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YOUTH UNEMPLOYMENT CRISIS AND FOREIGN DIRECT INVESTMENT FLOWS IN SOUTH AFRICA

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Abstract. South Africa faces an acute youth unemployment crisis, with nearly 3.8 million young people aged 15 to 24 neither employed nor in education or training. Despite some government interventions such as the Economic Reconstruction and Recovery Plan, the Presidential Youth Employment Initiative, and the National Youth Policy (2020–2030), the youth unemployment crisis persists and deepens. Thus, this study investigates the dynamic relationship between foreign direct investment (FDI) and youth unemployment in South Africa using annual time-series data spanning 1991 to 2024. Applying both the linear Autoregressive Distributed Lag (ARDL) bounds testing approach and the Nonlinear ARDL (NARDL) model, the study tests for symmetric and asymmetric effects of foreign direct investment flows on youth unemployment. Having confirmed the existence of long-run cointegration, the study estimates an ARDL model and finds that youth unemployment increases alongside increasing FDI in the long run in South Africa. This result suggests that capital-intensive FDI inflows do not generate sufficient youth employment opportunities. This study also finds that NARDL asymmetric analysis reveals that positive and negative FDI shocks have divergent effects. In the short run, FDI inflows are more closely associated with youth unemployment than FDI outflows, while dynamic multiplier analysis confirms that FDI withdrawals inflict greater long-run harm. Interestingly, GDP growth rate and inflation rate are robust factors that reduce youth unemployment in both models. These findings call for targeted, labour-intensive, investment-attracting strategies, economic growth-enhancing strategies, and stronger domestic capital formation policies to address structural youth unemployment in South Africa.

Keywords: youth unemployment; foreign direct investment; foreign portfolio investment; gross fixed capital formation; South Africa

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JEL Classification: J21, F21, F32, O40, O55

1. Introduction

Youth unemployment is a socioeconomic crisis and has long been considered one of the biggest threats to the economies of emerging and developing countries. In Africa, one in every three youths aged 15 to 35 is either unemployed or discouraged from seeking employment, while another one in every three is vulnerably employed (AfDB, 2026). The same source identified the main culprit as low economic growth. In that, African countries have only been able to absorb 3.1 million new entrants to the labour market, out of nearly 12 million year-on-year job seekers.

In more specific terms, the discussion of unemployment in South Africa is laden with various biases and inaccuracies. For instance, the official statistics suggest that of the 10.3 million South African youth aged 15 to 24, more than 62% are neither employed nor in education or training (Statistics South Africa - STATSSA, 2025A). The same source suggests that unemployment among those aged 25-34 stands at more than 40%. The Public Servant Association of South Africa (PSA) have difference statistics. According to the PSA (2025),

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unemployment among graduates stands at about 33%. CrimePro (2025) puts the youth unemployment rates put the figure at almost 75%. Hence, the youth unemployment population of more than 66% (two in every three youths) can safely be regarded as a heated gunpowder about to explode. The South African evidence suggests that the trend has been consistent, with recent explosive reality (STATSSA, 2025B). Given the socioeconomic and communal maladies associated with youth unemployment, a strategic approach to transposing this strategic national asset into a productive force is unequivocally indispensable.

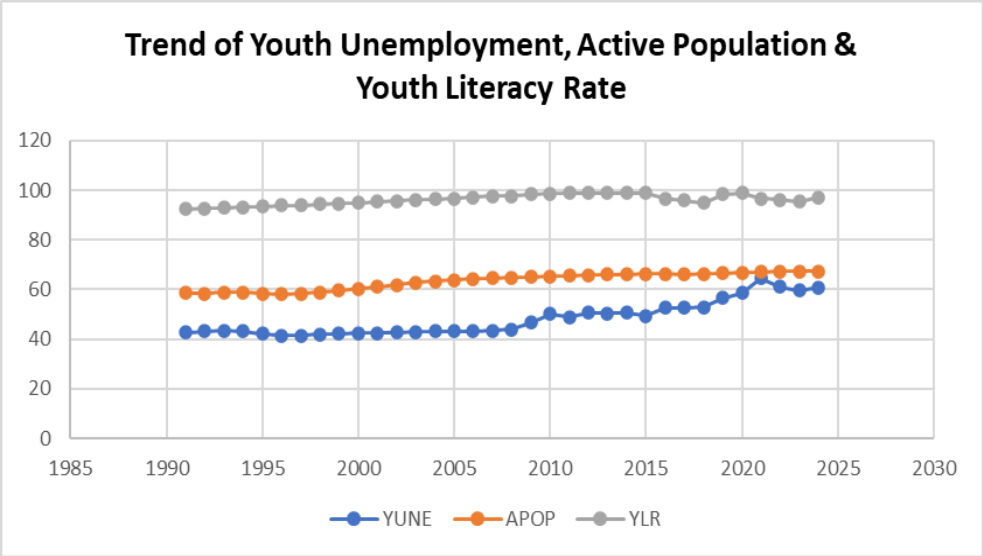
Truly, erosion of household consumption income, savings, and national investment trajectory is a troubling reality due to the loss of income among the youth; the most troubling are the exogenous and contagion effects of this anomaly. Specifically, rising crime rates, especially among the youth, have continued to raise the ugly head of systemic societal disintegration (Fagbadebo et al., 2024). For instance, more than 85% of murder cases were committed by youth between the ages of 15 and 25 in 2010 (Institute for Security Studies, 2013). The situation has worsened over time (STATSSA, 2025A). Another ugly byproduct of joblessness is the unyielding resentment and attacks on immigrants (xenophobia). This hostile incident has been attributed to anaemic growth, which has tamed the expansion of the national productive frontiers, rendering them incapable of absorbing a teeming workforce. Most xenophobic attitudes are attributable to a lack of job opportunities and perceived competition for available jobs from foreign nationals (Ogunnoiki & Adeyemi, 2019; Olofinbiyi, 2022). This is particularly disturbing, especially because a total of 1,295 incidents of xenophobic attacks, 128,758 displacements, 5648 looted shops, and 696 deaths have been reported between 2008 and 2019 (Xenowatch, 2019). Various sexual assaults were also recorded over the period. There are also cases of protests and xenophobic attacks across South Africa in 2026.

In recognition of the dire consequences of unemployment for the country's socio-economic stability, the government of South Africa has made some efforts to ameliorate youth unemployment. The government has implemented the Economic Reconstruction and Recovery Plan (ERRP, 2020), the Presidential Youth Employment Initiative (PYEI) (2020), and the Government's National Youth Policy (2020 to 2030). The main aim of these initiatives was to increase the proportion of youth employed in the public sector to 25% within the medium term (Zikhali & Matsiliza, 2024). Despite these efforts, the situation appears to be getting worse by the day. The Public Servants Association (PSA) of South Africa (2025) asserts that the youth population is suffering from various structural problems like poor and stagnant economic growth, an ailing educational structure, a mismatch of skills and academic curriculum, failed reform in the labour market, and apartheid spatial planning that led to communal disestablishment.

In realism, the unyielding youth unemployment is systematically underpinned by a poorly calibrated spatial educational system walled within the reckoning segregative anomaly of Whites rule that subsisted for almost half a century. The segregative rule entrenched a mismatch between educational curricula and required skills to power macroeconomic expansion. It is thus somewhat surprising that unemployment rises in tandem with a high youth literacy rate. The situation is compounded by the fact that the aggregate population growth continues to balloon (World Bank, 2025). The same source concludes that youth unemployment rates, youth literacy rates, and the active population (that is, people aged 15 to 64) as a percentage of the total population are progressively high in South Africa. The trends for these statistics are presented in Figure 1 and are measured in percentages.

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Figure 1. Trends of youth unemployment, active population, and youth literacy rate



Source: Authors' construct based on data from the World Bank (2025)

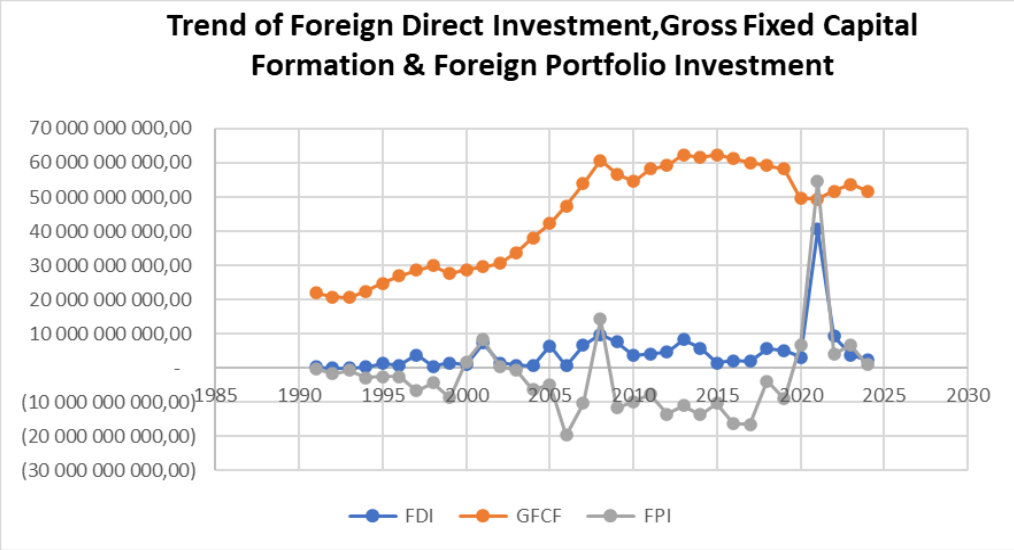
From Figure 1, the youth literacy rate has consistently remained high since the early 1990s, even before the political emancipation of 1994. The Figure suggests that almost all the youth population in South Africa has passed through formal education, with a notable downward spiral from 2015 to 2018. Though literacy rate picked up again in 2020, it has since been wobbling but still remains above 80%. On the other hand, the active population has consistently increased, possibly due to unrelenting growth in the aggregate population. Conversely, youth employment steadily pitched below 50%, save for 2021 when it broke the medium bracket.

To address unemployment, investments in gross fixed capital formation through huge financial injections are indispensable (Aregbeshola, 2018). The same source suggests that foreign direct investment inflows are a more reliable source of external funding to bridge domestic capital shortages. To this end, FDI can be utilized as a strategic tool to alleviate unemployment. Historical studies have also emphasized this possibility (Keynes, 1936), specifically through the Keynes General Equilibrium Model. For Keynes, unemployment can be solved by investing, including through FDI and domestic investment (Gross Fixed Capital Formation - GFCF).

There is a substantial scholarly attention (both theoretical and empirical) that interrogates the question of how truly foreign investment serves as an engine of job creation. Dunning (1977) and Borensztein et al. (1998) argue that foreign direct investment creates jobs through the establishment of new businesses, spillover effects from inflows, and structural integration between foreign companies and local firms/suppliers. On the contrary, critics argue that, because foreign direct investment is more capital-intensive in resource-rich countries, such as South Africa, it substitutes local labour and leads to structural unemployment among low-skilled and young people (Rodrik, 2016). Foreign portfolio investments, which are speculative in nature, can also be seen as another complicating factor, since their volatility can cause financial shocks to the real economy, leading to negative effects on the employment trajectory (Adegboye et al., 2020). The interaction of FDI, FPI and GFCF is depicted in Figure 2.

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Figure 2. Trends Analysis of FDI, FPI and GFCF in South Africa (1990 to 2024)



Source: Authors' construct based on data from the World Bank (2025)

According to Figure 2, FDI inflows to South Africa have been disappointing since 1994. It must be said, however, that the country reached its peak attractiveness sometime in 2008 and somewhat in 2013. Aside from these outliers, the inflow of FDI to the country has largely been anaemic. Given its nature, foreign portfolio investments have been chaotic and conspicuously erratic. It reached its peak in 2006 and its lowest point in 2021 due to weak appetite for emerging-market equities during the COVID-19 period. Expectantly, the GFCF has remained steady and then receded since 2020.

The South African economic landscape offers a particularly instructive context for examining these dynamics. Despite significant liberalization efforts and integration into the global marketplace since the democratic transition in 1994, the country has failed to translate investment inflows into meaningful and sustained employment gains, especially for young people. It is on record that South Africa is the second-largest recipient of cumulative FDI stock in Africa, just trailing behind Nigeria (Joshua et al., 2022; Haudi & Yoyok, 2020; Udi et al., 2020). The disconnection between GFCF and the steady inflow of FDI as drivers of economic growth, and by extension, employment opportunities, invokes scientific investigation. This is the major motivation for this study.

Empirically, the literature on the investment-employment nexus in South Africa and other economies has employed linear estimation methods that assume that positive and negative investment shocks have symmetric effects on unemployment (Phiri, 2014; Alalawneh, 2020; Karimov et al., 2020; Pasara & Garidzirai, 2020). However, this assumption is theoretically implausible in light of empirical evidence of asymmetric labour-market responses, downward wage rigidities and non-linear responses of enterprises to investment shocks (Shin et al., 2014). Ignoring asymmetry could lead to incorrect inferences and policy conclusions.

Our study seeks to overcome this shortcoming and therefore apply the linear ARDL bounds testing technique advanced by Pesaran et al. (2001) and the Nonlinear ARDL (NARDL) model propounded by Shin et al. (2014). By decomposing FDI into positive and negative partial sums, the NARDL model allows us to test whether the

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contractions and expansions in FDI and other macroeconomic variables have different effects on youth unemployment in the short and long runs. This two-pronged approach provides a more policy-relevant description of the investment-unemployment relationship in South Africa.

Thus, the remainder of this paper is organized as follows: Section 2 describes the materials and methods, including the background theory and the data and econometric models used. Section 3 clearly presents and discusses the results, and Section 4 presents the policy implications and a conclusion.

2. Materials and Methods

2.1 Theoretical Framework

This research builds on a combination of economic theories that link up the variables that are relevant for this study. First, the classical investment-employment relationship, based on the neoclassical production function model, assumes that investment (local and foreign) increases an economy's productive capacity, raises labour demand, and ultimately lowers unemployment (Mankiw et al., 1992). In this approach, FDI and gross fixed capital formation (GFCF), a proxy for domestic investment, directly expand the capital stock, raise national output and generate jobs. The Ownership, Location, and Internalization (OLI) framework proposed by Dunning (1977) provides further detail on the rationale for multinational enterprises' foreign investment and the potential employment effects. Second, Okun (1962) and Phillips (1958) provide two distinct theoretical foundations for inverse relationships between unemployment and the economic growth rate, and between inflation and the economic growth rate, respectively. In addition, inflation is supported by the monetary transmission literature, which holds that inflation reduces real income levels, leads to mispriced investment prices, and, when combined with monetary policy, lowers aggregate output and employment.

Again, Keynes (1936) argued that aggregate demand components are key to economic growth, which in turn accelerates job creation. In South Africa, public investment in infrastructure, education and other social welfare schemes is important in the context of historical exclusion and spatial disparities (Burger & Calitz, 2021). However, since aggregate demand components such as household consumption, government expenditure, and external trade contribute significantly to the economic growth rate, this study uses the GDP growth rate (GGR) in line with both Okun's law and Keynesian postulates. Third, the portfolio balance theory and financial integration literature guide the modelling of foreign portfolio investment. FPI is distinct from FDI in that it is liquid, reversible and responsive to global risk factors (Adegboye et al., 2020). The flightiness of FPI flows can serve as a channel from financial to real activity and potentially increase uncertainty for firms, stunting investment and job creation.

Finally, Human Capital Theory, proposed by Becker (1964), presents a strong theoretical framework that connects the youth literacy rate (YLR) **and the** active population (APOP) as a proxy for labour participation **with** unemployment**.** These are key factors relating to human capital development that constitute the supply side of labour in an economy. Mdoe et al (2023) and Habiyaremye et al. (2022) empirically demonstrated the relevance of YLR and APOP to unemployment. These variables are suitable for explaining the unemployment-foreign direct investment nexus in a dynamic framework.

The rationale for employing NARDL asymmetries from a theoretical perspective is that it addresses issues concerning positive and negative shifts in foreign direct investment. The inflexibilities in wages, due to minimum wage regulations, collective wage bargaining agreements, and the costly processes of hiring and laying off workers in South Africa, imply that firms respond differently to positive and negative shocks (Phiri, 2014). Positive capital flows (FDI) are likely to generate slow employment growth as companies gear up for higher productivity, while negative capital flows (reversals or disinvestment) can trigger permanent unemployment.

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2.2 Data Sources and Description

The current study is based on time-series data covering South Africa from 1991 through 2024, comprising 34 data points. Data on the youth unemployment rate commenced in 1991, and by 1994, South Africa's economic and investment environment changed with the arrival of its democratic dispensation. The series ends with the most recent period for which data is available. The variables used in the analysis, along with their sources, are explained in Table 1.

Table 1. Variable descriptions, measurements and motivation for inclusion

Variable/Code	Definition	Motivating study
Youth Unemployment Rate (YUNE)	Unemployment rate among persons aged 15-24 as a percentage of the total labour force.	Keynes (1936); Choga (2018).
Foreign Direct Investment (FDI)	Net foreign acquisition and control of investment in South Africa measured in billions of USD	Aregbeshola (2014); Lakemann et al. (2025)
Foreign Portfolio Investment (FPI)	Net purchases of foreign financial assets (stocks and bonds). It is measured in billions of USD	Keynes (1936); Bibi (2025).
Gross fixed capital formation (GFCF)	Gross fixed capital formation	Keynes (1936); Solow (1956)
GDP Growth Rate (GGR)	Annual percentage change in economic growth.	Okun (1962),
Inflation (INF)	Annual change in prices is measured as the consumer price index (CPI)	Phillips (1958); Buthelezi (2023).
Active Population (APOP)	Percentage of people ages 15-64 out of the total population.	Becker, (1964); Mdoe et al. 2023).
Youth Literacy Rate (YLR)	Percentage of people ages 15 -24 who could read and write with an understanding of their daily life	Becker, (1964); Mdoe et al. 2023).

Source: Compiled by the author

All variables in this study were sourced from the World Bank database to ensure data credibility, quality, transparency, and authority. Data for YLR were extrapolated for a few missing observations using a 5-year moving average since the observations did not vary widely.

2.3 Model Specification

2.3.1 The ARDL Bounds Testing Approach

Pesaran et al. (2001) proposed that the ARDL bounds testing approach to cointegration is preferred to Johansen (1991) and Engle and Granger (1987), which are conventional cointegration methods. First, it is applicable regardless of whether the regressors are I(0), I(1), but not 1(2) or mutually cointegrated. Second, it performs well in small samples. Third, it provides simultaneous estimates of short-run and long-run parameters within a single equation framework through the Error Correction Model (ECM). Fourth, it is robust to the presence of structural breaks in the data (Narayan, 2005). Thus, we specify three interrelated modelling frameworks. The ARDL model for long-run bounds testing, the ECM for short-run dynamics and speed of adjustment and the NARDL) with asymmetric decomposition of FDI to capture the differential effects of FDI inflows and withdrawals on youth unemployment. The NARDL extension (Shin et al, 2014) allows the long-run and short-run effects of FDI to differ in sign and magnitude depending on whether FDI is increasing or decreasing. Thus, we specify the unrestricted ARDL error correction model for the youth unemployment rate in South Africa. The baseline model takes the form:

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$$YUNE_t = f(FDI_t, FPI_t, GFCF_t, GGR_t, INFR_t, APOP_t, YLR_t) \quad (1)$$

Where t = time-specific observations, and the variables have clearly been defined in the preceding sections of the paper.

Further restating the model in its stochastic form, we obtain

$$YUNE_t = \alpha_0 + \alpha_1 FDI_t + \alpha_2 FPI_t + \alpha_3 GFCF_t + \alpha_4 GGR_t + \alpha_5 INFR_t + \alpha_6 APOP_t + \alpha_7 YLR_t + \varepsilon_t \quad (2)$$

Where α_0= Constant, α_1- α_7 are coefficient estimates, and ε_t = the error term.

By taking a semi-log-linear form, we obtain the long-run static equation (3). We use the semi-log because, apart from FDI, FPI, and GFCF, which are in billions of United States dollars, the remaining variables are expressed as rates (%) and do not need to be logged. Note that, for FDI and FPI, which are measured as net and have some negative overall outcomes, we adopt the inverse hyperbolic sine (asinh) approach (Mullahy & Norton, 2024) to preserve their original signs, and we use "L" as the symbol for the natural log. This prevents the situation where traditional logging adds a constant and converts negative values to positive values, which likely affects the estimates' outcomes by both sign and magnitude.

$$YUNE_t = \alpha_0 + \alpha_1 LFDI_t + \alpha_2 LFPI_t + \alpha_3 LGFCF_t + \alpha_4 GGR_t + \alpha_5 INFR_t + \alpha_6 APOP_t + \alpha_7 YLR_t + \varepsilon_t \quad (3)$$

For the error correction model, we followed the Pesaran et al. (2001) approach, and the ARDL $(P, q_1, q_2, q_3, q_4, q_5, q_6, q_7)$. The model is estimated in the following unrestricted error correction form, which simultaneously permits the testing of the long-run bounds relationship and the short-run dynamics:

$$ECT_{t-1} = \Delta YUNE_{t-1} - \hat{\alpha_0} - \hat{\alpha_1}\Delta LFDI_{t-1} - \hat{\alpha_2}\Delta LFPI_{t-1} - \hat{\alpha_3}\Delta LGFCF_{t-1} - \hat{\alpha_4}\Delta GGR_{t-1} - \hat{\alpha_5}\Delta INFR_{t-1} - \hat{\alpha_6}\Delta APOP_{t-1} - \hat{\alpha_7}\Delta YLR_{t-1} + \varepsilon_t \quad (4)$$

Where ΔYUNE_t is the first difference of youth unemployment, α_0 is the constant, $\hat{\alpha_1}_i ... \hat{\alpha_7}_i$ represent short-run dynamic coefficients, $\hat{\alpha_1} ... \hat{\alpha_7}$ are level coefficients used in the bounds F-test for cointegration, and ε_t is a white noise error term.

As such, this study applies the critical value bounds proposed by Pesaran et al. (2001) for the test of long run relationship (or cointegration) among the variables under investigation. In an event where the calculated F-value is larger than the critical value of the upper-bound I(1), the presence of cointegration is established. We use the Akaike Information Criterion (AIC) to determine the optimal lags. Upon confirmation of cointegration, long-run relationships are established, and the short-term dynamics along with the rate of adjustment are captured through the estimation of the Error Correction Model (ECM). This is because the ϕ coefficient in the ECM is negative and statistically significant.

2.3.2 The Non-Linear ARDL Approach

Shin et al. (2014) extend the linear ARDL approach by decomposing the explanatory variables into positive and negative partial components, thereby enabling the analysis of asymmetric impacts in both the short- and long-run. This is done by constructing positive and negative partial sums of the explanatory variable, FDI, in this study. Following the specification in equation (3), we modify it as appropriate and obtain

$$YUNE_t = \alpha_0 + \bar{I} \pm \bar{a}, \quad LFDI\bar{a}, \quad ^{+} + \alpha_2 LFDI_t^{-} + \alpha_3 LFPI_t + \alpha_4 LGFCF_t + \alpha_5 GGR_t + \alpha_6 INFR_t + \alpha_7 APOP_t + \alpha_8 YLR_t + \varepsilon_t \quad (5)$$

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In the same manner, the decomposed partial sums are constructed for FDI in the ECM model for asymmetry. These partial sums replace the original variables in the ARDL framework, yielding the NARDL specification:

$$ECT_{t-1} = \Delta YUNE_{t-1} - \alpha_0 - \alpha_1 \Delta LFDI\bar{a},\ \bar{a},\langle\bar{a},\ ^{+} - \alpha_2 \Delta LFDI\bar{a},\ \bar{a},\langle\bar{a},\ ^{-} - \alpha_3 \Delta LFPI_{t-1} - \alpha_4 \Delta LGFCF_{t-1} - \alpha_5 \Delta GGR_{t-1} - \alpha_6 \Delta INFR_{t-1} - \alpha_7 \Delta APOP_{t-1} - \alpha_8 \Delta YLR_{t-1} \quad (6)$$

The test of asymmetry uses the Wald test of equal long-run (H_0: $L^+ = L^-$) and short-run (H_0: $\Sigma\alpha^+ = \Sigma\alpha^-$) coefficients, where a rejection of these null hypotheses provides confirmation of asymmetric effects.

Finally, to further assess the model's fitness and performance, we conducted diagnostics for serial correlation (Breusch-Godfrey LM test), heteroscedasticity (ARCH test), model specification (Ramsey RESET test), and normality (Jarque-Bera test). To also test for parameter stability, we apply the tests of both Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares (CUSUMS) recursive residuals in line with the suggestion of Brown et al. (1975). All estimates are obtained using EViews 12.

3. Results and Discussion

3.1 Descriptive Statistics

The study performs a thorough preliminary analysis before estimating the model. The moments (mean, standard deviation, minimum, maximum, skewness and kurtosis) of all variables are calculated.

Table 2. Descriptive Statistics

Variable	YUNE (%)	FDI (USD)	FPI (USD)	GFCF (USD)	GGR (%)	INFR (%)	APOP (%)	YLR (%)
Mean	48.103	4.51bn	-2.85bn	44.10bn	2.05	6.34	63.43	96.21
Median	43.656	2.74bn	-4.05bn	49.50bn	2.44	5.76	64.72	96.35
Maximum	64.652	40.70bn	54.7bn	42.40bn	5.60	15.33	67.43	98.96
Minimum	41.427	3.34mn	-19.60bn	20.70bn	-1.17	-0.69	58.13	92.32
Std. Dev.	6.844	7.00	-12.70bn	15.10bn	2.40	3.06	3.38	2.06
Skewness	0.917	4.19	2.75	-0.27	-1.20	0.82	-0.46	-0.24
Kurtosis	2.620	22.22	13.47	1.44	5.38	4.73	-2.9392	1.92
Jarque-Bera	4.980	622.61	198.37	3.84	16.17	8.07	-2.1905	1.98
Probability	0.083	0.000	0.000	0.15	0.00	0.017	0.000	0.37
Obs.	34	34	34	34	34	34	34	34

Source: Extract from E-Views 12

The descriptive statistics provide estimates for 34 observations per variable and show a balanced time structure. The. distributions, central tendencies, and variations of the variables examined in this study. Regarding the normality of the variables, only YUNE (P = 0.083), GFCF (P = 0.15), and YLR (P = 0.37) are normally distributed, while the rest are not, as their p-values are less than 0.05. However, both FDI and FPI are logged to remove the excessive influence of non-normal distribution.

The average youth unemployment rate (YUNE) is 48.10%, the median of 43.66% is a bit lower than the mean, and the skewness is 0.917. The average spread around the mean is 6.84, indicating moderate spread or deviation in youth unemployment across the sample period. Regarding foreign direct investment (FDI) flows, they are highly volatile, averaging USD 4.51 billion and reaching a high of USD 40.70 billion. An extreme inflow episode is evident from the high difference between the mean and median flow. The skewness (4.19) and kurtosis (22.22) are very high, indicating a highly skewed right distribution and leptokurtosis, hence the presence of extreme observations. The negative mean and median FPI values indicate an average net outflow of USD 2.85 billion. But there were also significant jumps and drops in the variable, ranging from USD 19.60 billion in minimum outflows

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to USD 54.7 billion in maximum inflows. High positive skewness (2.75) and kurtosis (13.47) indicate extreme positive shocks and volatility in the distribution.

The mean of gross fixed capital formation (GFCF) is USD 44.10 billion, which shows that investment in fixed assets has been relatively high in recent years. The volatility, as indicated by the standard deviation of USD 15.10 billion, suggests significant variations in domestic investment activity. The distribution is relatively symmetrical with a skewness coefficient of -0.27. In addition, the GDP growth rate (GGR) averaged 2.05%, ranging from -1.17% to 5.60%, and alternated between economic contraction and expansion. The negative skewness coefficient (-1.20) indicates a negatively skewed distribution, meaning that growth results are more likely to be lower. The kurtosis is 5.38, indicating a leptokurtic distribution with heavier tails than the normal distribution. The average inflation rate (INFR) is 6.34%, with moderate inflation during the period under consideration. There is some variability in INFR, as evidenced by the 3.06 standard deviation. The positive skewness (0.82) indicates that there were episodes of higher inflation growth. The active population (APOP) had an average percentage of 63.43%, indicating that a significant number of people in South Africa are in the economically active age bracket. The negative skewness (-0.46) is due to slight left skewness, and the relatively low standard deviation (3.38) indicates stability over time. The reported kurtosis value of -2.9392 appears unusual, as most statistical software reports positive kurtosis; this may be due to excess kurtosis reporting or a possible data entry error. The mean Youth literacy rate (YLR) is 96.21% with a relatively small standard deviation of 2.06, and the highest stability among the variables. This means that youth literacy has been high throughout the study.

3.2 Unit Root Tests

The study employs several unit root tests, including the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979), the Phillips-Perron (PP) test (1988), and the Zivot-Andrews (ZA) (1992). The ZA test is important in the South African context as evidence of structural breaks has been documented in response to the 2008-2009 global financial crisis, the 2020 COVID-19 pandemic, and in the post-apartheid policy environment. The addition of structural break unit root tests helps avoid spurious inference by accounting for unknown breaks in the data-generating process. The bounds testing approach of ARDL is theoretically based on the absence of I(2) variables. ARDL testing allows for a combination of I(0) and I(1) variables, making it a suitable approach with the limited sample size used in this study (Pesaran et al., 2001). The FDI and FPI are log-transformed to remove heteroscedasticity and allow for interpretation of the coefficients as elasticities. Since they are net values, the transformation is performed using a signed logarithm, which serves the same purpose as the inverse hyperbolic sine (asinh) proposed by Mullahy and Norton (2024). The unit root test results are provided in Table 3.

Table 3. Unit Root Test Results

Variable	ADF Level	ADF First Diff.	PP Level	PP First Diff.	ZA Break	Order
YUNE	-1.843	-4.217***	-1.762	-5.103***	-4.891** (2009)	I(1)
LFDI	-2.104	-5.631***	-2.009	-6.014***	-5.234** (2008)	I(1)
LFPI	-1.556	-4.893***	-1.623	-5.441***	-4.678** (2020)	I(1)
LGFCF	-1.987	-4.762***	-1.844	-5.219***	-5.012** (2009)	I(1)
INF	-2.678*	-5.891***	-2.567*	-6.123***	-5.102** (2002)	I(0)/I(1)
APOP	-4.635***	-1.953	-2.319	-2.0879	-4.9535** (1998)	I(0)
GGR	-4.282***	-1.286	-4.282***	-6.2175***	-2.9392 (2009)	I(0)
YLR	-2.737*	2.208	-2.037	-4.8960***	-2.1905 (2001)	I(1)

Source: Extract from E-Views 12

Note: *** p < 0.01, ** p < 0.05, * p < 0.10. Critical values follow MacKinnon (1996). ZA test reports the year of the endogenous structural break.

The results in Table 3 confirm that all variables are either I(0) or I(1), and none exhibits I(2) properties, and hence satisfy the prerequisite for ARDL bounds testing. The structural breaks identified by the ZA test around 2008-2009 (during the global financial crisis) and 2020-2021 (during the COVID-19 pandemic) are consistent with known episodes of macroeconomic disruption in South Africa and globally.

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3.3 ARDL Bounds Test for Cointegration

The results of the ARDL bounds F-test on cointegration are presented in Table 4. The ARDL (2, 0, 2, 2, 2, 2, 2, 1) model lag order is optimal according to the AIC, and accounts for up to 2 lags, due to the relatively small number of observations in the dataset.

Table 4. Bounds Cointegration Results

Statistic	Level of Significance	Lower Bounds 1(0)	Upper Bounds 1(1)
Computed F-Statistic	-	4.065	4.065
Critical Values bounds	10%	1.7	2.83
Critical Values bounds	5%	1.97	3.18
Critical Values bounds	2.5%	2.22	3.49
Critical Values bounds	1%	2.54	3.91

Source: Extract from E-Views 12

It is evident that the ARDL model bounds test F-statistic value of 4.065 significantly exceeds the Pesaran et al. (2001) upper critical value of 3.91 at the 1% significance level, thereby supporting cointegration of the YUNE, FDI, FPI, GFCF, GGR, INF, APOP and YLR series in the long run. This result aligns with the estimates of Liu et al (2024), who show that there exists long-run cointegration between FDI and unemployment in sub-Saharan African countries.

3.4 ARDL Long-Run and Short-Run Estimates

Table 5. ARDL Long-Run and Short-Run Estimates (Dependent Variable: YUNE)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PANEL A: LONG-RUN ESTIMATES				
LFDI	1.3603	0.4020	3.3841	0.0054
LFPI	0.0852	0.0271	3.1488	0.0084
LGFCF	-0.3258	1.8051	-0.1805	0.8598
GGR	-4.6118	0.7841	-5.8818	0.0001
INFR	-1.0547	0.2727	-3.8672	0.0022
APOP	0.6690	0.2798	2.3907	0.0341
YLR	0.0311	0.4318	0.0720	0.9438
PANEL B: SHORT-RUN ESTIMATES				
ΔYUNE(-1)	-0.5365	0.1458	-3.6792	0.0032
ΔLFPI	0.0105	0.0097	1.0829	0.3001
ΔLFPI(-1)	-0.0479	0.0136	-3.5089	0.0043
ΔLGFCF	10.1317	4.0956	2.4738	0.0293
ΔLGFCF(-1)	12.1266	4.1925	2.8925	0.0135
ΔGGR	-0.5879	0.1301	-4.5180	0.0007
ΔGGR(-1)	0.8009	0.2027	3.9513	0.0019
ΔINFR	-0.0394	0.0778	-0.5056	0.6223
ΔINFR(-1)	0.5407	0.1259	4.2935	0.0010
ΔAPOP	0.1294	0.7735	0.1673	0.8699
ΔAPOP(-1)	-2.0342	0.9244	-2.2006	0.0481
ΔYLR	0.5400	0.1583	3.4118	0.0052
ECT(-1)*	-0.6012	0.0838	-7.1758	0.0000

Source: Extracts from E-Views

Table 5 presents the long- and short-run ARDL estimates, which show a statistically significant, positive impact of FDI (1.3603, P=0.0054) on youth unemployment in the long run. This implies that a 1%-point rise in FDI leads

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to approximately 1.36 % rise in youth unemployment. Such findings do not correspond to what was anticipated a priori but given the pattern of large inflows of foreign direct investment into South Africa and subsequent outflows, it is possible to observe them because foreign direct investment may not lead to job creation after it leaves the country. This clearly shows that increases in FDI do not create sufficient jobs to reduce youth unemployment in South Africa. The finding differs from Khobai et al. (2017), who found that increases in FDI significantly generate employment in South Africa's manufacturing and services sectors. The findings of this study seem to suggest that a larger share of FDI flows into capital-intensive industries, such as South African mining, financial, and telecommunications, which generate little employment for unskilled youth. It is equally evident from the result that FPI also rises alongside rising youth unemployment. This is expected because we examined these variables as net flows and accounted for their inflows and outflows. The data show large outflows that may have neutralised the positive impact of these capital sources on job creation in South Africa.

It is also evident from the table that, while the unemployment-reducing impact of GFCF (-0.3258, P = 0.8598) is insignificant in the long run. This seems counterintuitive, but it is common in time-series applications where GFCF can be collinear with other regressors or crowd out more employment-generating investment. This finding is at variance with the theoretical expectation that GFCF, particularly in labour-intensive sectors such as construction, retail, and light manufacturing, generates more direct employment for young workers than foreign capital (Bhorat et al., 2020). On the other hand, GGR (-4.6118, P = 0.0001) and INFR (-1.0547, P = 0.0022) have negative and statistically significant impacts on youth unemployment in South Africa. This shows that the rates of economic growth and inflation have the long-run potential to substantially reduce youth unemployment in South Africa, which is consistent with Okun (1962) and Phillips (1958), respectively. Buthelezi (2023) equally finds inflation useful in taming the unemployment menace in South Africa. As expected, APOP (0.6690, P=0.0341) has a positive, statistically significant impact on youth unemployment, indicating that as the active population in South Africa rises, so does youth unemployment. This is consistent with the law of supply, especially when labour supply exceeds demand. It is equally evident that YLR (0.0311, P=0.9438) has an increasing impact on youth unemployment; although the relationship is not significant, it suggests that basic education may not necessarily lead to job opportunities for South African youths.

In the short run (Panel B), ΔYUNE exhibits mean reversion, with the current period's level of youth unemployment negatively correlated with the previous period's level, as shown by the lagged coefficient of -0.5365 (P=0.0032). This is plausible in models of unemployment or cyclical output. Both ΔLGFCF and ΔLGFCF(-1) are large and significant (10.13 and 12.13), indicating that capital formation does have a significant short-run effect on reducing youth unemployment in the study area. Contemporaneously, ΔGGR is negative (-0.59), while the lag is positive (0.80), suggesting that, even in the short run, economic growth rate is a significant factor in reducing the youth unemployment rate. Also, in the short run, the relationships between lagged inflation and inflation rates are ΔINFR (-0.0394, P=0.6223) and ΔINFR(-1) (0.5407, P=0.0010), suggesting that, contrary to the long-run results, inflation does not have the capacity to drive down youth unemployment in South Africa. Again, in the short run, YLR is significant but is not so in the long run, indicating cyclical, not structural, youth labour effects (ΔYLR = 0.5400, P=0.0052). The error correction factor is negative and statistically highly significant, ECT(-1) [-0.6012, P = 0.0000]. This confirms the existence of a long-run cointegrating relationship and shows rapid convergence to equilibrium in the event of any temporary disequilibrium among the model's variables at 60% per period.

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3.5 Model Diagnostics (ARDL)

To ensure the results are not spurious, we estimate post-diagnostic tests to verify whether our model meets the necessary goodness-of-fit criteria.

Table 6. Summary of ARDL Model Diagnostic Tests

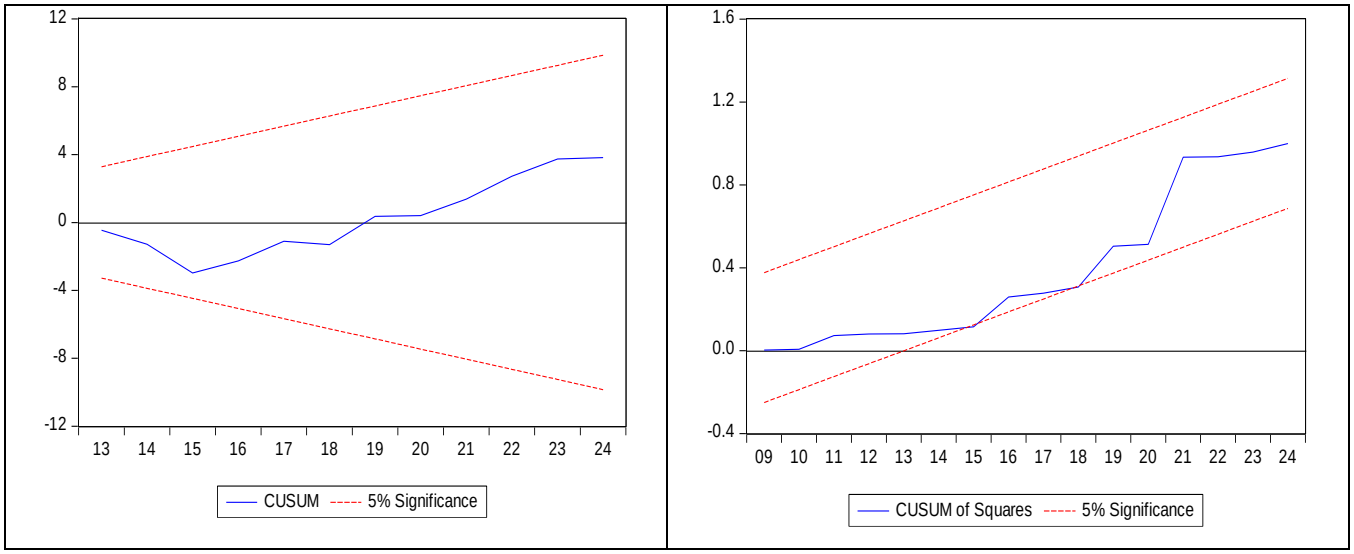
Diagnostic Test	Value/ P-values	Decision
R-squared	0.8957	R-square of 89.57% indicate the model's high predictive power.
Adj. R-squared	0.8298	
Durbin-Watson stat	2.2285	This approximates to 2, indicating no autocorrelation.
Breusch-Godfrey LM (χ^2)	0.9749 (0.4104)	Based on the P-value (0.4140 >0.05), there is no serial correlation
Breusch-Pagan-Godfrey	0.2361 (0.9975)	Based on the P-value (0.9975 >0.05), there is no heteroscedasticity
Ramsey RESET (F)	4.6756 (0.0535)	Given the P-value (0.9975 >0.05), the correct specification

Source: Extracts from E-Views Output

Note: P-values are in parentheses for diagnostic tests, and the P-values greater than the 0.05 threshold level are preferred for all diagnostic tests.

Furthermore, to ensure that the model is structurally stable, we conducted the tests of cumulative sums (CUSUMS) and cumulative sums of squares (CUSUM Squares).

Figure 3. CUSUM and CUSUM of Squares



Source: Extract from E-views Output

Figure 3 is a combination of two measures of the stability of residuals. The left-hand side of Figure 3 represents the cumulative sum (CUSUM) of recursive residuals, and on the right is the CUSUM of Squares. While the former measures the structural stability of the models, the latter tests the stability of the variance of residuals, both at 5% level of significance. The middle non-straight lines on either side run the sum of residuals over time, and they are the CUSUM and CUSUM of squares line. This shows that all the lines remain inside the CUSUM and CUSUM of squares limits for the entire sample time. Thus, the model's coefficients are stable, and error variance remains consistent over time. This is significant because it provides validation of the accuracy and reliability of long-run and short-run coefficient estimates from the ARDL and Bounds testing framework.

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3.6 NARDL Asymmetric Estimate

Table 7 presents the NARDL estimates, which account for asymmetric effects of FDI on youth unemployment in South Africa. The NARDL estimates were derived from the ARDL results, so they follow the same variable choice and order, as well as the optimal lag length.

Table 7. NARDL Long-Run Asymmetric Estimates (Dependent Variable: YUNE)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PANEL A: LONG-RUN ESTIMATES				
LFDI_POS	1.0869	0.7260	1.4971	0.1727
LFDI_NEG	-1.2148	1.3824	-0.8788	0.4052
LFPI	0.1193	0.0371	3.2152	0.0123
LGFCF	8.7216	3.1205	2.7949	0.0234
GGR	-5.1231	0.8147	-6.2886	0.0002
INFR	-1.5284	0.4654	-3.2838	0.0111
APOP	-3.2612	1.4751	-2.2109	0.0580
YLR	0.3957	0.7557	0.5236	0.6147
PANEL B: SHORT-RUN ESTIMATES				
ΔYUNE(-1)	-0.5354	0.1283	-4.1739	0.0031
ΔLFDI_POS	0.9525	0.2193	4.3431	0.0025
ΔLFDI_NEG	0.6689	0.1950	3.4310	0.0089
ΔLFDI_NEG(-1)	1.0642	0.2449	4.3451	0.0025
ΔLFPI	-0.0180	0.0087	-2.0613	0.0732
ΔLFPI(-1)	-0.0718	0.0150	-4.7797	0.0014
ΔLGFCF	17.5046	4.0972	4.2724	0.0027
ΔLGFCF(-1)	11.9600	3.7827	3.1617	0.0134
ΔGGR	-0.5703	0.1190	-4.7932	0.0014
ΔGGR(-1)	0.8742	0.1804	4.8467	0.0013
ΔINFR	-0.0470	0.0729	-0.6448	0.5371
ΔINFR(-1)	0.7112	0.1341	5.3102	0.0007
ΔYLR	0.5978	0.1400	4.2685	0.0027
ΔYLR(-1)	0.5012	0.1760	2.8477	0.0216
ECT(-1)*	-0.5558	0.0636	-8.7328	0.0000

Source: Extract from E-views Output

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. FDI^+ and FDI^- denote positive and negative partial sum decompositions, respectively.

From Table 7, LFDI_POS (1.0869, P=0.1727), in the long run, positive FDI shocks have no significant impact. This is a radical change from linear. The negative FDI shock (LFDI_NEG, -1.2148, P=0.4052) is also long-run insignificant. This implies that increases or decreases in FDI have no statistically discernible long-term impact with asymmetry. This means the apparent linear impact was concealing the partial impacts on both sides of the equation. Equally, LFPI (0.1193, P = 0.0123) is slightly stronger than the linear model estimate (0.085) and positive and significant.

In the NARDL, however, GFCF (8.7216, P=0.0234) is large and significantly positive in the long run, but not in the linear model. This indicates that the relationship between FDI and GFCF was likely linear and should be separated from the ARDL to observe the long-run impact of domestic capital formation. Both economic growth rate and inflation rate remain negative and statistically significant [GGR (-5.1231, P=0.0002) and INFR (-1.5284, P=0.0111)]. This shows that the two variables are significant instruments necessary for tackling youth unemployment in South Africa. For APOP (-3.2612, P=0.0580), the sign reverses relative to the linear model (was

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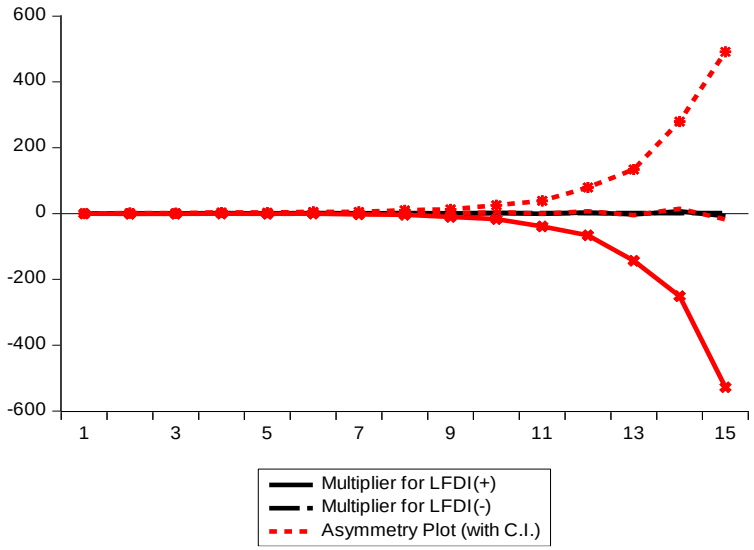
+0.669, but in NARDL it is -3.261). This is a minor sign reversal, as the positive effect of the demographic component of the linear model might be artefactual, due to the symmetric treatment of FDI associated with population dynamics.

In the short run, ΔLFDI_POS (0.9525, P=0.0025) and ΔLFDI_NEG (0.6689, P=0.0089) are significant, but their magnitudes differ (0.95 against 0.67). This is the main asymmetry result. Positive FDI shocks have a larger effect in the short run than negative shocks, which can be explained by irreversibility and sunk-cost theory (Dixit & Pindyck, 1994), implying that investors entering have a larger effect than those leaving. The lagged effect of a negative FDI shock is also strong (1.06, P = 0.0025), indicating that the impact of FDI outflows is magnified over time, which can be explained by disrupted supply chains, knowledge loss, and contagion effects. However, the model's convergence speed is slightly slower than the linear model's (55.6% against 60.1%), indicating that, for correct modelling of asymmetries, the time required to restore equilibrium is slightly longer.

In summary, the ARDL's significant positive FDI effect (1.36) disappears when the NARDL separates positive and negative partial sums. This is not contradictory; it is the theoretical motivation for NARDL (Shin, Yu & Greenwood-Nimmo, 2014). The symmetric estimator relaxes the assumption that the pass-through of capital inflows and outflows is structurally equal. From an economic perspective, FDI entry is associated with technology transfer, job creation, and backward linkages, while FDI exit is associated with sudden capital outflows, supply chain disruptions, and confidence shocks. These are mechanically different processes and will be averaged out.

3.7 Dynamic Multiplier Analysis

Figure 4. Dynamic Asymmetric Multiplier Graph



Source: Extract from E-views Output

Figure 4 is a Nonlinear ARDL (NARDL) asymmetry plot, showing the cumulative dynamic multipliers of positive and negative changes in an FDI variable (LFDI) on youth unemployment in South Africa. The solid black line LFDI(+) represents the cumulative effect of FDI increases on youth unemployment, and the dashed black line (LFDI(-) represents the cumulative effect of FDI decreases on youth unemployment. The dashed red line represents the asymmetry plot, which shows the difference between the two multipliers (with confidence interval)

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The Short run (periods 1-11) has produced near-zero effects. It can be observed that both multipliers hover close to zero in early periods, suggesting that FDI changes (whether positive or negative) have little immediate impact on youth unemployment in the short run. However, in the long run (periods 12-15), divergence and strong asymmetry emerge. LFDI(+) trends downward, indicating that FDI inflows *reduce* youth unemployment over time, consistent with expectations of job creation. Also, LFDI(-) trends sharply upward, indicating that FDI outflows/declines increase youth unemployment by a larger magnitude. The gap between the two lines is also large, thereby confirming the presence of significant asymmetry. The asymmetry plot (red dashed) diverges sharply, and the confidence interval widens dramatically after period 11, and the asymmetry line moves strongly negative. This implies that the negative shock is statistically and economically larger than the positive shock. This is the visual confirmation of asymmetry.

In a strict economic sense, FDI withdrawals significantly hurt youth unemployment in South Africa, whereas FDI inflows help it. This is consistent with the postulation of Dixit and Pindyck (1994) who find that investors entering carry larger structural effects (job creation, infrastructure, training, supply chains) that take time to unwind. On their exit from the country, the breakage of such linkages results in increased levels of youth unemployment, because it will take time for the new entrants to be in a position to offer employment opportunities due to their lack of the same level of skills as those who held them before. This aligns with South Africa's vulnerability structure of South Africa, which includes labour market inflexibility and limited absorptive capacity.

4. Conclusion and Policy Recommendations

4.1 Conclusion

The present study analyzed the relationship between foreign investment flows and youth unemployment in South Africa for the time horizon 1991 to 2024 using both the linear ARDL and nonlinear ARDL (NARDL) estimation approaches. The main goal was to go beyond traditional symmetric modelling assumptions and to fully account for the different effects of inflows and outflows of FDI on the South African youth labour market. The results of the bounds cointegration test showed that there is a long-run equilibrium relationship among youth unemployment, FDI, FPI, GDP growth rate, inflation, active population and youth literacy rate, with the error correction speed of adjustment in the linear model at 60% per period and in the NARDL model at 55.6%. The linear ARDL results showed a counterintuitive positive and statistically significant long-run relationship between FDI and youth unemployment, indicating that FDI inflows have not generated significant youth employment. This is also reflective of the structural composition of South Africa's investment portfolio, which has a relatively small share of investments in sectors that are less capital-intensive and which tend to employ unskilled youth. The youth unemployment rate is positively and significantly associated with FPI, indicating that speculative capital flows and net outflows affect real economic activity and employment opportunities. The long-run results of the linear model yielded no statistically significant results for domestic investment (GFCF), whereas the NARDL model produced a large, statistically significant result, suggesting that collinearity between FDI and domestic investment might obscure its significance in the symmetric model. Results from the negative, statistically significant relationships between the GDP growth rate and youth unemployment, and between the inflation rate and youth unemployment, in both the ARDL and NARDL, confirm Okun's Law and the Phillips curve in the South African context.

The NARDL asymmetric estimates offered more comprehensive and detailed information. In the short term, both positive and negative FDI shocks had an important impact, but the positive shock had a larger impact (0.95) than the negative (0.67). But in the long run, neither the positive nor the negative impact of FDI was statistically significant, and thus the overall linear impact of FDI was a statistical artefact arising from the addition of asymmetric partial impacts. The results were corroborated by the dynamic multiplier analysis, which revealed that FDI withdrawals have a significantly larger negative impact on youth unemployment in the long run than FDI

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inflows have a positive impact. This is a further indication of the structural vulnerability of the South African youth labour market to FDI withdrawals. To confirm the fitness of the ARDL model, certain diagnostic tests were used to show that the model did not suffer serial correlation, heteroscedasticity, or misspecification, while the CUSUM and CUSUM of Squares tests confirmed the structural stability of the ARDL model's parameters over the sample period.

To sum up, the results show that the current sectoral mix of FDI is insufficient to address youth unemployment in South Africa. These are all explained by the asymmetric nature of its effects, the destabilising effect of speculative portfolio flows, the dominance of capital-intensive investment, and the structural mismatches in the youth labour market. The evidence is overwhelming that it is essential to create a new policy paradigm that focuses on investing in labour to reduce youth unemployment, deepening domestic capital, achieving strong economic growth, and structural reform of education and skills provision to match demand.

4.2 Policy Recommendations

South Africa should shift its FDI approach from high-capital-expenditure sectors such as mining and oil, to labour-intensive sectors such as manufacturing, agro-processing, construction and the green economy, which can be boosted through transparent, well-designed incentive packages from investment promotion bodies such as InvestSA to combat youth unemployment.

There is a need to increase domestic capital formation (GFCF). Public-private investment in infrastructure, such as roads, electricity, and broadband, would boost demand and create direct employment opportunities for young people. Broad GDP growth is the most effective tool in the fight against youth unemployment and must be a main policy priority.

The Reserve Bank must increase the effectiveness of its macro-prudential policies to reduce the volatility of foreign portfolio investments, including maintaining adequate foreign exchange reserves, building local capital markets, and implementing countercyclical fiscal policies to protect jobs from the effects of foreign portfolio investments.

There is a need for drastic changes in the education system. The enduring gap between the reading and writing proficiency of youth and the skills profile required in the labour market requires changes to the curriculum, additional workplace programmes, and an increased number of learnerships and apprenticeships in growth sectors. Labour market reforms must also be flexible while maintaining strong protections for workers, such as increased youth wage subsidies and eased entry barriers for young job seekers via phased employment contracts.

Maintaining the inflation rate within the Reserve Bank's 3%–6% target range is necessary to ensure investor confidence, safeguard the capacity to generate jobs, and protect real wages. Lastly, with the increase in the youth population and the creation of more jobs being created than required, it is imperative that active employment programmes, such as the Presidential Youth Employment Initiative, be scaled up to effectively absorb the youth population.

Limitations of the Study

This study suffers from a few limitations; for instance, not all factors affecting unemployment, such as institutional quality and sectoral FDI inflows, were considered, and the study period was relatively short. This was due to data availability; nevertheless, major variables intended to influence unemployment were used, and the methodology adopted is appropriate for short time-series data.

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