JEBI

Journal of Economics and Business Issues

Analyzing the Relationship between Balance of Trade and Unemployment in the South African Economy

Gideon F van Rhyn [1], Mike Muzekenyi [2,*]

[1] Engineer1; gideonvr@foskor.co.za
[2] Manager: Institute for postgraduate Studies; Mikem@stadio.co.za
* Correspondence: Mikem@stadio.ac.za; Tel.: +27 76 5546644

Abstract: This study examines the relationship between the Balance of Trade (BOT) and unemployment in South Africa from 2002 to 2022 aiming to assess whether the BOT positively or negatively affects employment. The increasing openness of trade in a global context and discussions surrounding free and open international trade have sparked numerous studies and debates in recent years. Current trends suggest that governments engage in trade agreements to foster international relationships, often underestimating their potential negative effects on domestic economies. This study aims to investigate and analyze the impact of the balance of trade on employment within the South African economy. Utilizing time-series data from the first quarter of 2002 to the fourth quarter of 2022, the research examines the relationship through unit root tests, stationary tests, multiple-breakpoint tests, an ARDL model, ECM, and residual and stability diagnostic tests using EViews software. The findings quantitatively confirm a significant direct linear relationship between BOT and unemployment in South Africa. Consequently, to enhance employment opportunities, stakeholders in both the private and public sectors must tackle the challenges associated with trade and unemployment, with the study offering several recommendations to revitalize the country's economic prospects.

Keywords: keyword 1; Balance of Trade, Employment, Absolute Advantage, South Africa

1. Introduction

The theory of absolute advantage posits that a nation should specialize in producing goods or services in which it holds an absolute advantage while importing those in which it has an absolute disadvantage. However, despite increases in both exports and imports over recent years, South Africa has witnessed a troubling rise in unemployment (3, 1). As reported by the World Economic (4), a thriving economy typically leads to improved living standards, underscoring the crucial role that employment plays in this pursuit. In the first quarter of 2022, South Africa recorded an alarming unemployment rate of 35.3 percent, the highest globally (16). This crisis highlights the urgent need to investigate the factors contributing to such high unemployment, particularly the nation's heavy dependence on imported consumer goods, which hampers growth across various sectors and reduces local job opportunities (1).

The ongoing global discussions regarding trade openness have prompted numerous studies showcasing its potential economic benefits. Literature indicates that international trade can enhance economic growth through economies of scale, foreign knowledge access, market expansion, and increased competition. In January 2024, the South African Revenue Service (SARS) reported a trade deficit of R9.4 billion, with imports outstripping exports (2); imports rose by 2.5 percent while exports fell by 12.8 percent month-on-month. Trade deficits can adversely impact a nation's gross domestic product (GDP), inflate unemployment rates, escalate exchange rates, and contribute to higher inflation and interest rates. Given the recent surge in unemployment, which reached 32.1 percent in the fourth quarter of 2023 (4) and youth unemployment hitting 44.3 percent, understanding these underlying causes is more critical than ever. This study aims to explore the influence of South Africa's BOT on employment, addressing the under-researched impacts of rising imports, and enhancing the broader understanding of the country's economic dynamics.

Citation: Rhyn, G. F. & Muzekenyi, M. (**2025)** Analyzing the Relationship between Balance of Trade and Unemployment in the South African Economy**,** *Journal of Economics and Business Issues, 5(2)*, 44-53.

Received: 12/03/2025
Accepted: 25/07/2025
Published: 31/07/2025

2. Literature Review

The BOT plays a critical role in shaping the economic landscape of nations, influencing employment levels and overall economic health. Understanding the dynamics between trade policies, imports, and local job opportunities is essential for addressing high unemployment rates, particularly in vulnerable economies like South Africa. This literature review examines the existing research on BOT and its impact on employment, highlighting gaps in knowledge and the need for further exploration in this vital area. The first section covers theoretical followed by empirical underpinnings.

2.1. Theoretical Framework

The foundation of modern international trade theory originates from Adam Smith, who introduced the concept of absolute advantage in his influential work published in 1776. This theory contradicts the mercantilist perspective, which argued that a nation's wealth and power were dependent on maintaining a trade surplus by maximizing exports and minimizing imports (Maglio, 2024). Instead, Smith championed the idea of free trade, suggesting that countries should specialize in producing goods and services where they possess a relative advantage while importing those that others can produce more efficiently. This shift in perspective highlighted the significance of maximizing profit over mere trade volume, resonating with industrialists and policymakers. Smith's theory posits that, similar to individuals, countries have unique talents and resource endowments that shape their productivity strengths (5). By concentrating on sectors where they hold an absolute advantage, nations can boost their overall economic output and efficiency, leading to mutual benefits from trade. Trade's advantages manifest as firms gain access to larger markets, producing economies of scale and stimulating entrepreneurial innovation. However, while Smith's theory presents a hopeful outlook on trade's role in driving economic growth and employment, it acknowledges potential drawbacks, such as the risk of relying excessively on imports, which can jeopardize domestic industries and cause job losses, particularly in sectors unable to compete with cheaper foreign products (6). Therefore, grasping the implications of the Balance of Trade (BOT) is essential, as it significantly influences economic growth and employment levels. Smith's insights provide relevant context for this study, underscoring the necessity of investigating the relationship between BOT and employment dynamics, which is elaborated on in the following sections.

2.2. Gross Domestic Product

Gross Domestic Product is a fundamental measure of national economic performance and is defined as the total monetary value of final goods and services produced within a country's borders during a specified time (6). The growth or decline in GDP serves as a critical indicator of a nation's economic health and prosperity. In South Africa, GDP is analyzed across ten distinct sectors, which include agriculture, mining, manufacturing, and services, among others (4). Each sector's performance contributes uniquely to the overall economic landscape. Changes in GDP are often employed to assess economic growth, calculated as a percentage change in the value of all final goods and services produced over time (7). A robust GDP growth rate is typically associated with increased employment opportunities, as businesses expand and hire more workers to meet rising demand. Conversely, sluggish GDP growth can precipitate higher unemployment rates, as firms may retrench employees in response to declining revenue. The relationship between GDP and employment is further complicated by various external and internal factors, including trade policies, economic shocks, and shifts in consumer behavior.

2.3. Balance of Trade

The Balance of Trade represents the monetary value difference between a country's exports and imports over a specified period and serves as a critical measure of a nation's trade performance (8). A positive balance, or trade surplus, indicates that a country exports more than it imports, which is generally viewed as favorable for economic health. Conversely, a trade deficit, where imports exceed exports, raises concerns about sustainability and reliance on foreign goods. The theoretical perspective suggests that a trade surplus can foster economic growth by enhancing foreign currency inflows, enabling investment in domestic industries (8). In contrast, persistent trade deficits can undermine local production capacity, erode job opportunities, and lead to economic vulnerabilities, such as reduced foreign exchange reserves. Thus, understanding the dynamics of BOT is crucial for policymakers aiming to stimulate economic growth and manage employment levels effectively. A country's BOT intricately interacts with its GDP, shaping economic outcomes and influencing public policy decisions.

2.4. Unemployment

Unemployment is a significant economic indicator that reflects the health of a country's labor market and is defined as the condition in which individuals actively seek employment but cannot find work (Hayes, 2024). It is not merely a reflection of job availability but also an essential measure of economic performance. Unemployment is classified into various categories: frictional, cyclical, structural, and institutional. Each type of unemployment arises from different causes and has varying implications for the economy. Frictional unemployment, for instance, is short-term and occurs when individuals voluntarily leave their jobs to seek other opportunities. In contrast, cyclical unemployment links directly to the economic cycle, rising during downturns and declining in periods of growth. Structural unemployment occurs due to technological changes or shifts in industry demand, leading to a mismatch between workers' skills and available jobs. Institutional unemployment arises from government policies and labor market regulations that can create barriers to employment. Analyzing unemployment trends provides crucial insights into economic health and the effectiveness of policies aimed at boosting employment.

2.6. Relationship Between GDP and BOT

In examining the interplay between GDP and the balance of trade, various studies have demonstrated differing perspectives and outcomes across different economic contexts. (10) conducted a comprehensive study on 28 European Union countries, revealing a positive relationship between the trade balance and economic growth. This study, analyzing data from 1998 to 2018, highlighted how a deteriorating trade balance negatively impacted the economic growth of these countries. The research concluded that international trade fosters economic growth by enhancing capital formation, transforming industrial structures, and improving both technological and institutional advancements (10). The findings further emphasize that sustainable economic growth hinges on revenues generated from exports to finance, increasing imports, reinforcing the necessity for a balanced trade approach.

(11) focused their research on the Sri Lankan economy, examining the determinants of BOT. The study underscored the significant role that GDP, import volumes, and inflation rates play in shaping the trade balance, whereas exchange rates did not appear to exert a notable influence. The authors identified Sri Lanka's reliance on imports, specifically consumer goods compromising local production capabilities and, consequently, economic growth. The research also indicated that policies aimed at reducing dependency on imports through market liberalization and domestic production strengthening were essential for improving the trade balance and fostering economic growth.

(12) explored the trade policies of the United States and their impact on BOT and GDP growth, particularly considering the North American Free Trade Agreement (NAFTA). The study found a negative correlation between a rising trade balance and GDP growth, suggesting that increased trade deficits negatively affected economic performance. Coupet's findings emphasize the importance of strategic trade policies in managing the balance of trade to foster economic growth, recommending a closer examination of future agreements to ensure they align with domestic economic goals.

2.7. Relationship Between GDP and Unemployment

The interplay between GDP growth and unemployment has been extensively studied, revealing complex dynamics. (4) investigated the impact of the manufacturing sector on GDP and employment rates in South Africa. The study found that while the manufacturing industry traditionally serves as a significant contributor to economic growth and job creation, its performance has waned over the last two decades. Citing factors such as high import duties, power supply issues, and political instability, Mc Camel concluded that bolstering the manufacturing sector could revitalize both GDP growth and employment rates. Recommendations included enhancing trade laws to protect domestic industries and investing in renewable energy to ensure stable electricity supply.

On a broader scale, (13) analyzed the relationship between entrepreneurship, income, and unemployment in South Africa. Their findings suggested that while the country experiences high per capita GDP growth, unemployment persists at alarming levels. The study illuminated how entrepreneurship initiatives are crucial in addressing joblessness. However, it also noted the obstacles posed by a weak skills base, inefficient regulations, and high transaction costs, urging policy reforms to facilitate an environment conducive to entrepreneurship and employment growth. Further research by (15) examined the agricultural sector's contribution to GDP and employment, suggesting that agriculture plays a vital role in developing economies. As agricultural productivity improves, it creates a foundation for manufacturing and industrial growth, thereby stimulating job

creation. The study highlighted that while agricultural employment may decline with industrialization, its productivity gains remain fundamental to overall economic health.

2.8. Relationship Between Unemployment and BOT

The relationship between unemployment and the Balance of Trade (BOT) has garnered significant attention in empirical literature, yielding diverse findings. (9) investigated the impact of trade openness on unemployment rates in Kenya, concluding that while trade can improve resource allocation and stimulate economic activity, it often exacerbates unemployment as domestic industries face heightened competition from abroad. This study emphasized the necessity for collaboration between government and industry to equip local job seekers with skills relevant to a rapidly evolving global market.

(2) explored the negative correlation between trade openness and unemployment across various income levels and found that trade frequently results in job losses in particular sectors, thereby contributing to rising unemployment. While trade can create opportunities in certain industries, the overall impact tends to disadvantage vulnerable labor markets, especially in developing countries. In contrast, (6) analyzed China's trade expansion, noting that while the nation created millions of new jobs through its export-maximizing trade policies, traditional sectors like agriculture suffered job losses. Jiang highlighted the importance of balancing trade liberalization with policies aimed at protecting and transitioning affected workers into new opportunities. Additionally, (17) focused on the European context, revealing that increased imports from China negatively impacted unemployment in the EU's manufacturing sector, as domestic firms reduced their workforce in response to foreign competition. These findings underscore the complex interactions between GDP, BOT, and unemployment, illustrating that while trade can drive economic growth, its effects on employment can be detrimental, particularly for vulnerable sectors. The subsequent section will outline the methodology employed in this study.

3. Materials and Methods

This study analyzes the link between trade and employment and its impact on the South African economy, focusing on BOT and the unemployment rate. It aims to collect and assess data to identify the causal relationship between these factors. The study employs a defined set of variables to assess the effect of the balance of trade on unemployment. Table 1.1 presents all the variables utilized in the study, accompanied by an explanation of the dependent and independent variables.

Table 1. Variables Specification

Denotations	Variable Specifications
EG	Economic growth (GDP growth rate)
BOT	Balance of trade (export-imports relationship)
UNEMP	Unemployment rate (proxy for employment)
FDI	Foreign direct investments
GDPpc	GDP per capita

The study includes four independent variables: BOT (balance of trade), EG (economic growth), FDI (foreign direct investment), and GDP per capita. While the focus is on the relationship between BOT and GDP concerning unemployment (UNEMP), FDI and GDP per capita are also considered due to their potential short- and long-term impacts on UNEMP. Actual data values were sourced for all variables in the study. The study employs a dynamic model to assess the balance of trade's impact on South Africa's unemployment rate over a specific period, building on Adekunle's (2016) econometric model that examined trade's effect on unemployment across 20 countries. This model allows for testing whether changes in explanatory variables at time lead to immediate changes in the dependent variable at the same time.

The econometric model for analyzing the impact of trade on unemployment, as outlined by (18), is presented below:

$$UNEMP_t = \beta_0+\beta_1 BOT_t+ \beta_2 EG_t+\beta_3 GDPpc_t+\beta_4 FDI_t+ \varepsilon_t \quad \ldots\ldots(1)$$

When analyzing time series data, addressing the effects of outliers and calculating elasticity coefficients can be accomplished through logarithmic transformation. Equation 3.3 illustrates the empirical econometric model that will be employed in this study:

$$LnUNEMP_t = \beta_0+\beta_1 LnBOT_t+ \beta_2 LnEG_t+ \beta_3 LnGDPpc_t+ \beta_2 LnFDI_t+ \varepsilon_t \ldots\ldots(2)$$

This study highlights the critical need for using stationary data to prevent spurious results when examining the relationship between the Balance of Trade (BOT) and unemployment. To verify that the data is stationary, several statistical tests will be employed, including the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, along with the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test. The ADF and PP tests evaluate unit roots, while the KPSS test directly assesses stationarity, providing a comprehensive method to confirm the data's statistical properties before further analysis. Additionally, to explore long-term relationships among non-stationary data series, the study applies the Autoregressive Distributed Lag (ARDL) model (19), which can accommodate variables that are stationary in different forms (I(0) or I(1)). The ARDL framework enables the testing of cointegration among the variables and the assessment of both long-run and short-run dynamics. To ensure the reliability and stability of the model's estimates, model diagnostic tests including assessments for residual normality, serial correlation, and heteroscedasticity will be conducted. Furthermore, stability diagnostic tests such as CUSUM and CUSUMSQ will provide additional validation of the persistence of the model parameters over time.

4. Results

4.1. Descriptive Statistics of the Variables

Descriptive statistics summarize the key features of a dataset (9), and the main methods used in this study are outlined in Table 2. The means in the first row show the average values of each variable for the selected period, while the standard deviation in the fourth row indicates variability around the mean. Skewness in the fifth row reveals the shape of variable distributions, with positive skewness indicating a long right tail and negative skewness a long-left tail. Additionally, row six presents kurtosis measurements, which assess the peakedness of distributions, and the seventh and eighth rows display the Jarque-Bera statistics, testing for normal distribution in the dataset.

Table 2. Estimated Descriptive Statistics Results

	UNEMP	BOT	EG	GDPpc	FDI
Mean	0.269	7 130.577	0.006	0.068	18 089.89
Maximum	0.353	52 700	0.137	0.109	562 000
Minimum	0.215	-10 700	-0.17	0.028	-13 900
Std. Dev	0.032	12 728.650	0.025	0.024	61 539.01
Skewness	0.955	1.821	-2.367	-0.021	8.364
Kurtosis	3.369	6.468	37.223	1.767	74.421
Jarque-Bera	13.243	88.503	4 177.685	5.326	18 832.520
Probability	0.001	0	0	0.07	0
Observations	84	84	84	84	84

The study's analysis of variables using the Jarque-Bera test indicates that the UNEMP has a JB statistic of 13.243 and a p-value of 0.001, suggesting non-normality due to skewness (0.955) and kurtosis (3.369). The BOT has a JB statistic of 88.503 and a p-value of 0.000, also indicating strong non-normal distribution with notable skewness (1.821) and high kurtosis (6.468). EG exhibits an exceptional JB statistic of 4,177.685 and a p-value of 0.000, reflecting significant deviations from normality, supported by high kurtosis (37.223) and negative skewness (-2.367). Conversely, GDPpc has a moderate JB statistic of 5.326 and a p-value of 0.070, suggesting it may approximately follow a normal distribution. In contrast, FDI shows a remarkably high JB statistic of 18,832.520 and a p-value of 0.000, indicating strong non-normality with extreme skewness (8.364) and kurtosis (74.421). Overall, UNEMP, BOT, EG, and FDI display significant deviations from normality, while GDPpc may be nearly normal, suggesting that transformations, such as natural logarithms, are necessary to address skewness in further modeling and analyses. The data was also tested for unit root using ADF and the results are presented in the following subsection.

4.2. Unit root and correlation results

A stationary time series exhibits constant serial correlation over time. Unit root tests, correct t-statistics non-parametrically to handle structural breaks and undefined correlations. To minimize variations in the data and accurately assess growth rates, the study transforms the dataset into natural logarithmic (Ln) form. The results are presented in Table 3.

Table 3. Augmented Dickey-Fuller Unit Roots Results

Variables	At Level I(0)				At 1st Difference I(1)		Results (order of integration)
	Without trend		With trend		Without trend		
	T-statistics	P-value	T-statistics	P-value	T-statistics	P-value	
LnUNEMP	-1.039	0.736	-1.945	0.622	-13.323	0 **	I(1)
LnBOT	-2.457	0.130	-3.041	0.128	-21.833	0 **	I(1)
LnEG	-10.631	0 **	-----	-----	-----	-----	I(0)
LnGDPpc	-2.835	0.058	-1.308	0.879	-11.295	0 **	I(1)
LnFDI	-8.847	0 **	-----	-----	-----	-----	I(0)

(**) The rejection of the null hypothesis of not stationary at the 1% significance level
(*) The rejection of the null hypothesis of not stationary at the 5% significance level

The ADF unit root test results reveal that some variables are stationary at level while others require differencing to achieve stationarity. For the LnUNEMP, the T-statistic is -1.039 with a p-value of 0.736 at I(0), indicating non-stationarity, but becomes stationary at first difference with a T-statistic of -13.323 and p-value of 0.000 at I(1). Similarly, the LnBOT has a T-statistic of -2.457 and p-value of 0.13 at I(0), also non-stationary, while at I(1), it shows a T-statistic of -21.833 and a p-value of 0.000, confirming stationarity. The LnEG is already stationary at level with a T-statistic of -10.631 and p-value of 0.000. The LnGDPpc shows a T-statistic of -2.835 and p-value of 0.058 at I(0) but becomes stationary at first difference with a T-statistic of -11.295 and p-value of 0.000 at I(1). The LnFDI is stationary at level with a T-statistic of -8.847 and a p-value of 0.000. Consequently, since each variable has shown either I(0) or I(1) stationarity, the null hypothesis of unit roots in all variables cannot be rejected. Additionally, the PP unit root test is expected to align with these ADF results, given their similar methodologies. The following section presents correlation Matrix results.

4.3. Correlation Matrix Results

The estimated correlation results for all the variables under this study in the form of correlation coefficients, including their corresponding p-values, are presented in Table 4.

Table 4. Estimated Correlation Matrix Results

Variables	LnUNEMP	LnBOT	LnEG	LnGDPpc	LnFDI
LnUNEMP	1				
LnBOT	0.478	1			
	0.000 **	-----			
LnEG	0.157	-0.16	1		
	0.155	0.147	-----		
LnGDPpc	0.268	0.329	-0.095	1	
	0.014 *	0.002 **	0.390	-----	
LnFDI	0.106	-0.025	-0.125	0.136	1
	0.335	0.819	0.256	0.218	-----

(**) P-value significant at a 1% significance level
(*) P-value significant at a 5% significance level

The correlation coefficients presented in Table 4 provide a quantitative measure of the relationships among the study's variables. A coefficient of 0 indicates no relationship, while values between -1 and +1 reflect varying strengths of linear relationships: negative coefficients denote

inverse relationships, while positive coefficients indicate direct relationships. Coefficients closer to -1 or +1 suggest stronger inverse or direct relationships, respectively. In this study, the variables analyzed include LnUNEMP, LnBOT, LnEG, LnGDPpc, and LnFDI, with UNEMP as the dependent variable. The table shows positive correlations of 0.478 with BOT, 0.157 with EG, 0.268 with GDPpc, and 0.106 with FDI, signifying direct relationships. Notably, BOT is significant at the 1% level, and GDPpc is significant at the 5% level, while EG and FDI do not meet significance thresholds below 10%. Overall, the findings indicate direct linear relationships between UNEMP and the other variables, with only BOT and GDPpc showing statistically significant correlations, thus reinforcing the argument of a meaningful relationship between unemployment, balance of trade, and GDP per capita within the South African economy. Furthermore, the results highlight a strong positive correlation between BOT and GDPpc, addressing gaps in prior research by establishing a statistically significant connection among these variables. The following section presents cointegration and vector error correction results.

4.4. Cointegration test & Vector error correction results

The unit root and stationarity tests in section ii reveal that study variables are a mix of I(0) and I(1) integration orders, with none being stationary at I(2). This allows for the use of the ARDL test approach for cointegration to assess the long-run impact of the Balance of Trade on employment in South Africa. Following this, the VEC results will be reported and interpreted to analyze the short-run effects. First, lag order selection results are presented followed by ARDL model results.

a) Optimal Lag Order

Before proceeding with the ARDL estimation, it is essential to determine the optimal lag order. The maximum number of lags for the ARDL model was established using the VAR Lag Order Selection Criteria, with the results detailed in Table 5, which presents the lag orders calculated by various information criteria.

Table 5. Optimal Lag Order: ARDL Model

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-181.133	NA	7.22E-05	4.653325	4.802202	4.713014
1	199.5401	704.2453	9.94E-09	-4.238503	-3.345243*	-3.880369
2	239.1006	68.24184	6.96e-09*	-4.602515*	-2.964872	-3.945937*
3	248.2788	14.68519	1.05E-08	-4.206971	-1.824944	-3.251948
4	286.197	55.92935*	7.90E-09	-4.529926	-1.403516	-3.276459

* Indicate**s** lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The results for the lag order estimation confirm that the criteria selected four lags. Four lags for VAR were used as the maximum number of lags in the ARDL model, regressing the selected dependent variables under study on unemployment. The following section presents ARDL test results.

b) ARDL Test Results: Long Impact on Unemployment

This section employs the ARDL test approach to cointegration to evaluate the long-run impact of the Balance of Trade on Unemployment in the South African economy. The ARDL test results, including the lower and upper bounds along with the corresponding F-value, are presented in Table 6.

Table 6. Estimated ARDL Model tests Results

ARDL Model	**Estimated F-value**	
ARDL Model (1,1,0,0,1)	40.97	
	Critical Value Bounds	
Significance levels	**Lower Bound I(0)**	**Upper Bound I(1)**
10%	3.03	4.06
5%	3.47	4.57
1%	4.4	5.72
Note: critical values from Pesaran et al. (2001); Table CI (V)		
Long-run Equation: LUNEMP = -2.6584 + 0.0329*LBOT - 0.2725*LEG - 1.1608*LGDPpc +0.0116*LFDI		

Table 6 reveals that the estimated F-value for the ARDL model is 40.97, surpassing the critical value bounds at the 1 percent significance level, which leads to the rejection of the null hypothesis of no long-run impact and confirms the existence of cointegration. Thus, the variables under study BOT, EG, GDPpc, and FDI all have a long-run impact on UNEMP in South Africa. Specifically, BOT and FDI exhibit positive long-run impacts, with a 1 percent increase in BOT associated with a 0.033 percent rise in UNEMP and a 1 percent increase in FDI linked to a 0.012 percent rise in UNEMP. Surprisingly, the FDI impact contradicts expectations, likely due to the adverse effects of the COVID-19 pandemic, which resulted in significant job losses despite receiving substantial FDI. Conversely, EG and GDPpc negatively influence UNEMP, with a 1 percent increase in EG decreasing UNEMP by 0.273 percent and a 1 percent increase in GDPpc reducing it by 1.161 percent, indicating that economic production and overall welfare significantly influence unemployment trends in the region. The VEC model results are presented below.

c) VEC Model Results: Short-run Impact on Unemployment

This section presents the short-run impact analyzed using the VEC model, following the long-run results from the ARDL model. As noted by (16), the VEC model assesses the speed of adjustment for observed variables to return to long-run equilibrium, with Table 7 detailing the VEC model results from the ARDL analysis.

Table 7. Estimated ECM Results

ARDL Model (1,1,0,0,1)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LnUNEMP(-1))	-0.496155	0.055561	-8.929904	0
D(LnBOT(-1))	0.016318	0.006275	2.600692	0.0112*
D(LnEG)	-0.135199	0.010444	12.94486	0**
D(LnGDPpc)	-0.575932	0.079133	-7.278031	0**
D(LnFDI(-1))	0.005763	0.004392	1.31221	0.1935
ECT(-1)	-0.496155	0.033766	-14.69388	0**
(**) denotes significance at 1% level				
(*) denotes significance at 5% level				

The estimated ECT coefficient in Table 7 is negative and significant at the 1 percent level, indicating that the speed of adjustment back to long-run equilibrium among the observed variables can be assessed. With an ECT value of -0.496, it suggests that it takes approximately two quarters, or six months, for unemployment to return to long-run equilibrium following any changes in BOT, EG, GDPpc, and FDI, allowing for the calculation of the short-run impact on unemployment for each variable. The following section presents model diagnostic test results.

d) Model Diagnostic test results

This section presents and interprets the results of the residual and stability diagnostic tests to ensure that the findings from the ARDL test and VEC model in the previous section are reliable and not spurious. Table 8 displays the residual diagnostic test results for the ARDL model.

Table 8. Estimated ECM Results

Residual Diagnostic Tests	ARDL Model (1,1,0,0,1)	
	P-value	**Decision**
Normality Test	0.9035*	Do not reject H_0
Serial Correlation Test	0.7857*	Do not reject H_0
Heteroscedasticity Test	0.3115*	Do not reject H_0

(*) Fail to reject the null hypothesis at 1% and 5% significance levels

All three tests Normality, Serial Correlation, and Heteroscedasticity failed to reject the null hypothesis, indicating that the variables in the ARDL model are not affected by non-normal distribution, serial correlation, or heteroscedasticity. This suggests that the results produced by the ARDL model are valid and not spurious or misleading.

5. Discussion

To address this econometric objective, both the correlation matrix and ARDL model results presented in Sections i, ii and iii, were utilized. The correlation matrix quantitatively assessed the strength of the relationship between the BOT and UNEMP, revealing a correlation coefficient of 0.478. This value signifies a substantial direct linear relationship, given that coefficients closer to -1 or +1 indicate strong inverse or direct associations. The results support. The significance of this correlation is reinforced by a p-value below the 1% threshold. Additionally, the ARDL model results established that BOT exerts a long-run positive impact on UNEMP, with a 1% increase in BOT leading to a 0.033% rise in unemployment. Furthermore, the VEC model analysis suggests that it takes approximately 62 quarters for UNEMP to return to long-run equilibrium after any change in BOT. Overall, the findings confirm a positive long- and short-run relationship between BOT and UNEMP in South Africa from 2002 to 2022. The results support (18) who argued that trade assists in the obtainability of production factors such as capital, technology, labour, and human capital across the global markets, which impacts various economic levels and trade benefits. There are adverse effects that result from free trade, such as closing infant industries since they cannot compete fully with well-founded firms from other developed countries. The results also support (18), who concluded that trade had the potential to decrease unemployment in specific industries and democratic areas but could not conclude that trade influences the unemployment level in a country significantly. Moreso, (17) conducted a study on the European Union and how China's exports impacted European jobs and revealed found that the increased susceptibility to Chinese imports caused a higher rate of workers to flow from employment to unemployment and a reduced probability of unemployed landing employment.

6. Conclusion And Recommendation

This study comprehensively examined the impact of the BOT on UNEMP in South Africa from 2002 to 2022, rooted in Adam Smith's theory of absolute advantage, which emphasizes trade as essential for economic development. The empirical literature review confirmed that BOT is a significant economic variable, especially in developing countries, and the econometric analysis revealed a substantial direct linear relationship between BOT and UNEMP, indicating that changes in the trade balance directly influence unemployment rates. The findings also highlighted the long- and short-run impacts of GDP per capita on UNEMP, illustrating the interconnectedness of economic growth and employment levels. To achieve sustainable economic growth, the study recommends that South Africa reduce its reliance on imported finished goods while boosting production of raw materials and capital goods, prioritize sectors such as agriculture, manufacturing, and mining for their labor absorption potential, invest in advanced foreign technologies to enhance local productivity, promote technology education to meet the demands of a technology-driven economy, and address entrepreneurial challenges among the unemployed. Finally, the government must resolve inefficiencies in state-owned enterprises to foster a conducive environment for industry growth and attract foreign investments. Collectively, these insights underscore the critical role of BOT in shaping employment outcomes in South Africa and provide a roadmap for policymakers aiming to enhance the nation's economic stability and improve citizens' livelihoods.

Author Contributions: Gideon F. van Rhyn conducted the research for this dissertation under the supervision of Dr. Mike Muzekenyi. Dr. Muzekenyi subsequently adapted the dissertation into this article.

Funding: This research received no external funding.

Data Availability Statement: The data can be provided upon request.

Acknowledgments: We gratefully acknowledge the support received from several sources. Milpark education provided invaluable administrative assistance, STADIO Higher Education supplied essential technical support in the form of publication fees. His combined support was instrumental in ensuring the successful completion of the research.

Conflicts of Interest: The authors declare no conflict of interest

References

1. Nkamba, X., Niyimbanira, F. & Nishimwe-niyimbanira, R., 2023. Effect of Monetary Policy on Unemployment in South Africa: An Econometric Approach. Journal of Public and Administration, 58(3-1), pp. 63-71.
2. World Economic Forum, 2025. Why can improving living standards stimulate growth. [Online] Available at: https://www.weforum.org/stories/2025/01/improving-living-standards-stimulate-growth/ [Accessed 6 January 2025].
3. Khalid, W., 2021. The Relationship Between Unemployment and Economic Growth in South Africa: VAR Analysis. Forman Journal of Economic Studies, 17(1), pp. 1-32.
4. Statistics South Africa, 2024. Quarterly Labor Force Survey (QLFS) – Q4: 2023. [Online] Available from: https://www.statssa.gov.za/publications/P0211/Media%20release%20QLFS%20Q4%202023.pdf [Accessed: 2024-04-28]
5. Smith, M., 2023. Adam Smith on Growth and Economic Development. History of Economics Review, 86(1), pp. 2-15.
6. Tsoulfidis, L., 2024. Adam Smith's Wealth of Nations. In: Competing Schools of Economic Thought. Cham: Pringer, pp. 39-75.
7. Chen, Y., Subhan, M., Ahmad, G. & Adil, M., 2024. Unveiling the linkages among digital technology, economic growth, and carbon emissions: A resource management perspective. Resources Policy, 91(10).
8. Cizakca, M., 2024. Understanding the Determinants of Foreign Trade Volume in Turkiye: An Empirical Analysis. Journal of Business and Economic option, 7(1), pp. 19-28.
9. Hayes, A. 2024. What is unemployment? Causes, Types, and Measurement. [Online] Available from: https://www.investopedia.com/terms/u/unemployment.asp#:~:text=The%20term%20unemployment%20refers%20to,unemployment%20is%20the%20unemployment%20rate. [Accessed: 2024-04-20]
10. 10. Blavasciunaite, D., Garsviene, L. & Matuzeviciute, K. 2020. Trade Balance Effects on Economic Growth: Evidence from European Union Countries. [Online] Available from: https://www.mdpi.com/2227-7099/8/3/54 [Accessed: 2024-02-08]
11. Weerasinghe, E. & Perera, T.R. 2019. Determinants of Balance of trade in the Sri Lankan Economy. [Online] Available from: https://www.researchgate.net/profile/tissa-ravinda-perera/publication/354170540_determinants_of_balance_of_trade_in_the_sri_lankan_economy/links/60bf8e3d92851cecf1656130/determinants-of-balance-of-trade-in-the-sri-lankan-economy.pdf [Accessed: 2024-02-08]
12. Coupet, E. 2020. What's the Big Deal about a Trade Deficit?: A VECM Analysis of Causality of U.S. Economic Growth and its Trade Balance. [Online] Available from: https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=146211883&site=ehost-live [Accessed: 2024-02-22
13. Mahadea, D. & Kaseeram, I. 2018. The Relationship between Unemployment, Entrepreneurship, Rising Income in South Africa: An Exploratory Study. [Online] Available from:https://web.p.ebscohost.com/ehost/viewarticle/render?data=dgjymppp44rp2%2fdv0%2bnjisfk5ie46a9krqawsrkk63nn5kx95ux-xjl6oruqxpbbiskqesrintfkwp55zy5zyit%2fk8xnh6ueh7n%2fivbkpr0yvqlnnponnflva41c2qujpt6phslpcq0zg2efftq2zskurtnqwp69o49m3tro28h3i3%2fe%2b6tfsf7vb7d7i2lt68t6kjn%2fdu1nmnn%2bgu6exsq%2bqsuy3pqr%2b7ejrefkz5i3q4vj99uoa&vid=80&sid=de884d79-c05f-4bcc-8750-58b2116ec965@redis [Accessed: 2024-02-23]
14. Arendonk, A. v., 2015. The development of the share of agriculture in GDP and employment. [Online] Available at: https://edepot.wur.nl/342795 [Accessed 2 March 2025].
15. Aghelmaleki, H., Bachmann, R. & Stiebale, J. 2022. The China Shock, Employment Protection, and European Jobs. [Online] Available from: https://web.p.ebscohost.com/ehost/viewarticle/render?data=dgjymppp44rp2%2fdv0%2bnjisfk5ie46a9krqawsrkk63nn5kx95ux-xjl6oruqxpbbiskqesrintfkwp55zy5zyit%2fk8xnh6ueh7n%2fivbkpr0yvqlnnponnflva41c2qujpt6phslpcq0zg2efftq2zskurtnqwp69o49m3tro28h3i3%2fe%2b6tfsf7vb7d7i2lt68t6kjn%2fdu1nmnn%2bgu6ezulaste2vrqr%2b7ejrefkz5i3q4vj99uoa&vid=74&sid=de884d79-c05f-4bcc-8750-58b2116ec965@redis [Accessed: 2024-02-23]
16. Adekunle, S.B. 2016. The Impact of Trade on Unemployment. [Online] Available from :http://i-rep.emu.edu.tr:8080/xmlui/handle/11129/3037 [Accessed: 2024-02-10]
17. Kripfgaz, S. & Schneider, D., 2023. ARDL: Estimating autoregressive distributed lag and equilibrium correction models. The Stata Journal: Promoting communications on statistics and Stata, 23(4), pp. 983-1019.
18. 20. Kirema, P.K. 2019. Effects Of Trade Openness on Unemployment Rate In Kenya. [Online] Available from: http://erepository.uonbi.ac.ke/handle/11295/109381 [Accessed: 2024-02-10]