

**THE EFFECT OF INVESTMENT AND ECONOMIC GROWTH ON UNEMPLOYMENT
IN SOUTH AFRICA**

by

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DECLARATION

I declare that **THE EFFECT OF INVESTMENT AND ECONOMIC GROWTH ON UNEMPLOYMENT IN SOUTH AFRICA** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

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Date

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ABSTRACT

Unemployment is one of the triple challenges that South African economy is currently facing. The combination of foreign investment and domestic investment can be utilised to decrease the level of unemployment in a country. Therefore, this study examines the effect of investments (Foreign Investment and Domestic Investment) and economic growth on unemployment in South Africa. The autoregressive distribution lag model (ARDL), which can accommodate a variety of stationarity levels and distinct time series data variables, has been utilised in the study to investigate this effect. The model used annual data gathered from 1998 to 2020. The unit root tests of have showed that variables are stationary at level and 1st difference.

The empirical findings indicated that the economic growth and unemployment are positively related in both short, and long run. This is because the economy is facing a jobless growth, where enough jobs are not created and the relationship between foreign direct investment and unemployment is insignificant in both short run and long run. The findings have also indicated that domestic investment affect unemployment negatively in both short and long run, while inflation affect unemployment positively. VAR Granger causality results indicated that there is no directional causality between foreign direct investment and unemployment, there is a bi-directional causality between domestic investment and unemployment, and unidirectional causality between economic growth and unemployment. The research opens to new policy perception that government policy should be directed to Agricultural sector and infrastructure because they are more labour intensive.

KEY CONCEPTS:

Domestic investment, economic growth, Inflation, foreign direct investment and unemployment.

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ACRONYMS

ADF - Augmented Dickey-Fuller

ARDL - Autoregressive Distribution Lag

DI - Domestic Investment

DD - Difference-in-Differences

ECM - Error Correction Model

INF - Inflation

FDI – Foreign Direct Investment

FGLS - Feasible Generalised Least Squares

GDP – Gross Domestic Product

GFCF -Gross fixed capital formation

GEAR - Growth Employment and Redistribution
Accelerated and Shared Growth for South Africa

NDP - National Development Plan

PP - Phillips-Perron

RDP - Reconstruction and Development Programme

SA – South Africa

S.E – Standard Error

SVAR - Structural Vector Autoregression

UNEMP – Unemployment

VAR - Vector auto regression

VECM - Vector Error Correction Model

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CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION AND BACKGROUND

South Africa is amongst countries experiencing high unemployment rate in the whole world (International Labour Organisation, 2020; Galal, 2023). But according to the data from the World Bank (2023), unemployment for Sub-Saharan African countries was reported to be around 6.7% in 2022 (The World Bank, 2023). Despite the uncontained unemployment rate in South Africa, the foreign direct investment-economic growth nexus could be a panacea to the unemployment problem experienced in South Africa. There is a long-run correlation between foreign direct investment and economic growth in the Sub-Saharan region, and this growth is found to include the creation of jobs and low unemployment (Ayenew, 2022). However, there are factors that may slow economic growth which include weak institutions, infrastructure and skills which may make it difficult to realise a high level of economic growth and employment (Ofori et al., 2022).

The growth of the economy and foreign investment can be instrumental in reducing the level of unemployment in South Africa. Foreign investment has been used in developed countries to solve the unemployment problem through investing in new factories, building and upgrading offices as well as improving infrastructures (Baddeley, 2014). In developing countries, foreign investment is channelled to provide expertise and capital to local industries, which results in improved level of productivity and creation of employment (Merouani, 2014).

South Africa is a country located in the southern part of African which had a relatively low unemployment rate during the apartheid era. Given that the unemployment figure did not include Bantustans and the black's majority, and unemployment rate averaged 20% that time (StatsSA, 2018). During the democratic era, the figures of unemployment began to rise (Mbekeni & Phiri, 2020). The average unemployment from 1998 to 2020 was reported to be around 28.2% (SARB, 2022). The South African unemployment rate has increased more significantly to 32.5% in 4th quarter of 2020 due to Covid-19 pandemic when most of the companies and organisations were forced to temporarily close for some time

(StatsSA, 2021). Nevertheless, it is argued that more investments in the form of investment raised within the country and investment from foreign countries could decrease the level of unemployment in South Africa (Ayenew, 2022).

Notably, investments from foreign countries have the potential to generate more jobs or employment in the host country through the introduction of new technology and capital equipment (Lueth & Fuchs, 2017). New technology and the investment in new capital equipment has the potential to spur economic growth and if growth is inclusive, it is accompanied by employment of factors of production, with includes the employment of labour (Choi, Dutz & Usman, 2020). Although foreign investment promotes the use of new technology, which has the potential to create more job opportunities in the host country, business with more investment will be more competitive and the ones with less investment may try to cut cost through reducing workers in order to try to stay afloat in the market (Degryse, 2016).

With South African unemployment rate amongst the youth recorded to be over 60%, it is more likely that the youth might want to try to survive by trying ways of getting some money through illegal ways (Mudzanani, 2022). The crime rate will increase, as people will want to make money through illegal means and poverty is likely to worsen which has an undesirable influence on the standard of living in South Africa.

At the commencement of the democratic era, the South African government pursued socio-economic policies that aimed at increasing economic growth and enhancing trade to address the triple challenge problem of poverty, inequality, and unemployment as well as other economic challenges (Bhorat, Hirsch & Mtuli, 2014). The programme of action included the introduction of Reconstruction and Development Programme (RDP) in 1994, a people orientated socialist framework (Holden & Cameron, 2016; Jahed & Brey, 2010). The Growth Employment and Redistribution (GEAR) blueprint which commenced in 1996, was a neoclassical perspective which failed to create the desired jobs and Accelerated and Shared Growth for South Africa (AsgiSa) in 2006, addressing the tension between growth and redistribution (Holden & Cameron, 2016; Jahed & Brey, 2010). The demise of AsgiSa was caused by the launch of Medium-Term Strategic Framework which was meant to cut unemployment and poverty by half by 2014 (Fourie, 2015). While the New Growth Path, another government's blueprint was aimed at realising South Africa's 2030

objectives enshrined in the National Development Plan (NDP) (Republic of South Africa, 2018)

Notably, that there are studies written on the study topic ranging from developed countries to emerging countries, together with South Africa. The studies for developed nations, among others, were done by Vacaflares, Mogab and Kishan (2017) in USA who used the Javorcik and Sparteneau approach, while Jia, Han, Peng and Lei (2019) in China used Mahalanobis's distance matching and Difference-in-Differences (DID) econometric methodology and found out that FDI and unemployment are negatively related. Whereas in developing countries related studies, among others, were conducted by Garang, Yacouba and Thiery (2018) for Uganda who employed the Autoregressive Distribution Lag (ARDL) methodology in their study, and Nelson, Ekokeme and Ekokeme (2018) for Nigeria who employed the Ordinary least of squares technique and concluded that FDI insignificantly affect unemployment.

Chella and Phiri (2017) and Manenzhe (2018) conducted related studies for South Africa on unemployment but in the mining sector. The relatively recent study on the effect of investment in South Africa (FDI and Domestic investment) on unemployment by Chella and Phiri (2017) show that FDI have no direct effect on unemployment while domestic investment negatively affects unemployment. Given the existence of mixed results on unemployment in the literature, this study employs the Autoregressive Distribution Lag (ARDL) approach, VECM Granger causality and accounting innovations such as the impulse response and variance decomposition to determine the effect of foreign investment, domestic investment, and economic growth on unemployment in South Africa.

1.2 STATEMENT OF THE PROBLEM

From previous five years, South African unemployment has remained rising, while the government efforts through the implementation of the NDP to address the issue of unemployment are still to yield the desired result. Most of South Africans are still unemployment since many employment opportunities require an individual to have a tertiary qualification, which simply makes it difficult for people to find employment in South Africa (Mudzanani, 2022). The number of people looking for employment, particularly African woman and youth who reached working age, has increased in the past years

while the number of available jobs is not increasing at the same rate (Government Communication, 2014).

The International Labour Organisation estimated the average total unemployment, female youth unemployment, male youth unemployment to be 27.5%, 59.7% and 49.5% respectively (World Bank, 2022). The unemployment rate in South Africa was expected to be 14% by 2020 and be reduced to 6% by 2030 (National Planning Commission, 2012), which is now proving to be elusive according to the statistics on the ground. The existence of unfavorable trade and current account balance during this democratic era (SARB, 2020), signifies the inadequacy of domestic efforts such as domestic savings being funneled into domestic investment. To augment domestic efforts to ignite the economy and generate the much-needed jobs, the mobilisation of foreign savings through foreign direct investment becomes a key ingredient in an endeavor to realise the 2030 unemployment target. Therefore, this research investigates the effect of investments (foreign and domestic) and economic growth on unemployment in South Africa in order to seek ways to reduce the problem of unemployment that has bedevilled the South African economy.

1.3 RESEARCH AIM AND OBJECTIVES

1.3.1 Aim

The aim of this research is to investigate the effect of investment and economic growth on unemployment in South Africa for the period from 1998 to 2020.

1.3.2 Objectives

The objectives of the study are:

- To determine the nexus between foreign direct investment and unemployment.
- To assess the association that exist between domestic investment and unemployment.
- To establish relationship between economic growth and unemployment.
- To examine the causal connection that exist between foreign direct investment, domestic investment, economic growth, and unemployment.
- To determine the behaviour of unemployment to shocks emanating from foreign direct investment, domestic investment, and economic growth.

1.4 RESEARCH HYPOTHESIS

H_{01} : Foreign direct investment and unemployment have no correlation.

H_{A1} : Unemployment and foreign direct investment have correlation.

H_{02} : Unemployment and domestic investment are unrelated.

H_{A2} : Unemployment and domestic investment are related.

H_{03} : Economic growth is unrelated to unemployment.

H_{A3} : Economic growth and unemployment are correlated.

H_{04} : The correlation between unemployment, economic growth, domestic investment, as well as foreign direct investment is not causative.

H_{A4} : There is causal connection between foreign direct investment, domestic investment, economic growth, and unemployment.

H_{05} : Unemployment does not respond to the shocks emanating from domestic investment, foreign direct investment, and economic growth.

H_{A5} : Unemployment respond to the shocks emanating from domestic investment, foreign direct investment, and economic growth.

1.5 DEFINITION OF CONCEPTS

- **Unemployment**

Unemployment can be defined as the quantity of people who are currently searching for job, but they cannot manage find one (Mohr & Associates, 2015). Individuals who are above the age of 16, not involved in education and training sector, not getting any payment for work done or owns business and they are presently available to work during the specified time, are referred to be unemployed (Das, 2022). During the specified period, unemployment is computed by dividing the total number of unemployed by the entire labour force (Das, 2022).

- **Investment**

Investment is defined an act of buying an asset or equipment with an aim of generating income or profit in future (Mohr & Associates, 2015). This can be made by an individual, organisations, or government, but the assets ought to not be acquire with an aim to consume but rather to generate income in future (Kimberly & Erika, 2021). Investment can be generated domestically or from foreign countries.

Foreign direct investments are the investments made from one country by the individuals, corporate and government with business interest into another foreign country with business interest (Kimberly & Erika, 2021). Foreign direct investment (FDI) is when a foreign company, individuals take or buy control of ownership of the domestic companies. FDI can take place when individuals start foreign operations or acquire foreign assets of foreign company (Research-FDI, 2021).

Domestic investments are either private investments made by individuals or public investment made by government-in the economy. This are investments made within the borders of a country rather than abroad (The Economics Times, 2022). Individuals and government that make such investments, make them with an aim to obtain highest return and to obtain control and ownership in businesses an investment is made into (Gifford, 2016).

- **Inflation rate**

Inflation rate is the level at which all the prices of goods and services in the economy changes during the specified period, within a year (Mohr & Associates, 2015). It measures how fast the currency of the country loses its value. It can also be used to measure how one unit of a country's currency can buy or afford now compared to the specified past time (Farlex, 2012).

- **Gross domestic product**

GDP is the entire amount spent on goods and services generated inside the boundaries of the nation in a certain period, such as a year (StatsSA, 2013). It is the total value of all completed commodities produced inside the borders of the country. Regardless of ownership, for as long as they are produced within the borders of the country the form part of GDP (Mohr & Associates, 2015).

1.6 ETHICAL CONSIDERATIONS

The study employs annual time series data and ensures that all the sources used are credited and correctly cited. The study is conducted following the University of Limpopo plagiarism Policy and Procedures. The study also ensure that the standards of the university are followed and maintained. The materials used are handled with honesty and integrity and all sources are correctly cited.

Significance of the study

1.7 SIGNIFICANCE OF THE STUDY

1.8 STRUCTURE OF THE STUDY

There are five chapters in the study. The research's problem statement, background of the research, and introduction are all included in the first chapter. The literature review, which includes the theoretical and empirical literature that are relevant to the research, are covered in the second chapter. The study's research techniques are presented in

Chapter 3. The discussion and interpretation of results are presented in chapter 4. Chapter 5 gives the summary of the study, findings, conclusions reached by the study and the recommendations made based on the results.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In chapter 1, the research introduced the study conducted, stated problem statement, objectives of the study, and outlined the research aim. This chapter elaborates on theoretical literature and empirical literature on the association among foreign investment, domestic investment, inflation as well as unemployment. The theoretical literature further explains the Classical theory of employment, the monetarist theory of employment, Okun's law, and Keynesian theory of employment, while empirical indicates the findings by other scholars on the association of unemployment and foreign investment; unemployment and domestic investment; unemployment and inflation; unemployment and gross domestic product/economic growth.

2.2 THEORETICAL LITERATURE

This segment provides an overview of the existing theories and concepts that are relevant to the research topic. The theoretical framework also provides a structure for the study's argument and a justification for the study's conclusions.

2.2.1 The classical theory of employment

The fundamental analysis of this theory is the principle of market exchange activities by the French economist, arguing that demand is triggered by supply (Mouhammed, 2011). It emphasised that the market for labour is composed of the supply of labour and demand of labour (Mouhammed, 2011). The analysis by Rodriguez (2015) on the classical theory of employment indicates that there are three main parts of the theory, namely: demand for labour and supply for labour as well as the equation for wage. The positive relationship between unemployment rate and wage rate may exist, subsequent to a decrease in

spending except, when there is a decrease in supply, then they are negatively related (Brunner & Meltzer, 1978).

The supply of labour is founded on the bases of opportunity cost on each person's willingness of not taking part in other activities – informally defined as leisure – in order to dedicate time to labour, which is used to determine supply of labour (Brunner & Meltzer, 1978). Classical economists argue that wage rates should be cut or lowered to encourage firms to employ more workers. Wicksell argued that raising wages would encourage workers to provide more labour or working hours (Jonung, 1989).

If wages are sufficiently flexible, then full employment can be maintained (Jonung, 1989). Productivity is also affecting the wage rate- the increase of wages is likely to be as a result of a raise in productivity and while a decrease of wage is likely to decrease the work intensity and productivity (Mouhammed, 2011). In the classical approach, unemployment is also affected by the labour market conditions (Blanchard & Lawrence, 1999).

In the Classical view, the main factor that determines unemployment is flexible wage rate. According to the classical view, supply creates its own demand and equilibrium is obtained through flexible wage rate (Rodriguez, 2015). Additionally, factors that may influence unemployment are productivity and labour market conditions. They also believe that any individual that cannot cut their wages are unemployment at their own will and that this is only for temporary (Manenzhe, et al., 2018).

2.2.2 The Monetarist Theory

Monetarist theory of employment is a counter-unemployment hypothesis established by Milton Friedman, who viewed the General theory as a market-clearing model in which employees misinterpreted a change in nominal earning for a change in real wage (Garrison, 1984). According to Friedman, a gap between the demand for labour and supply of labour is what defines unemployment (Khumalo, 2014). If wages of employees do not reflect an adjustment of inflation, then they will not be willing to work more hours as this would not be real increase in their real earnings and producers are not going increase their production when the market price rises by the equivalent rate of as production cost (Khumalo, 2014).

According to the Friedman theory, real conditions that are affecting the supply of labour and labour demand are the determinants of natural rate of unemployment (Mashaite, 2018). The factors may include changes in technology, minimum wage law, mismatch of skills and job requirement, the degree of unionisation. Nevertheless, the errors that may occur in expectation of price level and the real wage can result in moving away from the natural rate of unemployment (Khumalo, 2014).

Monetarist theory of employment has assumed that full employment level can be obtained, as well as unemployment can be decreased by changing the quantity of money in circulation (Jain & Khanna, 2010). Monetarists assume that any wage imbalance caused by unemployment is originated from monetary disturbance. For example, decline in money supply would keep price level constant, increase real wage, and therefore increase the problem of unemployment level (Vedder & Gallaway, 1997). The monetarists also assume that unemployment is negatively related to the money supply under the assumption that there are some disruptions from the monetary side.

2.2.3 Okun's Law

Arthur Okun (1962) has identified the inverse association among the level of unemployment and the total productivity, in which this relationship became known as Okun's Law. The strong connection between employment level and the level of total output (Gross Domestic product) defines Okun's law (Lancaster & Tulip, 2015). The law explains the inverse correlation between unemployment level and GDP.

The mathematical form of Okun's law is expressed as: $U_t - U^* = \theta (Y_t - Y^*)$. From the equation, U represent the unemployment rate, Y is the natural log of real gross domestic product. Under Okun's law, U^* is called full employment and Y^* is called full potential output.

The Okun's law explains the continuous connection during the transition within the annual rate of unemployment and the annual growth of real GDP. As stated by Okun's law, the negative number of outputs reflects a decline in the real gross domestic product while a positive number will reflect a growth or increase of real domestic product meaning the economy is at a prosperity stage. According to Khumalo (2014), the connection between gross domestic product and unemployment level may be explained by three alternative

approaches, namely, a) the correlation of variation of unemployment rate and with the real Gross national product, b) association of unemployment rate with deviations from actual gross national product, c) by employing the assumption of constant ratio.

Unemployment is primarily affected by the fluctuations in the real gross domestic product around its trend in the long run (Krugman & Wells, 2006). The fluctuations of unemployment rate are usually smaller than the related change of output gap (Khumalo, 2014). The coefficient of Okun's law represents the connection between the real GDP gap and unemployment. The coefficient of Okun's law change because of some external factors such as technology, law, preferences, demographics (Neely, 2010).

Okun's law was afterwards subjected to being criticised for failing to include some relationship which affected output and unemployment (Manenzhe, 2018). Investment activity has an impact on labour efficiency and production as well as the state of technology (Khumalo, 2014). One of the reasons why it is left out is because there are some developments on the law since its innovation.

2.2.4 The Keynesian theory

The assumption that the real wages are determined by the money-wage relationship, according to Keynes (1936), is not clearly correct and it happens to be based on the implicit hypothesis that the price level is defined separately by the amount of money. Keynes argues that the Classical theory's projections do not match with the reality of employee's reaction to changes in real wage (Keynes, 1936). According to the Keynesian perspective, job opportunities are what causes real wage to change not the way the classical are viewing it (Rodriguez, 2015). As a result, real wage cannot form part in determining employment level.

Keynes (1936) explains unemployment in his book named *The General Theory of Employment, Interest Rate and Money*. According to Keynes (1936), unemployment raises from the shortage of total demand. The central heart of Keynesian principle is the fundamental assumption of sufficient demand. The respective demand level gives firms the production level. Consequently, the aggregate demand for goods and services establishes the level of income, resulting in a level of employment (Rodriguez, 2015). According to Keynes (1936), demand is the function of income level, not price level, in that, the more the person has money the greater their demand for goods and services

increases. Effective demand is made up of two main parts, that is, consumption and investment expenditure. Keynes (1936) does not claim that inefficient demand can be reimbursed by corresponding increase of private investment spending, but rather by an increase of government investment spending to correct the employment situation.

2.3 EMPIRICAL LITERATURE

This section of the study seeks to review the existing empirical literature on the topic of the effect of investment and economic growth on unemployment. The purpose of this literature review is to identify prior research that is relevant to the topic and to analyse the findings of these studies to establish a foundation of knowledge on the subject. Therefore, the objective of this review is to pinpoint the most important results research and to identify any gaps in the existing literature that need to be addressed through further study.

2.3.1 FDI and Unemployment

The study conducted by Chella and Phiri (2017) examined the long-run connection between FDI, domestic investment, and unemployment rate in South Africa. The study employed Autoregressive distribution lag approach using quarterly time series data from 1stQ of 1970 to 4thQ of 2014. The empirical results showed that domestic investment significantly affect unemployment negatively, whereas foreign direct investment affect unemployment negatively and insignificantly.

The association between Foreign direct investment and unemployment has been stretched by researcher which employed different methodology in other African country. Nelson, et al (2018) directed research on how foreign investment affects unemployment in Nigeria. Their study was covering the period from 1980 to 2015 and the tests that were employed included unit root testing, co-integration, and ordinary least squares. The study discovered that the connection between foreign investment and unemployment is negative and insignificant. This study also suggested that the Nigerian government should create an environment that can attract investment from foreign countries and ensure that productive resources are fully used before going into savings. It can be noted that the studies just considered, proved that foreign direct investments affect unemployment negatively and insignificantly while such studies employed different methodologies, used different period of study as well as different countries.

Studying the relationship between FDI and unemployment continued to be conducted even on panel data. Tsaurai (2018)'s study examined the conditions in BRICS countries by using panel data analysis method from 1994 to 2014. The study employed pooled and fixed effect method and the study revealed that conditions such as economic growth, human capital, and financial development should be at their highest level to attract more foreign investment in such a way that the investment will positively impact the creation of employment.

Another study on FDI and unemployment on panel data was conducted Mkombe et al. (2021), which investigated the impact of foreign direct investment on youth unemployment in the Southern African development public. The study used panel data covering the period from 1994-2017 using Feasible Generalised Least Squares (FGLS) technique. The results indicated that the effect of FDI is insignificant on youth unemployment in SADC region.

2.3.2 Domestic Investment and Unemployment

Researches conducted around the relationship between domestic investment and unemployment include study directed by Hoon et al. (2018), which investigated the association between Investment, current account, and the long swings of unemployment for 20 Organisation for Economic Cooperation and Development (OECD) countries from 1960 to 2015 using Ordinary Least Squares (OLS) method. This research concluded that there is an inverse connection between investment and unemployment in OECD countries. Another study around the association between domestic investment and unemployment was conducted in developing country by Anowor, et al (2019) which examined how investment affect unemployment rate in developing country, Nigeria, between 1980 and 2017. Their study used dynamic model error correction, which indicated that investment has a potential of creating employment. The results concluded that investment has a negative and significant relationship with unemployment. The study indicated that investment is efficient in decreasing the level of unemployment.

Studying the association between domestic investment and unemployment continued in developed countries. The study conducted in developed country was conducted by Heiliati (2019) who investigated the effect of foreign investment, GDP, domestic investment, and population growth on unemployment in Indonesia using yearly time

series data from 1984 to 2016. This study employed Ordinary Least Squares method. The study's findings showed that remittance, population growth and GDP has an important and positive impact on unemployment while domestic investment exhibited negative and important effect on unemployment. This study obtained similar result to the study by Anowor, (2019) in developing country. Also, Umam & Wardhana (2020) investigated the relationship between real GDP growth, total debt, net debt, and investment in Asian OIC countries covering the period from 1985 to 2019. Their study employed panel data regression to examine the effect of investment, total debt, net debt as well as economic growth on unemployment. The results of the study showed that investment is inversely related to unemployment, that is, as investment increases, unemployment declines.

Studying the relationship between domestic investment and unemployment even continued in Panel data. Nasution, et al (2020) conducted a study about domestic investment, foreign investment and unemployment reduction in Indonesia using panel data regression over the period from 2006 to 2018. The study had an aim to determine the effect of domestic investment on unemployment on Indonesia. The investment variable was divided into domestic investment and foreign investment. The study used Feasible Generalised Least of Squares with unrealised regression. The study's empirical results showed that foreign direct investment and domestic investment have a significant, positive impact in reducing unemployment in Indonesia.

The study conducted by Nasution, Tarigan and Siregar (2020) in Indonesia have found that domestic investment and unemployment are positively related while other sampled studies have indicated that domestic investment and unemployment are negatively related. This study has employed Feasible Generalised Least Squares with Seemingly Unrelated Regression (FGLS-SUR). Different methodology and sample period were employed, that could have resulted in obtaining different results.

2.3.3 Inflation rate and Unemployment

Arslan & Zaman (2014) studied the relationship between inflation and unemployment. They analysed the determinates of unemployment in Pakistan from 1999 to 2010. Their study showed that Inflation, GDP, FDI, and population growth are the main determinates of unemployment. This study concluded that Inflation, and gross domestic product

negatively affect unemployment in Pakistan. Another study conducted in Pakistan was conducted by Mangnejo et al., (2020) also examined the relationship between inflation and unemployment in Pakistan and have employed time series data between 1991 to 2015. Their study used E-views to show the existence of Phillips Curve in Pakistan. Their study revealed different results which indicated that when inflation is increasing unemployment is increasing.

A study by Gaber (2018) investigated the determinants of unemployment in Palestine covering the period from 1994 to 2017 and the research used Ordinary Least squares. The study investigated the association between unemployment, and macroeconomics factors such as gross domestic product, Inflation, labour force external trade, and restrictions on labour movement. The empirical results showed that inflation positively and significantly affect unemployment. According to CUSUM and CUSUM SQUIRES, the study was well stable within 5% level of significance. Similar results are obtained in different studies where they have used different sampled period, region and methodology.

A study conducted by Singh (2018) obtained different results. The study investigated the impact of economic growth and Inflation on unemployment in Indian economy. The study was covering time interval from 2011 to 2018. The findings of the research were that inflation positively and insignificantly affects unemployment.

2.3.4 Economic growth and Unemployment

The research by Shem (2016) investigated the economic determinates of Youth unemployment in Kenya over the period between 1979 and 2012. To examine the relationship among economic variable, youth unemployment, GDP, population, foreign direct investment, and external debt, the study employed time series data using ARDL to test the long run effect of determinants. The study showed that there is a positive connection between GDP and youth unemployment.

The study conducted by Banda et al., (2016), inspected the impact of GDP on unemployment in South Africa from 1994 to 2012 using quarterly data. The study employed time series data using Vector Error Correction Model (VECM). The result of this study indicated that real effective exchange rate, economic growth and budget deficit affect unemployment positively and labour productivity influences unemployment negatively.

The study in Nigeria was conducted by Akinyemi, et al. (2018) inspecting the trend between entrepreneurship, unemployment and GDP covering the period from 1981 to 2011. The study employed ordinary least of squares to achieve the objective. The results showed that entrepreneurial activities, investment and economic growth are positively associated to unemployment. While a study conducted by Musara, et al (2020) have investigated the entrepreneurial activity for economic growth and unemployment reduction in South Africa covering the period from 2000 to 2016. The descriptive analysis results indicated that there is a positive relationship between entrepreneurial activity, unemployment, and economic growth. While this these two studies have found the economic growth have a positive relationship with unemployment, they have investigated different concept. The first study examined trend while the other study examined entrepreneurial activity in two different countries.

A study by AL-Sawaiea (2020) examined the connection between economic growth and unemployment in Jordal. The ARDL methodology was used to conduct the study, which encompassed the years 1976 to 2018. The empirical findings of the study showed that there is a negative and significant association between unemployment and economic growth, which synchronises with the Okun's law. Another study by Hjazeen et al. (2021) looked into the relationship between unemployment and economic growth in the Jordanian economy from 1991 to 2019 in a different study. ARDL methodology was used in the study to look into this association. The study's conclusions showed that there is a positive correlation between education, the proportion of women in the population, urban population, and unemployment, and a negative correlation between economic growth and unemployment. These results are similar to each other while they have been conducted in different regions.

The study by Wagar, et al (2021) examined the effect of real GDP, inflation rate, and exchange rate on unemployment in South Africa over the period from 1980 to 2018. Their study employed Vector Correction, Johansen, and Granger Causality tests and the results revealed that there is no long-run association between the Gross Domestic Product (GDP), inflation rate, and exchange rate on unemployment.

2.3.5 Causality between domestic investment, foreign direct investment, economic growth and unemployment

Studies about the causality between foreign direct investment and unemployment include study by Strat, et al (2015) who investigated causality analysis between FDI and unemployment using annual data covering the period from 1991 to 2012. The study used Toda Yamamoto approach from European Union members. The results of the study with regard to Bulgaria, Hungary, Estonia and Malta, discovered that the inflow of FDI significantly decreases unemployment. The causal relationship between inflation, economic growth, and unemployment which was conducted in North African nations was investigated by Sahnoun & Abdennadher (2019). The research utilised vector error correction methods, Johansen cointegration technique, Dickey Fuller and Phillips Perron test for unit root, spanning the years 1965 to 2016. Their empirical findings demonstrated a unidirectional flow from economic growth to unemployment, from inflation to unemployment, and from economic growth to unemployment. The findings suggest that both unemployment and inflation might contribute to each other.

Another conducted in Africa was conducted by Sahnoun & Abdennadher (2019) investigating the causality between inflation, economic growth and unemployment in African countries covering the period from 1965 to 2016. The study has employed vector error correction model (VECM) to examine the causality relationship between variable of the study. The empirical result of the study showed unidirectional causality from inflation to economic growth, from economic growth to unemployment, and from inflation to unemployment. Both above studies were conducted in Africa have indicated a unidirectional causality relationship from economic growth to unemployment.

A study conducted in developed country include the study by Nguyen (2019) which investigated the causal relationship between economic growth, foreign direct investment, and unemployment in central of Asia from 1997 to 2016. The study used vector autoregressive model. Findings of the study have showed that economic growth and unemployment do not cause other variable and foreign direct investment caused other variables.

AL-Sawaiea (2020) have investigated the association between economic growth and unemployment in Jordal. The study has covered the period from 1976 to 2018 using

ARDL method. The causality test results indicated that there is a bidirectional causality between economic growth and unemployment. Another study by Wagar, et al (2021) examined the impact of real Gross Domestic Product (GDP), inflation rate, and exchange rate on unemployment in South Africa over the period from 1980 to 2018. Their study employed Vector Correction, Johansen, and Granger causality tests. According to Granger causality results, there is a bidirectional causality between real GDP against unemployment, exchange rate against unemployment, as well as inflation against unemployment. These results indicated the same causal relationship between economic growth and unemployment which is having a bidirectional relationship.

2.3.6 The behavior of unemployment to shocks applied to domestic GFCF, FDI and economic growth

The studies around studying the behaviour of unemployment to the shock of GFCF, FDI and economic growth includes a study by Zdravkoic, et al (2017) which analysed the impact of FDI on unemployment in transition countries using panel cointegration approach. The study used Structural Vector Autoregression (SVAR) on quarterly data from 1stQ of 2005 to 4thQ of 2016 on Turkey economy. The findings of the study were that the positive shock on foreign investment reduces unemployment. The study by Zamnib (2021) has investigated the factors that contribute to unemployment in Pakistan. To achieve its goal, the study analysed annual data from 1975 to 2019 and auto regressive distribution lag (ARDL). The impulse response function was also ascertained using vector auto regression, or VAR. According to the impulse response function results, unemployment responds to shocks from within initially favourably, adversely after two years, and positively after three years. When foreign direct investment shocks occurred, unemployment first responded negatively before eventually dying out. The shocks of economic expansion caused unemployment to respond negatively before it eventually died out to zero.

The study conducted in Nigeria include the study by Maijama'a & Musa (2020) which examined the relationship between renewable energy consumption and unemployment in Nigeria between 1991 to 2015. The study used the VAR methodology to examine the impulse response of unemployment. The results of impulse response function for

unemployment showed that unemployment response was positive from 1st period to 10th period to the shocks of investment and credit to private sector. Unemployment reacted negatively to the shocks of foreign direct investment throughout the period.

Wagar, et al (2021) examined the effect of real GDP, inflation rate, and exchange rate on unemployment in South Africa over the period from 1980 to 2018. The Vector Correction, Johansen, and Granger Causality tests were employed. According to impulse response test, gross domestic product responded positively and significantly in the long run. In addition, the variance decomposition indicated that in long run and short run, independent variables strongly estimate unemployment.

A study was conducted to investigate how economic growth affects unemployment in Zambia by Tembo (2023). The study used quarterly data which covered the period 1990 to 2020. The VAR technique employed investigated the response of unemployment to the shock of explanatory variables of the study. The response of unemployment to the shocks of itself was positive from the 1st period to the 2nd period and thereafter it declined and remained relatively flat from 3rd period until 5th period. The response of unemployment was negative from 2nd period until the 10th period to the shocks of economic growth. Unemployment reacted positively to the shocks of foreign direct investment between 1st and 4th period, reacted negatively between 4th and 6th period and thereafter became positive.

2.4 SUMMARY

Chapter 2 has discussed the theoretical literature and reviewed the empirical literature relevant to the topic of the study. Theories which are discussed in theoretical literature include the Keynesian theory, Classical theory, Monetarist theory and Okun's Law while in the empirical literature studies around unemployment and the independent variables – FDI, domestic investment, economic growth were discussed. In Chapter 3, the study explains the research methodology employed.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In the second chapter of the study, literature on various theories of unemployment were explained to articulate relevant analytical framework for South Africa. This was accompanied by applicable studies and a brief description of the relationship between investment, economic growth, and unemployment. The study's econometrics methods employed are explained in this chapter. Data, model's specification, and estimate methods like co-integration, Granger casualty testing, stationarity/unit root testing, accounting innovations (such as variance decomposition and impulse response), Autoregressive Distribution Lag (ARDL), diagnostic testing, and stability testing are all explained.

3.2 DATA

The research employs yearly data, which is secondary in nature and covers the period from 1998 to 2020. The study's relevant data variable listed in table 3.1, was obtained from the World bank considering that it is rated as one of the most trustworthy datahub.

Table 3.1: Model Variables

Variables.	Measure	Source
Unemployment	Unemployment rate	World Bank
Foreign Direct Investment	FDI as ratio/rate to GDP	World Bank
Domestic Investment	Gross fixed capital formation (GFCF) as a percentage to GDP	World bank
Economic growth	GDP growth rate	World bank
Inflation (Control variable)	Inflation rate	World bank

Table 3.1 shows the variables and measures together with their sources.

3.3 MODEL SPECIFICATION

The model of the study explains how much of the changes of the depended variable are explained by changes of independent variables. Unemployment is the dependent

variable, while the primary independent variables are economic growth, domestic and international direct investment, as inflation is included as a controlled variable. The model explains that unemployment is influenced foreign and domestic investments and economic growth, while inflation. The standard equation of the model is defined as:

$$UNEMP = f(FDI, GDP, GFCF, INF) \dots \dots \dots (3.1)$$

where: *UNEMP* is unemployment, *FDI* is foreign direct investment as a rate to GDP, *INFL* is inflation, *GDP* is the growth rate of gross domestic product, and *GFCF* is gross fixed capital formation as a rate to GDP. The study adopted the model from Chella & Phiri (2017); however, economic growth was added to the model as supported by the Okun's law (Okun, 1962).

The prior expectation of the study is that unemployment will be affected negatively by foreign direct investment, domestic investment, economic growth as well as inflation.

A multi regression format of (3.1) can be re-written as follows:

$$UNEMP_t = \beta_0 + \beta_1 FDI_t + \beta_2 GFCF_t + \beta_3 GDP_t + \beta_4 INF_t + \varepsilon_t \dots \dots \dots (3.2)$$

where: β_0 represent a constant or intercept, β_1 to β_4 are the coefficients of independent variables, and ε_t is a disturbance term. Since all variables are in the form of rates or ratios, transformation phase will not be necessary.

3.4 ESTIMATION TECHNIQUE

This section of the study focuses on stationarity testing, cointegration analysis, Granger causality, impulse response, long run, and short run coefficients using Autoregressive Distribution Lag (ARDL), diagnostic testing, and lastly stability test.

3.4.1 Stationarity/Unit root test

The initial tests that has to be taken before analysis, is the stationarity or unit root testing because time series data have an issue of spuriousness. Before regressing time series

data, there is a need to deal with stationarity tests first (Mutya, 2013). There are two forms of testing for stationarity, which are formal unit root testing and informal unit root testing, which involve virtual inspection of graphs. The study employs both formal unit root testing and informal unit root testing.

When a variable is stationary, it would mean that it has a steady mean, variance, as well as co-variance (Weber, et al., 1992). The study employs the standard version of ADF and PP to check the order of integration. Therefore, stationarity testing is employed to check the order of integration of variables and to also ensure that invalid results are prevented (Arfaoui, et al., 2016).

3.4.1.1 Augmented Dickey-Fuller (ADF) unit root test

Augmented Dickey-Fuller (ADF) is an amended version of Dicker-Fuller, it can accommodate more complex and large time series data (Arfaoui et al., 2016). The (H_0) states that the unit root occurs, that is the variable is non-stationary, while the (H_1) states that the unit root does not occur, that is the variable is stationary (Moffatt, 2019). The rule of thumb state that, reject (H_0) when the probability value is less than 5% level of significance and do not reject (H_0) when the probability value is greater than 5% level of significance. Dickey & Fuller (1976) holds that the mathematical equation for ADF is represented as:

$$\Delta X_t = \theta_0 + \theta_1 + \beta_0 X_{t-1} + \sum_{i=1}^h \beta_i \Delta X_{t-1} + \varepsilon_t \dots \dots \dots (3.3)$$

From equation (3.3); Δ indicates the first difference; t indicates the time series; h is the number of lags used and ε denotes the error term. The θ and β denotes the parameters. To reject the non-stationary null hypothesis X_t then β_0 must be statistically significant and have a negative sign.

3.4.1.2 Phillips-Perron (PP) test

Phillips-Perron test (PP) is employed in the model of the study as an alternative for ADF. One of the advantages about PP test is that it adjusts the test statistics and is resistant to the errors' heteroscedasticity as well as unidentified autocorrelation (Phillips & Perron,

1988). The (H_0) for PP test states that states that the unit root occur, meaning the variable is non-stationary if the probability value is more than the level of significance. While the alternative (H_1) states that the unit root does not occur, that is the variable is stationary (Dickey & Pantula, 1987). The rule of thumb, states that, reject (H_0) when the probability value is less than 5% level of significant and do not reject (H_0) when the probability is more than 5% levels of significance.

3.4.2 Autoregressive Distributed Lag Approach (ARDL)

The Autoregressive Distribution lag (ARDL) approach is the purified method of the traditional autoregressive technique and regression with distribution lag (Pesaran & Shin, 1997). This approach combines the Autoregressive approach with the distribution lag to regress a variable over its previous and present values of the independent variables (Pesaran & Shin, 1997). Thus, the ARDL model can be presented as follows:

$$Y_t = \sigma + \chi Y_{t-1} + \beta_0 X_t + \beta_0 X_{t-1} + \varepsilon_t \dots \dots \dots (3.4)$$

Where; Y_t denotes the dependent variable lagged by one year; X_t denotes independent variable lagged one year; and ε_t denotes the error term.

The rephrased autoregressive model is represented as follows:

$$Y_t = \sigma (1 + \chi + \chi^2 + \chi^3 + \dots) + (1 + \chi L + \chi^2 L^2 + \chi^3 L^3 + \dots) (\beta_0 X_t + \beta_0 X_{t-1}) \dots \dots \dots (3.5)$$

From equation (3.5), proves that $|\chi| < 1$. Equation (3.5) is the autoregressive technique that estimates the changes in X_t on the future values of Y_t . From equation (3.5), the long run static equilibrium (Y,X) can be derived as:

$$Y_t = Y_{t-1} = Y, X_t = X_{t-1} = X \dots \dots \dots (3.6)$$

In equation (3.6) the error term is considered to be zero.

$$\text{Therefore, } Y = \frac{\sigma}{1-\chi} + \frac{\beta_0 + \beta_1}{1-\chi} \dots \dots \dots (3.7)$$

Where; Y_t is replaced by $Y_{t-1} + \Delta Y_t$ and where Δ denotes the first difference operator and X_t with $X_{t-1} + \Delta X_t$ in equations (3.4) to yield the following equation

$$\Delta Y = \sigma + \beta_0 \Delta X_t - (1 - \chi) \left[Y_{t-1} - \frac{\sigma}{1 - \chi} - \frac{\beta_0 + \beta_1}{1 - \chi} X_{t-1} \right] + \varepsilon_t \dots \dots \dots (3.8)$$

The term in bracket from equation (3.8) represent the long-run equilibrium parameters of the ARDL model. According to Pesaran & Shin (1997), equation (3.8) develops the ARDL model in order to incorporate the bounds test for cointegration, short run and long run parameters simultaneously. Thus, the following equation was developed to account for the error term which does not have the restricted error corrections:

$$\Delta Y = \partial_{0Y} + \sum_{i=1}^p \beta_{iY} \Delta Y_{t-1} + \sum_{i=1}^p \delta_{iY} \Delta X_{t-1} + \alpha_{1Y} \Delta Y_{t-1} + \alpha_{2Y} \Delta X_{t-1} \varepsilon_{1t} \dots \dots \dots (3.9)$$

In equation (3.9), P denotes the lag structure Y_t and X_t denotes the underlying variable and ε_{1t} denotes error term with zero mean and finite covariance matrix. According to Pesaran et al (2001), the (H_0) of no long equilibrium is test against the (H_1) of the long run equilibrium in equation (3.9). The null hypothesis $H_0: \alpha_{1Y} = \alpha_{2Y} = 0$ and the alternative hypothesis $H_1: \alpha_{1Y} \neq 0, \alpha_{2Y} \neq 0$. The test is then employed in the study to test the hypothesis of the effect of investment and economic growth on unemployment.

3.4.2.1 ARDL specification of the unemployment model

ARDL is the most preferred methodology over Johansen technique due to its ability to incorporate variables, which have different level of integration. The fact that ARDL simultaneously captures the short- and long-term relationships is one of its greatest advantages. (Pesaran, et al., 2001). The ARDL model of the study for unemployment is constructed as follows:

variable adjusts to changes in the independent variables. The rate of change has to be negative because a negative and significant coefficient suggest that any short-run changes in the variable will result in a stable long run relationship (Ncanywa & Letsoalo, 2019). The ECM with a positive coefficient indicates that the model is explosive.

3.4.3 Granger causality test

After estimating the effect of FDI on unemployment, the study employed Granger causality to check whether the variables Granger cause each other or not. From granger causality principle, an independent variable granger causes the dependent variable if the previous values of independent variable can be used to forecast values of dependent. In addition, the dependent variable Granger causes independent variable if the lagged values of dependent variable can be used to predict the value of independent variable (Granger, 1969).

VAR Granger causality test can have three possible results or conclusion (Adams, 2010). First, its unidirectional Granger causality, where dependent variable can Granger cause independent variable or independent can granger cause dependent variable. The second conclusion can be bidirectional, where an explained variable granger cause regressor variable and independent variable granger cause dependent variable. Then lastly, the model can have no causality, where dependent variable cannot granger cause independent variable, or independent cannot granger cause dependent variable. The model of granger causality can also be used to check the robustness of the results (Adams, 2010). The (H_0) of granger causality state that the independent variables they do not granger cause the dependent variable. Mathematical representation of granger causality is represented as:

$$Y_t = \delta_0 + \sum_{j=1}^J \delta_j Y_{t-j} + \sum_{k=1}^K \gamma_k X_{t-k} + \varepsilon_t \dots \dots \dots (3.11)$$

Where; Y_t denotes the dependent variable; X_t denotes independent variable; and ε_t denotes an error term (Ncanywa & Letsoalo, 2019).

Granger (1969) emphasizes that the mathematical presentation of granger can be constructed as follows:

Unidirectional causality form: $Unemp_t$ to FDI_t exist if:

$$\sum_{i=1}^p \delta_{2J} \neq 0 \text{ and } \sum_{i=1}^p \delta_{2J} = 0 ; P \text{ is the lag structure.}$$

Unidirectional causality form: FDI_t to $Unemp_t$ exist if:

$$\sum_{i=1}^p \delta_{2J} \neq 0 \text{ and } \sum_{i=1}^p \delta_{2J} = 0$$

Bidirectional causality form: between $Unemp_t$ and FDI_t if:

$$\sum_{i=1}^p \delta_{2J} \neq 0 \text{ and } \sum_{i=1}^p \delta_{2J} \neq 0$$

No-Causality form: between $Unemp_t$ and FDI_t if:

$$\sum_{i=1}^p \delta_{2J} = 0 \text{ and } \sum_{i=1}^p \delta_{2J} = 0$$

This set of procedure is to be done again and interchanging the variables (Domestic investment, inflation, and gross domestic product) (Ncanywa & Letsoalo, 2019). The study employed unrestricted VAR-Granger causality to establish if investments and economic growth as well as inflation, they can granger cause unemployment.

3.4.4 Diagnostic testing

The diagnostic tests are executed using the model of the study with the goal to find out if any of the classical linear regression model expectations are being disregarded or ignored. The testing is carried out to check the legitimacy and reliability of the model (Ncanywa & Letsoalo, 2019). The study uses various tests such as Jarque-Bera for

normality testing, Ramsey RESET for misspecification in the model, Breusch-Pagan Godfrey, and ARCH LM for heteroscedasticity, and also Breusch-Godfrey LM test for serial correlation (Gujarati & Porter, 2004).

3.4.4.1 Normality test

The study employed normality testing to determine the likelihood that a value of the independent variable underlying the data set is normally distributed and to determine whether the data collection has been well defined by a normal distribution (Das & Imon, 2016). Jarque-Bera test conducted in order to establish or determine normality from the study model.

3.4.4.2 Serial correlation

Serial correlation is used to indicate how data of the same variable over specific time periods relate to one another. Serial correlation test is employed to test if the dependent variable can relate to its lagged/past values of itself for future (Sharmiladevi, 2020). If a variable's serial correlation value is zero, then there is no relationship, and every observation is independent of every other observation. Conversely, observations are serially correlated, and future observations are impacted by past values if a variable's serial correlation skews toward one (Durbin & Watson, 1951). Breusch-Godfrey LM test is conducted to check for serial correlation (Gujarati & Porter, 2004).

3.4.4.3 Heteroscedasticity

Heteroscedasticity is an issue that can arise in econometric models, whereby the standard deviation of the error terms is not constant across the range of the independent variables (Gujarati, 2003). This can be problematic in statistical analysis as the assumptions of homoscedasticity are necessary for valid inference to be made from the results obtained (Wooldridge, 2013). In a dissertation, the presence of heteroscedasticity was by conducting a formal test such as the Breusch-Pagan test or the White test. If heteroscedasticity is present, it should be addressed with appropriate methods such as weighted least squares or robust standard errors (Wooldridge, 2013). It is important to note that the presence of heteroscedasticity does not necessarily invalidate the results of the analysis. It can still be possible to draw valid conclusions from the results, but it may

be necessary to consider the implications of the heteroscedasticity for the interpretation of the results (Pagan & Hall, 1983).

3.4.6 Stability testing

The stability tests are executed to check the sturdiness of the model if the findings are vigorous. For stability testing purpose, CUSUM and CUSUM of Squares tests are employed in the study to check for stability of the model (Tanizaki, 2001). The test demonstrates that all regression coefficients in the model are stable when the residual plots of CUSM and CUSUM OF SQUARES remains inside the critical bounds of the 5% level of significant (Mohapatra , et al., 2016).

3.4.6.1 CUSUM test

The CUSUM test is a technique commonly employed by economists to spot changes in a pattern of data over time. It involves comparing the cumulative sum of data points to a specific threshold (Lee & Moon, 2020). If the difference between the two is substantial, it could signify a shift in the underlying trends. This method is often used to detect irregularities and to identify variations in economic trends (Hintz, 2012).

3.4.6.2 CUSUM of Squares

CUSUM of Squares, also known as Cumulative Sum of Squared Deviations, is a statistical approach that aims to detect variations in the average of a time series (Brooks, 2019). Unlike other methods, it does not make any presumptions about the underlying distribution of the data (Brooks, 2019). The CUSUM of Squares technique works by computing the cumulative total of squared differences from the mean at each time point (Brooks, 2019). When this Cumulative Sum surpasses a pre-set threshold, it indicates a change in the average (Brooks, 2019). This method is particularly useful for recognising small or gradual changes in the average, which may not be noticeable using other techniques such as control charts (Brooks, 2019).

3.5 ACCOUNTING INNOVATIONS

Impulse response functions and Variance Decomposition are employed to test how the dependent variable response to the shocks of independent variable.

3.5.1 Impulse response

The study employs impulse response function methodology to study the reaction of the dependent variables when there are structural shocks in the model. The function shows how the dependent variable reacts to the shock of the independent variable on its standards deviations (Lutkepohl, 2016). The function of Impulse response monitors how each variable on the model affects others.

3.5.2 Variance decomposition

The Impulse response function demonstrate the shocks effect of a variable on path adjustment. Variance decomposition measures forecast error variance which quantifies the impact of all type on shocks (Lindgren, 2012). According to Nyberg & Lanne (2014), Impulse response and variance decomposition are the most common techniques for interpreting estimated linear and non-linear multivariate time series models. Variance decomposition examines how one standard shock originated from dependent variable attributes to independent variable (Manenzhe, et al., 2018). This analysed how much in percentage would a shock of any independent variable account for the fluctuations in a dependent variable of 10 periods.

3.6 SUMMARY

This chapter presented the research methodology employed to determine effect of investment and economic growth on unemployment in South Africa. The initial test explained how the study deals with the issue of stationarity using unit root testing, therefore, ADF test and PP test were explained. The ARDL bounds test for cointegration, ARDL determines the long run and short run coefficients of the variables of the study. Granger causality methodology tests the casual relationship between the variables. Impulse response functions are meant to test for shocks applied on model variables in relation to their individual response. To conclude, diagnostic and stability tests are employed to justify the robustness of the variables and reliability of the model, respectively. In Chapter 4 the analytical methodology described in Chapter 3 was applied to South African yearly data (1998-2020).

CHAPTER 4

DISCUSSION / PRESENTATION / INTERPRETATION OF FINDINGS

4.1 INTRODUCTION

In Chapter 3, the research methodology and research techniques employed to provide more reliable and efficient results in determining the effect of investment and economic growth on unemployment in South Africa were explained. The interpretation of results is a crucial step in any economic research. Chapter 4 provides the findings of the study. In this chapter, the results of the study are discussed in an endeavour to address the research objectives and the findings are analysed considering the existing empirical literature and theories. This chapter provides a thorough examination of the results, and a comprehensive overview of the study's results.

4.2 UEMPLOYMENT MODEL

4.2.1 Stationarity/Unit root tests results

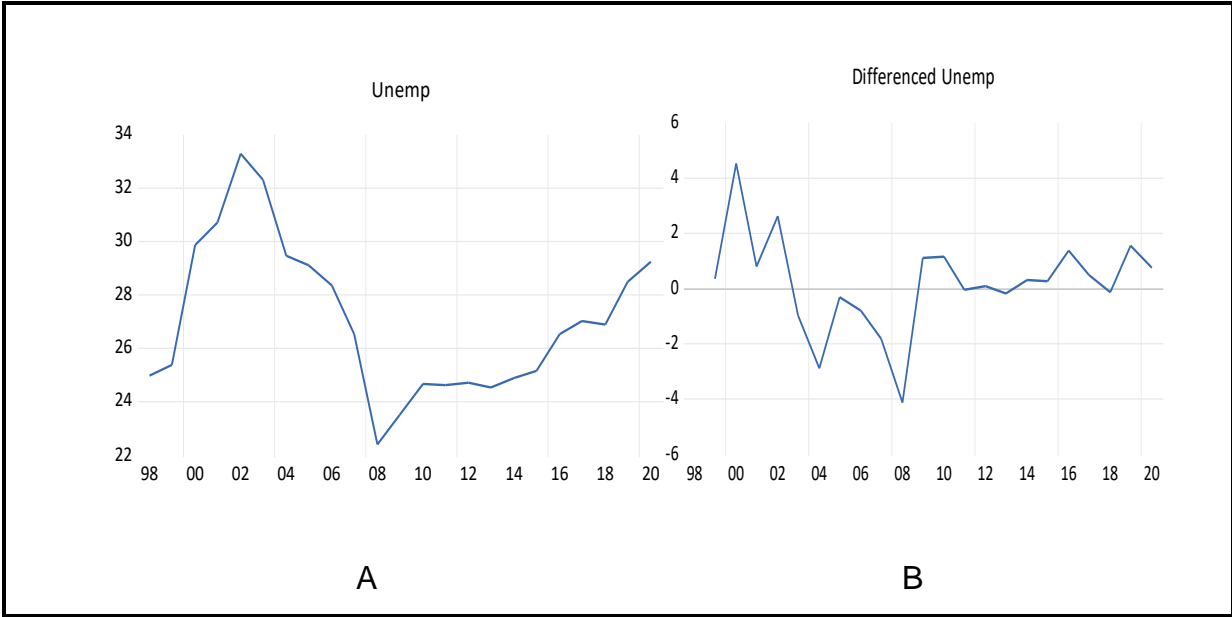
The stationarity tests are conducted in the study to assist in choosing the most appropriate if not good estimation technique for the study to avoid having spurious results. Before performing estimations, determining the variable's integration order in time series data is

essential to avoid spurious regression. Thus, there is a need to employ both formal and informal unit root tests.

4.2.1.1 Visual unit root testing

Panels (A) and (B) in Figure 4.1 depict unemployment at level and at 1st difference respectively. Panel (A) indicates that unemployment variable seems not to hover around the mean of zero. Therefore, unemployment does not appear to be stationary at level. Panel (B), however, shows that unemployment variable at first difference seems to be oscillating around the mean of zero. Therefore, unemployment appears to integrate at order I (1), but this conclusion need to be verified by formal unit root tests.

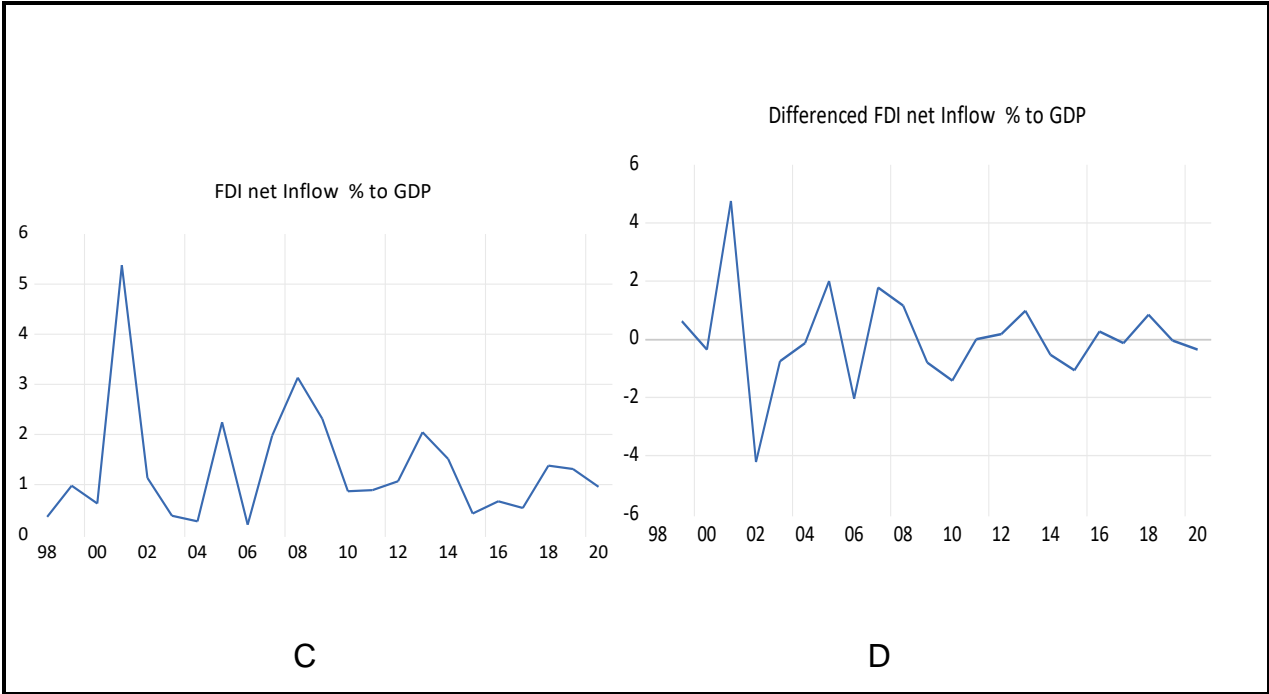
Figure 4.1: Unemployment at level and 1st difference



Also, panels (C) and (D) in Figure 4.2 depict the foreign direct investment level and 1st difference, respectively. According to both panels (C) and (D), foreign direct investment

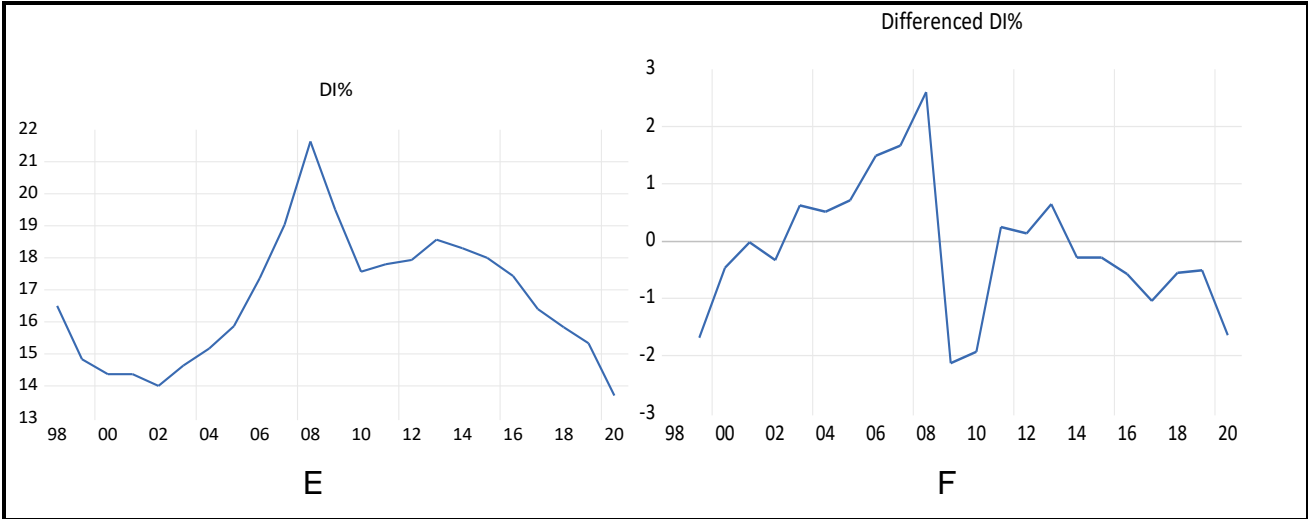
is not upward trending or downward trending, foreign direct investment seems to be stationary at level as it oscillates around the mean of one. Therefore, foreign direct investment appears to integrate at order (0).

Figure 4.2: Foreign Direct Investment at level and 1st difference



Panel (E) and (F) in figure 4.3 show domestic investment at level and at first difference, respectively. Panel (E) shows that domestic investment is non-stationary. In Panel (F) shows that domestic investment is stationary at 1st difference as it swings around the mean of zero, hence, the variable domestic investment integrates at order I (1).

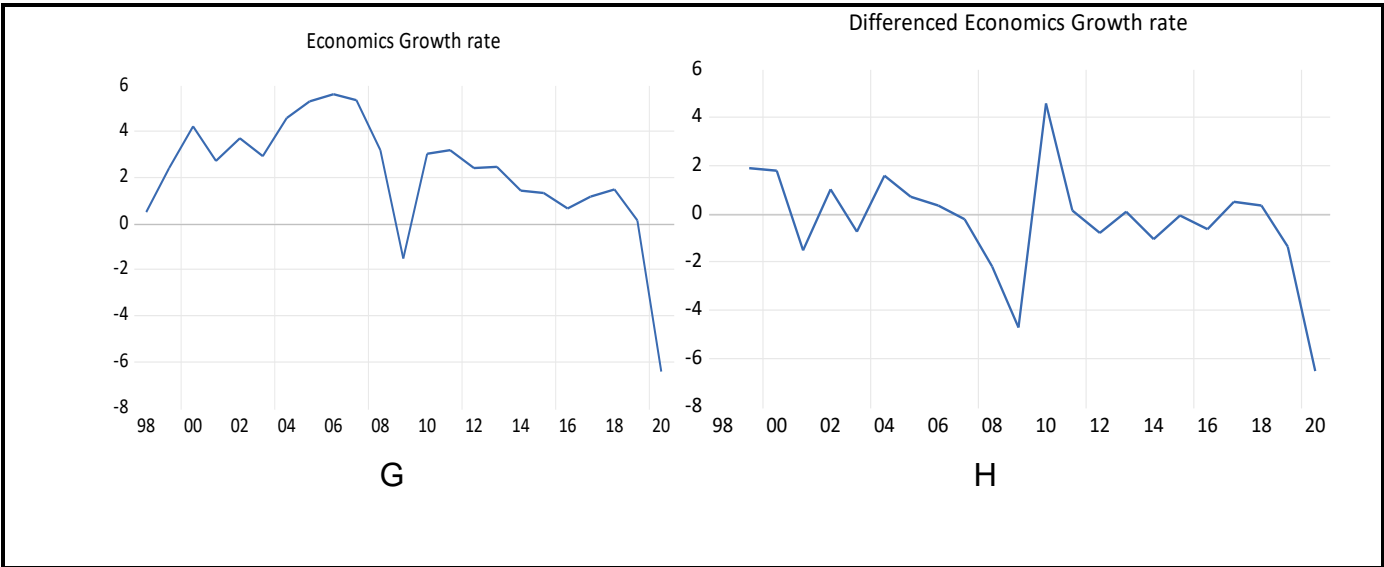
Figure 4.3: Domestic Investment at level and 1st difference



Panel (G) and (H) in Figure 4.4 displays the Economic growth at level and at first difference, respectively. Panel (G) shows that economic growth does not seem stationary even, yet it passes through the mean of zero, for the most part is above the mean and then comes below the mean of zero. Economic growth in Panel (H) seems to be stationary at first difference as it fluctuates around the mean of zero, hence, the variable trade deficit integrates at order I (1). Thus, Economic growth is stationary at first difference.

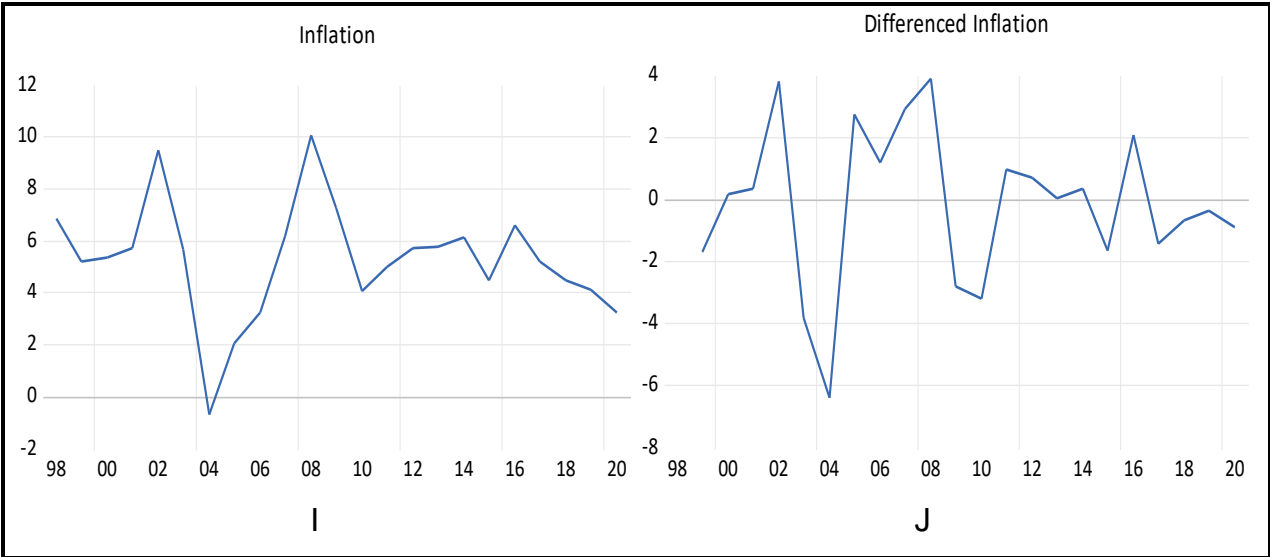
Figure 4.4 Economic growth at level and 1st difference





Panels (I) and (J) depicts inflation at level and at first difference, respectively. Panel (I) shows that the entire observed period of inflation does not float around the mean of zero, even though it touches zero two times. Therefore, inflation is not stationary at level. Panel (J) however shows inflation at first difference as it swings around the mean of zero. Inflation is integrated at order 1 (1).

Figure 4.5: Inflation at level and 1st difference.



4.2.1.2 Formal unit root testing

Formally, the Augmented Dickey-Fuller unit root test and Phillips Perron unit root test are employed. Table 4.1 shows the results for both Augmented Dickey-Fuller (ADF) test and Phillips Perrons (PP) test. Both unit root tests were conducted on all variables of the study, that is, on unemployment, foreign direct investment, domestic investment, and inflation. The study ran both tests on model of intercept, intercept and trend and none.

Table 4.1: Augmented Dickey-Fuller and Phillips Perron Unit Root Test Results

Series	Model	ADF Lags	ADF Statistic	PP Bandwidth	PP Statistic	Conclusion & Order of Integration
Unemp	Intercept	4	-3.040391	2	-3.004861	Do not reject H_0
	Intercept Trend and Intercept	4	-3.632896	2	-3.632896	

Series	Model	ADF Lags	ADF Statistic	PP Bandwidth h	PP Statistic	Conclusion & Order of Integration
	None	4	-1.957204	0	-1.957204	
D(Unemp)	Intercept	7	-3.012363*	0.345	-3.012363*	Reject H_0
	Trend and Intercept	7	-3.791172**	35	-3.644963*	
	None	7	-1.958088**	4	-3.958088**	
FDI	Intercept	4	-3.004861**	0.407	-3.004861**	Reject H_0
	Trend and Intercept	4	-3.690814*	0.777	-3.632896**	
	None	4	-1.957204*	1.41	-1.957204*	
GFCF	Intercept	4	-3.012363	3.1	-3.004861	Do not reject H_0
	Trend and Intercept	4	-3.632896	2.7	-3.632896	
	None	4	-1.957204	2.85	-1.957204	
D(GFCF)	Intercept	8	-3.012363*	0.954	-3.012363*	Reject H_0

Series	Model	ADF Lags	ADF Statistic	PP Bandwidth h	PP Statistic	Conclusion & Order of Integration
	Trend and Intercept	8	-3.828975**	9	-3.644963*	
	None	8	-1.9258088**	0.94	- 1.9258088* *	
GDP	Intercept	4	-3.004861	0.818	-3.004861	Do not reject H_0
	Trend and Intercept	4	-3.632896	0.348	-3.632896	
	None	4	-1.957204*	0.411	-1.957204	
D(GDP)	Intercept	4	-3.012363*	1.07	- 3.012363**	Reject H_0
	Trend and Intercept	4	-3.644963*	0.798	- 3.644963**	
	None	4	-1.958088**	0.858	- 1.958088**	
INF	Intercept	4	-3.012363*	1.69	-3.004861*	Do not reject H_0
	Trend and	4	-3.673616	1.69	-3.632896	

Series	Model	ADF Lags	ADF Statistic	PP Bandwidth h	PP Statistic	Conclusion & Order of Integration
	Intercept					
	None	4	-1.957204	0.804	-1.957204	
D(INF)	Intercept	4	-3.040391**	0.209	- 3.012363**	Reject H_0
	Trend and Intercept	4	-3.286909**	0.152	- 3.644963**	
	None	4	-1.961409**	0.206	- 1.958088**	

Key: *10%, 5%** and 1%***

Source: Author's compilations

Table 4.1 shows the unit root testing results derived when the ADF unit root test and PP unit root test were applied. The test results show that foreign direct investment is the only variable that is stationary at level 0, that is the variable is integrated at order 0. The null hypothesis of the existence of unit root was rejected at 5% level of significance with respect to the intercept, trend and intercept, as well as none models.

The ADF unit root test results indicated that unemployment is stationary at 1st difference. The PP unit root test results also rejected the null hypothesis of the existence of unit root at 1st difference for unemployment, meaning that unemployment is stationary 1st difference. Similarly, Both the ADF and the PP unit root test results confirmed that domestic investment is also stationary at 1st difference. Since null hypothesis of the existence of the unit root was rejected at 5% level of significance.

Inflation (INF) and gross domestic product (GDP) proved to be stationary at 1st difference I(1) since the null hypothesis of the existence of a unit root was rejected at 5% level of

significate. One of the prerequisite conditions to employ ARDL is that variables need be integrated at order 1 and order 0, hence ARDL qualified to be applied in this study.

4.2.2 ARDL test results

The study's aims and objectives are attained through the application of autoregression distribution lag (ARDL) technique. The ARDL results are presented below.

4.2.2.1 ARDL Bounds test results

Table 4.2 shows the results of cointegration. Cointegration, checks for the existence of long run relationship between the unemployment and the dependent variable of the study.

Table 4.2 ARDL Bounds test results

Model: $UNEMP = f(FDI, INFL, GDP, GFCF)$			
Calculated F-Statistics = 26.87163			
No. Independent of variables K = 4			
Level of significance	Lower Bound (0)	Upper Bound (1)	Conclusion
10%	2.2	3.09	Cointegration
5%	2.56	3.49	Cointegration
1%	3.29	4.37	Cointegration
Source: Author's compilations			

The model of the study has five variables of which four are independent variables, hence K = 4 (Four). The calculated F-statistics of 26.87163 is greater than the lower and upper bound critical values of 3.29 and 4.37. Therefore, the null hypothesis of no cointegration is rejected at 1% level of significant. As a result, the model variables are cointegrated in the long run.

4.2.2.2 ARDL Long run model

This section present long run results of the study.

Table 4.3. Long-run results

Variable	Coefficient	P-Value
FDI	-0.348008	0.0558
GFCF	-1.970350	0.0000
GDP	0.504059	0.0024
INF	0.528119	0.0008
C	57.04584	0.0000
Source: Author's compilations		

Table 4.4 illustrates the long run coefficients of the study, where:

$$Unemp = 57.05 - 0.358FDI - 1.97GFCF + 0.50GDP + 0.53INF \dots \dots \dots (4.1)$$

The results in equation (4.1) show how investments, economic growth and inflation affect unemployment in the long run. The results show that real growth is significant and positively related to unemployment. This means that Okun's law does not hold in a case of South Africa as the theory states that there is a negative relationship between real output (Economic growth) and unemployment (Okun,1962). The results are in line with what Shem (2016) found when investigating the economic determinants of youth unemployment in Kenya. Their results indicated that economic growth is positively related to youth unemployment. The coefficient of economic growth 0.50, showing a positive sign and significant at 5% implies that economic growth has a positive relationship with unemployment. A 10% increase of economic growth leads to a 5% increase of unemployment in South Africa. According to Datt (1994) he argues that when economic growth is positively related to unemployment, it means that the economy is experiencing a jobless growth - the growth of the economy is not generating enough jobs. These results are consistent with Banda, et al. (2016) who found out that economic growth have a positive impact on unemployment in South Africa. However, the study by Hjazeen, et al. (2021), found that economic growth and unemployment are negatively related.

Foreign direct investment has -0.34 as a coefficient and is insignificant at 5% level of significance, indicates an insignificant and negative relationship between foreign direct investment and unemployment in South Africa for the sampled period of study. This could be because foreign investments are directed into technology (Degryse, 2016). The results are supported by the empirical studies by Johnny, et al. (2018) and Mkombe, et al. (2021) as well as the study by Chella & Phiri (2017).

Domestic investment coefficient is -1.97 and is significant at 5% level of significant, showing that domestic investment effect unemployment negatively. This means that 10% increase in domestic investment will lead to 19.70% decrease of unemployment in South African. The results are in line with what Chella & Phiri (2017) found when investigating long run negative relationship between domestic and foreign direct investment in South Africa. This is also supported by Keynesian theory which explains that increase in investment will result in an increase in employment or a decrease of unemployment (Keynes, 1936).

The results in Table 4.3 show that inflation has a coefficient of 0.53 and is significant at 5% level implying that inflation and unemployment have a positive and significant relationship in South Africa for the sampled period of study. A 10% increase of inflation leads to an increase of 5.28% of unemployment in South Africa. The result synchronises with results of studies by Mangnejo, et al and Ahmed (2020) as well as Arslan & Zaman (2014).

4.2.2.3 ARDL short run and ARDL Error Correction Model

Table 4.4 Short run and ARDL Error Correction Model results		
Variable	Coefficient	P-Value
D(FDI)	-0.247265	0.0666
D(GFCF)	-1.399965	0.0000
D(GDP)	0.144360	0.0268
D(INF)	0.375237	0.0002
CointEq(-1)	-0.710516	0.0000
<i>Source: Author compilation</i>		

Table 4.4 show the short run coefficient of the study's variables.

$$Unemp = -0.247265FDI - 1.399965GFCF + 0.144360GDP + 0.375237INF \dots \dots (4.2)$$

Equation (4.2) have the coefficient of -1.39 for domestic investment significant at 5% level of significant shows that there is a negative relationship between domestic investment and unemployment. Meaning that investment could be channelled into modern production process. A 10% increase in domestic investment leads to a reduction in unemployment by 14% in South Africa. The results are in line what Nasution, et al (2020) found when investigating domestic investment, foreign investment, and unemployment reduction in Indonesia. The results are also supported by Keynesian Theory which says that investment and unemployment are negatively related (Keynes, 1936).

Table 4.4 also show that foreign direct investment with a coefficient of -0.24, is negative and statistically insignificant at 5% level significance in the short run.

The coefficient of economic growth is 0.14 which is significant at 5% level of significance showing, that there is a positive relationship between unemployment and economic growth in the short run. A 10% increase in economic growth induces unemployment to increase by 1.44% in South Africa. The result coincides with the result of Shem (2016) who investigated economic determinants of youth unemployment in Kenya and also stated that the outcome of the study is strange. The results were also supported by the study which investigated the trend between Entrepreneurship, unemployment, and Economic growth in Nigeria by Akinyemi, el al (2018) which indicated that economic growth and unemployment are positively related, and this could be because the growth of the economy is not generating enough jobs.

Table 4.4 results also revealed that inflation with a coefficient of 0.37 is statistically significant at 5% level of significance, implying that there is a positive relationship between inflation and unemployment in South Africa in the short run. This means that a 10% increase of inflation results in a 3.75% increase in unemployment. In this case, Phillips curve theory is violated empirically. However, the results are also in line with the findings of the study by Gaber (2018) who investigated the determinates of unemployment in Palestine.

The short run results further show that the error correction term is negative at -0.710516 and statistically significant at 5% level of significance. This means that the model of the

study has a speed of adjustment that is acceptable, having the correct sign and significant at 5% level. The results show that about 71.05% of disequilibrium will converge towards equilibrium every year given that the study uses yearly data.

4.2.3 Granger Causality test results

Granger causality methodology is employed to confirm whether the past and present values of independent variable can be used to predict dependent variable (Granger, 1969). Independent variable is said to Granger cause variable dependent if both the past and present values of independent variable can be used to predict the dependent variable (Granger, 1969). The bounds testing technique employed in the study does not show the direction of causality if it exists between the variables of the study. Therefore, the Granger causality can assist to identify causal relationship among the model variables in the study.

Table 4.5 Granger Causality test results

Null Hypothesis (H_0)	Ob	F-Statistics	P-Value	Conclusion
FDI does not granger cause Unemp	22	1.52476	0.2320	Accept (H_0)
Unemp does not granger cause FDI		0.00137	0.9709	Accept (H_0)
GFCF does not granger cause Unemp	22	16.6819	0.0006	Reject (H_0)
Unemp does not granger cause GFCF		4.87900	0.0397	Reject (H_0)
	22	3.72297	0.0687	Accept (H_0)

GDP does not granger cause Unemp		0.15291	0.7001	Accept (H_0)
Unemp does not granger cause GDP				
INF does not granger cause Unemp	22	0.00064	0.9801	Accept (H_0)
Unemp does not granger cause INF		0.98967	0.3323	Accept (H_0)
GFCF does not granger cause FDI	22	0.08130	0.7786	Accept (H_0)
FDI does not granger cause GFCF		0.23915	0.6034	Accept (H_0)
GDP does not granger cause FDI	22	3.58912	0.0735	Accept (H_0)
FDI does not granger cause GDP		0.14375	0.7088	Accept (H_0)
INF does not granger cause FDI	22	0.02495	0.8762	Accept (H_0)
FDI does not granger cause INF		4.56456	0.0459	Reject (H_0)
INF does not granger cause GFCF	22	3.03318	0.0977	Accept (H_0)
		1.27835	0.2723	Accept (H_0)

GFCF does not granger cause INF				
GDP does not granger cause GFCF	21	11.9362	0.0007	Reject (H_0)
GFCF does not granger cause GDP		7.37035	0.0054	Reject (H_0)
INF does not granger cause GDP	22	2.10538	0.1543	Accept (H_0)
GDP does not granger cause INF		0.13367	0.8758	Accept (H_0)
<i>Source: Author compilation</i>				

Table 4.5 shows the Granger causality results. The results shows that there is no directional Granger causality between employment and FDI and vice versa. This implies that, changes of unemployment do not follow changes of foreign direct investment as well as changes of foreign direct investment does not follow changes of unemployment. The results are in line with the result of ARDL long run result, confirming that foreign direct investment does not affect unemployment in South Africa for sample period of study.

The results also indicate that there is a bi-directional Granger causality between domestic investment and unemployment at 5% level of significance. This implies that domestic investment follows changes in unemployment and unemployment follow changes in domestic investment. The results are in line with ARDL long run result which stated that domestic investment affect unemployment in South Africa.

The unidirectional Granger causality for the study is found to exist between economic growth and unemployment, economic growth, and foreign direct investment, as well as inflation and domestic investment. The unidirectional Granger causality between

economic growth and unemployment means that unemployment follows movement of economic growth which this is in line with the study's results for ARDL long run results.

4.2.4 Diagnostic test results of the ARDL

The diagnostic tests are executed in the model of the study with the goal to find out if any of the classical linear regression model assumptions are being violated or ignored. The diagnostic test results are reported below in Table 4.6. To check if the model is correctly specified, Jarque – Bera test is employed. Breusch – Pagan Godfrey and ARCH LM are employed in the study to check for the existence of the problem of heteroscedasticity in the model. To check if autocorrelation exist in the model of the study, Breusch-Godfrey serial correlation LM test is employed.

Table 4.6 Diagnostic test results

Diagnostic test	Null Hypothesis (H_0)	Probability Value	Conclusion
Normality Test – Jarque – Bera test	Residuals are normally distributed.	0.65733	Do not reject (H_0). Residuals are normally distributed.
Misspecification – Ramsey reset	No misspecification.	0.7936	Do not reject (H_0). There is no misspecification.

Heteroscedasticity – Breusch – Pagan Godfrey	No heteroscedasticity.	0.8805	Do not reject (H_0). The model has no heteroscedasticity
Heteroscedasticity – ARCH LM.	No autoregression conditional heteroscedasticity.	0.8132	Do not reject (H_0). The model has no heteroscedasticity.
Serial correlation – Breusch-Godfrey serial correlation LM test.	No serial correlation.	0.5093	Do not reject (H_0). The model has no serial correlation.

Source: Author's compilation

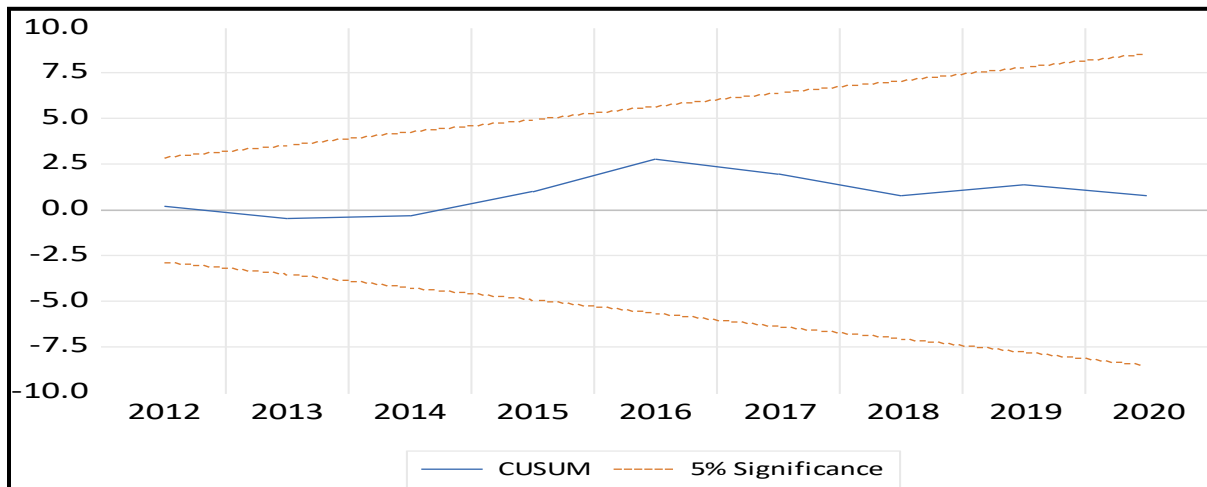
Table 4.6 demonstrates the diagnostic test results of the study model. According to the Jarque-Bera test, the residuals are normally distributed in the model, as the corresponding p-value is 0.65733. The null hypothesis (H_0) that residuals are normally distributed is not rejected at 5% level of significance. Ramsey Reset test was used in the study to test if the model is correctly specified, and the test results show that the model is correctly specified. In this case, the null hypothesis of no misspecification in the model cannot be rejected at 5% level of significance.

Heteroscedasticity was tested in the model using Breusch – Pagan Godfrey and ARCH LM tests. Both tests show that the model does not suffer from heteroscedasticity since the null hypothesis of no heteroscedasticity is not rejected at 5% level of significance. The study has also employed Breusch-Godfrey serial correlation LM test to test for serial correlation and the results shows that the model has no serial correlation due to failure to reject the null hypothesis of no serial correlation at 5% level of significance.

4.2.5 Stability tests results

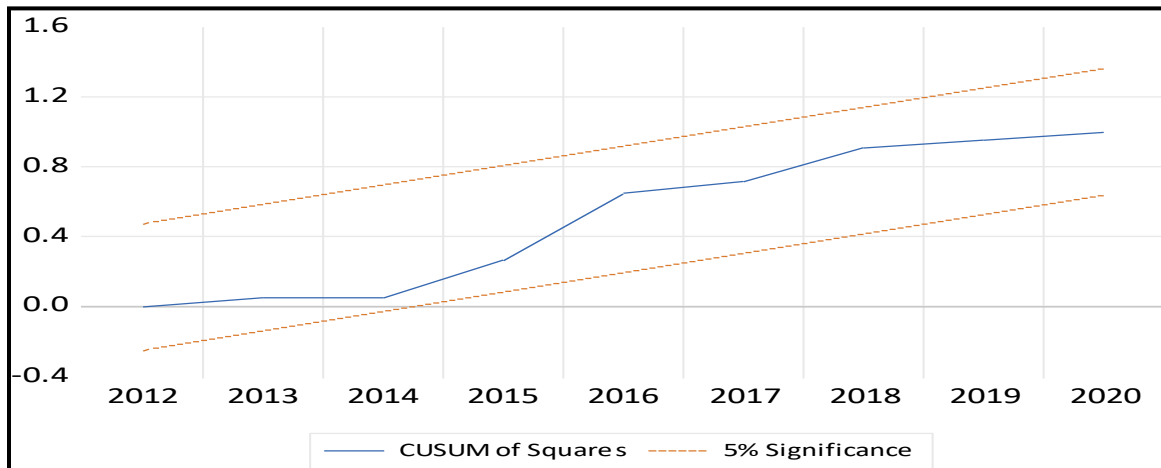
The study used the CUSUM test and the CUSUM of squares test to evaluate the model's stability.

Figure 4.6 CUSUM Test



Given that the cumulative sum stays within the region bounded by two critical lines, that is, the 5% significance liners as shown in Figure 4.6, the model is deemed to be stable and correctly specified. The results in Figure 4.6 demonstrate that there is parameter or variance stability throughout the sample period considered.

Figure 4.7 CUSUM of squares test

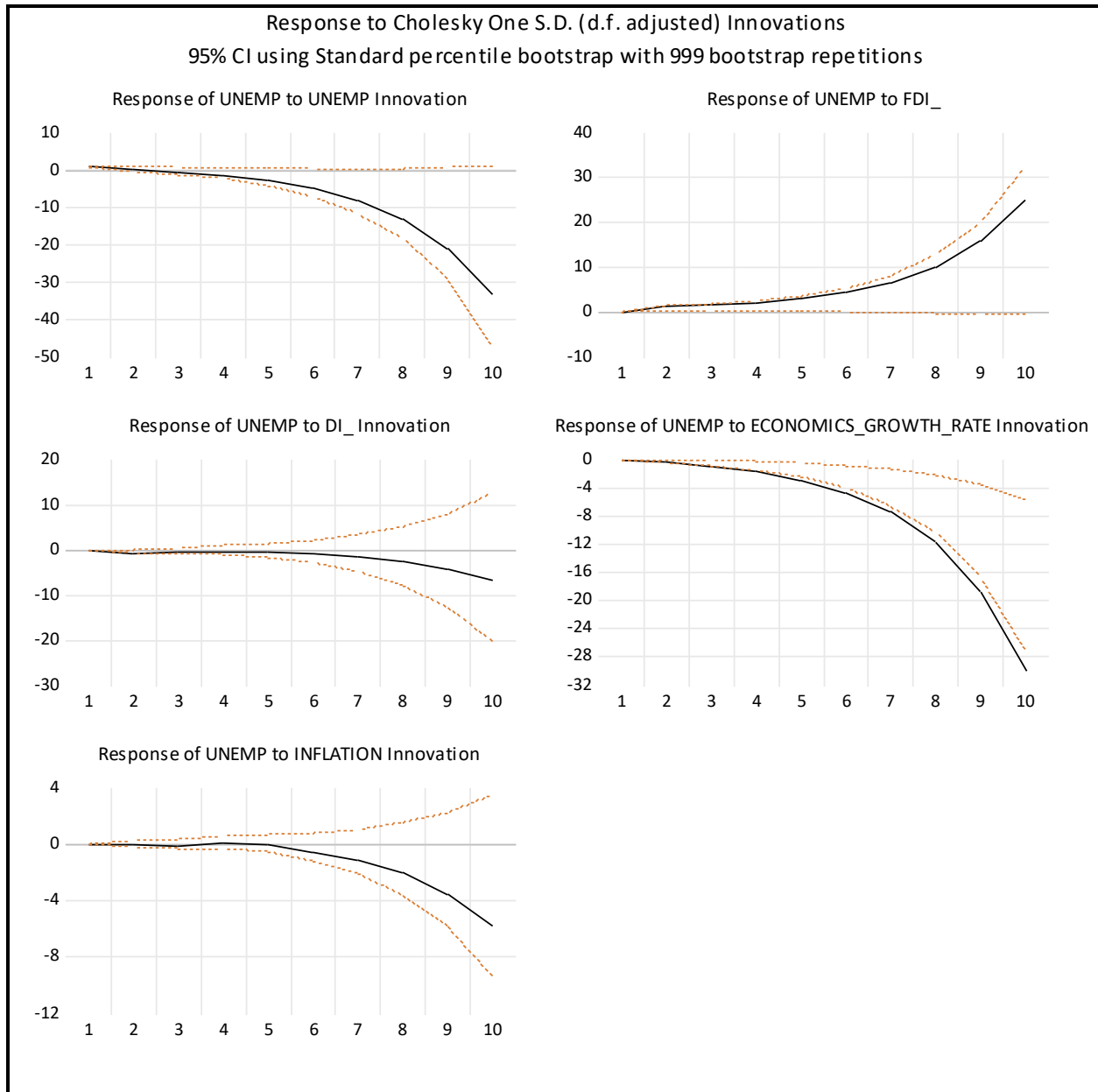


According to Figure 4.7, the model is considered robust and accurately defined because the results reveal that there is parameter or variance stability over the sample period taken into consideration. This is because the cumulative sum stays within the area bounded by two critical lines, i.e., the 5% significance lines.

4.2.6 Impulse response function results

Impulse response functions indicate how each variable in the model of the study reacts to the shocks from other variable in the model.

Figure 4.8 Impulse response function of unemployment (UNEMP)



In Figure 4.8 are the results of the impulse response function of UNEMP to shocks of all the independent variables – FDI, GFCF, GDP, and INF. The results shows that UNEMP reacts negatively to its own shocks as well as the shocks of DI, GDP and INF for the period of study. However, UNEMP reacts positively in the first period then, halfway in the second period it starts to react negatively. Unemployment only reacts positively to the shocks of FDI.

Figure 4.9 Impulse response function of foreign direct investment (FDI)

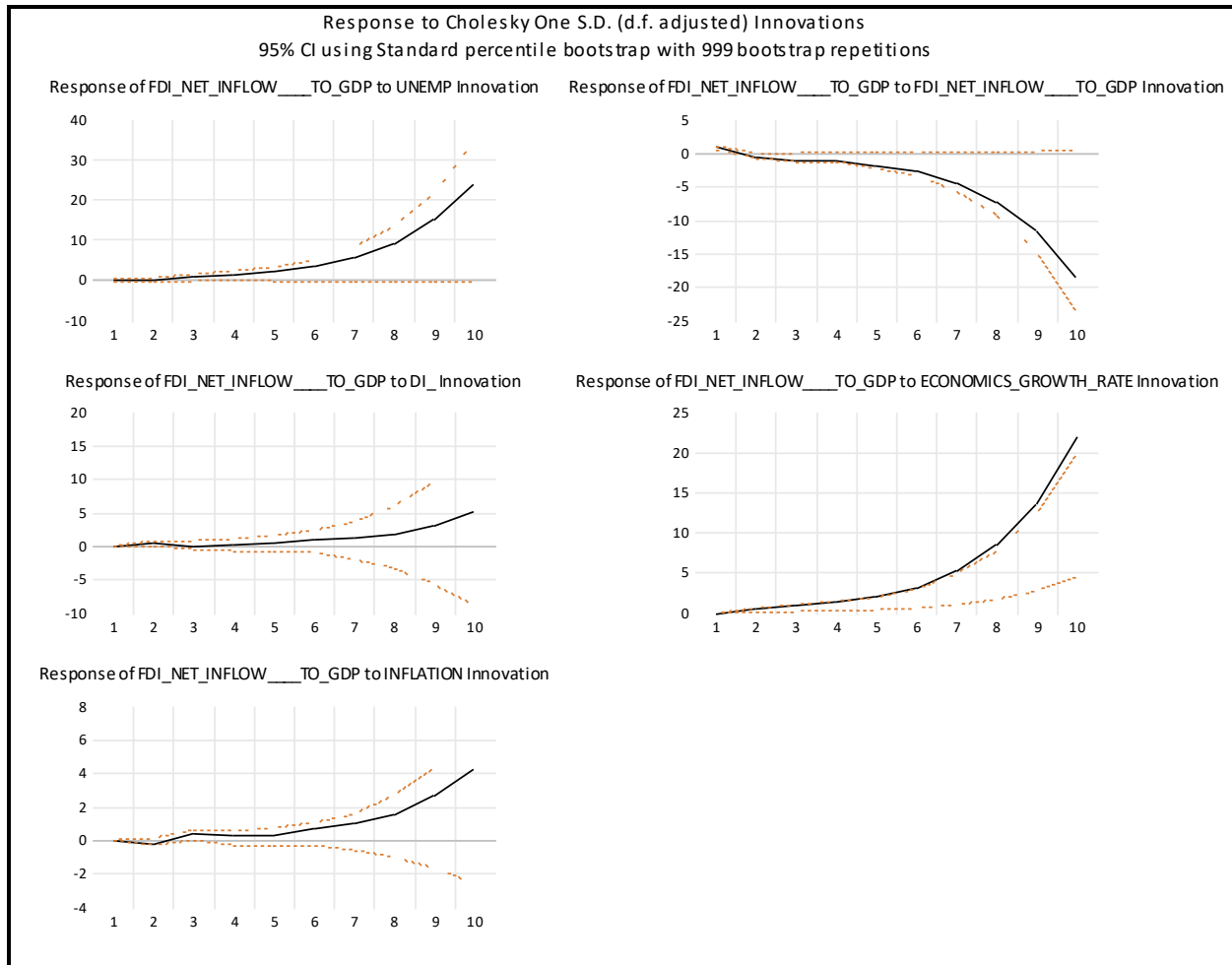


Figure 4.9 shows the results of the impulse response function of FDI to shocks all the variables in the model of the study – UNEMP, GFCF, GDP, and INF as well as its own shocks. FDI reacts positively to the shocks on all the variables, that is, shocks of – UNEMP, GFCF, GDP. The reaction to the shock of INF was negative in first period. The results shows that the FDI response negatively to its own shocks from the second period and positively in the first period.

Figure 4.10 Impulse response function of Domestic investment (GFCF)

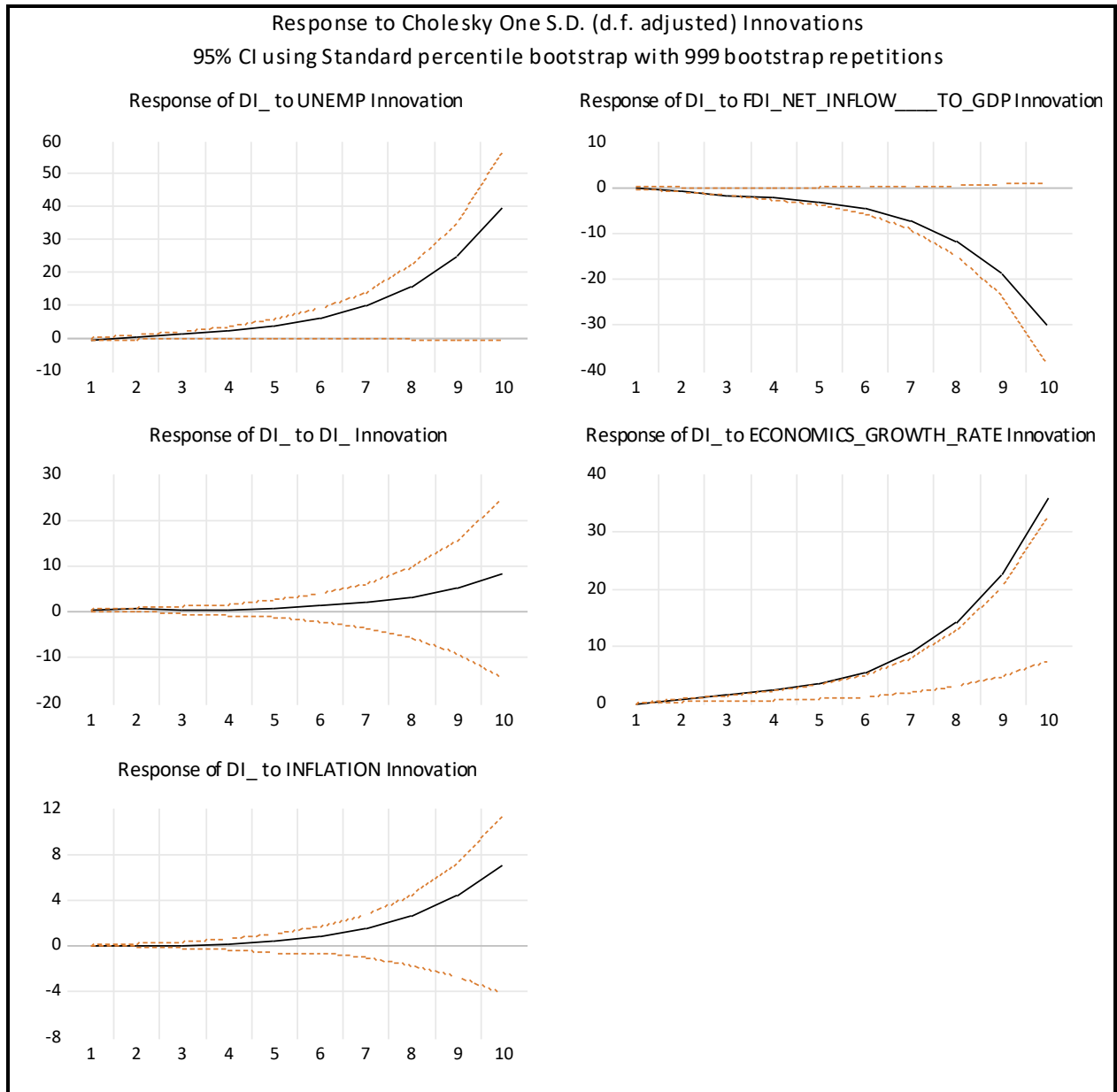


Figure 4.10 depicts the results of the impulse response function of GFCF to shocks of all the variables in the model of the study – UNEMP, FDI, GDP, and INF as well as its own shocks. GFCF reacts positively to all the variables, that is UNEMP, INF, GDP and to its own shocks except for FDI where it reacts negatively.

Figure 4.11 Impulse response function of economic growth (GDP)

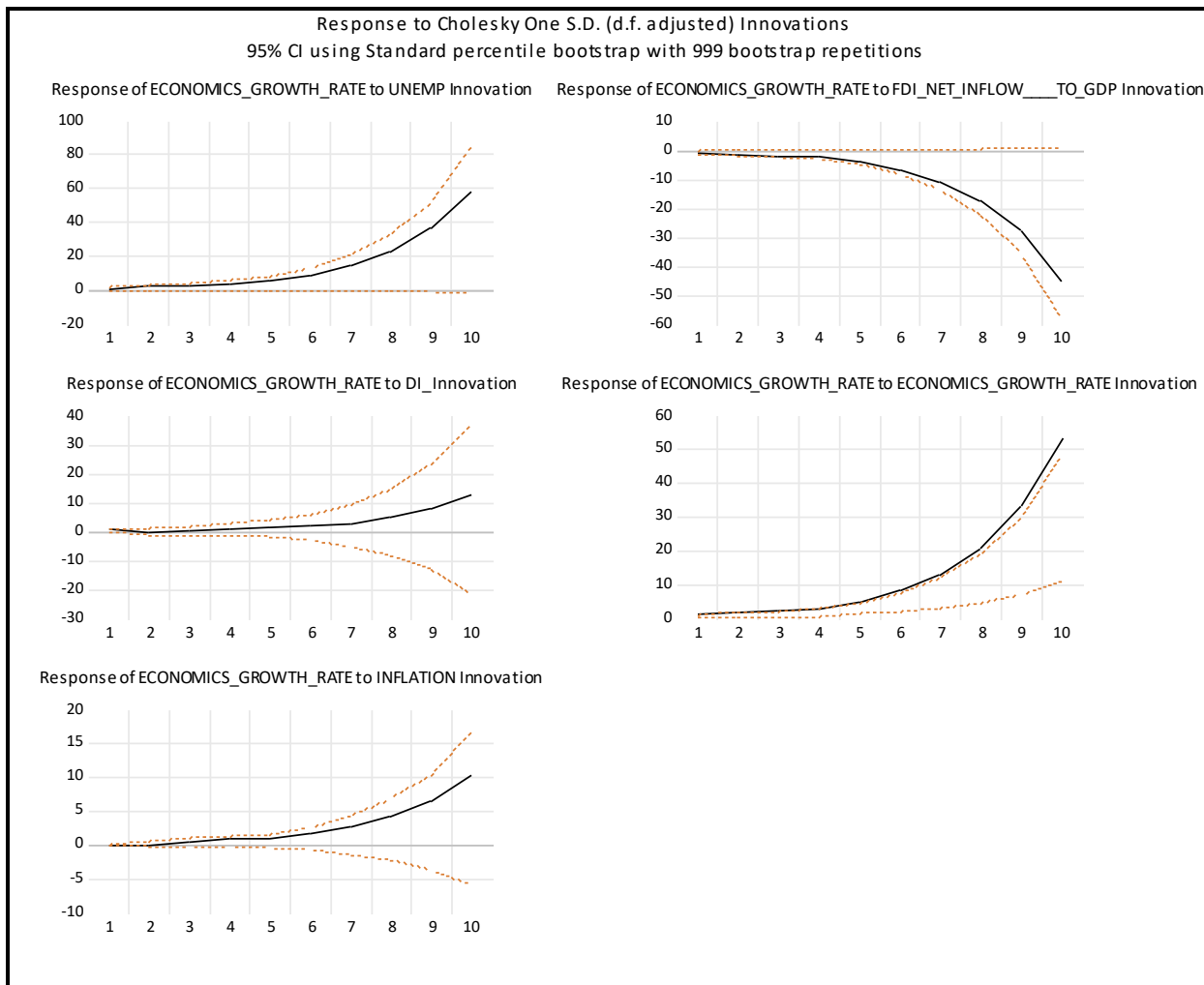


Figure 4.11 reveals the results of the impulse response function of GDP to the shocks of UNEMP, FDI, GFCF, INF as well as its own shocks. GDP reacts positively to the shocks of UNEMP, GFCF, INF and to its own shocks. However, the response of GDP to the shocks of FDI it reacted negatively, to the shocks of GFCF, it reacted negatively in the third period then went back to reacting positively from the fourth period to tenth period, and the reaction to the shocks of INF was also positive. The reaction of GDP to the shocks of FDI was negative.

Figure 4.12 Impulse response function of inflation (INF)

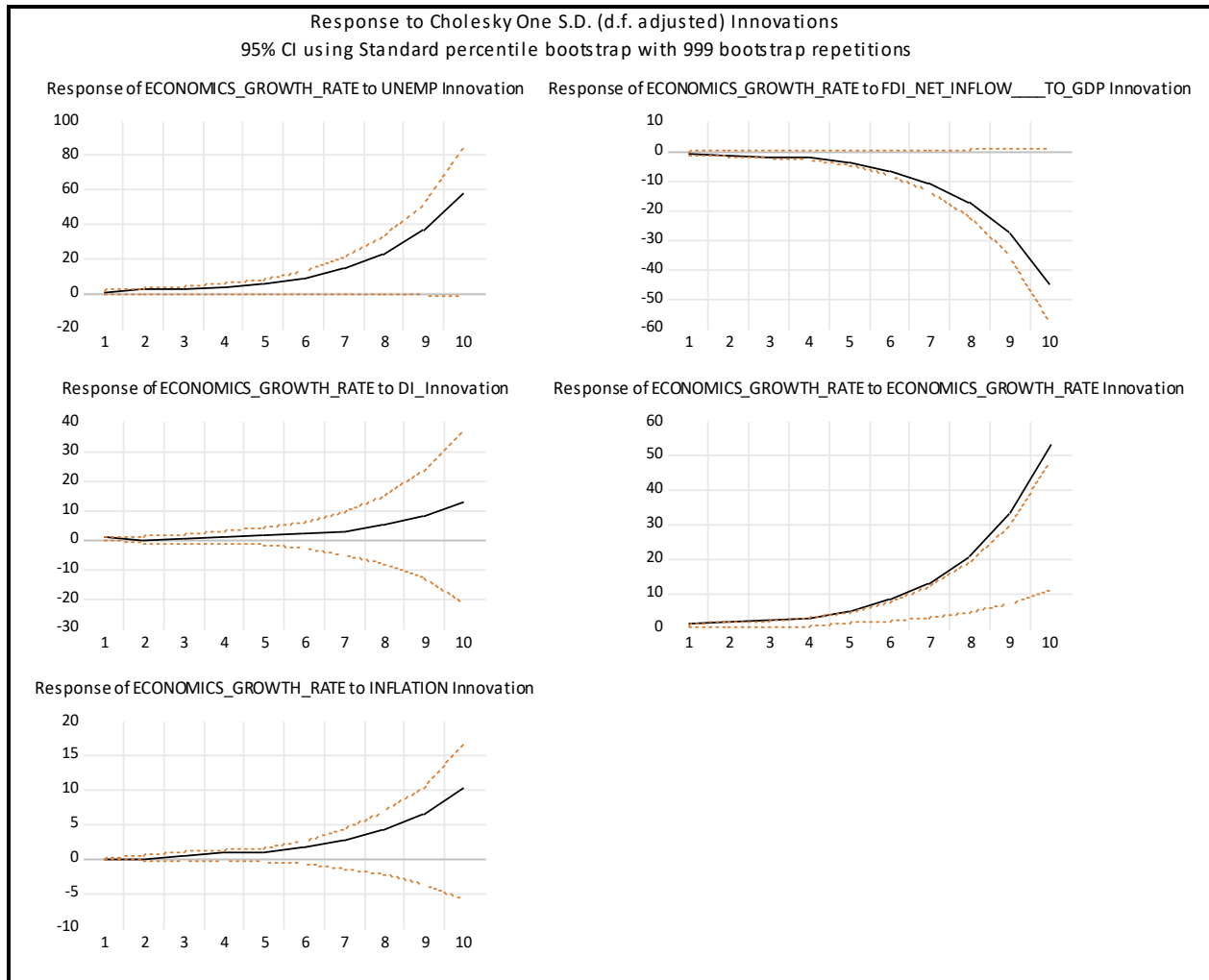


Figure 4.12 shows the results of the impulse response function of INF. The graphs show how INF reacts to its own shocks and the shocks emanating from UNF, FDI, GFCF, and GDP. INF reacts positively to own shocks, the shocks from UNF, GFCF, and GDP.

All the variables reacted negatively to the shock from FDI except UNEMP which reacted positively to UNEMP shock, even FDI reacted negatively to its own shocks.

4.2.7 Variance Decomposition

Variance decomposition is also known as the Generalised forecasting error is employed using Vector Autoregressive (VAR) to test the effect of investments as well as economic growth on unemployment in South Africa. The variance decomposition indicates by how much in percentage does the shocks/impulse of an independent variable account for the fluctuations of the dependent variable (Nyberg & Lanne 2014).

Table 4.7. Variance decomposition of UNEMP

Period	S.E	UNEMP	FDI	GFCF	GDP	INF
1.	1.045565	100.00	0.000000	0.000000	0.000000	0.000000
2.	1.744777	37.39708	41.10900	16.69127	4.794045	0.08609
3.	2.618547	19.77975	54.57513	11.12806	14.30485	0.212216
4.	3.954320	20.86497	47.14772	6.196950	25.67289	0.117473
5.	6.412334	26.41533	39.82828	3.368956	30.33793	0.049503
6.	10.32486	32.34280	33.00715	2.200547	32.12533	0.324171
7.	16.55184	37.05427	27.79889	1.705502	32.84184	0.599498
8.	26.41621	39.25105	25.32095	1.568785	33.01822	0.841003
9.	42.09794	40.21924	24.08381	1.590580	33.04485	1.061520
10.	67.20253	40.58406	23.54008	1.640713	33.05416	1.180979
<i>Source: Author compilation</i>						

Table 4.7 shows the results of variance decomposition of UNEMP on independent variables over ten periods. In short-run, first-period 100% forecast error variance in UNEMP can be explained by itself; other variables don't have a significant impact. Also

in the short run, that is in the third period, the shocks from UNEMP, FDI, GFCF, GDP, and INF accounts for 19.78%, 54.58%, 11.13%, 14.30% and 0.21% of fluctuations of UNEMP, respectively. These collectively amount to 100%. In the long run, that is in the tenth period, UNEMP, FDI, GFCF, GDP, and INF account for 40.58%, 23.54%, 1.64%, 33.05% and 1.18% of fluctuations of UNEMP, respectively. The contribution of GDP to UNEMP increases significantly from the short run into the long run while the contribution GFCF decreases over time.

Table 4.8. Variance decomposition of FDI

Period	S.E	UNEMP	FDI	GFCF	GDP	INF
1.	1.060872	2.367608	97.63239	0.000000	0.000000	0.000000
2.	1.472557	5.305702	71.81535	8.591461	12.85289	1.434592
3.	2.240101	18.26953	51.59862	3.769882	22.06719	4.294783
4.	3.213652	31.43964	35.19114	2.011165	28.63790	2.720156
5.	4.751522	35.40198	30.48590	2.155985	30.18579	1.770340
6.	7.323945	37.44065	26.69961	2.520262	31.57800	1.761480
7.	11.78388	39.27235	24.52230	2.123134	32.72542	1.356786
8.	19.02482	39.42298	24.51856	1.804763	33.06572	1.187976
9.	30.53879	39.77146	24.18855	1.731838	33.07801	1.230152
10.	48.96194	40.12917	23.82711	1.737906	33.06511	1.240694
<i>Source: Author compilation</i>						

Table 4.8 displays the variance decomposition of FDI. In the first period, FDI depended greatly on its own shocks as it has contributed the highest percentage of 97.63% while

UNEMP contributed 2.36% and other variables were on zeros – meaning that their influence were not of important. In short run, that is in third period, UNEMP, FDI, GFCF, GDP and INF explain 18.27%, 51.60%, 3.77%, 22.07%, 4.29% variation of FDI, respectively. While in the long run, that is in the tenth period, UNEMP, FDI, GFCF, GDP, and INF have contributed 40.13%, 23.83%, 1.74%, 33.07%, and 1.24% to the fluctuations of FDI. The contribution of FDI to its own fluctuations have been diminishing over a period of time while the contribution of UNEMP has been increasing.

Table 4.9. Variance decomposition of GFCF

Period	S.E	UNEMP	FDI	GFCF	GDP	INF
1.	0.710411	48.59770	5.074890	46.32741	0.000000	0.000000
2.	1.497804	13.72507	39.99888	28.69780	17.52685	0.051401
3.	2.891868	18.75205	43.45124	8.572674	29.20486	0.019180
4.	4.837774	25.58493	38.67691	3.572674	32.18979	0.051626
5.	7.714661	32.35388	32.45826	2.294322	32.52063	0.372889
6.	12.26985	36.96910	27.59211	1.966415	32.78723	0.685149
7.	19.63630	39.18547	25.12846	1.749754	33.05559	0.880731
8.	31.45290	40.05097	24.13364	1.645234	33.12551	1.044641
9.	50.31030	40.41096	23.68228	1.644447	33.09526	1.167050
10.	80.46583	40.50914	23.50559	1.683988	33.06983	1.231450
<i>Source: Author compilation</i>						

The variance decomposition of GFCF is displayed in Table 4.9. The results show that in the first period, UNEMP, FDI and GFCF are the ones which have contributed 48.60%,

5.07%, 46.33% to the variation of GFCF while other variables have contributed zeros. While UNEMP, FDI, GFCF, GDP, and INF cause 18.75%, 3.45%, 8.5%, 29.20%, 0.02% variation of GFCF respectively in the short run. In the long, UNEMP, FDI, GFCF, GDP and INF can cause 40.51%, 23.51%, 1.68%, 33.07%, 1.23% fluctuations of GFCF, respectively.

Table 4.10. Variance decomposition of GDP

Period	S.E	UNEMP	FDI	GFCF	GDP	INF
1.	1.808661	10.83474	38.68223	10.59903	39.88399	0.000000
2.	3.805790	38.77855	25.99717	3.728403	31.46951	0.026366
3.	5.252595	38.58923	26.65007	1.999999	32.31486	0.445832
4.	7.526863	43.13775	21.73802	2.344836	31.23388	1.545513
5.	11.48845	43.40427	20.67920	2.362257	32.08674	1.467533
6.	18.21721	41.87145	21.95009	1.930826	32.89295	1.354689
7.	29.13047	40.96110	22.90197	1.727089	33.07423	1.335616
8.	46.55362	40.62610	23.29235	1.722904	33.02890	1.329739
9.	74.47162	40.44750	23.44895	1.763052	33.03034	1.310165
10.	119.4197	40.33046	23.55146	1.771256	33.06424	1.282579
<i>Source: Author compilation</i>						

Table 4.10 displays the results of variance decomposing of GDP. The results shows that the inflation did not have an influence in the fluctuations of economic growth in the first period. In the short run, UNEMP, FDI, GFCF, GDP, and INF contributed 38.59, 26.65%, 2.00%, 32.31%, and 0.45% to the fluctuations of economic growth respectively. Whereas

innovation to UNEMP, FDI, GFCF, GDP, and INF in the long run accounted for 40.33%, 23.55%, 1.77%, 33.06%, and 1.28% fluctuation in GDP respectively. The shocks of unemployment contributed significantly to fluctuations of economic growth, followed by its own shocks, then inflation contributed the least.

Table 4.11. Variance decomposition of INF

Period	S.E	UNEMP	FDI	GFCF	GDP	INF
1.	1.998947	2.282983	8.479473	46.93169	8.366748	33.93911
2.	2.449519	10.12814	7.605687	46.50360	10.91451	24.84807
3.	3.807958	19.42011	22.77414	19.33311	27.99285	10.47980
4.	6.012032	22.91993	33.41247	7.939321	30.81794	4.910335
5.	9.108409	31.89617	29.07326	4.545914	31.27859	3.206065
6.	14.12976	36.53478	26.14530	3.366833	32.00285	1.950243
7.	22.58789	38.10775	25.11953	2.568036	32.78636	1.418334
8.	36.53852	39.10303	24.52389	2.013475	33.13624	1.223362
9.	58.85141	39.68396	24.20868	1.772990	33.14593	1.188437
10.	94.35335	40.04798	23.90760	1.730303	33.09354	1.220575
<i>Source: Author compilation</i>						

The variance of decomposition results in Table 4.11 reveals that a shock to UNEMP, FDI, GFCF, GDP, and INF in the third period explained 19.42%, 22.77%, 19.33%, 27.99%, and 10.48% variation in INF in the short run. While a shock to UNEMP, FDI, GFCF, GDP, and INF in the tenth period contributed 40.05%, 23.91%, 1.73%, 33.09%, and 1.22% of fluctuations in INF respectively in the long run. The effect of unemployment to inflation

gradually increased over time and it proved to have the greatest influence in the long run, while the influence of domestic investment diminished over time.

4.3 SUMMARY

Chapter successfully presented the test results of unit root testing, the bounds testing cointegration results, long-run and short-run coefficient of ARDL combined with ARDL ECM. The study continued to present the impulse response, variance decomposition Granger causality, diagnostic and stability test results. Chapter 5 concludes this study with some recommendations and possible extension of the study for future researchers.

CHAPTER 5

SUMMARY, RECOMMENDATIONS, CONCLUSION.

5.1 INTRODUCTION

In this concluding chapter, we will synthesize the findings from the analysis presented in the previous chapter 4, offering a comprehensive overview of the study's key insights regarding the impact of investments and economic growth on unemployment in South Africa.

The primary aim of the study was to examine the effect of investment and economic growth on unemployment in South Africa for the period from 1998 to 2020. The objectives of the study were to:

- To determine the nexus between foreign direct investment and unemployment.
- To assess the association that exist between domestic investment and unemployment.
- To establish relationship between economic growth and unemployment.
- To examine the causal connection that exist between foreign direct investment, domestic investment, economic growth, and unemployment.
- To determine the behaviour of unemployment to shocks emanating from foreign direct investment, domestic investment, and economic growth.

The Autoregression distribution lag (ARDL), granger causality, impulse response as well as variance decomposition were employed in the study to achieve these objectives. The study employed South African data obtained from World Bank as a reliable source, which is freely available. The frequency of data used in the study is yearly covering the period from 1998 to 2020. Cointegration test between the dependent variable and independent variables was tested using ARDL bounds test. This was to test if the variables of the study cointegrate.

The study continued to run some test and Granger causality testing was employed in the study to check for causal relationship between the variables of study. Impulse response function test was carried to test how variables reacts to the shocks of other variables in the model of the study. Diagnostic tests were carried to find out if any of the classical

linear regression model assumptions were being violated, while stability testing was employed to analyse the stability of both long run and short run coefficients.

5.2 SUMMARY AND INTERPRETATION OF FINDINGS

The results of the study are based on a model that analysed how investments and economic growth affected South Africa's unemployment rate while inflation was added as a controlled variable. First, a stationarity test was conducted, and both unit root tests – formal and informal test – were used in the study. The informal unit root testing procedure involved the use of graphical inspection and the formal unit root tests used were the ADF test and PP test. The formal tests confirmed that the variables of the study are integrated at order 1 and 0, which allowed the study to employ Autoregression Distribution Lag (ARDL). It was demonstrated by the ADF and PP unit root tests that unemployment, domestic investment, economic growth, and inflation are integrated at order 1 while foreign direct investment was the only variable in the model of the study which is integrated at order 0. This outcome empowered the study to employ ARDL technique.

The ARDL results showed that the Okun's law does not hold in a case of South Africa as the law states that there is negative association between economic growth and unemployment. The results of the study showed that the relationship between unemployment and economic growth is positive. These findings are like the results that were found by Shem (2016) and Banda, et al. (2016), however, the study by Hjazeen, et al. (2021), their results were in line with Okun's Law. This means that South African economy is facing a jobless growth according to the results from the study. This may be because there is a mismatch between the skills and abilities for employment in the labor market.

The effect of FDI was found to be insignificant at 5% level in both short run and long run. For the sampled study period, the link between FDI and unemployment in South Africa is shown to be negative and insignificant. The results are supported by empirical studies by Johnny, et al., (2018) and Mkombe, et al. (2021) as well as the study by Chella & Phiri (2017). This relationship could be because of foreign investment taking time to materialized jobs which lead to delayed impact on unemployment. Sometime foreign

investments may overtake local investments, which may result in job losses that counteract any gains from foreign investment.

The results of ARDL in both long run and short runs showed that domestic investment and unemployment have a negative relationship and is significant at 5% level, showing that domestic investment affects unemployment negatively. These results are supported by Keynesian theory and the study by Nasution, et al (2020). This could mean that domestic investment has led to business expansions skills development in a way that people are able get employed.

Also, ARDL results showed that inflation has a positive relationship with unemployment in both long and short run, that is significant at 5% level. The error correction model revealed that about 71.05% of disequilibrium will converge towards equilibrium yearly since the study employed yearly data.

The study employed granger causality testing procedure to test for casual effect between model variables. According to study's Granger causality findings, there is no directional causality between FDI and unemployment. However, the findings showed that domestic investment and unemployment were causally related in both directions, and that unemployment and economic growth were causally related in one way only.

Additionally, the impulse response function was used to check the response on the variables when there are shocks applied to variables in the model. The study's findings regarding impulse response function revealed that all the variables in the study reacts positively to each other and to their own shocks except for shocks from foreign direct investment. Variables of the study have been reacting negatively to the shocks of foreign direct investment. Unemployment reacted negatively to the shocks of domestic investment, economic growth, its own shock, as well as the shocks emanating from inflation and reacted positively to the foreign direct investment shocks.

The diagnostic tests and stability tests indicated that the model of the study is of good fit. The results of the study showed that it is not only Okun's law that does not hold in the case of South Africa, but also, Phillips curve argument. The results showed that there is a positive association between inflation and unemployment.

5.3 LIMITATIONS OF THE STUDY

The research investigated the effect of investments and economic growth on unemployment in South Africa. The results of the study are only limited to the South African context. Yearly data from 1998 to 2020 were used in the study, implying that the study covered only 22 years, of which the results are based these years. This implies that different results could be reached over a longer period using different frequency.

More variables could have been used, nonetheless, Moh (2012), pointed out that having too many variables reduces the degree of freedom in a study and further noted that an acceptable model could have four to eight variables. Hence, a reasonable number of variables was used and applied ARDL technique which is known to produce favourable results on the small samples, the study limitations had little impact on the study's conclusions.

5.4 CONCLUSION

According to the study, Okun's law does not apply to South Africa both long and short run. The study's conclusions suggest that unemployment and economic growth are positively correlated. This suggests that there is not enough employment being created for people in South Africa despite the country's economic progress. The findings also showed that while FDI has an unimportant effect on unemployment, both local and foreign investment have a negative impact.

5.5 RECOMMENDATIONS

The results obtained in the study indicates that the economic growth of South Africa does not generate enough jobs for individuals, hence there seem to be a problem of jobless growth. It could be as a result of outsourced labour from other counties, the use of modern technology instead of using manual labour and the mismatch between the individual skills and the jobs description.

South African economy is in a stage where most of the production is completed by machines, making it difficult for semi-skilled and lowed skilled workers to find

employment. To address the issue of a jobless growth, policy makers should develop a policy that encourage manual labour which also augment technology. Government policy makers should provide more incentive or encourage agricultural sector and the development of infrastructure because they are more labour intensive.

Investments – both foreign direct investment and domestic investment – should be directed into education and training in order to support use of new technology deployed in various sectors of South Africa. Policy makers should focus on fostering domestic investments as a strategy for creation of employment. The study has showed that foreign investment and domestic investments are effective in decreasing unemployment.

The study has also showed that inflation have a positive relationship with unemployment in South Africa for the sampled period of study. This positive relationship between inflation and unemployment may be as result of having a high inflation rate which decrease the buying power of customers, and this has resulted in a decrease of demand of goods and services (Keynes, 1936). Having a low demand for goods will result in the production decreasing followed by the increase in unemployment.

Policy maker should ensure a conducive financial environment for both foreign investments and domestic investments exists. Monetary policy authorities can use monetary policy to encourage more investments to decrease the level of unemployment in both long and short run. A rise of interest is rendered to be more effective in attracting more investors. If individuals and businesses are aware that they stand to gain more from investing, they tend to invest more.

5.6 AREAS OF FUTURE RESEARCH

Having low unemployment is one of the macro-economic objectives that each country must achieve (Mohr & Associates, 2015). Unemployment rate has an upward trend in South Africa, which indicates that the unemployment rate is increasing, and it continues to be one of the crises that the country is facing (StatsSA, 2021). Unlike other studies, this study combined simultaneously both domestic and foreign efforts to address the unemployment problem that has worsened the triple challenge that the country currently

confronts. The study's findings will contribute to the current literature on unemployment in South Africa and can assist policy makers in designing or improving current policies that can bring more investments and set the country on the desired inclusive economic growth trajectory. Future researcher may employ quarterly data, add another variable or increase the years of study to test the outcome of this study.

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APPENDICES

Appendix A: Data of the study.

Years	FDI net Inflow % to GDP	Inflation	Economics Growth rate	Domestic Investment	Unemp	DI%
1998	0,359739	6,880553	0,5	16,42789	25	16,51397
1999	0,99219	5,181488	2,4	15,65505	25,37	14,84128
2000	0,638425	5,338952	4,2	15,06028	29,88	14,38705
2001	5,368357	5,701905	2,7	14,57378	30,69	14,36331
2002	1,146352	9,494707	3,700374	15,03612	33,29	14,02729
2003	0,39749	5,679418	2,949075	15,65711	32,31	14,65691
2004	0,2742	-0,69203	4,55456	16,96035	29,45	15,16724
2005	2,257809	2,062852	5,277052	16,83182	29,12	15,8783
2006	0,205124	3,243902	5,603806	18,4902	28,34	17,36554
2007	1,977568	6,177812	5,360474	19,32597	26,54	19,02162
2008	3,126857	10,05528	3,191044	21,28725	22,41	21,61482
2009	2,312182	7,264562	-1,53809	18,76694	23,52	19,49086
2010	0,884902	4,063539	3,039733	17,59564	24,68	17,56164
2011	0,903377	5,017158	3,168556	18,85324	24,64	17,80937
2012	1,064922	5,723944	2,396232	18,58454	24,73	17,93493
2013	2,053581	5,776404	2,485468	19,16876	24,56	18,57871
2014	1,519327	6,13602	1,413826	18,48796	24,89	18,3012
2015	0,438736	4,509208	1,321862	18,63321	25,15	18,00895
2016	0,684613	6,594604	0,664552	16,96045	26,54	17,4415
2017	0,539674	5,181082	1,157947	16,61073	27,04	16,39881
2018	1,375712	4,504577	1,487617	16,5409	26,91	15,85022

2019	1,318804	4,124351	0,113054	16,02114	28,47	15,3467
2020	0,954002	3,223885	-6,43197	12,74555	29,22	13,71686

Appendix B: Unit root testing

1. Augmented Dickey-Fuller.

Unemployment.

Null Hypothesis: EMPLOYMENT has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic - based on AIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.414369	0.0243
Test critical values:		
1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

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

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(EMPLOYMENT)

Method: Least Squares

Date: 04/20/23 Time: 15:29

Sample (adjusted): 2003 2020

Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMPLOYMENT(-1)	-0.462575	0.135479	-3.414369	0.0051
D(EMPLOYMENT(-1))	0.352462	0.185404	1.901051	0.0816
D(EMPLOYMENT(-2))	-0.103724	0.198856	-0.521603	0.6114
D(EMPLOYMENT(-3))	0.282267	0.174694	1.615781	0.1321
D(EMPLOYMENT(-4))	0.273655	0.176075	1.554190	0.1461
C	12.15253	3.640783	3.337890	0.0059
R-squared	0.549862	Mean dependent var	-0.226111	
Adjusted R-squared	0.362304	S.D. dependent var	1.479703	
S.E. of regression	1.181629	Akaike info criterion	3.432867	
Sum squared resid	16.75498	Schwarz criterion	3.729658	
Log likelihood	-24.89581	Hannan-Quinn criter.	3.473791	
F-statistic	2.931694	Durbin-Watson stat	2.346864	
Prob(F-statistic)	0.058891			

Null Hypothesis: EMPLOYMENT has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on AIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.507801	0.7955
Test critical values:		
1% level	-4.440739	
5% level	-3.632896	
10% level	-3.254671	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(EMPLOYMENT)
 Method: Least Squares
 Date: 04/20/23 Time: 15:30
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMPLOYMENT(-1)	-0.215578	0.142975	-1.507801	0.1481
C	6.408631	4.201507	1.525317	0.1437
@TREND("1998")	-0.034852	0.063436	-0.549407	0.5891
R-squared	0.106878	Mean dependent var		0.191818
Adjusted R-squared	0.012865	S.D. dependent var		1.762381
S.E. of regression	1.751008	Akaike info criterion		4.084384
Sum squared resid	58.25454	Schwarz criterion		4.233162
Log likelihood	-41.92822	Hannan-Quinn criter.		4.119432
F-statistic	1.136844	Durbin-Watson stat		1.384292
Prob(F-statistic)	0.341706			

Null Hypothesis: D(EMPLOYMENT) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on AIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.396772	0.0229
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(EMPLOYMENT,2)
 Method: Least Squares
 Date: 04/20/23 Time: 15:31
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EMPLOYMENT(-1))	-0.757903	0.223124	-3.396772	0.0030
C	0.143330	0.393974	0.363805	0.7200
R-squared	0.377826	Mean dependent var		0.018095
Adjusted R-squared	0.345080	S.D. dependent var		2.221125
S.E. of regression	1.797493	Akaike info criterion		4.101056
Sum squared resid	61.38865	Schwarz criterion		4.200534
Log likelihood	-41.06109	Hannan-Quinn criter.		4.122645
F-statistic	11.53806	Durbin-Watson stat		1.737241
Prob(F-statistic)	0.003026			

Null Hypothesis: D(EMPLOYMENT) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on AIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.396772	0.0229
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(EMPLOYMENT,2)
 Method: Least Squares
 Date: 04/20/23 Time: 15:31
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EMPLOYMENT(-1))	-0.757903	0.223124	-3.396772	0.0030
C	0.143330	0.393974	0.363805	0.7200
R-squared	0.377826	Mean dependent var		0.018095
Adjusted R-squared	0.345080	S.D. dependent var		2.221125
S.E. of regression	1.797493	Akaike info criterion		4.101056
Sum squared resid	61.38865	Schwarz criterion		4.200534
Log likelihood	-41.06109	Hannan-Quinn criter.		4.122645
F-statistic	11.53806	Durbin-Watson stat		1.737241
Prob(F-statistic)	0.003026			

Foreign direct Investment.

Null Hypothesis: FDI_NET_INFLOW____TO_GDP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.691149	0.0013
Test critical values:		
1% level	-3.769597	
5% level	-3.004861	
10% level	-2.642242	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(FDI_NET_INFLOW____TO_GDP)

Method: Least Squares

Date: 04/20/23 Time: 15:57

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI_NET_INFLOW____TO_GDP(-1)	-1.033175	0.220239	-4.691149	0.0001
C	1.428370	0.392588	3.638341	0.0016
R-squared	0.523888	Mean dependent var		0.027012
Adjusted R-squared	0.500082	S.D. dependent var		1.689856
S.E. of regression	1.194811	Akaike info criterion		3.280361
Sum squared resid	28.55145	Schwarz criterion		3.379546
Log likelihood	-34.08397	Hannan-Quinn criter.		3.303726
F-statistic	22.00688	Durbin-Watson stat		2.032111
Prob(F-statistic)	0.000140			

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

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.664878	0.0523
Test critical values:		
1% level	-4.571559	
5% level	-3.690814	
10% level	-3.286909	

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

Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(FDI_NET_INFLOW____TO_GDP)

Method: Least Squares

Date: 04/20/23 Time: 15:58

Sample (adjusted): 2003 2020

Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI_NET_INFLOW____TO_GDP(-1)	-2.039209	0.556419	-3.664878	0.0037
D(FDI_NET_INFLOW____TO_GDP(-1))	1.225237	0.463308	2.644543	0.0228
D(FDI_NET_INFLOW____TO_GDP(-2))	0.755162	0.341414	2.211865	0.0491
D(FDI_NET_INFLOW____TO_GDP(-3))	0.427936	0.244815	1.747995	0.1083
D(FDI_NET_INFLOW____TO_GDP(-4))	0.399814	0.154197	2.592888	0.0250
C	3.781794	1.181693	3.200319	0.0084
@TREND("1998")	-0.073877	0.039537	-1.868537	0.0885
R-squared	0.727070	Mean dependent var		-0.010686
Adjusted R-squared	0.578200	S.D. dependent var		1.064373
S.E. of regression	0.691269	Akaike info criterion		2.384727
Sum squared resid	5.256387	Schwarz criterion		2.730983
Log likelihood	-14.46254	Hannan-Quinn criter.		2.432471
F-statistic	4.883907	Durbin-Watson stat		1.767255
Prob(F-statistic)	0.011431			

Economic growth

Null Hypothesis: ECONOMICS_GROWTH_RATE has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.859623	0.7815
Test critical values:		
1% level	-3.769597	
5% level	-3.004861	
10% level	-2.642242	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(ECONOMICS_GROWTH_RATE)

Method: Least Squares

Date: 04/20/23 Time: 16:01

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECONOMICS_GROWTH_RATE(-1)	-0.233005	0.271055	-0.859623	0.4002
C	0.279571	0.844512	0.331045	0.7441
R-squared	0.035631	Mean dependent var		-0.315090
Adjusted R-squared	-0.012587	S.D. dependent var		2.257928
S.E. of regression	2.272095	Akaike info criterion		4.565789
Sum squared resid	103.2483	Schwarz criterion		4.664975
Log likelihood	-48.22368	Hannan-Quinn criter.		4.589155
F-statistic	0.738951	Durbin-Watson stat		1.452293
Prob(F-statistic)	0.400184			

Null Hypothesis: ECONOMICS_GROWTH_RATE has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.069325	0.5334
Test critical values:	1% level	-4.440739	
	5% level	-3.632896	
	10% level	-3.254671	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(ECONOMICS_GROWTH_RATE)
 Method: Least Squares
 Date: 04/20/23 Time: 16:01
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECONOMICS_GROWTH_RATE(-1)	-0.543765	0.262774	-2.069325	0.0524
C	3.374622	1.360901	2.479697	0.0227
@TREND("1998")	-0.200169	0.074021	-2.704204	0.0141
R-squared	0.303644	Mean dependent var		-0.315090
Adjusted R-squared	0.230344	S.D. dependent var		2.257928
S.E. of regression	1.980882	Akaike info criterion		4.331085
Sum squared resid	74.55396	Schwarz criterion		4.479864
Log likelihood	-44.64194	Hannan-Quinn criter.		4.366133
F-statistic	4.142455	Durbin-Watson stat		1.608966
Prob(F-statistic)	0.032129			

Null Hypothesis: ECONOMICS_GROWTH_RATE has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.048359	0.2563
Test critical values:	1% level	-2.674290	
	5% level	-1.957204	
	10% level	-1.608175	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(ECONOMICS_GROWTH_RATE)

Method: Least Squares

Date: 04/20/23 Time: 16:02

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECONOMICS_GROWTH_RATE(-1)	-0.159503	0.152145	-1.048359	0.3064
R-squared	0.030347	Mean dependent var		-0.315090
Adjusted R-squared	0.030347	S.D. dependent var		2.257928
S.E. of regression	2.223404	Akaike info criterion		4.480345
Sum squared resid	103.8140	Schwarz criterion		4.529938
Log likelihood	-48.28379	Hannan-Quinn criter.		4.492027
Durbin-Watson stat	1.524800			

Null Hypothesis: D(ECONOMICS_GROWTH_RATE) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.711501	0.0118
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(ECONOMICS_GROWTH_RATE,2)

Method: Least Squares

Date: 04/20/23 Time: 16:02

Sample (adjusted): 2000 2020

Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ECONOMICS_GROWTH_RATE(-1))	-1.053911	0.283958	-3.711501	0.0015
C	-0.421564	0.504965	-0.834838	0.4142
R-squared	0.420294	Mean dependent var		-0.402144
Adjusted R-squared	0.389783	S.D. dependent var		2.962138
S.E. of regression	2.313914	Akaike info criterion		4.606151
Sum squared resid	101.7298	Schwarz criterion		4.705629
Log likelihood	-46.36459	Hannan-Quinn criter.		4.627740
F-statistic	13.77524	Durbin-Watson stat		1.690209
Prob(F-statistic)	0.001480			

Null Hypothesis: D(ECONOMICS_GROWTH_RATE) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.115774	0.0202
Test critical values:		
1% level	-4.467895	
5% level	-3.644963	
10% level	-3.261452	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(ECONOMICS_GROWTH_RATE,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:03
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ECONOMICS_GROWTH_RATE(-1))	-1.151553	0.279790	-4.115774	0.0006
C	1.151507	1.098019	1.048713	0.3082
@TREND("1998")	-0.131239	0.082164	-1.597289	0.1276
R-squared	0.492261	Mean dependent var		-0.402144
Adjusted R-squared	0.435846	S.D. dependent var		2.962138
S.E. of regression	2.224867	Akaike info criterion		4.568835
Sum squared resid	89.10061	Schwarz criterion		4.718053
Log likelihood	-44.97277	Hannan-Quinn criter.		4.601219
F-statistic	8.725653	Durbin-Watson stat		1.792068
Prob(F-statistic)	0.002243			

Null Hypothesis: D(ECONOMICS_GROWTH_RATE) has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.731427	0.0007
Test critical values:		
1% level	-2.679735	
5% level	-1.958088	
10% level	-1.607830	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(ECONOMICS_GROWTH_RATE,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:04
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ECONOMICS_GROWTH_RATE(-1))	-1.051455	0.281784	-3.731427	0.0013
R-squared	0.399029	Mean dependent var		-0.402144
Adjusted R-squared	0.399029	S.D. dependent var		2.962138
S.E. of regression	2.296317	Akaike info criterion		4.546938
Sum squared resid	105.4614	Schwarz criterion		4.596677
Log likelihood	-46.74285	Hannan-Quinn criter.		4.557733
Durbin-Watson stat	1.633213			

Inflation.

Null Hypothesis: INFLATION has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.891977	0.0080
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(INFLATION)
 Method: Least Squares
 Date: 04/20/23 Time: 16:05
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.930585	0.239103	-3.891977	0.0011
D(INFLATION(-1))	0.475288	0.209427	2.269469	0.0358
C	4.894162	1.353255	3.616586	0.0020
R-squared	0.457062	Mean dependent var		-0.093219
Adjusted R-squared	0.396736	S.D. dependent var		2.570216
S.E. of regression	1.996289	Akaike info criterion		4.352021
Sum squared resid	71.73307	Schwarz criterion		4.501238
Log likelihood	-42.69622	Hannan-Quinn criter.		4.384405
F-statistic	7.576482	Durbin-Watson stat		2.056502
Prob(F-statistic)	0.004100			

Null Hypothesis: INFLATION has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 3 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.036522	0.1486
Test critical values:		
1% level	-4.532598	
5% level	-3.673616	
10% level	-3.277364	

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

Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INFLATION)

Method: Least Squares

Date: 04/20/23 Time: 16:07

Sample (adjusted): 2002 2020

Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-1.441765	0.474808	-3.036522	0.0095
D(INFLATION(-1))	0.871724	0.370600	2.352195	0.0351
D(INFLATION(-2))	0.325464	0.306472	1.061973	0.3076
D(INFLATION(-3))	0.323384	0.266290	1.214407	0.2462
C	7.788348	2.805366	2.776232	0.0157
@TREND("1998")	-0.014407	0.091822	-0.156901	0.8777
R-squared	0.529371	Mean dependent var		-0.130422
Adjusted R-squared	0.348360	S.D. dependent var		2.706196
S.E. of regression	2.184555	Akaike info criterion		4.652791
Sum squared resid	62.03967	Schwarz criterion		4.951035
Log likelihood	-38.20152	Hannan-Quinn criter.		4.703266
F-statistic	2.924525	Durbin-Watson stat		1.616462
Prob(F-statistic)	0.055227			

Null Hypothesis: INFLATION has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.297476	0.1736
Test critical values:		
1% level	-2.674290	
5% level	-1.957204	
10% level	-1.608175	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(INFLATION)
 Method: Least Squares
 Date: 04/20/23 Time: 16:22
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.116570	0.089843	-1.297476	0.2085
R-squared	0.070034	Mean dependent var		-0.166212
Adjusted R-squared	0.070034	S.D. dependent var		2.531532
S.E. of regression	2.441277	Akaike info criterion		4.667308
Sum squared resid	125.1565	Schwarz criterion		4.716901
Log likelihood	-50.34039	Hannan-Quinn criter.		4.678991
Durbin-Watson stat	1.867287			

Null Hypothesis: D(INFLATION) has a unit root
 Exogenous: Constant
 Lag Length: 3 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.763291	0.0016
Test critical values:		
1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

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

Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INFLATION,2)

Method: Least Squares

Date: 04/20/23 Time: 16:24

Sample (adjusted): 2003 2020

Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-2.515026	0.528002	-4.763291	0.0004
D(INFLATION(-1),2)	1.355905	0.417736	3.245842	0.0064
D(INFLATION(-2),2)	0.723125	0.306261	2.361139	0.0345
D(INFLATION(-3),2)	0.547527	0.210655	2.599167	0.0220
C	-0.400359	0.508052	-0.788026	0.4448

R-squared	0.755238	Mean dependent var	-0.260737
Adjusted R-squared	0.679926	S.D. dependent var	3.806117
S.E. of regression	2.153313	Akaike info criterion	4.602026
Sum squared resid	60.27785	Schwarz criterion	4.849351
Log likelihood	-36.41823	Hannan-Quinn criter.	4.636128
F-statistic	10.02819	Durbin-Watson stat	1.348137
Prob(F-statistic)	0.000629		

Null Hypothesis: D(INFLATION) has a unit root
 Exogenous: Constant
 Lag Length: 3 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.763291	0.0016
Test critical values:		
1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

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

Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INFLATION,2)

Method: Least Squares

Date: 04/20/23 Time: 16:24

Sample (adjusted): 2003 2020

Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-2.515026	0.528002	-4.763291	0.0004
D(INFLATION(-1),2)	1.355905	0.417736	3.245842	0.0064
D(INFLATION(-2),2)	0.723125	0.306261	2.361139	0.0345
D(INFLATION(-3),2)	0.547527	0.210655	2.599167	0.0220
C	-0.400359	0.508052	-0.788026	0.4448
R-squared	0.755238	Mean dependent var		-0.260737
Adjusted R-squared	0.679926	S.D. dependent var		3.806117
S.E. of regression	2.153313	Akaike info criterion		4.602026
Sum squared resid	60.27785	Schwarz criterion		4.849351
Log likelihood	-36.41823	Hannan-Quinn criter.		4.636128
F-statistic	10.02819	Durbin-Watson stat		1.348137
Prob(F-statistic)	0.000629			

Null Hypothesis: D(INFLATION) has a unit root
 Exogenous: None
 Lag Length: 3 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.801051	0.0001
Test critical values:		
1% level	-2.699769	
5% level	-1.961409	
10% level	-1.606610	

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

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INFLATION,2)

Method: Least Squares

Date: 04/20/23 Time: 16:25

Sample (adjusted): 2003 2020

Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-2.498423	0.520391	-4.801051	0.0003
D(INFLATION(-1),2)	1.345754	0.411846	3.267610	0.0056
D(INFLATION(-2),2)	0.716909	0.301987	2.373976	0.0324
D(INFLATION(-3),2)	0.543888	0.207734	2.618193	0.0202
R-squared	0.743546	Mean dependent var		-0.260737
Adjusted R-squared	0.688591	S.D. dependent var		3.806117
S.E. of regression	2.123965	Akaike info criterion		4.537577
Sum squared resid	63.15721	Schwarz criterion		4.735437
Log likelihood	-36.83819	Hannan-Quinn criter.		4.564859
Durbin-Watson stat	1.296608			

Domestic Investment.

Null Hypothesis: DI_t has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.746563	0.3948
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: $D(DI_t)$

Method: Least Squares

Date: 04/22/23 Time: 11:48

Sample (adjusted): 2000 2020

Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DI_{t-1}	-0.215313	0.123278	-1.746563	0.0978
$D(DI_{t-1})$	0.473955	0.213676	2.218105	0.0396
C	3.602841	2.094695	1.719984	0.1026
R-squared	0.254642	Mean dependent var		-0.053543
Adjusted R-squared	0.171825	S.D. dependent var		1.153439
S.E. of regression	1.049677	Akaike info criterion		3.066406
Sum squared resid	19.83281	Schwarz criterion		3.215624
Log likelihood	-29.19727	Hannan-Quinn criter.		3.098790
F-statistic	3.074737	Durbin-Watson stat		1.855754
Prob(F-statistic)	0.071004			

Null Hypothesis: DI_ has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.567495	0.9709
Test critical values:		
1% level	-4.440739	
5% level	-3.632896	
10% level	-3.254671	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(DI_)
 Method: Least Squares
 Date: 04/22/23 Time: 11:49
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DI_(-1)	-0.082073	0.144622	-0.567495	0.5770
C	1.620188	2.302164	0.703768	0.4901
@TREND("1998")	-0.031733	0.043595	-0.727895	0.4756
R-squared	0.067830	Mean dependent var		-0.127141
Adjusted R-squared	-0.030293	S.D. dependent var		1.177385
S.E. of regression	1.195085	Akaike info criterion		3.320435
Sum squared resid	27.13633	Schwarz criterion		3.469214
Log likelihood	-33.52479	Hannan-Quinn criter.		3.355483
F-statistic	0.691274	Durbin-Watson stat		1.165144
Prob(F-statistic)	0.513102			

Null Hypothesis: DI_ has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.610675	0.4412
Test critical values:		
1% level	-2.674290	
5% level	-1.957204	
10% level	-1.608175	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(DI_)
 Method: Least Squares
 Date: 04/22/23 Time: 11:49
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DI_(-1)	-0.009018	0.014767	-0.610675	0.5480
R-squared	0.005445	Mean dependent var		-0.127141
Adjusted R-squared	0.005445	S.D. dependent var		1.177385
S.E. of regression	1.174175	Akaike info criterion		3.203397
Sum squared resid	28.95240	Schwarz criterion		3.252990
Log likelihood	-34.23737	Hannan-Quinn criter.		3.215080
Durbin-Watson stat	1.172039			

Null Hypothesis: D(DI_) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.008270	0.0504
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(DI_2)
 Method: Least Squares
 Date: 04/22/23 Time: 11:50
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DI_(-1))	-0.642692	0.213642	-3.008270	0.0072
C	-0.033683	0.241394	-0.139534	0.8905
R-squared	0.322631	Mean dependent var		0.002041
Adjusted R-squared	0.286980	S.D. dependent var		1.308456
S.E. of regression	1.104867	Akaike info criterion		3.127720
Sum squared resid	23.19390	Schwarz criterion		3.227198
Log likelihood	-30.84106	Hannan-Quinn criter.		3.149309
F-statistic	9.049686	Durbin-Watson stat		1.761468
Prob(F-statistic)	0.007228			

Null Hypothesis: D(DI_) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.318845	0.0905
Test critical values: 1% level	-4.467895	
5% level	-3.644963	
10% level	-3.261452	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(DI_2)
 Method: Least Squares
 Date: 04/22/23 Time: 11:51
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DI_(-1))	-0.688913	0.207576	-3.318845	0.0038
C	0.702028	0.517636	1.356221	0.1918
@TREND("1998")	-0.061523	0.038686	-1.590319	0.1292
R-squared	0.406080	Mean dependent var		0.002041
Adjusted R-squared	0.340089	S.D. dependent var		1.308456
S.E. of regression	1.062923	Akaike info criterion		3.091486
Sum squared resid	20.33649	Schwarz criterion		3.240703
Log likelihood	-29.46060	Hannan-Quinn criter.		3.123870
F-statistic	6.153558	Durbin-Watson stat		1.928546
Prob(F-statistic)	0.009195			

Null Hypothesis: D(DI_) has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.081531	0.0038
Test critical values:		
1% level	-2.679735	
5% level	-1.958088	
10% level	-1.607830	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(DI_2)
 Method: Least Squares
 Date: 04/22/23 Time: 11:51
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DI_(-1))	-0.641226	0.208087	-3.081531	0.0059
R-squared	0.321936	Mean dependent var		0.002041
Adjusted R-squared	0.321936	S.D. dependent var		1.308456
S.E. of regression	1.077443	Akaike info criterion		3.033506
Sum squared resid	23.21766	Schwarz criterion		3.083245
Log likelihood	-30.85181	Hannan-Quinn criter.		3.044301
Durbin-Watson stat	1.761844			

2. Phillips Perron.

Unemployment.

Null Hypothesis: EMPLOYMENT has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.718060	0.4088
Test critical values:		
1% level	-3.769597	
5% level	-3.004861	
10% level	-2.642242	

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

Residual variance (no correction)	2.690001
HAC corrected variance (Bartlett kernel)	4.000772

Phillips-Perron Test Equation

Dependent Variable: D(EMPLOYMENT)

Method: Least Squares

Date: 04/20/23 Time: 16:35

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMPLOYMENT(-1)	-0.186233	0.130288	-1.429392	0.1683
C	5.216123	3.534074	1.475952	0.1555
R-squared	0.092689	Mean dependent var		0.191818
Adjusted R-squared	0.047324	S.D. dependent var		1.762381
S.E. of regression	1.720175	Akaike info criterion		4.009237
Sum squared resid	59.18001	Schwarz criterion		4.108422
Log likelihood	-42.10160	Hannan-Quinn criter.		4.032602
F-statistic	2.043163	Durbin-Watson stat		1.396558
Prob(F-statistic)	0.168326			

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.819786	0.6604
Test critical values:		
1% level	-4.440739	
5% level	-3.632896	
10% level	-3.254671	

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

Residual variance (no correction)	2.647933
HAC corrected variance (Bartlett kernel)	3.935659

Phillips-Perron Test Equation
 Dependent Variable: D(EMPLOYMENT)
 Method: Least Squares
 Date: 04/20/23 Time: 16:36
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMPLOYMENT(-1)	-0.215578	0.142975	-1.507801	0.1481
C	6.408631	4.201507	1.525317	0.1437
@TREND("1998")	-0.034852	0.063436	-0.549407	0.5891
R-squared	0.106878	Mean dependent var		0.191818
Adjusted R-squared	0.012865	S.D. dependent var		1.762381
S.E. of regression	1.751008	Akaike info criterion		4.084384
Sum squared resid	58.25454	Schwarz criterion		4.233162
Log likelihood	-41.92822	Hannan-Quinn criter.		4.119432
F-statistic	1.136844	Durbin-Watson stat		1.384292
Prob(F-statistic)	0.341706			

Null Hypothesis: EMPLOYMENT has a unit root
 Exogenous: None
 Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	0.292483	0.7615
Test critical values:		
1% level	-2.674290	
5% level	-1.957204	
10% level	-1.608175	

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

Residual variance (no correction)	2.983000
HAC corrected variance (Bartlett kernel)	3.702400

Phillips-Perron Test Equation
 Dependent Variable: D(EMPLOYMENT)
 Method: Least Squares
 Date: 04/20/23 Time: 16:37
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMPLOYMENT(-1)	0.005028	0.013895	0.361861	0.7211
R-squared	-0.006137	Mean dependent var		0.191818
Adjusted R-squared	-0.006137	S.D. dependent var		1.762381
S.E. of regression	1.767780	Akaike info criterion		4.021716
Sum squared resid	65.62600	Schwarz criterion		4.071308
Log likelihood	-43.23887	Hannan-Quinn criter.		4.033398
Durbin-Watson stat	1.511146			

Null Hypothesis: D(EMPLOYMENT) has a unit root
 Exogenous: Constant
 Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.396772	0.0229
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Residual variance (no correction)	2.923269
HAC corrected variance (Bartlett kernel)	2.923269

Phillips-Perron Test Equation
 Dependent Variable: D(EMPLOYMENT,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:39
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EMPLOYMENT(-1))	-0.757903	0.223124	-3.396772	0.0030
C	0.143330	0.393974	0.363805	0.7200
R-squared	0.377826	Mean dependent var		0.018095
Adjusted R-squared	0.345080	S.D. dependent var		2.221125
S.E. of regression	1.797493	Akaike info criterion		4.101056
Sum squared resid	61.38865	Schwarz criterion		4.200534
Log likelihood	-41.06109	Hannan-Quinn criter.		4.122645
F-statistic	11.53806	Durbin-Watson stat		1.737241
Prob(F-statistic)	0.003026			

Null Hypothesis: D(EMPLOYMENT) has a unit root
 Exogenous: Constant, Linear Trend
 Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.303905	0.0929
Test critical values:		
1% level	-4.467895	
5% level	-3.644963	
10% level	-3.261452	

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

Residual variance (no correction)	2.922260
HAC corrected variance (Bartlett kernel)	2.922260

Phillips-Perron Test Equation
 Dependent Variable: D(EMPLOYMENT,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:39
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EMPLOYMENT(-1))	-0.757470	0.229265	-3.303905	0.0039
C	0.080298	0.896206	0.089597	0.9296
@TREND("1998")	0.005247	0.066560	0.078827	0.9380
R-squared	0.378040	Mean dependent var		0.018095
Adjusted R-squared	0.308934	S.D. dependent var		2.221125
S.E. of regression	1.846430	Akaike info criterion		4.195949
Sum squared resid	61.36747	Schwarz criterion		4.345166
Log likelihood	-41.05746	Hannan-Quinn criter.		4.228333
F-statistic	5.470390	Durbin-Watson stat		1.739442
Prob(F-statistic)	0.013927			

Null Hypothesis: D(EMPLOYMENT) has a unit root
 Exogenous: None
 Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.453285	0.0015
Test critical values:		
1% level	-2.679735	
5% level	-1.958088	
10% level	-1.607830	

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

Residual variance (no correction)	2.943633
HAC corrected variance (Bartlett kernel)	2.943633

Phillips-Perron Test Equation
 Dependent Variable: D(EMPLOYMENT,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:40
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EMPLOYMENT(-1))	-0.750307	0.217273	-3.453285	0.0025
R-squared	0.373492	Mean dependent var		0.018095
Adjusted R-squared	0.373492	S.D. dependent var		2.221125
S.E. of regression	1.758071	Akaike info criterion		4.012760
Sum squared resid	61.81629	Schwarz criterion		4.062499
Log likelihood	-41.13398	Hannan-Quinn criter.		4.023554
Durbin-Watson stat	1.740977			

Foreign direct investment.

Null Hypothesis: FDI_NET_INFLOW_____TO_GDP has a unit root

Exogenous: Constant

Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.021775	0.0006
Test critical values:	1% level	-3.769597	
	5% level	-3.004861	
	10% level	-2.642242	

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

Residual variance (no correction)	1.297793
HAC corrected variance (Bartlett kernel)	0.633753

Phillips-Perron Test Equation

Dependent Variable: D(FDI_NET_INFLOW_____TO_GDP)

Method: Least Squares

Date: 04/20/23 Time: 16:41

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI_NET_INFLOW_____TO_GDP(-1)	-1.033175	0.220239	-4.691149	0.0001
C	1.428370	0.392588	3.638341	0.0016
R-squared	0.523888	Mean dependent var		0.027012
Adjusted R-squared	0.500082	S.D. dependent var		1.689856
S.E. of regression	1.194811	Akaike info criterion		3.280361
Sum squared resid	28.55145	Schwarz criterion		3.379546
Log likelihood	-34.08397	Hannan-Quinn criter.		3.303726
F-statistic	22.00688	Durbin-Watson stat		2.032111
Prob(F-statistic)	0.000140			

Null Hypothesis: FDI_NET_INFLOW_____TO_GDP has a unit root
 Exogenous: Constant, Linear Trend
 Bandwidth: 13 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.713730	0.0000
Test critical values:	1% level	-4.440739	
	5% level	-3.632896	
	10% level	-3.254671	

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

Residual variance (no correction)	1.239852
HAC corrected variance (Bartlett kernel)	0.160444

Phillips-Perron Test Equation
 Dependent Variable: D(FDI_NET_INFLOW_____TO_GDP)
 Method: Least Squares
 Date: 04/20/23 Time: 16:41
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI_NET_INFLOW_____TO_GDP(-1)	-1.055412	0.222116	-4.751622	0.0001
C	1.897339	0.634578	2.989924	0.0075
@TREND("1998")	-0.038157	0.040494	-0.942292	0.3579
R-squared	0.545144	Mean dependent var		0.027012
Adjusted R-squared	0.497264	S.D. dependent var		1.689856
S.E. of regression	1.198173	Akaike info criterion		3.325596
Sum squared resid	27.27674	Schwarz criterion		3.474375
Log likelihood	-33.58156	Hannan-Quinn criter.		3.360644
F-statistic	11.38573	Durbin-Watson stat		2.092505
Prob(F-statistic)	0.000562			

Null Hypothesis: FDI_NET_INFLOW____TO_GDP has a unit root
 Exogenous: None
 Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.355361	0.0210
Test critical values:		
1% level	-2.674290	
5% level	-1.957204	
10% level	-1.608175	

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

Residual variance (no correction)	2.156772
HAC corrected variance (Bartlett kernel)	2.156772

Phillips-Perron Test Equation
 Dependent Variable: D(FDI_NET_INFLOW____TO_GDP)
 Method: Least Squares
 Date: 04/20/23 Time: 16:42
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI_NET_INFLOW____TO_GDP(-1)	-0.423455	0.179783	-2.355361	0.0283
R-squared	0.208760	Mean dependent var		0.027012
Adjusted R-squared	0.208760	S.D. dependent var		1.689856
S.E. of regression	1.503155	Akaike info criterion		3.697399
Sum squared resid	47.44898	Schwarz criterion		3.746991
Log likelihood	-39.67139	Hannan-Quinn criter.		3.709081
Durbin-Watson stat	2.272070			

Economic Growth.

Null Hypothesis: ECONOMICS_GROWTH_RATE has a unit root

Exogenous: Constant

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-0.943776	0.7542
Test critical values:		
1% level	-3.769597	
5% level	-3.004861	
10% level	-2.642242	

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

Residual variance (no correction)	4.693104
HAC corrected variance (Bartlett kernel)	4.859390

Phillips-Perron Test Equation

Dependent Variable: D(ECONOMICS_GROWTH_RATE)

Method: Least Squares

Date: 04/20/23 Time: 16:43

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECONOMICS_GROWTH_RATE(-1)	-0.233005	0.271055	-0.859623	0.4002
C	0.279571	0.844512	0.331045	0.7441
R-squared	0.035631	Mean dependent var		-0.315090
Adjusted R-squared	-0.012587	S.D. dependent var		2.257928
S.E. of regression	2.272095	Akaike info criterion		4.565789
Sum squared resid	103.2483	Schwarz criterion		4.664975
Log likelihood	-48.22368	Hannan-Quinn criter.		4.589155
F-statistic	0.738951	Durbin-Watson stat		1.452293
Prob(F-statistic)	0.400184			

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.885858	0.6276
Test critical values:		
1% level	-4.440739	
5% level	-3.632896	
10% level	-3.254671	

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

Residual variance (no correction)	3.388816
HAC corrected variance (Bartlett kernel)	3.026634

Phillips-Perron Test Equation
 Dependent Variable: D(ECONOMICS_GROWTH_RATE)
 Method: Least Squares
 Date: 04/20/23 Time: 16:43
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECONOMICS_GROWTH_RATE(-1)	-0.543765	0.262774	-2.069325	0.0524
C	3.374622	1.360901	2.479697	0.0227
@TREND("1998")	-0.200169	0.074021	-2.704204	0.0141
R-squared	0.303644	Mean dependent var		-0.315090
Adjusted R-squared	0.230344	S.D. dependent var		2.257928
S.E. of regression	1.980882	Akaike info criterion		4.331085
Sum squared resid	74.55396	Schwarz criterion		4.479864
Log likelihood	-44.64194	Hannan-Quinn criter.		4.366133
F-statistic	4.142455	Durbin-Watson stat		1.608966
Prob(F-statistic)	0.032129			

Null Hypothesis: ECONOMICS_GROWTH_RATE has a unit root
 Exogenous: None
 Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.063324	0.2507
Test critical values:		
1% level	-2.674290	
5% level	-1.957204	
10% level	-1.608175	

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

Residual variance (no correction)	4.718820
HAC corrected variance (Bartlett kernel)	4.782713

Phillips-Perron Test Equation
 Dependent Variable: D(ECONOMICS_GROWTH_RATE)
 Method: Least Squares
 Date: 04/20/23 Time: 16:43
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECONOMICS_GROWTH_RATE(-1)	-0.159503	0.152145	-1.048359	0.3064
R-squared	0.030347	Mean dependent var		-0.315090
Adjusted R-squared	0.030347	S.D. dependent var		2.257928
S.E. of regression	2.223404	Akaike info criterion		4.480345
Sum squared resid	103.8140	Schwarz criterion		4.529938
Log likelihood	-48.28379	Hannan-Quinn criter.		4.492027
Durbin-Watson stat	1.524800			

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.453034	0.0204
Test critical values:	1% level	-3.788030	
	5% level	-3.012363	
	10% level	-2.646119	

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

Residual variance (no correction)	4.844276
HAC corrected variance (Bartlett kernel)	3.562938

Phillips-Perron Test Equation
 Dependent Variable: D(ECONOMICS_GROWTH_RATE,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:44
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ECONOMICS_GROWTH_RATE(-1))	-1.053911	0.283958	-3.711501	0.0015
C	-0.421564	0.504965	-0.834838	0.4142
R-squared	0.420294	Mean dependent var		-0.402144
Adjusted R-squared	0.389783	S.D. dependent var		2.962138
S.E. of regression	2.313914	Akaike info criterion		4.606151
Sum squared resid	101.7298	Schwarz criterion		4.705629
Log likelihood	-46.36459	Hannan-Quinn criter.		4.627740
F-statistic	13.77524	Durbin-Watson stat		1.690209
Prob(F-statistic)	0.001480			

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

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.897028	0.0310
Test critical values:	1% level	-4.467895	
	5% level	-3.644963	
	10% level	-3.261452	

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

Residual variance (no correction)	4.242886
HAC corrected variance (Bartlett kernel)	2.189957

Phillips-Perron Test Equation
 Dependent Variable: D(ECONOMICS_GROWTH_RATE,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:45
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ECONOMICS_GROWTH_RATE(-1))	-1.151553	0.279790	-4.115774	0.0006
C	1.151507	1.098019	1.048713	0.3082
@TREND("1998")	-0.131239	0.082164	-1.597289	0.1276
R-squared	0.492261	Mean dependent var		-0.402144
Adjusted R-squared	0.435846	S.D. dependent var		2.962138
S.E. of regression	2.224867	Akaike info criterion		4.568835
Sum squared resid	89.10061	Schwarz criterion		4.718053
Log likelihood	-44.97277	Hannan-Quinn criter.		4.601219
F-statistic	8.725653	Durbin-Watson stat		1.792068
Prob(F-statistic)	0.002243			

Null Hypothesis: D(ECONOMICS_GROWTH_RATE) has a unit root
 Exogenous: None
 Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.597464	0.0010
Test critical values:		
1% level	-2.679735	
5% level	-1.958088	
10% level	-1.607830	

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

Residual variance (no correction)	5.021973
HAC corrected variance (Bartlett kernel)	4.366123

Phillips-Perron Test Equation
 Dependent Variable: D(ECONOMICS_GROWTH_RATE,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:45
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ECONOMICS_GROWTH_RATE(-1))	-1.051455	0.281784	-3.731427	0.0013
R-squared	0.399029	Mean dependent var		-0.402144
Adjusted R-squared	0.399029	S.D. dependent var		2.962138
S.E. of regression	2.296317	Akaike info criterion		4.546938
Sum squared resid	105.4614	Schwarz criterion		4.596677
Log likelihood	-46.74285	Hannan-Quinn criter.		4.557733
Durbin-Watson stat	1.633213			

Inflation.

Null Hypothesis: INFLATION has a unit root

Exogenous: Constant

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.711044	0.0881
Test critical values:		
1% level	-3.769597	
5% level	-3.004861	
10% level	-2.642242	

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

Residual variance (no correction)	4.209712
HAC corrected variance (Bartlett kernel)	2.196613

Phillips-Perron Test Equation

Dependent Variable: D(INFLATION)

Method: Least Squares

Date: 04/20/23 Time: 16:46

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.631549	0.209783	-3.010489	0.0069
C	3.221768	1.215316	2.650971	0.0153
R-squared	0.311841	Mean dependent var		-0.166212
Adjusted R-squared	0.277433	S.D. dependent var		2.531532
S.E. of regression	2.151902	Akaike info criterion		4.457089
Sum squared resid	92.61366	Schwarz criterion		4.556275
Log likelihood	-47.02798	Hannan-Quinn criter.		4.480455
F-statistic	9.063042	Durbin-Watson stat		1.609871
Prob(F-statistic)	0.006911			

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.629082	0.2721
Test critical values:		
1% level	-4.440739	
5% level	-3.632896	
10% level	-3.254671	

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

Residual variance (no correction)	4.195706
HAC corrected variance (Bartlett kernel)	2.216086

Phillips-Perron Test Equation
 Dependent Variable: D(INFLATION)
 Method: Least Squares
 Date: 04/20/23 Time: 16:47
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.634767	0.215254	-2.948923	0.0082
C	3.453937	1.549002	2.229782	0.0380
@TREND("1998")	-0.018687	0.074201	-0.251845	0.8039
R-squared	0.314130	Mean dependent var		-0.166212
Adjusted R-squared	0.241934	S.D. dependent var		2.531532
S.E. of regression	2.204129	Akaike info criterion		4.544666
Sum squared resid	92.30553	Schwarz criterion		4.693444
Log likelihood	-46.99133	Hannan-Quinn criter.		4.579714
F-statistic	4.351029	Durbin-Watson stat		1.611638
Prob(F-statistic)	0.027816			

Null Hypothesis: INFLATION has a unit root
 Exogenous: None
 Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.156652	0.2177
Test critical values:		
1% level	-2.674290	
5% level	-1.957204	
10% level	-1.608175	

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

Residual variance (no correction)	5.688931
HAC corrected variance (Bartlett kernel)	2.960488

Phillips-Perron Test Equation
 Dependent Variable: D(INFLATION)
 Method: Least Squares
 Date: 04/20/23 Time: 16:47
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.116570	0.089843	-1.297476	0.2085
R-squared	0.070034	Mean dependent var		-0.166212
Adjusted R-squared	0.070034	S.D. dependent var		2.531532
S.E. of regression	2.441277	Akaike info criterion		4.667308
Sum squared resid	125.1565	Schwarz criterion		4.716901
Log likelihood	-50.34039	Hannan-Quinn criter.		4.678991
Durbin-Watson stat	1.867287			

Null Hypothesis: D(INFLATION) has a unit root
 Exogenous: Constant
 Bandwidth: 11 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-5.885974	0.0001
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Residual variance (no correction)	6.290400
HAC corrected variance (Bartlett kernel)	1.094760

Phillips-Perron Test Equation
 Dependent Variable: D(INFLATION,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:48
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-0.987240	0.227768	-4.334417	0.0004
C	-0.091544	0.576166	-0.158886	0.8754
R-squared	0.497184	Mean dependent var		0.038029
Adjusted R-squared	0.470720	S.D. dependent var		3.624342
S.E. of regression	2.636768	Akaike info criterion		4.867378
Sum squared resid	132.0984	Schwarz criterion		4.966856
Log likelihood	-49.10747	Hannan-Quinn criter.		4.888967
F-statistic	18.78717	Durbin-Watson stat		1.977589
Prob(F-statistic)	0.000357			

Null Hypothesis: D(INFLATION) has a unit root
 Exogenous: Constant, Linear Trend
 Bandwidth: 12 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-6.096618	0.0004
Test critical values:		
1% level	-4.467895	
5% level	-3.644963	
10% level	-3.261452	

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

Residual variance (no correction)	6.260619
HAC corrected variance (Bartlett kernel)	0.868982

Phillips-Perron Test Equation
 Dependent Variable: D(INFLATION,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:48
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-0.986595	0.233465	-4.225882	0.0005
C	0.250543	1.309772	0.191288	0.8504
@TREND("1998")	-0.028500	0.097399	-0.292612	0.7732
R-squared	0.499564	Mean dependent var		0.038029
Adjusted R-squared	0.443960	S.D. dependent var		3.624342
S.E. of regression	2.702602	Akaike info criterion		4.957870
Sum squared resid	131.4730	Schwarz criterion		5.107088
Log likelihood	-49.05764	Hannan-Quinn criter.		4.990254
F-statistic	8.984330	Durbin-Watson stat		1.987415
Prob(F-statistic)	0.001968			

Null Hypothesis: D(INFLATION) has a unit root
 Exogenous: None
 Bandwidth: 11 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-6.094826	0.0000
Test critical values:		
1% level	-2.679735	
5% level	-1.958088	
10% level	-1.607830	

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

Residual variance (no correction)	6.298758
HAC corrected variance (Bartlett kernel)	1.123161

Phillips-Perron Test Equation
 Dependent Variable: D(INFLATION,2)
 Method: Least Squares
 Date: 04/20/23 Time: 16:48
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-0.985363	0.221849	-4.441597	0.0003
R-squared	0.496516	Mean dependent var		0.038029
Adjusted R-squared	0.496516	S.D. dependent var		3.624342
S.E. of regression	2.571711	Akaike info criterion		4.773468
Sum squared resid	132.2739	Schwarz criterion		4.823207
Log likelihood	-49.12141	Hannan-Quinn criter.		4.784262
Durbin-Watson stat	1.977172			

Domestic Investment.

Null Hypothesis: DI_ has a unit root

Exogenous: Constant

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.226567	0.6437
Test critical values:		
1% level	-3.769597	
5% level	-3.004861	
10% level	-2.642242	

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

Residual variance (no correction)	1.267866
HAC corrected variance (Bartlett kernel)	1.722589

Phillips-Perron Test Equation

Dependent Variable: D(DI_)

Method: Least Squares

Date: 04/22/23 Time: 11:53

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DI_(-1)	-0.123027	0.131654	-0.934476	0.3612
C	1.945085	2.231775	0.871542	0.3938
R-squared	0.041836	Mean dependent var		-0.127141
Adjusted R-squared	-0.006073	S.D. dependent var		1.177385
S.E. of regression	1.180954	Akaike info criterion		3.257030
Sum squared resid	27.89305	Schwarz criterion		3.356216
Log likelihood	-33.82733	Hannan-Quinn criter.		3.280395
F-statistic	0.873246	Durbin-Watson stat		1.090487
Prob(F-statistic)	0.361205			

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-0.905459	0.9373
Test critical values:		
1% level	-4.440739	
5% level	-3.632896	
10% level	-3.254671	

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

Residual variance (no correction)	1.233469
HAC corrected variance (Bartlett kernel)	1.627848

Phillips-Perron Test Equation
 Dependent Variable: D(DI_)
 Method: Least Squares
 Date: 04/22/23 Time: 11:54
 Sample (adjusted): 1999 2020
 Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DI_(-1)	-0.082073	0.144622	-0.567495	0.5770
C	1.620188	2.302164	0.703768	0.4901
@TREND("1998")	-0.031733	0.043595	-0.727895	0.4756
R-squared	0.067830	Mean dependent var		-0.127141
Adjusted R-squared	-0.030293	S.D. dependent var		1.177385
S.E. of regression	1.195085	Akaike info criterion		3.320435
Sum squared resid	27.13633	Schwarz criterion		3.469214
Log likelihood	-33.52479	Hannan-Quinn criter.		3.355483
F-statistic	0.691274	Durbin-Watson stat		1.165144
Prob(F-statistic)	0.513102			

Null Hypothesis: DI_ has a unit root
 Exogenous: None
 Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-0.574508	0.4568
Test critical values:		
1% level	-2.674290	
5% level	-1.957204	
10% level	-1.608175	

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

Residual variance (no correction)	1.316018
HAC corrected variance (Bartlett kernel)	1.757500

Phillips-Perron Test Equation

Dependent Variable: D(DI_)

Method: Least Squares

Date: 04/22/23 Time: 11:55

Sample (adjusted): 1999 2020

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DI_(-1)	-0.009018	0.014767	-0.610675	0.5480
R-squared	0.005445	Mean dependent var		-0.127141
Adjusted R-squared	0.005445	S.D. dependent var		1.177385
S.E. of regression	1.174175	Akaike info criterion		3.203397
Sum squared resid	28.95240	Schwarz criterion		3.252990
Log likelihood	-34.23737	Hannan-Quinn criter.		3.215080
Durbin-Watson stat	1.172039			

Null Hypothesis: D(DI_) has a unit root
 Exogenous: Constant
 Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.008945	0.0503
Test critical values:		
1% level	-3.788030	
5% level	-3.012363	
10% level	-2.646119	

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

Residual variance (no correction)	1.104471
HAC corrected variance (Bartlett kernel)	1.105655

Phillips-Perron Test Equation
 Dependent Variable: D(DI_,2)
 Method: Least Squares
 Date: 04/22/23 Time: 11:56
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DI_(-1))	-0.642692	0.213642	-3.008270	0.0072
C	-0.033683	0.241394	-0.139534	0.8905
R-squared	0.322631	Mean dependent var		0.002041
Adjusted R-squared	0.286980	S.D. dependent var		1.308456
S.E. of regression	1.104867	Akaike info criterion		3.127720
Sum squared resid	23.19390	Schwarz criterion		3.227198
Log likelihood	-30.84106	Hannan-Quinn criter.		3.149309
F-statistic	9.049686	Durbin-Watson stat		1.761468
Prob(F-statistic)	0.007228			

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

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-3.321817	0.0900
Test critical values:		
1% level	-4.467895	
5% level	-3.644963	
10% level	-3.261452	

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

Residual variance (no correction)	0.968404
HAC corrected variance (Bartlett kernel)	0.399245

Phillips-Perron Test Equation
 Dependent Variable: D(DI_,2)
 Method: Least Squares
 Date: 04/22/23 Time: 11:56
 Sample (adjusted): 2000 2020
 Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DI_(-1))	-0.688913	0.207576	-3.318845	0.0038
C	0.702028	0.517636	1.356221	0.1918
@TREND("1998")	-0.061523	0.038686	-1.590319	0.1292
R-squared	0.406080	Mean dependent var		0.002041
Adjusted R-squared	0.340089	S.D. dependent var		1.308456
S.E. of regression	1.062923	Akaike info criterion		3.091486
Sum squared resid	20.33649	Schwarz criterion		3.240703
Log likelihood	-29.46060	Hannan-Quinn criter.		3.123870
F-statistic	6.153558	Durbin-Watson stat		1.928546
Prob(F-statistic)	0.009195			

Appendix C: ARDL Long run Coefficients and Bounds test.

ARDL Long Run Form and Bounds Test
 Dependent Variable: D(EMPLOYMENT)
 Selected Model: ARDL(1, 2, 2, 0, 2)
 Case 2: Restricted Constant and No Trend
 Date: 04/22/23 Time: 12:51
 Sample: 1998 2020
 Included observations: 21

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	44.28395	5.633843	7.860346	0.0000
EMPLOYMENT(-1)*	-0.816197	0.114154	-7.149938	0.0001
FDI_NET_INFLOW_____...	0.256928	0.245875	1.044954	0.3233
DI_(-1)	-1.384956	0.163953	-8.447274	0.0000
ECONOMICS_GROWT...	0.234885	0.055115	4.261757	0.0021
INFLATION(-1)	0.086728	0.101270	0.856406	0.4140
D(FDI_NET_INFLOW_____...	-0.113190	0.101144	-1.119091	0.2921
D(FDI_NET_INFLOW_____...	-0.275065	0.119333	-2.305010	0.0466
D(DI_)	-1.434278	0.182344	-7.865767	0.0000
D(DI_(-1))	0.492492	0.160279	3.072718	0.0133
D(INFLATION)	0.252836	0.076749	3.294340	0.0093
D(INFLATION(-1))	0.085191	0.066718	1.276876	0.2336

* 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.
FDI_NET_INFLOW_____...	0.314787	0.284861	1.105055	0.2978
DI_	-1.696841	0.092454	-18.35330	0.0000
ECONOMICS_GROWT...	0.287780	0.081492	3.531415	0.0064
INFLATION	0.106259	0.125756	0.844960	0.4200
C	54.25646	1.468659	36.94285	0.0000

$$EC = EMPLOYMENT - (0.3148 * FDI_NET_INFLOW_TO_GDP - 1.6968 * DI_ + 0.2878 * ECONOMICS_GROWTH_RATE + 0.1063 * INFLATION + 54.2565)$$

F-Bounds Test					Null Hypothesis: No levels relationship				
Test Statistic	Value	Signif.	I(0)	I(1)					
					Asymptotic: n=1000				
F-statistic	16.16419	10%	2.2	3.09					
k	4	5%	2.56	3.49					
		2.5%	2.88	3.87					
		1%	3.29	4.37					
					Finite Sample: n=35				
Actual Sample Size	21	10%	2.46	3.46					
		5%	2.947	4.088					
		1%	4.093	5.532					
					Finite Sample: n=30				
		10%	2.525	3.56					
		5%	3.058	4.223					
		1%	4.28	5.84					

Appendix D: Short run Coefficients.

Dependent Variable: UNEMP

Method: ARDL

Date: 05/07/23 Time: 13:22

Sample (adjusted): 2001 2020

Included observations: 20 after adjustments

Maximum dependent lags: 3 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (1 lag, automatic): FDI_NET_INFLOW____TO_GDP

DI_ECONOMICS_GROWTH_RATE INFLATION

Fixed regressors: C

Number of models evaluated: 48

Selected Model: ARDL(3, 0, 0, 1, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
UNEMP(-1)	0.147269	0.115063	1.279906	0.2269
UNEMP(-2)	-0.055077	0.110741	-0.497351	0.6287
UNEMP(-3)	0.197292	0.081082	2.433241	0.0332
FDI_NET_INFLOW____TO_GDP	-0.247265	0.121473	-2.035565	0.0666
DI_	-1.399965	0.139916	-10.00573	0.0000
ECONOMICS_GROWTH_RATE	0.144360	0.056518	2.554250	0.0268
ECONOMICS_GROWTH_RATE(-1)	0.213782	0.125578	1.702386	0.1167
INFLATION	0.375237	0.066710	5.624865	0.0002
C	40.53198	4.188823	9.676222	0.0000
R-squared	0.983595	Mean dependent var	27.12500	
Adjusted R-squared	0.971664	S.D. dependent var	2.937867	
S.E. of regression	0.494537	Akaike info criterion	1.731772	
Sum squared resid	2.690232	Schwarz criterion	2.179852	
Log likelihood	-8.317724	Hannan-Quinn criter.	1.819242	
F-statistic	82.44171	Durbin-Watson stat	1.936058	
Prob(F-statistic)	0.000000			

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

Appendix E: ECM.

Appendix F: Granger Causality test

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 01:29

Sample: 1998 2020

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
FDI_NET_INFLOW____TO_GDP does not Granger Cause UNEMP	22	1.52476	0.2320
UNEMP does not Granger Cause FDI_NET_INFLOW____TO_GDP		0.00137	0.9709

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 01:39

Sample: 1998 2020

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
ECONOMICS_GROWTH_RATE does not Granger Cause UNEMP	22	3.72297	0.0687
UNEMP does not Granger Cause ECONOMICS_GROWTH_RATE		0.15291	0.7001

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 01:31

Sample: 1998 2020

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
DI_ does not Granger Cause UNEMP	22	16.8610	0.0006
UNEMP does not Granger Cause DI_		4.87900	0.0397

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 01:39

Sample: 1998 2020

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
INFLATION does not Granger Cause UNEMP	22	0.00064	0.9801
UNEMP does not Granger Cause INFLATION		0.98967	0.3323

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 01:41

Sample: 1998 2020

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
DI_ does not Granger Cause FDI_NET_INFLOW____TO_GDP	22	0.08130	0.7786
FDI_NET_INFLOW____TO_GDP does not Granger Cause DI_		0.27915	0.6034

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 01:45

Sample: 1998 2020

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
ECONOMICS_GROWTH_RATE does not Granger Cause FDI_NET_INFLOW____TO_GDP	22	3.58912	0.0735
FDI_NET_INFLOW____TO_GDP does not Granger Cause ECONOMICS_GROWTH_RATE		0.14375	0.7088

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 01:56

Sample: 1998 2020

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
INFLATION does not Granger Cause DI_	22	3.03318	0.0977
DI_ does not Granger Cause INFLATION		1.27835	0.2723

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 01:58

Sample: 1998 2020

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
ECONOMICS_GROWTH_RATE does not Granger Cause INFLATION	21	0.13367	0.8758
INFLATION does not Granger Cause ECONOMICS_GROWTH_RATE		2.10538	0.1543

Pairwise Granger Causality Tests

Date: 04/27/23 Time: 02:14

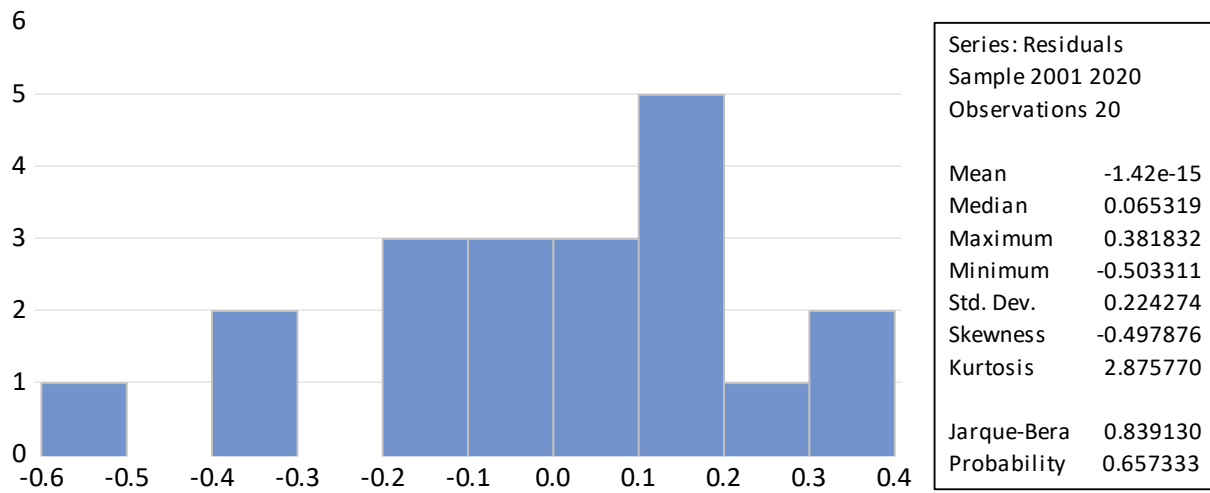
Sample: 1998 2020

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
ECONOMICS_GROWTH_RATE does not Granger Cause DI_	21	11.9362	0.0007
DI_ does not Granger Cause ECONOMICS_GROWTH_RATE		7.37035	0.0054

Appendix G: Diagnostic tests.

Normality test.



Misspecification.

Ramsey RESET Test

Equation: UNTITLED

Omitted Variables: Squares of fitted values

Specification: EMPLOYMENT EMPLOYMENT(-1) FDI_NET_INFLOW_____T

O_GDP FDI_NET_INFLOW_____TO_GDP(-1) FDI_NET_INFLOW_____

TO_GDP(-2) DI_ DI_(-1) DI_(-2) ECONOMICS_GROWTH_RATE

INFLATION INFLATION(-1) INFLATION(-2) C

	Value	df	Probability
t-statistic	0.161629	8	0.8756
F-statistic	0.026124	(1, 8)	0.8756
Likelihood ratio	0.068464	1	0.7936

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.005471	1	0.005471
Restricted SSR	1.681002	9	0.186778
Unrestricted SSR	1.675531	8	0.209441

LR test summary:

	Value
Restricted LogL	-3.283820
Unrestricted LogL	-3.249588

Unrestricted Test Equation:

Dependent Variable: EMPLOYMENT

Method: Least Squares

Date: 04/22/23 Time: 12:00

Sample: 2000 2020

Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMPLOYMENT(-1)	0.262667	0.502681	0.522532	0.6155
FDI_NET_INFLOW_____TO_GDP	-0.153543	0.271669	-0.565184	0.5874
FDI_NET_INFLOW_____TO_GDP(-1)	0.168216	0.471058	0.357102	0.7303
FDI_NET_INFLOW_____TO_GDP(-2)	0.394202	0.747853	0.527111	0.6124
DI_	-1.984123	3.407362	-0.582305	0.5764
DI_(-1)	0.730319	1.198215	0.609506	0.5591
DI_(-2)	-0.694784	1.263031	-0.550092	0.5973
ECONOMICS_GROWTH_RATE	0.325222	0.561953	0.578736	0.5787
INFLATION	0.367767	0.715708	0.513852	0.6212
INFLATION(-1)	-0.109892	0.194574	-0.564782	0.5877
INFLATION(-2)	-0.106672	0.150517	-0.708706	0.4986
C	56.41181	75.27171	0.749442	0.4750
FITTED^2	-0.007345	0.045442	-0.161629	0.8756

R-squared	0.990214	Mean dependent var	27.25619
Adjusted R-squared	0.975535	S.D. dependent var	2.925908
S.E. of regression	0.457648	Akaike info criterion	1.547580
Sum squared resid	1.675531	Schwarz criterion	2.194189
Log likelihood	-3.249588	Hannan-Quinn criter.	1.687911
F-statistic	67.45851	Durbin-Watson stat	2.090841
Prob(F-statistic)	0.000001		

Heteroscedasticity,

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	0.319030	Prob. F(11,9)	0.9610
Obs*R-squared	5.891282	Prob. Chi-Square(11)	0.8805
Scaled explained SS	2.155953	Prob. Chi-Square(11)	0.9979

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 04/22/23 Time: 12:01

Sample: 2000 2020

Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.368146	2.698919	0.506923	0.6244
EMPLOYMENT(-1)	-0.025988	0.054686	-0.475219	0.6460
FDI_NET_INFLOW____TO_GDP	-0.049916	0.048454	-1.030179	0.3298
FDI_NET_INFLOW____TO_GDP(-1)	-0.067574	0.058983	-1.145650	0.2815
FDI_NET_INFLOW____TO_GDP(-2)	-0.012172	0.057167	-0.212913	0.8361
DI_	-0.028233	0.087353	-0.323203	0.7539
DI_(-1)	0.027249	0.124316	0.219188	0.8314
DI_(-2)	-0.031436	0.076782	-0.409416	0.6918
ECONOMICS_GROWTH_RATE	0.002359	0.026403	0.089334	0.9308
INFLATION	0.032721	0.036767	0.889955	0.3967
INFLATION(-1)	-0.006615	0.034224	-0.193295	0.8510
INFLATION(-2)	0.000607	0.031962	0.019003	0.9853
R-squared	0.280537	Mean dependent var	0.080048	
Adjusted R-squared	-0.598806	S.D. dependent var	0.163738	
S.E. of regression	0.207037	Akaike info criterion	-0.016279	
Sum squared resid	0.385779	Schwarz criterion	0.580591	
Log likelihood	12.17093	Hannan-Quinn criter.	0.113257	
F-statistic	0.319030	Durbin-Watson stat	2.441031	
Prob(F-statistic)	0.960960			

Heteroskedasticity Test: ARCH

F-statistic	0.050396	Prob. F(1,18)	0.8249
Obs*R-squared	0.055839	Prob. Chi-Square(1)	0.8132

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 04/22/23 Time: 12:02

Sample (adjusted): 2001 2020

Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.086310	0.043232	1.996453	0.0612
RESID^2(-1)	-0.053001	0.236097	-0.224489	0.8249

R-squared	0.002792	Mean dependent var	0.081891
Adjusted R-squared	-0.052609	S.D. dependent var	0.167768
S.E. of regression	0.172125	Akaike info criterion	-0.586555
Sum squared resid	0.533285	Schwarz criterion	-0.486981
Log likelihood	7.865546	Hannan-Quinn criter.	-0.567117
F-statistic	0.050396	Durbin-Watson stat	1.995939
Prob(F-statistic)	0.824905		

Breusch-Godfrey Serial Correlation LM Test:
 Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.240329	Prob. F(2,7)	0.7926
Obs*R-squared	1.349323	Prob. Chi-Square(2)	0.5093

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 04/22/23 Time: 12:03

Sample: 2000 2020

Included observations: 21

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMPLOYMENT(-1)	0.087078	0.188484	0.461988	0.6581
FDI_NET_INFLOW___TO_GDP	-0.016094	0.114358	-0.140733	0.8920
FDI_NET_INFLOW___TO_GDP(-1)	-0.058521	0.166204	-0.352104	0.7351
FDI_NET_INFLOW___TO_GDP(-2)	-0.057202	0.155886	-0.366946	0.7245
DI_	-0.112690	0.283441	-0.397578	0.7028
DI_(-1)	0.136499	0.388517	0.351333	0.7357
DI_(-2)	0.078732	0.209589	0.375650	0.7183
ECONOMICS_GROWTH_RATE	0.026216	0.071363	0.367364	0.7242
INFLATION	0.038256	0.105974	0.360990	0.7288
INFLATION(-1)	-0.001384	0.083340	-0.016601	0.9872
INFLATION(-2)	-0.016869	0.077383	-0.217995	0.8337
C	-4.075270	8.972351	-0.454203	0.6634
RESID(-1)	-0.241172	0.562270	-0.428925	0.6809
RESID(-2)	-0.348274	0.525188	-0.663142	0.5285
R-squared	0.064253	Mean dependent var	-3.44E-16	
Adjusted R-squared	-1.673561	S.D. dependent var	0.289914	
S.E. of regression	0.474039	Akaike info criterion	1.579667	
Sum squared resid	1.572992	Schwarz criterion	2.276016	
Log likelihood	-2.586508	Hannan-Quinn criter.	1.730793	
F-statistic	0.036974	Durbin-Watson stat	1.862484	
Prob(F-statistic)	0.999999			

THE END