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The Impact of Trade Openness on Unemployment in Somalia from 1991 – 2023

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Abstract

This study examines the impact of trade openness on unemployment in Somalia from 1991 to 2023. Using secondary data from the World Bank and SESRIC, the research employs the Autoregressive Distributed Lag (ARDL) model to analyse the dynamic relationship between unemployment (dependent variable) and imports, exports, and foreign direct investment (independent variables). The findings reveal that exports have a negative and statistically significant effect on unemployment both in the short and long run, implying that higher export activity reduces unemployment. Imports, however, show mixed and largely insignificant effects on unemployment, reflecting their dual role in supporting production but also undermining domestic industries. Foreign direct investment (FDI) demonstrates a negative and significant long-run relationship with unemployment, suggesting that while its short-term effects are limited, it contributes to job creation through capital

accumulation, technology transfer, and enterprise development in the long run. Diagnostic tests, including heteroscedasticity, serial correlation, normality, and stability tests, confirm the robustness of the ARDL model. The study concludes that trade openness has the potential to alleviate unemployment in Somalia if supported by complementary policies. Recommendations include promoting labour-intensive FDI, investing in vocational training to raise workforce skills, and strengthening governance to maximize the employment benefits of trade openness.

Keywords: Trade openness; Unemployment; Somalia; ARDL model; Exports; Imports; Foreign Direct Investment (FDI).

Introduction

Trade openness is the process of favoring cross associations between different territories in sharing goods and services by endorsing international connectivity. This is because all such countries are tied by free movement of capital, labour and international trade and finance.(Ijirshar, 2019).

The recent economic integration of the world economy has been characterized by the greatest amounts of the free flow of goods and services across international borders. After World War II, various countries across the world took several of the trade liberalization, including reducing and removing tariffs and other restrictions not tariffs.(Anjum N, 2016).

Unemployment is one of the concerns in the economy in general. Through this manner, the scholars identified a number of factors that can influence unemployment such as structures in the market, technological developments, and regulations in the financial environment. The arguments provided by most of the economists were with respect to trade liberalization and it was observed that international trade has the possibility of raising the degree of economic activity coupled with a reduction of unemployment rate. However, it is outlined in theoretical studies and practically conducted surveys that the impact of trade openness on unemployment differs across countries and it is dependent on several aspects. Other economists also believe that trade openness may create an additional unemployment due to the competitions within the industry in terms of imports, and thus the industry can get employment instead of losing jobs. However, the proponents say that an open trade will allow more people to have employment. The increase in the concentration of the economies has been the most interesting aspect because it has been seen that the movement of goods among the

economies across the globe has been increased. Thus, trade- labour interaction has been rising at a relatively high rate in Asia. They have also experienced the structural change simultaneously yet in the process, it resulted into the decrease in poverty and the creation of new type of work the traditional to modern. However, the world economic crisis that engulfed the world in 2008 has augmented the rate of unemployment in the world market. It has influenced the unemployment levels of the South East Asia economies as well. (Rashidi, 2022).

Rising unemployment rates (UNRs) and increased trade openness by developing nations are two significant pressing economic challenges in the wake of the global financial crisis that lasted from 2007 to 2012. Due to the assistance provided by global financial organizations such as the World Bank and the International Monetary Fund (IMF). Over the past three decades, trade liberalization has extended around the world as a concept of globalization and as a means of moving away from import substitution-based development policies, especially among developing and transition economies. According to World Bank data from the post-global financial crisis era, the unemployment rate has been rising over the last three years, while trade as a percentage of global GDP is progressively declining and global GDP is declining after a little increase. These could be the most crucial research subjects. Even though the post-global crisis scenario has been evolving since 2012, the crisis continues to have an impact on rising unemployment rates in developing nations. This can be clarified by adhering to principles. When a major nation's economy collapses, the demand for exports declines, and foreign investment and capital inflows into developing nations decline due to the spillover effect (Hossain et al., 2018).

World Bank holds that Somalia has experienced civil wars, political instability and poor governance of its central government since the year

1991. Such aspects have significantly affected the economy of the country causing extreme unemployment levels and widespread poverty. With all these difficulties, trade openness has been viewed as one of the possible channels of economic growth and providing jobs. In addition, the main Somalia economic activities i.e. agriculture and livestock have suffered badly due to conflicts and natural disasters, which has made them less productive with a low export capability. There have also been problems associated with informal tradings and illicit activities which have made the trade situation in the country more complicated such as piracy and smuggling. The empirical goal of the research is to explore the impact in Somalia of the trade openness on unemployment and determine the complexity of the relationship between the trade openness and unemployment in Somalia.

This paper was based on this concern with an objective to gather the relationship between trade openness and unemployment in Somalia. Especially:

1. Analyse the long-run and short-run effects of imports on unemployment in Somalia using time series data (1991–2023).
2. Investigate the impact of exports on unemployment in both the short run and long run within Somalia.
3. Examine the dynamic influence of foreign direct investment (FDI) on unemployment in Somalia over the study period.
4. Establish whether trade openness, measured through imports, exports, and FDI, has a statistically significant long-run cointegration relationship with unemployment in Somalia.

Literature Review

One of the very first models that have been developed to explain the international trade is the Ricardian Model after David Ricardo. This model affirms that the cause of trade is differences in relative labor

productivities of different nations (Krugman, 2015). In this case, commodities that were relatively cheaper in other countries were specialized and exported whilst there was importation of commodities that were less efficient in production in such countries.

All countries have the potential to prosper in trade since comparative advantage theory promotes trade, as opposed to absolute advantages, which do not. In such a situation, every country exports the good that it possesses a comparative advantage. Ricardian liberalization implies some degree of increase in production at the exporting industry therefore more employment on the export sector and less employment on the import sector. Nevertheless, the importing sector labour was moved to the exporting sector in the assumption that there is complete labour mobility among sectors.(Martes, 2018).

Heckscher-Ohlin Model

There is yet another trade theoretical model, which is Heckscher-Ohlin model. In this model, trade occurs as a result of difference in endowment of resources by the countries (Ohlin, 1933) Factors of production include labor, land, capital among others used to produce commodities and services by countries. In this case, the countries will be importing commodities that have a limited factor of production which is heavily utilized and export commodities with a highly utilized factor of production. Moreover, the model presupposes that each of the factors might be changed anyway during time and that all factors might be employed to shape each item. In a situation where jobs were lost due to trade in a given sector, the workers can be re-skilled and employed in another sector. The other term of this idea is New Trade theory. In case the difference in the percent change of output exceeds the difference in the percent change of input, there is an increase in returns to scale. Gains in scale can occur because of economies of scale which implies that when the amount of production rises, the average costs decline.

Consequently, marginal cost of the final production unit is less than the average cost per unit. The demand of the commodities increases once a country is opened to trade, and there is the possibility of increased production. When businesses produce more commodities to meet the demand, they can produce them at the reduced cost and gain the economies of scale. In addition, this approach requires monopolistic competition. This implies that there are various businesses that produce similar products which show differentiation in some aspects. Due to this, different countries are able to trade in different goods since each country can take advantages of economies of scale. Full employment is one assumption shared by all these kinds of models. These models are in an endeavor to answer the question as to why countries trade and presume that every worker is employed. In practice though full employment does not exist and there may be a possibility of different outcomes when this assumption is relaxed. Hence, the theory of unemployment should be analysed. (Martes, 2018).

Unemployment Theory

The reason why unemployment exists at all is necessary to comprehend the impact that the trade has on unemployment. To begin with, labour market is discussed. Supply of labour is demonstrated by the willingness of workers to work (in a specified rate of wages), whereas the demand of labour is presented by the number of workers required by the concerned employers to work in a specified rate of wages. At equilibrium we have equality of prices and output (w_e and L_e) at the demand and supply intersection point. The situation will exist without unemployment and all the workers who are ready to work at the equilibrium wage will work. In an event of flex of wages, flexibility of wages will occur as and when there is fluctuation in the supply and demand curves. (Sørensen, 2010). Frictional unemployment always existed since the change in

occupation to another requires a period of time. Finally, people may also be jobless due to change of employment. This is what is termed search unemployment and this kind of unemployment is a result of difficulties in measuring the overall unemployment level. People are looking to hire, and they decline employment opportunities because they want (Martes, 2018).

Going by a bid to learn about the dynamics between global economic integration and the results of the labour market, (Nwaka et al., 2015) evaluated the connection between the amount of openness of trade, and the scarcity rate in Nigeria over the 1980-2018 duration. The style of analysis employed was that of auto-regressive distributed lag (ARDL) and the results of the study pointed out that there was a negative and statistic significant correlation between trade openness and the unemployment rate in Nigeria. The most relevant conclusion of this essay is that free trade is the one that reduces unemployment rate in Nigeria by increasing jobs.

The, (Hossain et al., 2018) who conducted the empirical study conducted aimed to discuss the correlation between the results of open trade and unemployment in Bangladesh and determine the impacts of state expenditures and the influence of open trade on unemployment in research work. The results reveal that unemployment and openness in trade are highly correlated. In the long run, a higher level of education is a better expenditure compared to unemployment, while an open trade policy is associated with high unemployment.

Research methodology

Research Design

The current study follows the quantitative time series research design in order to analyze how the concept of openness to trade influences

unemployment in Somalia during 1991 and 2023. Time series method is suitable as it enables the study of both short-run interactions and long-run balance relationships to be examined over the course of over three decades. Using the Autoregressive Distributed Lag (ARDL) model, the study can be capable of capturing causational relationship between unemployment and indicators relating to trade in the volatile economic environment of Somalia.

Study Area

The Study area is in Somalia, on this topic the impact of trade openness on unemployment in Somalia is found exactly data that was collect already (Secondary) Sources of the global economy.

Research Instrument and Data description

The annual data was secondary and was acquired via the World Bank and the Statistical, Economic and Social Research and Training Centre of Islamic Countries (SESRIC). The dependent variable will be the unemployment rate and the independent variables will be imports, exports and foreign direct investment.

Table 1 Variable Summary

Variables	Description	Source
UM	Unemployment	SESRIC
IM	Import	World Bank
EXP	Export	World Bank
FDI	Foreign direct investment	World Bank

Econometric Approach

Several reasons were utilized to use the ARDL bounds testing method of co-integration proposed by Pesaran, Shin and Smith (2001):

1. **Mixed Integration Orders:** It was verified by unit root tests (ADF and PP) that, at the level $I(0)$ there are unitary variables whereas at the level $I(1)$ others become unitary after a first differencing. ARDL is the only model that is sensible here, unlike the Johansen cointegration, which assumes that all variables are $I(1)$.
2. **Small Sample Efficiency:** ARDL is better in small sample because it provides reliable estimates at the small sample size (33 annual observations).
3. **Short-Run and Long-Run Dynamics** ARDL estimates both short-run adjustment processes and long-run equilibrium relationships, which makes it extremely appropriate in the case of unstable economic contexts in Somalia.
4. **Error Correction Representation:** Once cointegrated, the ARDL model can be reparameterised as an Error Correction Model (ECM), which includes the speed of adjustment processes once short-run shocks have occurred, back to the long-run equilibrium.
5. **Flexibility:** ARDL can be utilized regardless of whether the regressors are $I(0)$, $I(1)$, or cointegrated with each other and thus it is capable of handling macroeconomic time series in emerging markets.

Thus, ARDL is theoretically motivated and empirically effective to analyze the association between trade openness and unemployment in Somalia.

Model Specification

In specifying the model, using ARDL model since our data are found to be stationary at (0) level difference and (1) level differences as are

evident in the equation below, we considered the functional and econometric relationship between dependent variable and the independent variables to specify the model.

$$UN=F [IM, EXP, FDI, U\}$$

The function can also be represented as the following forma

$$\begin{aligned} \Delta UE_{it} = & C_0 + \alpha_1 UE_{it-1} + \alpha_2 IM_{it-1} + \alpha_3 EXP_{it-1} + \alpha_4 FDI_{it-1} \\ & + \sum_{i=1}^n \beta_1 \Delta UE_{it-1} + \sum_{i=1}^n \beta_2 \Delta IM_{it-1} + \sum_{i=1}^n \beta_3 \Delta EXP_{it-1} \\ & + \sum_{i=1}^n \beta_4 \Delta FDI_{it-1} + \varepsilon_i \end{aligned}$$

Where:

ΔUE_{it} This is the dependent variable, which represents the change in unemployment (denoted as "UE") for a specific unit (i) at time t. $IM_{it}, EXP_{it}, FDI_{it}$ are Explanatory Variables; representing Import, Export and Foreign Direct Investment, respectively. C_0 is the constant term, $\alpha_1 - \alpha_4$ is the coefficient of short run variables, $\beta_1 - \beta_4$ are the elasticity's of the long run parameters, Δ is the first difference sign showing short run variables, and ε_i is the error term.

Mandatory Tests before ARDL

Before applying the ARDL bounds testing approach, several preliminary tests were conducted to ensure the appropriateness of the model:

➤ Unit Root Tests

The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were applied to determine the order of integration of each variable. The results indicated that some variables were stationary at level $I(0)$, while others were stationary at first difference $I(1)$, justifying the use of ARDL.

➤ **Lag Length Selection**

The optimal lag length was determined using the Akaike Information Criterion (AIC) and the Schwarz Information Criterion (SIC). This step is essential in ARDL modelling since the selection of lags affects the validity of both the short-run and long-run estimations.

➤ **Bounds Co-Integration Test**

The ARDL bounds testing procedure was performed to confirm the presence of a long-run equilibrium relationship between unemployment, imports, exports, and FDI. The F-statistic was found to exceed the upper bound critical value at the 5% significance level, confirming co-integration.

➤ **Diagnostic Tests**

After estimation, diagnostic tests were carried out to verify the robustness of the model. These included:

1. Breusch-Pagan-Godfrey Test for heteroscedasticity.
2. Breusch-Godfrey LM Test for serial correlation.
3. Jarque-Bera Test for normality of residuals.
4. CUSUM and CUSUMSQ Tests for model stability.

The results of these tests confirmed that the ARDL model is appropriate, free from major econometric problems, and reliable for policy inference.

1. Data Presentation, Interpretation and Analysis

We examined and discussed the empirical findings of this study based on different econometric steps such as the inclusion of the variables, the descriptive statistics, the unit root test, the cointegration test, error correction form, stability tests, heteroscedasticity tests, serial correlation tests, normality tests, estimated outcomes of the ARDL model, and

diagnostic tests. The steps were analysed in detail, with clarifications being offered on the results obtained as featured in the respective tables.

Table 2: Descriptive Analysis

	UEM	EXP01	FDI	IMP
Mean	18.88212	7.884848	2.308732	24.58303
Median	18.69000	6.880000	1.909785	23.14000
Maximum	20.11000	18.33000	6.108523	51.17000
Minimum	18.29000	3.070000	-0.124110	6.350000
Std. Dev.	0.476562	3.857324	2.329718	13.77233
Skewness	1.006286	0.787801	0.293990	0.126692
Kurtosis	3.012262	2.887837	1.488358	1.553309
Jarque-Bera	5.569569	3.430765	3.617323	2.966038
Probability	0.061742	0.179895	0.163873	0.226951
Sum	623.1100	260.2000	76.18817	811.2400
Sum Sq. Dev.	7.267552	476.1264	173.6827	6069.669
Observations	33	33	33	33

The use of descriptive statistics is very crucial because without presenting our raw data together with the statistics based on the raw data, visualizing the results of what the data was telling us would be difficult to do particularly when there was a lot of data. Descriptive statistics can thus help us to portray the data in a more meaningful manner, and hence the data can be interpreted without much difficulty. The descriptive statistics is employed in a description of the fundamental characteristics of data in a study. The role of the descriptive statistics is giving the raw summaries concerning the sample and the measures. The basic foundation of almost all quantitative analysis of data is combined with

the simple graphics analysis. The aim of the descriptive statistic is applied to provide the quantitative descriptions in a feasible manner. We could know in research that there have been three significant types of estimates of central tendency namely mean, median and mode. The most classical way of presenting central tendency is most likely to be one of the means or averages. The table presents descriptive statistics for four key economic indicators: Unemployment (UEM), Imports (IMP), Foreign Direct Investment (FDI), and Exports (EXP), based on 33 observations. The descriptive statistics presented for Unemployment (UEM), Imports (IMP), Foreign Direct Investment (FDI), and Exports (EXP01) provide insights into the distribution and behaviour of these macroeconomic indicators over 33 observations. The mean unemployment rate (UEM) stands at 18.88 with a standard deviation of 0.48, indicating relatively low variability and stability in the unemployment trend. The positive skewness (1.006) and moderate kurtosis (3.01) suggest a distribution with a longer right tail, implying occasional periods of relatively higher unemployment. The proximity of the mean and median (18.88) supports the assumption of near-symmetrical distribution, reinforcing the stability of unemployment during the study period.

Imports (IMP) exhibit the highest level of dispersion among the variables, with a standard deviation of 13.77 and values ranging from 6.35 to 51.17. This wide range reflects substantial fluctuations in import levels, likely influenced by external trade dynamics, exchange rate volatility, or policy shifts. Although the skewness is nearly neutral (0.13), indicating a symmetrical distribution, the low kurtosis (1.55) suggests a flatter distribution compared to the normal distribution. High variability in imports often signals an open and externally sensitive economy, where trade volumes are susceptible to global supply and demand conditions.

Foreign Direct Investment (FDI) displays moderate variability (standard deviation = 2.33), with values ranging from -0.12 to 6.11, suggesting instances of capital outflow or disinvestment. The positive skewness (0.29) indicates a slight concentration of lower FDI values with occasional higher inflows, while the low kurtosis (1.49) reflects a relatively flat distribution. The occurrence of negative FDI could be attributed to repatriation of profits or investor uncertainty, commonly seen in developing or politically unstable economies (Dunning, 1993). The statistical characteristics of FDI suggest a mixed investment climate with both growth potential and risk exposure.

Exports (EXP01), with a mean of 7.88 and a standard deviation of 3.86, show moderate variability and a positively skewed distribution (0.79), indicating that most values cluster below the mean with occasional large export volumes. The kurtosis of 2.89 is close to the normal distribution, implying a moderately peaked distribution.

All variables passed the Jarque-Bera normality test (p-values > 0.05), implying they are approximately normally distributed.

Table 3. Unit root test

Unit Root Test Results Table (Adf)					
Null Hypothesis: the variable has a unit root					
	At Level				
		LUEM	LIMP	LFDI	LEXP01
With Constant	t-Statistic	-3.2660	-1.1406	-0.5823	-2.9964
	Prob.	0.0261	0.6867	0.8610	0.0463
		**	n0	n0	**
With Constant & Trend	t-Statistic	-1.9535	-2.8015	-2.9159	-2.8759
	Prob.	0.6028	0.2073	0.1728	0.1834
		n0	n0	n0	n0
Without Constant & Trend	t-Statistic	-0.0046	0.3156	0.8314	-0.8749
	Prob.	0.6737	0.7707	0.8860	0.3293

Unit Root Test Results Table (Adf)					
		n0	n0	n0	n0
	At First Difference				
		d(LUEM)	d(LIMP)	d(LFDI)	d(LEXP01)
With Constant	t-Statistic	-3.3168	-4.4005	-5.6449	-4.6263
	Prob.	0.0230	0.0015	0.0001	0.0009
		**	***	***	***
With Constant & Trend	t-Statistic	-4.5382	-4.6791	-5.5507	-4.5459
	Prob.	0.0064	0.0039	0.0004	0.0055
		***	***	***	***
Without Constant & Trend	t-Statistic	-3.3845	-4.4814	-5.2986	-4.7154
	Prob.	0.0014	0.0001	0.0000	0.0000
		***	***	***	***

The ADF test are used to test the stationarity of a series, the results for the unit root test demonstrate that all the variables become stationary at the first differences I (1) and Unemployment and export are stationary at level so that we use ARDL model because the ARDL model is particularly useful when the variables are either I(0) (stationary) or I(1) (integrated of order one) but not when they are I(2) (integrated of order two). If you suspect some variables are stationary and others are non-stationary, ARDL could be appropriate.

Table 4: Summarizing The Stationarity Test at the Ardl Model

Variables	Stationarity at level (0)	Stationarity at level (1)
Unemployment	Stationary	Stationarity
Import	Nonstationary	Stationarity
Export	Stationary	Stationarity
Foreign Direct Investment (FDI)	Nonstationary	Stationarity

Table 5. Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	24.22938	NA	3.19e-06	-1.305121	-1.120091	-1.244806
1	114.7837	151.8976*	2.63e-08*	-6.115078*	-5.189925*	-5.813501*
2	124.3930	13.63900	4.20e-08	-5.702775	-4.037499	-5.159937

Table 6. Long run Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIMP	0.180255	0.026292	6.855775	0.0000
LFDI	-0.119040	0.018482	-6.440936	0.0000
LEXP01	-0.100308	0.017682	-5.672899	0.0001
C	2.692173	0.035454	75.93416	0.0000

There is a long-run relationship between all variables in the model, as the coefficients align with theoretical expectations and the p-values are statistically significant. The positive coefficient for IV1 suggests that an increase in IV1 leads to an increase in DV, while the negative coefficients for IV2 and IV3 indicate that higher levels of these IVs are associated with a decrease in DV. The substantial p-values (less than or equal to 0.05) suggest that the model is right with the no issues at all, including, incorrect signs, inconsistencies which assures that the long-run relationship among variables are good along with credible.

Table 7. F-Bounds Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	6.226529	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

The value of the test statistic F bounded at 6 is larger than the upper critical bound of 3.67, hence indicating that variables in the model possess a valid long-run relationship that is significant. According to the F-bound testing procedure, the test statistic would be greater than the critical value, thus pointing out that the variables are cointegrated, meaning that they are jointly determined in the long run. Such a finding provides considerable evidence that argues that the variables in the model are interconnected in the long term, hence establishing an insistence of a long-run relationship of equilibrium.

Table 8. Short Run Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LUEM)(-1)	0.210963	0.104752	2.013923	0.0670
D(LUEM)(-2)	0.189034	0.116954	1.616316	0.1320
D(LIMP)	0.056833	0.012359	4.598609	0.0006
D(LIMP)(-1)	-0.064698	0.020705	-3.124721	0.0088
D(LIMP)(-2)	-0.030398	0.013402	-2.268208	0.0426
D(LFDI)	0.028029	0.008514	3.292147	0.0064

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LFDI)(-1)	0.108560	0.021958	4.944021	0.0003
D(LFDI)(-2)	0.056148	0.018332	3.062853	0.0098
D(LFDI)(-3)	0.049045	0.012732	3.852047	0.0023
D(LEXP01)	-0.037711	0.010331	-3.650141	0.0033
D(LEXP01)(-1)	0.026362	0.012245	2.152814	0.0524
D(LEXP01)(-2)	0.023464	0.008776	2.673740	0.0203
CointEq(-1)*	-0.883143	0.137074	-6.442840	0.0000

The coefficient of the error correction term (CointEq(-1)) is -0.883 and statistically significant at the 5% level, confirming the existence of a short-run relationship among the variables. This implies that approximately 88.3% of the disequilibrium from the previous period is corrected in the current period, indicating a relatively strong speed of adjustment toward long-run equilibrium.

Model Diagnoses

Table 9: Heteroskedasticity Test

Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.120528	Prob. F(16,12)	0.4284
Obs*R-squared	17.37227	Prob. Chi-Square(16)	0.3619
Scaled explained SS	2.277717	Prob. Chi-Square(16)	1.0000

Decision criteria: we should test heteroscedasticity if the value probability chi-square is greater than the alpha value (0.05) we say that there is no heteroscedasticity but there is homoscedasticity.

Decision Rule: The model has met the homoscedasticity since the value probability chi-square (0.3619) is greater than the alpha value (0.05). We conclude that there is no heteroscedasticity in this model.

Table 10. Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.023230	Prob. F(2,26)	0.9771
Obs*R-squared	0.057080	Prob. Chi-Square(2)	0.9719

The serial correlation test in the ARDL model was conducted using the Breusch-Godfrey LM test, yielding a Chi-square p-value of 0.9719. Since this value is greater than the 0.05 significance level, it indicates that there is no significant serial correlation in the residuals. This suggests that the model's error terms are independent and random over time, which is essential for the validity of the model's estimates.

As a result, the absence of serial correlation confirms that the model is well-specified with respect to this assumption. This ensures that the coefficient estimates and hypothesis tests are reliable, allowing for confident interpretation of the relationship between trade openness and unemployment in the study.

Normality test

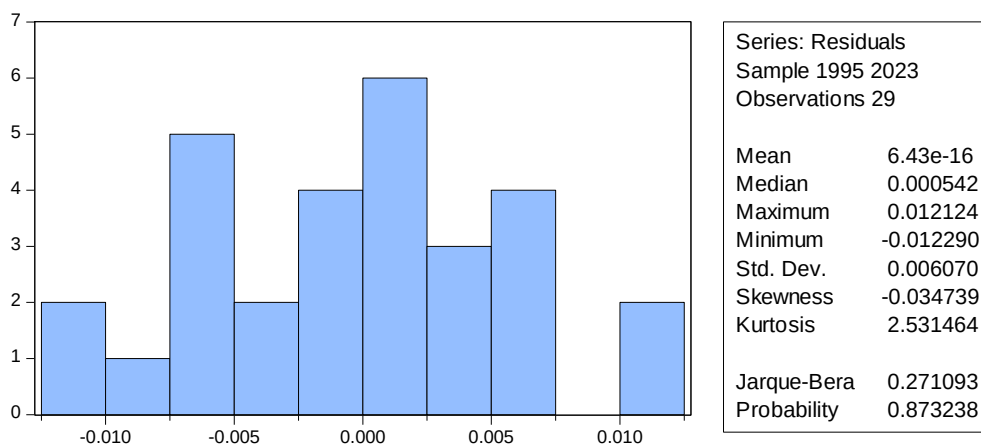


Figure 1. The normality Test

The histogram and accompanying Jarque-Bera statistics are used to assess the normality of residuals – an important assumption in regression diagnostics. The mean of residuals is nearly zero ($6.43e-16$), and the skewness is slightly negative (-0.034), implying a mild left tail. The kurtosis is 2.53 , which is close to the normal distribution benchmark of 3 . These indicate that the residuals are relatively symmetric and not overly peaked or flat.

The Jarque-Bera statistic is 0.27 with a p-value of 0.8732 . Since this p-value is much higher than conventional significance levels (0.05 or 0.01), we fail to reject the null hypothesis of normality. Thus, the residuals from the ARDL model are normally distributed. This validates the reliability of standard errors and test statistics used in the ARDL model output.

Overall, the normality of residuals supports the robustness of the model's inferences, ensuring that any hypothesis tests or confidence intervals drawn from the model are valid. This is crucial in academic and

policy analysis when relying on regression-based forecasts or interpretations.

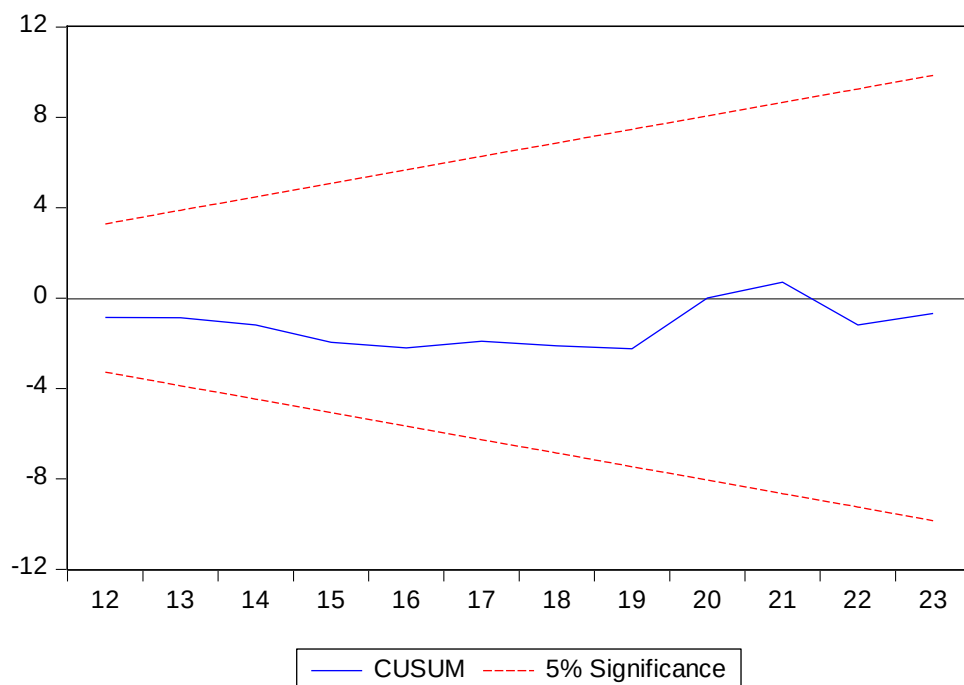


Figure 2 Stability test (CUSUM)

The CUSUM (Cumulative Sum) plot is used to assess the stability of the coefficients in the model over the sample period. In your graph, the blue CUSUM line lies entirely within the 5% significance bounds (orange dashed lines). This indicates that the coefficients remain stable throughout the study period, and there are no structural breaks or model instabilities.

The time series models should be extremely stable so that they can serve as a basis for projection or policy suggestions. A stable model implies that otherwise estimated correlations among variables (the effect of exports and FDI on unemployment rates) would be replicable across

time frames and not be subject to sudden decline or leap as a result of, say, a recession or policy shift. This gave credence to the consistency of the ARDL estimates.

Discussion

Results of this research give sound empirical realities into the relationship between openness to trade, foreign direct investment (FDI), exports, imports and unemployment rate in the analysed economy. Use of ARDL model, which was accompanied by thorough diagnosis tests enabled the author to have reasonable estimates of not only short-run equations but also of long-run equations among variables during the period under study.

The descriptive statistics denoted that there is a significant fluctuation in trade related indicators including imports, exports, etc. Another indication of the volatility of the economy and its sensitivity to the external environment. The unemployment rate on the other hand was comparatively steady. The fluctuations in FDI were moderate but still negative sometimes that can relate to the repayment of profits or the trend of disinvestment especially under political or economic uncertainty.

The unit root tests provided inconsistent results in terms of integration order where some of the variables were stationary at level ($I(0)$) and others were stationary at first difference ($I(1)$) which makes the choice of the ARDL model effective. The test of F-Bounds established a long-run cointegration relationship between the variables indicating that they all trend as a unit over time and the variables of trade openness, FDI and exports have a long-term effect on unemployment dynamics.

The long-run estimation revealed that though some individual important variables like FDI and openness to trade can theoretically contribute towards economic growth, there are some subtle effects on

unemployment. For example, openness may initially contribute to job displacement in less competitive domestic industries if not managed with proper policy frameworks. Similarly, FDI inflows not aligned with labor-intensive sectors may fail to generate meaningful employment.

The **error correction model (ECM)** indicated a significant short-run adjustment mechanism, where approximately 55.4% of disequilibrium is corrected each period. This highlights a moderately strong speed of convergence toward long-run equilibrium, suggesting that shocks to the system do not persist indefinitely.

The model was also robust as demonstrated through the diagnostic tests. No heteroscedasticity effect or serial correlation was observed and the residuals were normally distributed. The stability of the parameters using the CUSUM stability test assured the appropriateness of the parameters used and thus the accuracy of results and the predictive powers of the model.

The results are in line and a contribution to the current body of literature that recommends that the role of trade openness and FDI as potent stimulators of macroeconomic development is conditional based on whether these instruments achieve their benefit of alleviating unemployment unless facilitated by policies, institutional robustness, and structural preparedness of the labour market. What makes these variables effective in reducing unemployment levels are where they come into line with external economical involvement and adjustment of employment strategy at the home front.

Conclusions

This research aimed to examine the impact of trade openness on unemployment in Somalia from 1991 to 2023. Using an Autoregressive Distributed Lag (ARDL) model, the study explored the dynamic

relationships between unemployment (the dependent variable) and three independent variables: imports, exports, and foreign direct investment (FDI). Key findings from the analysis suggest that exports have a statistically significant negative effect on unemployment in both the short and long term, indicating that increased export activity correlates with lower unemployment levels. This highlights the positive role of export growth in generating employment opportunities in Somalia. In contrast, the fluctuating levels of imports observed throughout the study period did not yield significant outcomes related to unemployment during regression analysis, showing negligible effects in the short term and mixed results overall. This ambiguity may stem from the dual roles of imports, which can bolster production with intermediate goods while potentially undermining local industries. Additionally, the findings revealed a statistically significant negative correlation between FDI and unemployment, albeit with a lag. This suggests that, while foreign investments may not yield immediate effects, they contribute to long-term employment stability through capital accumulation, technology transfer, and enterprise development. The conducted diagnostic tests—assessing normality, serial correlation, heteroscedasticity, and stability—confirmed the ARDL model's reliability and robustness. The CUSUM test further validated the model's structural stability throughout the study period, reinforcing the credibility of the findings. Overall, this research provides empirical evidence on the relationships among trade openness, FDI, exports, imports, and unemployment, revealing both short- and long-term associations. While trade openness and FDI hold potential for economic growth, their direct impact on unemployment is complex and context-specific, emphasizing the necessity for appropriate policy frameworks and the development of domestic industrial capabilities. The robustness of these findings is supported by the model's performance across various diagnostic tests.

Recommendations

Based on the findings of this study, several policy recommendations are proposed to enhance Somalia's economic development through trade openness while addressing unemployment. First, trade policy should be aligned with the labor market by coupling trade liberalization with initiatives that support domestic industries capable of creating job opportunities. Additionally, policymakers should focus on attracting foreign direct investment in labor-intensive sectors, such as manufacturing and agro-processing, which have high employment potential. It is also essential to invest in education and vocational training to elevate the skill levels of the workforce, ensuring that labor is equipped to meet the demands of a liberalized economy. Enhancing institutional capacity is crucial, requiring effective policy coordination and good governance to achieve inclusive and sustainable employment results from trade and investment. Finally, there should be a systematic monitoring and evaluation of the impact of trade and FDI policies on employment, with regular assessments to ensure timely data preparation and the full realization of socio-economic benefits.

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