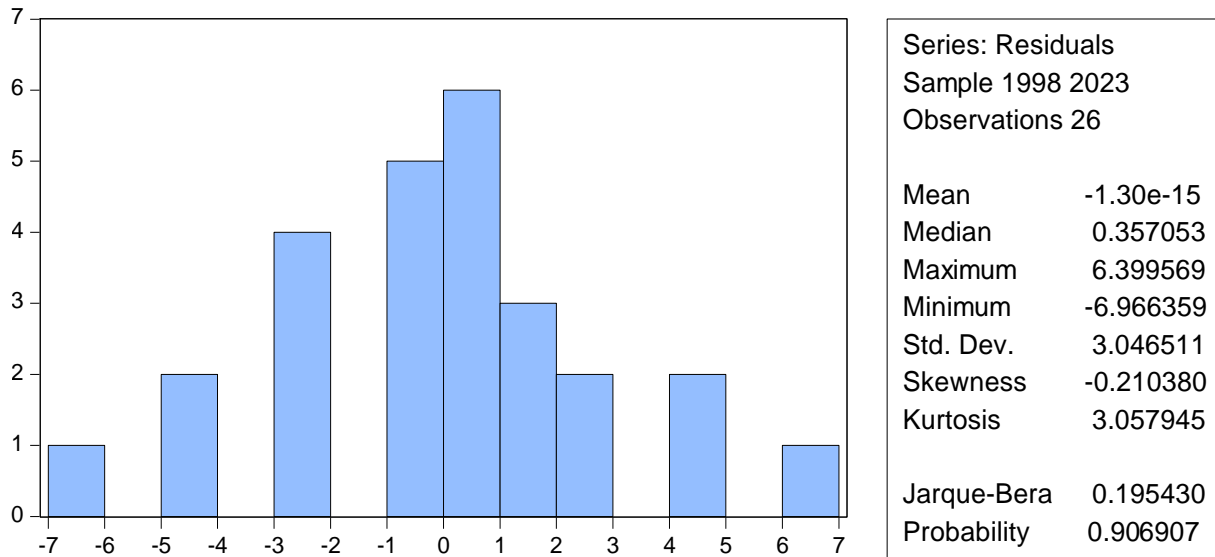


Figure 4.4.7 data distribution

#### 4.4.8. STABILITY OF THE MODEL

The model's stability diagnostics were assessed using the Cumulative sum (CUSUM) and CUSUM of the squares tests. Caporale and Pittis (2004) claim that the CUSUM-of-squares test is a useful and efficient instrument. The CUSUM line (Blue line) in Figures 4.4.8.1 and 4.4.8.2 shows that the model's long-term dynamic stability is demonstrated by the fact that it falls within the 5 percent significance boundary levels in both charts.

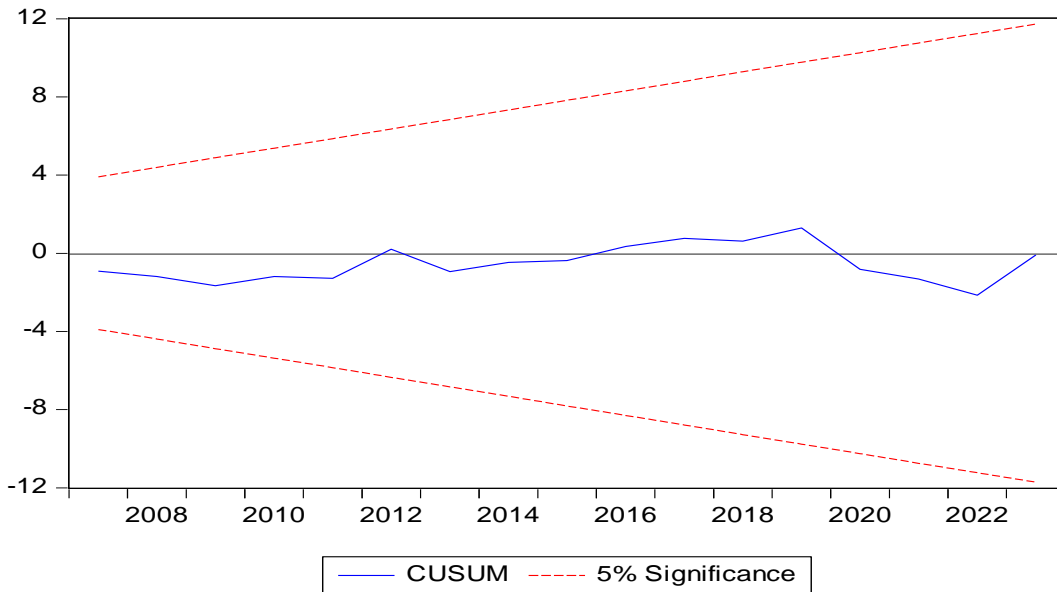


Figure 4.4.8.1 CUSUM

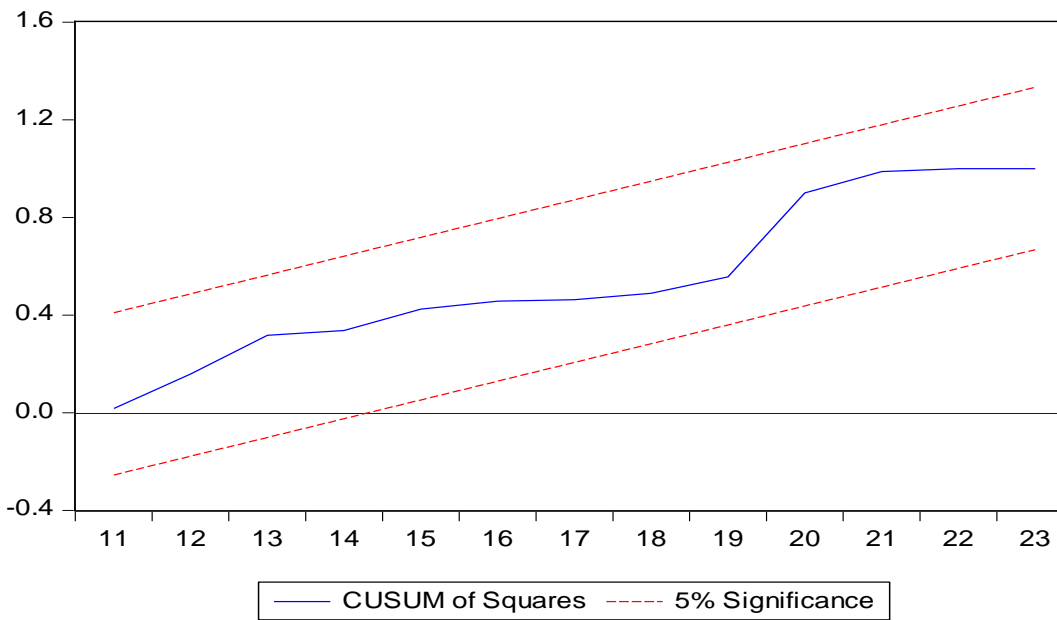


Figure 4.4.8.2 CUSUM-of-squares

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATION

#### 5.1.SUMMARY

The purpose of the study is to present the factors influencing real estate investment in Ethiopia. Urban population growth, GDP growth, interest rate, inflation rate, and exchange rate are the chosen independent variables. The ARDL model is used in the study to examine the effects of these variables on real estate investment using time series data spanning from 1996 to 2023. The study's findings serve as a basis for further research and are essential for understanding the real estate sector. Long-term effects of urban population increase on real estate investment are insignificant, although they are significant in the short term. In the short term, GDP growth significantly boosts real estate investment; however, this influence fades with time. In the short term, lending interest rates have a insignificant negative impact on real estate investment, but over time, they have a large beneficial impact. In the short and long terms, real estate investment is severely affected by inflation. In the short term, exchange rates have a significant positive effect on real estate investment; however, in long run, these effects become insignificant. The study's conclusions explore the key factors influencing real estate investment and provide clarification for earlier research.

#### 5.2.CONCLUSION

The author has conducted a thorough and original study that provides valuable insights for real estate investors, government officials, and policy makers. This study finds the factors which affect investment in real estate in Ethiopia. It is expected to be particularly beneficial for global investors interested in investing in Ethiopia. The study examines at the relationship between a number of economic indicators (independent variables) including GDP growth, urban population growth, lending interest rates, inflation rates, and exchange rates and real estate investment (dependent variable).

Find evidence that GDP growth and urban population expansion have a statistical short-term positive effect on real estate investment, but an insignificant long-term effect using the ARDL and ECM models. In the short term, there is a strong negative relation between the exchange rate and the inflation rate and real estate investment. Lending interest rate also have a strong positive effect however it has an insignificant negative effect on real estate investment in long and short run respectively. The Error Correction Model (ECM) results satisfied all of the conditions.

The CUSUM and CUSUM of the squares figures show that the model is stable and that no serial correlation was discovered. Additionally, there is no heteroscedasticity or ARCH impact in the model. According to the study's findings, every period, the system will be adjusted to return to equilibrium by 71.68% of its initial departure. Long-term causal relationships have been demonstrated between real estate investment and increases in GDP, interest rates, inflation rates, and currency rates, as well as urban population expansion.

### 5.3.RECOMMENDATION

As the researcher concludes that both urban population growth and GDP growth have a positive significant effect on real estate investment, therefore when making decisions, real estate investors should pay close attention to the growth of the urban population. Thus, urbanization has significantly altered the face of real estate in those years, going from people living in rural areas with lands for farming, agriculture, irrigation, etc. to a completely changed society with a high standard of living.

In order to sustain the economic growth rate, real estate market managers must be proactive in their urban and economic development strategies. It includes streamlining administrative processes and fostering an inviting investment climate.

To manage the effects of inflation and position their real estate portfolios for long-term success, investors should carefully plan, conduct market research, and make prudent financial projections.

They also need to spend money on innovation and research projects. This will put them in a better position to obtain market information, such as the understanding of the rate of inflation and the demand for real estate as a result of urbanization, which will enable them to make wise and accurate investment decisions. Investing more in innovation will also strengthen their competitive advantages.

The lending interest rate in Ethiopia sets a maximum lending interest rate for commercial banks, which is currently 10%. However, individual banks may set their own interest rates based on their business strategies and risk assessments. The lending interest rates for real estate investment in Ethiopia vary depending on the type of loan, the lender, and the borrower's creditworthiness. Therefore before considering a real estate investment loan in Ethiopia, it is important to research and compare different lenders interest rate and terms. It is also advisable to consult with a financial advisor or professional to assess the potential risks and returns of the investment.

#### 5.4.SUGGESTION FOR FURTHER STUDIES

As was previously mentioned, this study only included data spanning 28 years; therefore, in order to improve the findings and add even more independent variables, future research on the same topic should take into account data spanning a longer period of time. This is because the fundamental tenet of regression is that larger samples yield better results. In addition while this study employed a quantitative methodology, future research should adopt a qualitative approach and take into account additional qualitative factors, such as government policy, socio-cultural obstacles, infrastructure development, foreign investment, administrative barriers, political instability, that may influence real estate investment decisions in Ethiopia.

## 5.5.LIMITATION OF THE STUDY

The national bank's inconsistent data on their website was one of the study's main weaknesses. Another was that the study only looked at five factors that influence real estate investment decisions, despite the fact that a wider range of these factors, such as socio-cultural and political instabilities or legal issues, cannot be quantified because they are qualitative in nature and can only be captured in terms of proxies. This made it difficult to determine potential proxies for the drivers of real estate investment activity and also made it difficult to keep the country coverage at a maximum.

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## APPENDIX

### VAR

Vector Autoregression Estimates

Date: 04/17/24 Time: 07:33

Sample (adjusted): 1999 2019

Included observations: 16 after adjustments

Standard errors in ( ) & t-statistics in [ ]

	INV	POP	GDP	INT	INF
INV(-1)	-0.335050 (0.54891) [-0.61039]	4.80E-07 (1.7E-06) [ 0.27458]	2.33E-05 (3.9E-05) [ 0.60463]	-3.04E-07 (6.8E-06) [-0.04491]	3.68E-05 (6.6E-05) [ 0.55662]
INV(-2)	-0.042828 (0.45258) [-0.09463]	-4.81E-07 (1.4E-06) [-0.33344]	-4.92E-05 (3.2E-05) [-1.54935]	6.29E-06 (5.6E-06) [ 1.12663]	-2.60E-05 (5.5E-05) [-0.47669]
POP(-1)	31380.25 (330491.) [ 0.09495]	0.405236 (1.05299) [ 0.38484]	-76.10387 (23.2024) [-3.28000]	0.228192 (4.07976) [ 0.05593]	-23.73077 (39.8214) [-0.59593]
POP(-2)	70363.04 (275818.) [ 0.25511]	0.253277 (0.87880) [ 0.28821]	60.48353 (19.3640) [ 3.12351]	-0.678719 (3.40484) [-0.19934]	12.38986 (33.2337) [ 0.37281]
GDP(-1)	2905.851 (3663.67) [ 0.79315]	-0.001584 (0.01167) [-0.13572]	0.252541 (0.25721) [ 0.98185]	0.024551 (0.04523) [ 0.54285]	-0.486260 (0.44144) [-1.10153]
GDP(-2)	2194.637 (4816.60) [ 0.45564]	0.002801 (0.01535) [ 0.18254]	0.604299 (0.33815) [ 1.78706]	0.006490 (0.05946) [ 0.10915]	0.030145 (0.58036) [ 0.05194]
INT(-1)	6265.961 (46922.1) [ 0.13354]	-0.003785 (0.14950) [-0.02532]	-4.921156 (3.29420) [-1.49389]	0.385726 (0.57923) [ 0.66593]	1.414138 (5.65372) [ 0.25013]
INT(-2)	-4340.512 (39922.1) [-0.10872]	0.145983 (0.12720) [ 1.14768]	3.164945 (2.80276) [ 1.12922]	-0.437390 (0.49282) [-0.88753]	4.723483 (4.81027) [ 0.98196]
INF(-1)	-2941.978 (8040.89) [-0.36588]	0.004673 (0.02562) [ 0.18241]	1.789391 (0.56452) [ 3.16978]	-0.016046 (0.09926) [-0.16166]	0.622137 (0.96886) [ 0.64213]
INF(-2)	-4282.982 (4829.51) [-0.88684]	0.001973 (0.01539) [ 0.12822]	-0.901065 (0.33906) [-2.65755]	-0.007813 (0.05962) [-0.13105]	0.132500 (0.58191) [ 0.22770]
ECX(-1)	-2452.982 (4935.51) [-0.163265]	0.001862 (0.01539) [ 0.25398]	-0.708324 (0.31306) [-2.43765]	-0.035913 (0.04762) [-0.14235]	0.143270 (0.48791) [ 0.43780]
ECX(-2)	-3265.982 (2549.51) [-0.216784]	0.001358 (0.01539) [ 0.13632]	-0.901065 (0.33906) [-2.65755]	-0.054313 (0.08762) [-0.58905]	0.136780 (0.55411) [ 0.24180]

C	-408677.8 (898548.) [-0.45482]	-0.152891 (2.86291) [-0.05340]	90.74066 (63.0832) [ 1.43843]	14.73371 (11.0921) [ 1.32830]	-9.206442 (108.267) [-0.08503]
R-squared	0.289314	0.788296	0.884572	0.468533	0.534609
Adj. R-squared	-1.132059	0.364889	0.653716	-0.594402	-0.396174
Sum sq. resids	5.41E+10	0.549352	266.7250	8.246448	785.6548
S.E. equation	104033.8	0.331467	7.303766	1.284247	12.53519
F-statistic	0.203545	1.861790	3.831699	0.440791	0.574365
Log likelihood	-198.2373	4.269827	-45.21205	-17.40057	-53.85445
Akaike AIC	26.15467	0.841272	7.026507	3.550071	8.106806
Schwarz SC	26.68582	1.372426	7.557661	4.081226	8.637961
Mean dependent	61609.81	4.830306	15.60500	12.53125	14.75625
S.D. dependent	71248.35	0.415925	12.41167	1.017067	10.60867
Determinant resid covariance (dof adj.)		1.36E+08			
Determinant resid covariance		404189.8			
Log likelihood		-216.7922			
Akaike information criterion		33.97403			
Schwarz criterion		36.62980			
Number of coefficients		55			

#### LAG LENGTH CRITERIA

##### VAR Lag Order Selection Criteria

Endogenous variables: LINV LPOP LGDP LINT LINF LECX

Exogenous variables: C

Date: 04/17/24 Time: 00:33

Sample: 1996 2023

Included observations: 26

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-59.54407	NA	1.20e-05	5.699485	5.995701	5.773982
1	60.54192	167.0762*	9.05e-09	-1.612341	0.461170*	-1.090859
2	111.8313	44.59949	5.24e-09*	-2.941855*	0.908951	-1.973388*

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

## WALD TEST

Test Statistic	Value	df	Probability
t-statistic	1.395329	23	0.1762
F-statistic	1.946943	(1, 23)	0.1762
Chi-square	1.946943	1	0.1629

Null Hypothesis: C(5)=0  
 Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5)	1.512733	1.084141

Restrictions are linear in coefficients.

## ESTIMATE EQUATION

Dependent Variable: LINV  
 Method: ARDL  
 Date: 04/17/24 Time: 02:37  
 Sample (adjusted): 1998 2023  
 Included observations: 26 after adjustments  
 Maximum dependent lags: 2 (Automatic selection)  
 Model selection method: Akaike info criterion (AIC)  
 Dynamic regressors (2 lags, automatic): LPOP LGDP LINT LINF  
 Fixed regressors: C  
 Number of models evaluated: 162  
 Selected Model: ARDL(1, 0, 2, 1, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	47.71185	10.85425	4.395684	0.0004
D(INV(-1))	-0.238684	0.100022	-2.36324	0.0361
D(LPOP(-1))	42.00463	11.41834	3.678700	0.0036
D(LGDP(-1))	2.412735	0.759397	-3.177172	0.0055
D(LINT(-1))	-4.977732	6.233083	-0.798599	0.4355
D(LINF(-1))	-5.748835	1.502576	-3.825986	0.0028
D(ECX(-1))	-5.536168	8.598204	6.235742	0.0001
CointEq(-1)*	-0.716882	0.163226	-4.391950	0.0004

R-squared	0.528988	Mean dependent var	7.732692
Adjusted R-squared	0.439272	S.D. dependent var	4.435615
S.E. of regression	3.694438	Akaike info criterion	5.718958
Sum squared resid	232.0308	Schwarz criterion	6.154453
Log likelihood	-65.34646	Hannan-Quinn criter.	5.844365
F-statistic	5.896216	Durbin-Watson stat	2.379814
Prob(F-statistic)	0.063314		

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

CHECK LONG RUN EFFECT

Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPOP	10.47128	7.641138	1.370383	0.1979
LGDP	0.097598	1.692973	0.057649	0.9551
LINT	16.89803	7.708389	2.192161	0.0500
LINF	-15.44731	5.543859	-2.786381	0.0177
LECX	-0.422022	2.228725	-0.189356	0.8533

EC = LINV - (10.47128\*LPOP + 0.097598\*LGDP +16.89803\*LINT-15.44731\*LINF-0.422022\*LECX)

DIAGNOSTIC TEST

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.451288	Prob. F(2,15)	0.0585
Obs*R-squared	8.193876	Prob. Chi-Square(2)	0.0166

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 04/17/24 Time: 04:22

Sample: 1998 2023

Included observations: 26

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINV(-1)	0.659950	0.314815	2.096309	0.0534
LPOP	6.936824	9.460594	-0.733233	0.4747
LGDP	0.274991	0.919429	0.299089	0.7690
LGDP(-1)	0.294939	0.920653	-0.320358	0.7531
LGDP(-2)	-0.478550	0.911865	-0.524803	0.6074
LINT	-9.547245	8.092945	-1.179700	0.2565
LINT(-1)	11.60593	9.029568	1.285325	0.2182
LINF	-0.668684	1.238496	-0.539917	0.5972
LECX	-0.32687	0.945327	0.596208	0.5753
C	3.630439	21.82335	0.166356	0.8701
RESID(-1)	-1.134626	0.452959	-2.504919	0.0243
RESID(-2)	-0.012733	0.281875	-0.045174	0.9646

R-squared	0.315149	Mean dependent var	-1.30E-15
Adjusted R-squared	-0.141418	S.D. dependent var	3.046511
S.E. of regression	3.254807	Akaike info criterion	5.494250
Sum squared resid	158.9065	Schwarz criterion	6.026522

Log likelihood	-60.42526	Hannan-Quinn criter.	5.647525
F-statistic	0.690258	Durbin-Watson stat	1.817639
Prob(F-statistic)	0.719384		

## HETROSCHEDSTICITY

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.256182	Prob. F(8,17)	0.0755
Obs*R-squared	3.389251	Prob. Chi-Square(8)	0.0991
Scaled explained SS	5.889942	Prob. Chi-Square(8)	0.6596

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 04/17/24 Time: 04:32

Sample: 1998 2023

Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-190.9987	73.78025	-2.588751	0.0191
LINV(-1)	-0.437424	0.600364	-0.728599	0.4762
LPOP	33.47370	30.59931	1.093937	0.2892
LGDP	-2.251533	3.064717	-0.734663	0.4726
LGDP(-1)	2.586339	3.093424	0.836076	0.4147
LGDP(-2)	-8.155030	3.026651	-2.694407	0.0154
LINT	32.17284	24.47259	1.314648	0.2061
LINT(-1)	27.75433	26.61734	1.042716	0.3117
LINF	7.518357	4.051484	1.855704	0.0809
LECX	5.762358	5.710583	1.958256	0.8793

R-squared	0.514971	Mean dependent var	8.924262
Adjusted R-squared	0.286722	S.D. dependent var	13.05587
S.E. of regression	11.02644	Akaike info criterion	7.905893
Sum squared resid	2066.899	Schwarz criterion	8.341388
Log likelihood	-93.77661	Hannan-Quinn criter.	8.031300
F-statistic	2.256182	Durbin-Watson stat	2.358377
Prob(F-statistic)	0.075478		

## ARCH

### Heteroskedasticity Test: ARCH

F-statistic	3.035641	Prob. F(1,23)	0.0948
Obs*R-squared	2.914890	Prob. Chi-Square(1)	0.0878

### Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

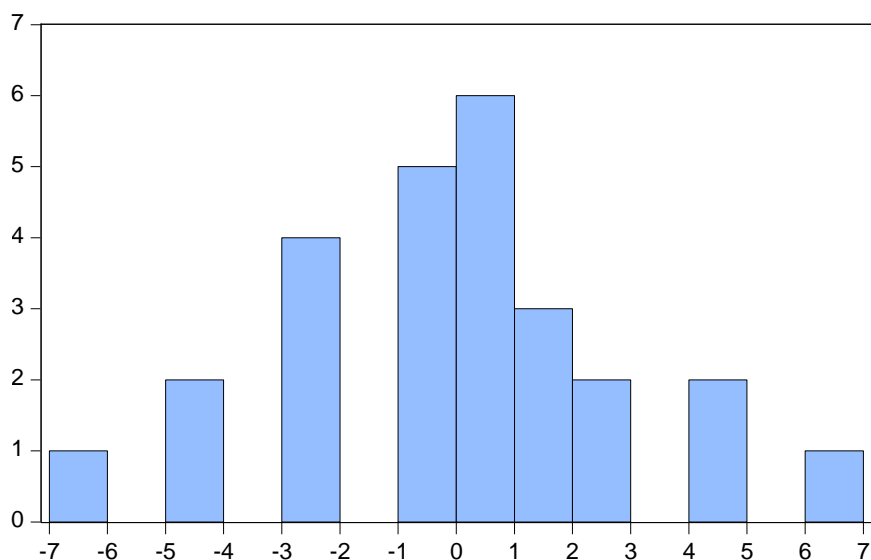
Date: 04/17/24 Time: 04:38

Sample (adjusted): 1999 2023

Included observations: 25 after adjustments

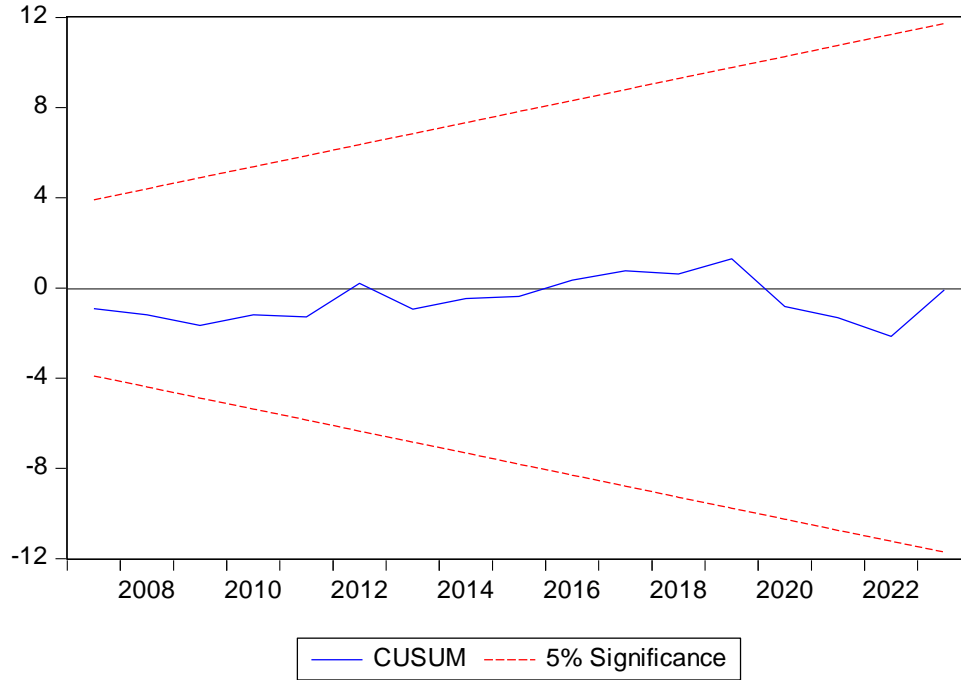
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.272318	3.061961	2.048465	0.0521
RESID^2(-1)	0.390970	0.224397	1.742309	0.0948
R-squared	0.116596	Mean dependent var	9.260520	
Adjusted R-squared	0.078187	S.D. dependent var	13.20968	
S.E. of regression	12.68276	Akaike info criterion	7.994983	
Sum squared resid	3699.607	Schwarz criterion	8.092493	
Log likelihood	-97.93729	Hannan-Quinn criter.	8.022028	
F-statistic	3.035641	Durbin-Watson stat	1.849054	
Prob(F-statistic)	0.094813			

## NORMALITY



Series: Residuals	
Sample 1998 2023	
Observations 26	
Mean	-1.30e-15
Median	0.357053
Maximum	6.399569
Minimum	-6.966359
Std. Dev.	3.046511
Skewness	-0.210380
Kurtosis	3.057945
Jarque-Bera	0.195430
Probability	0.906907

STABILITY



STABILITY 2

