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## Article

# The role of macroeconomic factors in shaping employment trends in Somalia

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# The role of macroeconomic factors in shaping employment trends in Somalia

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## ABSTRACT

Somalia has one of the most severe unemployment rates globally, due to its economic instability. Our study focuses on the macroeconomic effects on employment using an ARDL model. The key macroeconomic variables examined are GDP, inflation, FDI, foreign aid, and population growth, with data sourced from the World Bank spanning 32 years, from 1991 to 2022. The study found that GDP positively affects employment in both the short and long run. Inflation shows a positive correlation with employment in the short run but a negative effect but insignificant in the long run. FDI has a positive effect in the long run and a negative, insignificant effect in the short run. Foreign aid positively impacts employment in both the short and long run, though the effect is not significant in the latter. The study recommends policies to sustain economic growth, manage population growth, stabilize prices, and improve aid management to enhance employment opportunities in Somalia.

## IMPACT STATEMENT

This research examines the macroeconomic determinants of employment in Somalia, focusing on the effects of economic growth, inflation, foreign direct investment (FDI), foreign aid, and population growth from 1991 to 2022. Using an ARDL model, the study provides both short-term and long-term insights into how these factors influence employment trends. The findings underscore the positive role of GDP growth and foreign aid in promoting employment, while highlighting the negative impact of rapid population growth on job creation. This work is significant as it offers targeted policy recommendations to address Somalia's unemployment challenges, emphasizing the need for sectoral diversification, improved governance of foreign aid, and strategies to stabilize FDI flows. The study provides a vital contribution to the limited literature on Somalia's employment dynamics and serves as a guide for policymakers working to foster sustainable economic growth and job creation.

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## Introduction

Employment is a key indicator of economic health, defined by the World Bank as the fraction of the population aged 15 and older that is employed (World Bank, 2024). However, global employment trends remain challenging, with the International Labour Organization (ILO) projecting a modest rise in unemployment for 2024, particularly in low-income countries where poverty and unemployment rates are persistently high (ILO, 2024). Africa's employment landscape has been shaped by uneven economic growth, driven by factors such as natural resource endowments, political stability, and infrastructure development (Adekunle et al., 2023). While Foreign Direct Investment (FDI) in Africa has increased, particularly in natural resources and telecommunications, its overall share of global FDI remains small due to challenges like political instability and regulatory uncertainties (Asiedu, 2002). Similarly, foreign aid plays a crucial role in funding development projects, but its impact on economic growth and employment is often mixed due to governance and corruption issues (Moyo, 2009). Inflation, which varies

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widely across African countries, is driven by factors like currency fluctuations and fiscal policies, often posing a challenge to economic stability in countries with weaker institutions (Fedelino & Ter-Minassian, 2009).

### ***Stylized facts on employment and macroeconomic variables***

Somalia, in particular, has faced significant economic challenges due to decades of political instability, conflict, and a lack of central governance following the collapse of the government in 1991 (Menkhaus, 2007, 2014). This instability has led to the disintegration of formal economic institutions, severely disrupting economic activities and employment opportunities. As of 2023, Somalia's unemployment rate stands at 19.19%, one of the highest globally, with the country struggling to create sufficient job opportunities, especially for its large youth population (UNDP, 2024; World Bank, 2023).

Somalia's economy is heavily reliant on agriculture, particularly livestock production, which makes up a significant portion of GDP. However, this sector is highly vulnerable to climate variability, including frequent droughts and erratic rainfall patterns that threaten food security and disrupt rural employment opportunities (Warsame et al., 2022). Despite these challenges, Somalia has seen modest economic growth in recent years, with GDP growth rates improving from 2.4% in 2022 to 3.7% in 2023, and further growth anticipated in 2024 with the completion of the debt relief process (African Development Bank Group, 2024).

Foreign direct investment (FDI) has also played a crucial role in Somalia's economic recovery. In 2022, Somalia attracted USD 4.9 billion in FDI, primarily in sectors such as agriculture, livestock, fishing, and hydrocarbons (Lloyds Bank, 2024). However, FDI remains volatile due to political instability and weak regulatory frameworks, making the business environment unpredictable. Additionally, Somalia ranks among the top recipients of foreign aid globally, with foreign aid financing two-thirds of the national budget (BTI, 2024). While foreign aid is essential for supporting key sectors like healthcare, education, and infrastructure, its impact on sustainable job creation has been limited, often undermined by governance challenges and inefficiencies (Moyo, 2009).

Inflation has been another persistent challenge for Somalia, fluctuating due to weak fiscal management and currency instability. Although inflation rates are projected to decline to 5.21% in 2024, previous high inflation has eroded purchasing power and complicated efforts to reduce unemployment (African Development Bank Group, 2024). Meanwhile, Somalia's population growth rate, estimated at 3.2% in 2024, adds further pressure on the economy (World Population Review, 2024). With 70% of the population under the age of 30, the labor market faces significant challenges in absorbing this rapidly expanding young workforce, contributing to widespread youth unemployment.

Macroeconomic stability, economic growth, and low inflation are key drivers of employment creation (International Monetary Fund, & World Bank, 2024). Factors such as FDI (Tanveer et al., 2019), foreign aid, and controlled population growth also play an essential role in fostering an environment conducive to employment generation (Forte & Abreu, 2023). Countries that enjoy such favorable macroeconomic conditions often experience sustained economic development, lower unemployment, and improved social well-being (Pieloch-Babiarz et al., 2021). However, in Somalia, employment conditions remain challenging, with the country continuing to rank among those with the highest unemployment rates in the world (Maow, 2021).

While there has been substantial research on how individual macroeconomic factors such as economic growth, inflation, and FDI affect employment in various contexts (Meyer & Sanusi, 2019; Nguyen, 2024; Nguyen et al., 2024), limited research has focused on the combined effects of these factors on employment in Somalia. This gap in the literature is critical, as understanding the interaction of multiple macroeconomic variables is essential for developing targeted policies that can address Somalia's unique employment challenges.

This study seeks to fill this gap by utilizing an Autoregressive Distributed Lag (ARDL) model to analyze the relationships between economic growth, inflation, FDI, foreign aid, and population growth on employment in Somalia. By employing time series data from the World Bank, the study will provide insights that can help policymakers design effective strategies to increase employment opportunities and promote sustainable economic growth in Somalia.

## Literature review

The relationship between macroeconomic factors and employment trends has been widely studied in both developed and developing countries. However, research integrating multiple macroeconomic variables to assess their collective impact on employment, particularly in Somalia, remains limited. This literature review explores how economic growth, inflation, foreign direct investment (FDI), foreign aid, and population growth affect employment, forming the basis for this study.

## Theoretical framework

Economic theories provide diverse predictions regarding the impact of macroeconomic factors on employment. According to Keynesian economics, economic growth drives employment by stimulating demand for goods and services. Keynes argued that during economic expansions, increased consumer demand leads to higher production, which in turn creates more jobs (Auerbach & Gorodnichenko, 2017). Conversely, the Phillips Curve posits a short-term tradeoff between inflation and unemployment, where higher inflation results in lower unemployment in the short run (Phillips, 1958). However, this relationship disappears in the long run, according to some empirical findings.

Foreign Direct Investment (FDI) is another critical macroeconomic variable influencing employment. Dunning's Eclectic Paradigm (OLI Model) suggests that FDI boosts employment through the inflow of capital, advanced technology, and managerial expertise (Dunning, 2015). However, the extent to which FDI positively affects employment depends on how well the domestic economy can absorb these benefits.

Similarly, Aid Effectiveness Theory (Burnside & Dollar, 2000) argues that foreign aid can promote employment by funding infrastructure, education, and health projects. However, the effectiveness of foreign aid depends on proper management, with corruption or inefficiencies often reducing its impact. Finally, Demographic Transition Theory explains how population growth affects employment across different stages of development. Rapid population growth may lead to a surplus labor force, which, if not absorbed by the economy, can result in high unemployment (Galor, 2012).

## Empirical evidence

Several studies highlight the relationship between economic growth and employment, though the strength of this relationship varies across contexts. (Mushtaq et al., 2022) employed panel data analysis to assess the impact of economic growth on employment across Asian countries and found that economic growth significantly boosts employment in Asian countries. However, the panel data approach may obscure country-specific factors, which are critical in fragile economies like Somalia. (Haider et al., 2023) used a structural vector autoregression (SVAR) model to show that in developing countries, GDP growth does not always lead to proportional employment gains, a phenomenon known as 'jobless growth'. However, the SVAR model assumes shocks are exogenous, which may not apply to Somalia, where political instability is likely an internal factor affecting both growth and employment. (Meyer & Sanusi, 2019) applied a causality test to identify a bi-directional relationship between growth and employment in South Africa, but this method does not account for long-term structural challenges like the informal economy, which is highly relevant to Somalia's employment landscape. (Bluedorn, 2013) discuss the volatility of capital flows and how this impacts employment, a pertinent issue in Somalia given its political instability and reliance on foreign investment. Somalia's economy, like many other fragile economies, faces challenges in maintaining stable capital flows, which undermines sustainable job creation. These studies collectively highlight that while economic growth can drive employment, the unique context of Somalia, characterized by instability, may require a more tailored approach that addresses structural deficiencies beyond growth.

The Phillips Curve suggests a tradeoff between inflation and unemployment, but its validity has been questioned, particularly in developing economies. (Camara et al., 2023) employed an econometric model analyzing inflation rates and employment across Sub-Saharan Africa, showing that inflation above 14% has a significantly negative impact on employment. Their study uses a fixed threshold for inflation, but

this may not account for country-specific nuances in inflation dynamics. Somalia, with its history of currency volatility, may experience inflation differently, meaning a dynamic model would be more appropriate. (Angelov, 2023) explored the non-linear effects of inflation on employment using a generalized additive model (GAM), which offers flexibility in modeling relationships. This method is more suitable for Somalia's volatile inflation environment, as it does not assume a linear relationship. The variation in methodological approaches highlights the complexity of applying generalized inflation models to fragile economies like Somalia, where inflationary pressures are more volatile.

Foreign Direct Investment (FDI) is widely recognized as a catalyst for employment, but the long-term stability of its impact in fragile economies remains contested. (Nguyen et al., 2024) employed a panel data analysis, showing that FDI positively impacts both high- and low-skilled employment by introducing advanced technologies and managerial expertise. However, their reliance on panel data averages out country-specific variations, which might downplay the role of volatility in fragile economies like Somalia. (Rong et al., 2020) used a sectoral analysis approach, showing that FDI supports job creation in labor-intensive industries. This method, though useful, does not consider the instability of capital flows in fragile contexts like Somalia, (Afolabi & Raifu, 2024) used a sectoral analysis approach to show that FDI promotes employment in labor-intensive sectors, particularly in developing economies. This finding is highly relevant for Somalia, where FDI flows into agriculture, livestock, and hydrocarbons—sectors that are labor-intensive and vital for employment. However, despite this positive impact, (Bluedorn, 2013) and (Chletsos & Sintos, 2021) caution that in fragile economies like Somalia, capital flows and financial fragility can limit the long-term benefits of FDI on employment. (Chletsos & Sintos, 2021) specifically examine the role of financial fragility in economically vulnerable countries and its direct effects on employment. Their findings suggest that without addressing underlying financial instability, the employment benefits of FDI in fragile states can be short-lived or unstable. This insight is crucial for Somalia, where political and financial instability may undermine the potential gains from FDI.

Foreign aid plays a crucial role in employment creation by financing infrastructure and development projects. (Tanveer et al., 2019) used a cross-country panel regression to examine the effects of aid on employment. While their findings are generally positive, cross-country regressions can suffer from omitted variable bias, particularly when governance quality and corruption major issues in Somalia are not fully accounted for. (Martínez-Zarzoso et al., 2016) found that foreign aid can positively impact development outcomes when country-specific factors are considered. However, their fixed-effects model may not fully account for governance challenges, such as corruption, which are particularly relevant to Somalia and can distort aid effectiveness. (Gnangnon, 2020) applied a time-series analysis to study how 'Aid for Trade' programs can promote employment diversification in fragile economies. This method is more context-specific and thus better suited to Somalia, where sectoral diversification is crucial for stability. However, the challenges of governance and corruption, as noted by Chletsos and Sintos (2023), in their analysis of IMF programs, remain a key limitation in ensuring the effectiveness of aid in Somalia. These studies suggest that while aid can promote employment, its impact is contingent on governance quality, which remains a persistent challenge in Somalia.

Somalia's rapid population growth poses both opportunities and challenges for employment creation. (Adeosun & Popogbe, 2021) used a linear regression model to show that rapid population growth exacerbates unemployment when job creation does not keep pace. While linear models provide a clear picture, they may oversimplify the relationship between population growth and employment by not accounting for complex dynamics like labor market saturation or migration. (Mushtaq et al., 2022) confirm these findings but use panel data, which, as mentioned earlier, can obscure specific national contexts. (Ngai & Petrongolo, 2017) used a sectoral model to explore the rise of the service economy and its implications for gendered employment patterns. This approach is more relevant for Somalia as the country seeks to diversify away from agriculture. However, the application of their findings to Somalia requires careful consideration, as the country's economic infrastructure may not yet support the scale of service-sector growth seen in more stable economies. (Kluve et al., 2019), provide a meta-analysis on youth employment programs, using a wide range of methodological approaches. Their meta-analysis is particularly relevant for Somalia, given the country's high youth unemployment rate, but the generalizability of their findings to fragile states like Somalia may be limited due to governance and institutional



differences. These studies suggest that population growth poses a critical challenge for employment creation, and targeted policies, particularly youth employment programs, are essential.

The review of the literature highlights the complex relationship between macroeconomic factors such as GDP growth, inflation, FDI, foreign aid, population growth, and employment. While existing research offers valuable insights into how these factors influence employment, limited research has focused on Somalia, a country with unique political and economic challenges. This study aims to fill this gap by using an Autoregressive Distributed Lag (ARDL) model to analyze the short-term and long-term effects of these macroeconomic factors on employment trends in Somalia.

## Methodology

This study utilizes time series data from the World Bank, covering the period from 1991 to 2022. This period captures the critical phases of political instability, economic recovery, and international interventions, allowing for an analysis of macroeconomic factors and their impact on employment. The period was chosen because data for several key variables are unavailable before 1991 and after 2022. This time-frame provides the most reliable and complete dataset for accurate analysis of macroeconomic factors and employment trends in Somalia. It examines the relationship between variables such as economic growth (GDP), inflation (INF), foreign direct investment (FDI), foreign aid (FAID), and population growth (PG) with employment in Somalia. Table 1 provides a summary of the key variables used in the analysis, including their measurements and sources.

Autoregressive Distributed Lag (ARDL) model selected to analyze both the short-term and long-term relationships between the variables. This approach allows us to examine how selected macroeconomic variables impact employment over different time periods.

The ARDL model was chosen for this study due to its ability to handle both short-term and long-term relationships between variables, which is essential for analyzing Somalia's macroeconomic data. Unlike Johansen's cointegration method, which requires all variables to be integrated at the same level, ARDL accommodates variables that are a mix of  $I(0)$  and  $I(1)$ . It also performs well with small sample sizes, making it suitable for this study's 32-year dataset. Additionally, ARDL allows for flexible lag selection, enabling more accurate insights into how variables like FDI, inflation, and aid affect employment over time. The model's use of the Bounds Testing approach for cointegration further enhances its suitability, allowing for the detection of long-term relationships in mixed-order datasets. Overall, ARDL offers the flexibility and robustness needed to analyze the complex dynamics of macroeconomic factors and employment in Somalia.

The mathematical formulation of the ARDL model is as follows:

$$EMP = GDP_t + INF_t + FDI_t + FAID_t + PG_t \quad (1)$$

Based on the empirical work of Sarkodie and Adams (2018), the ARDL co-integration equation can be formulated as follows:

$$\begin{aligned} EMP_t = & \alpha_0 + \beta_1 GDP_{t-1} + \beta_2 INF_{t-1} + \beta_3 FDI_{t-1} + \beta_4 FAID_{t-1} + \beta_5 PG_{t-1} + \sum_{i=0}^q \Delta \alpha_1 GDP_{t-k} \\ & + \sum_{i=0}^p \Delta \alpha_2 INF_{t-k} + \sum_{i=0}^p \Delta \alpha_3 FDI_{t-k} + \sum_{i=0}^q \Delta \alpha_4 FAID_{t-k} + \sum_{i=0}^q \Delta \alpha_5 PG_{t-k} + \varepsilon_t \end{aligned}$$

Where  $\alpha_0$  represents the constant term,  $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$  are the coefficient of the short-run variables,  $\beta_1, \beta_2, \beta_3, \beta_4$  and  $\beta_5$  represent the elasticities of the long-run parameters, the symbol  $q$  denotes the

**Table 1.** Source and measurement.

Variables	Measurements	Sources
Employment (EMP)	Employment-to-population ratio (% of population ages 15+)	World Bank
Economic Growth	GDP growth (annual %)	World Bank
Inflation (INF)	Inflation, GDP deflator (annual %)	World Bank
Foreign direct investment (FDI)	Foreign direct investment, net inflows (BoP, current US\$)	World Bank
Foreign Aid (FAID)	Net official development assistance received (current US\$)	World Bank
Population Growth (PG)	Annual population growth (%)	World Bank

Note. Data compiled by the authors from the World Bank.

optimal lags of the dependent variable, while  $p$  indicates the optimal lags of the independent variables,  $\Delta$  signifies the first difference, representing the short-run variables, and  $\varepsilon_t$  is the error term.

Our analysis starts with a unit root test. Then, we will perform the ARDL model to test the long-term and short-term relationships between the variables. Finally, we will conduct diagnostic and stability tests, specifically focusing on serial correlation, heteroskedasticity, and normality tests.

The macro economic factors, including GDP, inflation, FDI, foreign aid, and population growth are expected to have significant impacts on employment. Economic growth is typically associated with positive employment effects (Mushtaq et al., 2022), while inflation's impact can be mixed, influencing purchasing power and cost of living (Angelov, 2023). FDI is expected to boost job creation (Rong et al., 2020), foreign aid can support employment through infrastructure and development projects (Tanveer et al., 2019), and population growth affects labor supply and demand dynamics (Adeosun & Popogbe, 2021).

### Data limitations

While this study relies on macroeconomic data from the World Bank (1991–2022), several limitations must be acknowledged, especially considering Somalia's political and economic instability.

Somalia's volatile political environment and weak institutions may lead to gaps and inaccuracies in the data, particularly due to difficulties in capturing the informal economy, which forms a large part of the country's economic activities.

The employment data, based on the employment-to-population ratio, may not fully capture informal employment. Additionally, much of the data for Somalia is modeled, leading to potential inaccuracies in reflecting the actual employment situation.

Periods of political instability, such as during the civil war, may have resulted in incomplete or estimated data, particularly in earlier years. Missing values or unreliable estimations from these periods may affect the precision of the study's analysis.

FDI and foreign aid data may not always capture smaller investments or account for aid disbursements tied to political objectives, which may not directly contribute to employment growth.

Given the potential data gaps, assumptions were made in the analysis, especially regarding data stationarity and the non-causal relationship between variables like FDI and employment. This limits the precision of the study's findings.

### Results

Table 2 provides a summary of the descriptive statistics for the key variables in this study, including employment (EMP), economic growth (GDP), inflation (INF), foreign direct investment (FDI), foreign aid (FAID), and population growth (PG). Employment (EMP) shows a mean of 5.85, with low variability (standard deviation of 0.42), and a slight negative skewness, indicating a left-skewed distribution. Economic growth (GDP) reveals significant variability (standard deviation of 5.58) and a pronounced left skew (−2.47), reflecting periods of negative growth common in volatile economies. Inflation (INF) presents a mean of 13.17% with high variability, indicating periods of extreme inflation, while FDI

**Table 2.** Descriptive statistics (Compiled by the authors by using EViews 12).

	EMP	GDP	INF	FDI	FAID	PG
Mean	5.852967	4.330558	13.170520	1.54E + 08	8.03E + 08	2.881176
Median	6.030650	6.694352	7.309868	91500000.	5.94E + 08	3.431286
Maximum	6.276559	9.946800	55.814750	6.36E + 08	3.04E + 09	4.994928
Minimum	5.049702	−17.846990	−15.346900	−479000.0	81180000	−4.629117
Std. Dev.	0.418555	5.575870	16.390170	1.98E + 08	7.54E + 08	2.132495
Skewness	−0.625337	−2.465537	1.004091	1.119993	1.188856	−3.004375
Kurtosis	1.874380	9.527304	3.692919	28.73513	27.84964	11.401080
Jarque-Bera	3.774943	89.228260	6.017246	6.690078	8.631796	142.244300
Probability	0.151454	0.000000	0.049360	0.035259	0.013355	0.000000
Sum	187.294900	138.577900	421.456800	4.92E + 09	2.57E + 10	92.197650
Sum Sq. Dev.	5.430844	963.800000	8327.772000	1.21E + 18	1.76E + 19	122.039500
Observations	32	32	32	32	32	32



**Table 3.** Unit root test (Compiled by the authors by using EViews 12).

Variables	Level		First difference	
	Intercept	Trend & intercept	Intercept	Trend & intercept
EMP	-2.963972	-3.562882	-2.963972	-3.568379
GDP	-2.960411***	-3.562882***	-2.963972***	-3.568379***
INF	-2.960411	-3.562882	-2.963972***	-3.568379***
FDI	-2.967767	-3.574244	-2.963972***	-3.568379***
FAID	-2.967767	-3.562882	-2.971853	-3.574244***
PG	-2.960411***	-3.562882**	-2.963972***	-3.568379***

Note. \*\* and \*\*\* symbolize significance at 5% and 1%, respectively.

**Table 4.** Spearman correlation tests (Computed by the authors using EViews 12).

	EMP	GDP	INF	FDI	FAID	PG
EMP	1.00000000	0.36272980	-0.78666760	0.65936500	0.58467854	0.32607234
GDP	0.36272980	1.00000000	-0.55221360	-0.03652330	-0.16589150	0.22210272
INF	-0.7866676	-0.55221360	1.00000000	-0.37090650	-0.28191300	-0.10358480
FDI	0.65936500	-0.03652330	-0.37090650	1.00000000	0.92061756	0.16352740
FAID	0.58467854	-0.16589150	-0.28191300	0.92061756	1.00000000	0.06604884
PG	0.32607234	0.22210272	-0.10358480	0.16352740	0.06604884	1.00000000

displays substantial variability (standard deviation of \$198 million), suggesting large fluctuations in net inflows. Similarly, foreign aid (FAID) has a right-skewed distribution, with an average of \$803 million in annual aid, marked by significant variability (standard deviation of \$754 million). Population growth (PG) shows a left-skewed distribution with a mean of 2.88% and significant variability.

The Jarque-Bera test results indicate that several variables deviate from normality, especially GDP, FDI, and FAID, which exhibit leptokurtic distributions, signaling extreme values and distributional outliers. These results underscore the need for caution when applying methods that assume normal distributions, particularly given the volatility of macroeconomic variables in Somalia.

The unit root tests using the Augmented Dickey-Fuller (ADF) tes in Table 3 determine the stationarity of each variable at both the level and first difference. The null hypothesis (H0) for these tests is that the series has a unit root (i.e. the series is non-stationary), while the alternative hypothesis (H1) is that the series does not have a unit root (i.e. the series is stationary). The results indicate that economic growth (GDP) and population growth (PG) are stationary at the level for both intercept and trend & intercept, signifying they are integrated of order  $I(0)$  and rejecting the null hypothesis at the level. Conversely, inflation (INF), foreign direct investment (FDI), and foreign aid (FAID) are not stationary at the level but become stationary at the first difference, indicating they are integrated of order  $I(1)$  and rejecting the null hypothesis at the first difference. Employment (EMP), however, is not stationary at both the level and first difference. These mixed integration orders for the variables justify the use of the ARDL model to explore both short-term and long-term relationships among the variables. Further analysis will involve the ARDL bounds test to check for cointegration and subsequently estimating the ARDL model to derive significant insights into the dynamics affecting employment in Somalia.

The Spearman correlation in Table 4 results reveal that EMP has a strong positive correlation with FDI, indicating that higher levels of foreign direct investment are associated with increased employment. Conversely, there is a strong negative correlation between EMP and INF, suggesting that higher inflation tends to decrease employment levels. GDP shows a moderate positive correlation with EMP, implying that economic growth supports employment. These findings provide a foundational understanding of how these macroeconomic factors impact employment in Somalia. The next step is to estimate the ARDL model to quantify the short-term and long-term effects of these independent variables on employment, given the established cointegration.

### Contigration test

The ARDL bounds test is used to determine whether a long-term relationship (cointegration) exists between the variables in the model. The test compares the calculated F-statistic to the lower and upper critical values at various significance levels (1%, 5%, 10%). If the F-statistic exceeds the upper bound at

**Table 5.** F-statistics bound tests (Computed by the authors).

Critical value (%)	Lower bound I (0)	Upper bound I (1)
10%	2.2	3.35
5%	2.56	3.79
2.5%	2.88	4.18
1%	3.41	4.68
<b>ARDL F-statistics</b>	<b>Wald F-stat 86.14418**</b>	

Note. The critical values, at the 5% significance level, are based on (Narayan, 2005).

\*\* denotes significance at the 5% level, indicating that the results are statistically significant with a 95% confidence level.

**Table 6.** ECM and short run estimation (Computed by the authors).

Variable	Coefficient	Prob
GDP(-3)	0.240470	0.0044
INF(-3)	0.068312	0.0148
FDI(-3)	-0.000000	0.1643
FAID(-3)	0.000000	0.0056
PG(-3)	0.429173	0.0299
ECM(-3)	-0.582187	0.8289

any significance level, we can reject the null hypothesis of no cointegration, meaning that a long-term equilibrium relationship exists between the variables.

As shown in Table 5, ARDL bound test's F-statistic of 86.14418 is significantly higher than the upper bound critical values at all conventional significance levels (10%, 5%, 2.5%, and 1%). This result strongly rejects the null hypothesis of no cointegration among the variables, indicating a robust long-term relationship between employment and the macroeconomic factors considered in the study.

The high F-statistic highlights the strength and reliability of the model in capturing significant long-term interactions. For instance, in a study by Pesaran et al. (2001), similar high F-statistics were observed, providing strong evidence of cointegration in their analysis of economic relationships.

These findings confirm the existence of long-term relationships among employment, economic growth, inflation, foreign direct investment, foreign aid, and population growth in Somalia. Given the presence of cointegration, the next step is to estimate the ARDL model to derive both short-term and long-term coefficients, which will provide deeper insights into the dynamic relationships between these variables.

### Short run analysis

Table 6 presents the short-run Error Correction Model (ECM) estimation results. The ECM captures the short-term dynamics of the relationship between the independent variables and employment, while also accounting for how quickly deviations from the long-term equilibrium are corrected.

The ECM and short-run estimation in Table 6 results reveal significant short-term dynamics impacting employment (EMP) in Somalia. The coefficient for GDP lagged by three periods is positive (0.240470) and statistically significant ( $p$ -value = 0.0044), indicating that economic growth three periods ago has a positive impact on current employment levels. This result is consistent with the findings of Mushtaq et al. (2022), who argue that economic growth stimulates job creation. The positive effect of GDP in the short run underscores the importance of maintaining steady economic growth to achieve immediate employment gains, even in volatile economies like Somalia.

Inflation, lagged by three periods, also shows a positive and statistically significant effect on employment (coefficient = 0.068312,  $p$ -value = 0.0148), which is somewhat counterintuitive, as inflation is generally expected to have a negative impact on employment. However, (Camara et al., 2023) suggest that inflation may have non-linear effects, particularly in Sub-Saharan Africa, where short-term inflation might be linked to other factors, such as wage adjustments or economic activity, that temporarily boost employment. In Somalia's context, inflation may not immediately harm employment due to the interplay of unique short-term economic conditions.

Foreign direct investment (FDI), lagged by three periods, has an insignificant impact on employment in the short run (coefficient = -0.000000,  $p$ -value = 0.1643), indicating that FDI does not have a statistically significant effect on employment within this time frame. This finding is consistent with (Bluedorn,

**Table 7.** Long run (Computed by the authors).

Variable	Coefficient	Std. Error	t-Statistic	Prob
GDP	0.129591	0.049682	2.608419	0.0217
INF	0.010762	0.010750	1.001063	0.3351
FDI	8.10E-09	4.20E-09	1.927516	0.0761
FAID	8.84E-10	8.39E-10	1.054063	0.3111
PG	−0.805102	0.337595	−2.384818	0.0330
C	−0.721597	0.505673	−1.427002	0.169

2013) and (Chletsos & Sintos, 2021), who caution that FDI in fragile economies like Somalia often faces instability, which can limit its short-term benefits. This suggests that while FDI can have long-term effects on job creation, its short-run impact is more constrained due to political and financial uncertainties.

Conversely, foreign aid (FAID) lagged by three periods shows a statistically significant positive effect on employment (coefficient = 0.000000,  $p$ -value = 0.0056). This result aligns with the findings of Tanveer et al. (2019) and (Martínez-Zarzoso et al., 2016), who argue that well-managed foreign aid can boost employment by funding critical infrastructure and social programs. The short-term effect of aid in Somalia reflects the immediate job creation benefits that come from aid-supported projects, particularly in sectors like infrastructure, healthcare, and education.

Population growth (PG) lagged by three periods also has a significant positive effect on employment (coefficient = 0.429173,  $p$ -value = 0.0299), which suggests that higher population growth in the short term can contribute to increased labor supply and, under certain conditions, may support job creation. However, this is context-dependent, as (Adeosun & Popogbe, 2021) argue that rapid population growth can strain labor markets if job creation does not keep pace. In Somalia's case, the positive effect in the short run may reflect a temporary absorption of labor in specific sectors.

Finally, the coefficient for the error correction term (ECM) lagged by three periods is insignificant (coefficient = −0.582187,  $p$ -value = 0.8289), indicating that short-term deviations from long-term equilibrium do not significantly impact employment in this period. This result suggests that short-term adjustments in Somalia's economy are not immediately correcting towards long-term employment trends, possibly due to ongoing structural challenges and economic volatility.

## Long run analysis

Table 7 presents the long-run coefficients of the ARDL model, which capture the effects of each macro-economic variable on employment over an extended period.

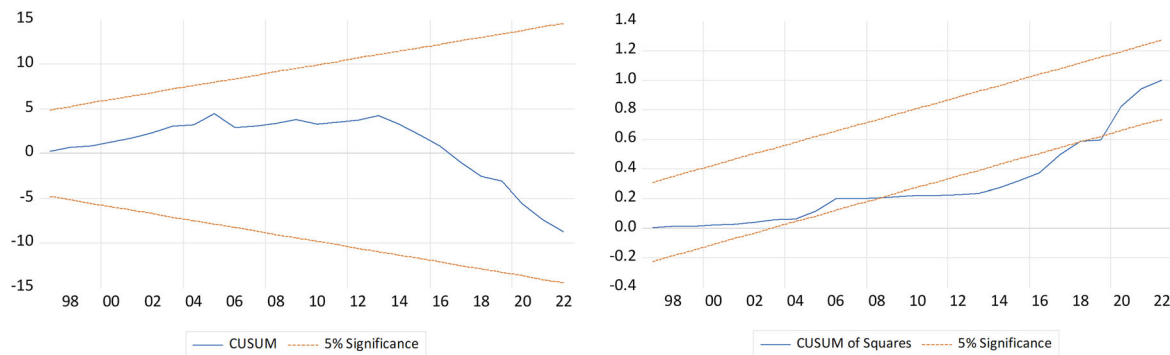
The results in Table 7 show that GDP has a significant positive impact on employment in Somalia, consistent with (Mushtaq et al., 2022) and Keynesian economics, which argue that economic growth stimulates job creation by increasing demand for goods and services. These finding highlights that fostering economic growth is crucial for job creation in Somalia, particularly in sectors like agriculture and telecommunications, which play a key role in the country's economic structure. However, (Haider et al., 2023) caution that GDP growth may not always translate into proportional employment gains, a phenomenon known as 'jobless growth', especially in fragile states where structural inefficiencies persist. Somalia's political instability and informal economy present additional challenges, echoing concerns raised by Meyer and Sanusi (2019), who found a similar disconnect between growth and employment in South Africa.

Population growth shows a negative and significant impact on employment, aligning with (Adeosun & Popogbe, 2021) and (Mushtaq et al., 2022), who argue that rapid population growth can overwhelm the labor market, particularly in countries like Somalia where job creation struggles to keep pace with an expanding workforce. This finding is also consistent with Demographic Transition Theory, which predicts that unless economic growth accelerates, rapid population expansion can exacerbate unemployment.

Inflation's positive short-term effect on employment, while unexpected, can be explained by considering the unique economic conditions of fragile states like Somalia. In such contexts, inflation may lead to temporary increases in wages, especially in sectors where wages are quickly adjusted to rising prices.

**Table 8.** Diagnosis and stability tests (Computed by the authors).

Diagnostic results		
	F-statistic	Prob.
Serial correlation	0.819135	0.5124
Heteroskedasticity	1.843748	0.1373
Normality	0.00000	0.534326

**Figure 1.** CUSUM and CUSUM of squares (Computed by the authors).

This short-term boost in wages can increase household consumption, stimulating demand for goods and services, which, in turn, can lead to higher employment levels as businesses seek to meet this demand. Furthermore, inflation in the short term may indicate increased economic activity, particularly in developing economies where price levels can rise as a result of demand outpacing supply in specific sectors. In Somalia, where the economy is highly informal and susceptible to fluctuations in supply and demand, this short-term inflationary impact may reflect a temporary surge in employment opportunities, particularly in agriculture, services, and small-scale industries. This phenomenon has also been observed in other Sub-Saharan African countries, where inflationary pressures may not immediately translate into job losses but rather stimulate economic activity in the short term (Camara et al., 2023).

Foreign direct investment (FDI) demonstrates a marginally significant positive effect on employment, consistent with the findings of Nguyen et al. (2024) and (Rong et al., 2020), who highlight the role of FDI in job creation through technology transfer and capital inflows, especially in labor-intensive sectors. However, as (Bluedorn, 2013) and (Chletsos & Sintos, 2021), caution, in fragile economies like Somalia, financial instability and capital flow volatility can undermine the long-term benefits of FDI. This suggests that while FDI contributes to job creation, its impact is limited unless Somalia addresses its broader financial and political challenges to create a stable investment climate.

Foreign aid, while positive, remains statistically insignificant, diverging from studies by Tanveer et al. (2019) and (Martínez-Zarzoso et al., 2016), who found that well-managed aid positively impacts employment. The weak influence of aid in Somalia may be attributed to governance challenges, corruption, and inefficient aid allocation, as noted by Gnanngnon (2020). Effective management of foreign aid is crucial for translating aid inflows into employment opportunities, especially in critical sectors such as infrastructure and education.

The results in Table 8 shows that our ARDL model is reliable and well structured. The serial correlation test shows an F-statistic of 0.819135 with a probability value of 0.5124, indicating that there is no significant serial correlation in the residuals of the model meaning that the residuals are not autocorrelated, which is essential for consistent and unbiased estimates.

Also, heteroskedasticity test results show an F-statistic of 1.843748 with a probability value of 0.1373, highlighted that there is no significant heteroskedasticity in the model, suggests that the variance of the residuals is constant, which supporting the of the model's estimates reliable.

In the normality test results indicate that a probability value of 0.5343, shows that the residuals of the model are normally distributed. This is important for the validity of statistical inferences made from the model.

Figure 1 illustrates the CUSUM and CUSUM of Squares tests performed to evaluate the stability of the ARDL model's coefficients over time. The CUSUM test plot demonstrates that the model's coefficients are stable, as the CUSUM line stays within the 5% significance boundaries throughout the sample period. Conversely, the CUSUM of Squares test indicates some instability towards the end of the period, as the CUSUM of Squares line crosses the 5% significance boundaries. This suggests that while the overall relationship between employment and the macroeconomic variables is stable, there may be some shifts or changes in the variance of the residuals towards the latter part of the sample period. Policymakers should consider these results, emphasizing strategies to foster economic growth, manage population growth, and optimize foreign aid and investment approaches. Further analysis with additional data could help address the observed instability.

## Conclusion

This research explores the macroeconomic determinants of employment in Somalia using an ARDL model, focusing on economic growth (GDP), inflation (INF), foreign direct investment (FDI), foreign aid (FAID), and population growth (PG). Mixed integration orders from unit root tests, with GDP and PG stationary at level and INF, FDI, and FAID stationary at first difference, support the ARDL approach.

The ARDL bounds test verifies a long-term relationship among the variables, with the F-statistic surpassing the upper bound critical value. Long-term findings reveal GDP positively influences employment, consistent with Keynesian economics and studies (Mushtaq et al., 2022), Population growth negatively affects employment, in line with findings by Adeosun and (Adeosun & Popogbe, 2021) and (Mushtaq et al., 2022). Inflation has an insignificant long-term effect on employment, differing from Phillips Curve predictions but aligning with (Camara et al., 2023). FDI has a marginally significant positive impact, similar to observations by Rong et al. (2020) and (Nguyen et al., 2024). However, foreign aid's impact is insignificant, contrasting with (Martínez-Zarzoso et al., 2016) and (Tanveer et al., 2019), indicating a need for more effective aid management in Somalia.

In the short term, lagged GDP, inflation, foreign aid, and population growth significantly influence current employment levels, while FDI does not show a notable short-term effect. Diagnostic and stability tests, including CUSUM and CUSUM of Squares, suggest overall model stability, with minor instability towards the sample period's end.

## Recommendations

The findings of this study offer critical insights into how Somalia's macroeconomic factors—such as economic growth, inflation, FDI, foreign aid, and population growth—affect employment. Based on these insights, several policy recommendations can be made to address Somalia's unemployment challenges and promote sustainable economic growth.

The heavy reliance on agriculture, particularly livestock production, makes Somalia's economy vulnerable to climate variability and global market fluctuations. To create a more resilient economy and generate sustainable employment, policymakers should prioritize sectoral diversification. Investment in sectors like manufacturing, services, and telecommunications can create new job opportunities, especially for Somalia's youth. This requires policies that encourage private sector investment, provide incentives for entrepreneurship, and enhance skills development in emerging industries. Moreover, public-private partnerships (PPPs) can play a pivotal role in developing infrastructure and fostering industrial growth.

While Somalia has attracted significant FDI in recent years, the volatility of these investments due to political instability and weak regulatory frameworks hampers long-term job creation. To stabilize FDI, the government should focus on strengthening institutional frameworks and improving political stability. Implementing transparent regulatory systems, reducing corruption, and offering incentives to investors in priority sectors such as agriculture, fisheries, and telecommunications will help attract more consistent foreign investments. Additionally, establishing special economic zones (SEZs) with favorable tax policies and infrastructural support could encourage foreign companies to invest in labor-intensive sectors, directly boosting employment.

Foreign aid continues to play a major role in Somalia's economy, yet its impact on employment has been mixed. Policymakers should ensure that aid programs are aligned with the country's employment goals. This can be achieved by channeling aid toward projects that have a direct impact on job creation, such as infrastructure development, vocational training, and entrepreneurship support. Monitoring and evaluation mechanisms must be strengthened to ensure aid is effectively utilized and that projects are managed transparently to prevent corruption. Partnering with international donors to establish performance-based aid programs tied to employment outcomes would also help maximize the impact of foreign aid.

High inflation has been a persistent issue in Somalia, reducing purchasing power and complicating economic stability. To control inflation and stabilize the currency, the government should focus on improving fiscal management and implementing sound monetary policies. This includes enhancing revenue collection, reducing the fiscal deficit, and managing public expenditures more effectively. The Central Bank of Somalia should also consider adopting inflation-targeting policies to stabilize prices, which in turn would contribute to a more favorable environment for job creation and economic stability.

With an annual population growth rate of 3.2% and a majority of the population under the age of 30, Somalia faces a significant challenge in providing employment for its expanding workforce. Addressing this demographic pressure requires both short-term and long-term strategies. In the short term, the government should expand youth employment programs, focusing on vocational training, apprenticeships, and entrepreneurship initiatives to equip young people with marketable skills. In the long term, improving education and skills development to ensure that the growing population is well-prepared for the future labor market. Investments in education infrastructure, technical and vocational education, and digital literacy will help equip the youth with the necessary skills for emerging industries. Additionally, fostering an environment that encourages entrepreneurship and small business development can empower the younger generation to create jobs rather than solely rely on formal employment opportunities. By supporting start-ups, especially in sectors like agriculture, renewable energy, and technology, Somalia can transform its demographic challenge into an opportunity for economic growth.

Given the limitations of government resources, public-private partnerships can play a vital role in creating jobs and driving economic development. The government should promote PPPs in key areas like infrastructure, renewable energy, and vocational training programs. Encouraging private sector investment in these areas will not only create jobs but also improve overall productivity and economic resilience. By developing clear frameworks for PPPs, the government can ensure that these collaborations lead to sustainable job creation and contribute to long-term economic development.

## **Limitations and future research**

While this study provides valuable insights into the relationship between macroeconomic factors and employment in Somalia, several limitations must be acknowledged. Understanding these limitations is crucial for contextualizing the results and identifying areas for further exploration.

### ***Data limitations***

The study relies on time series data from the World Bank, covering the period from 1991 to 2022. Although the World Bank is a reputable source, data collection in Somalia is often hindered by political instability, weak institutions, and the prevalence of an informal economy. As a result, the data may not fully capture all economic activities, particularly informal employment, which represents a significant portion of the workforce. Additionally, the reliance on modeled estimates for some variables introduces potential inaccuracies, especially in earlier years when data collection was less robust. These data limitations may affect the precision of the findings, particularly in identifying the exact magnitude of the relationship between macroeconomic variables and employment.



### ***Endogeneity issues***

This study faces potential endogeneity issues, particularly with FDI, foreign aid, and employment. While FDI and foreign aid can impact employment, higher employment levels may also attract more investment and aid, creating a two-way relationship. The ARDL model used helps analyze short- and long-term effects but does not fully resolve this issue, which may lead to biased estimates.

More advanced techniques like Generalized Method of Moments (GMM) or instrumental variables could better address endogeneity, but these methods were not feasible due to data limitations. Therefore, the results should be interpreted as correlations rather than causal relationships. Future research could explore using these advanced methods to clarify the direction of these relationships.

### ***Limited scope of variables***

While this study focuses on key macroeconomic variables such as GDP growth, inflation, FDI, foreign aid, and population growth, there are other factors that could also influence employment outcomes in Somalia. For example, the role of political stability, institutional quality, and infrastructure development were not explicitly included in this analysis, yet these factors are critical in determining the broader economic environment. Future research could expand the scope by incorporating these additional variables to provide a more comprehensive understanding of the factors influencing employment in fragile states like Somalia.

### ***Timeframe and external shocks***

The timeframe of the study (1991–2022) encompasses periods of extreme political instability, conflict, and economic recovery in Somalia. While this offers a long-term perspective, external shocks—such as global commodity price fluctuations, climate change impacts, and international aid shifts—could influence the relationship between macroeconomic variables and employment. These external shocks were not specifically analyzed in this study, but they may have significant effects on employment, particularly in a fragile economy. Future studies could examine the effects of external shocks more closely to understand their impact on employment dynamics.

### ***Sectoral analysis***

This study takes a macroeconomic approach, analyzing aggregate employment trends. However, sector-specific factors such as differences between agriculture, services, and manufacturing sectors are not fully explored. Given the high dependence on agriculture and the growing role of telecommunications and services in Somalia's economy, future research should conduct sectoral analyses to better understand how macroeconomic variables affect employment in different industries. This could provide more targeted insights for policymakers aiming to stimulate employment in specific sectors.

### ***Future research directions***

Future research could benefit from adopting more advanced econometric techniques to address the potential endogeneity concerns raised in this study. Specifically, methods like the Generalized Method of Moments (GMM) or instrumental variable (IV) approaches could be employed to better isolate the causal effects of macroeconomic variables such as foreign direct investment (FDI) and foreign aid on employment. These techniques are particularly useful in handling situations where explanatory variables may be correlated with the error terms, leading to biased estimates in traditional regression models. In the context of Somalia, where political instability and external shocks frequently affect both macroeconomic variables and employment, the application of GMM or IV methods could help disentangle these relationships and provide clearer insights into the direction of causality.

Moreover, future studies could explore sectoral differences in employment responses to macroeconomic changes. For instance, the effects of GDP growth, inflation, and FDI on employment might vary

significantly between Somalia's agriculture, services, and manufacturing sectors. Conducting sector-specific analyses would allow policymakers to design more targeted interventions aimed at boosting employment in the most vulnerable or promising areas of the economy.

Lastly, given the impact of external shocks such as global economic crises, climate change, and international aid fluctuations, future research should also examine how these shocks influence employment dynamics in fragile economies. By incorporating external factors and testing for their impact through vector autoregression (VAR) models or dynamic stochastic general equilibrium (DSGE) models, future studies can provide a more comprehensive picture of how Somalia's labor market responds to both internal and external pressures.

### Author contributions

- Abdikadir Ahmed Mohamed: Conceptualization, Methodology, Data Analysis, Writing - Original Draft
  - Abdikani Yusuf Abdulle: Literature Review, Data Collection, Writing - Review & Editing
  - Mahdi Mohamed Omar: Data Analysis, Writing - Review & Editing
- All authors have read and approved the final version of the manuscript.

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### Data availability statement

The data and materials used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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