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ANASAY

EFFECT OF FOREIGN DIRECT INVESTMENT (FDI) ON THE ECONOMIC GROWTH OF SOMALIA: ARDL BOUNDS TEST[1]

DOĞRUDAN YABANCI YATIRIMIN (DYY) SOMALİ'NİN EKONOMİK BÜYÜMESİNE ETKİSİ: ARDL SINIR TESTİ

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Abstract

It is a known fact that today, with the influence of globalization, financial borders between countries have disappeared. As borders remain, the importance of foreign direct investments also increases. Because foreign direct investments are a great opportunity for economic growth and development, especially for developing economies. In this direction the aim of this study is to empirically examine the impact of foreign direct investments on economic growth in Somalia between 1970 and 2022 with the help of the ARDL bounds test. According to the estimation findings, there is a positive and significant relationship between foreign direct investments and economic growth in Somalia in the specified period. The study also examined variables such as population growth, trade balance, exchange rate and inflation, which are thought to have an impact on economic growth. Accordingly, while population growth and trade balance were found to have a positive effect on economic growth, the effect of exchange rate and inflation variables on economic growth was found to be negative. However, the coefficients are statistically significant. For underdeveloped or developing countries with insufficient domestic savings, economic stability is very important in attracting foreign direct investments to the country. At this point, countries need to make efforts to stabilize their macroeconomic indicators.

Anahtar Kelimeler: *Foreign Direct Investment, Real GDP, Inflation, Trade Balance, ARDL*

Öz

Günümüzde küreselleşmenin etkisiyle ülkeler arasındaki mali sınırların ortadan kalktığı bilinen bir gerçektir. Sınırlar kaldıkça doğrudan yabancı yatırımların önemi de artmaktadır. Çünkü doğrudan yabancı yatırımlar, özellikle gelişmekte olan ekonomiler için ekonomik büyüme ve kalkınma için büyük bir fırsattır. Bu doğrultuda çalışmanın amacı Somali'de 1970-2022 yılları arasında doğrudan yabancı yatırımların ekonomik büyüme üzerindeki etkisini ARDL sınır testi yardımıyla ampirik olarak incelemektir. Tahmin bulgularına göre Somali'de belirtilen dönemde doğrudan yabancı yatırımlar ile ekonomik büyüme arasında pozitif ve anlamlı bir ilişkinin olduğu görülmektedir. Çalışmada ayrıca ekonomik büyüme üzerinde etkisi olduğu

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düşünülen nüfus artışı, ticaret dengesi, döviz kuru ve enflasyon değişkenleri de incelenmiştir. Buna göre nüfus artışı ve ticaret dengesi ekonomik büyüme üzerinde pozitif bir etkiye sahip olduğu bulunurken, döviz kuru ve enflasyon değişkenlerinin ekonomik büyüme üzerindeki etkisi negatif bulunmuştur. Bununla birlikte katsayılar istatistiksel olarak anlamlıdır. İç tasarrufları yetersiz olan az gelişmiş veya gelişmekte olan ülkeler için doğrudan yabancı yatırımların ülkeye çekilmesinde ekonomik istikrar oldukça önemlidir. Bu noktada ülkelerin, makroekonomik göstergelerini istikrarlı hale getirmek için çaba sarfetmeleri gerekmektedir.

Keywords: *Doğrudan Yabancı Yatırım, Reel GSYİH, Enflasyon, Ticaret Dengesi, ARDL*

1. Introduction

The Conference Board (2023) projected that global real GDP would grow by 2.9% in 2023, decrease from 3.3% in 2022, and further drop to 2.5% in 2024 due to increased prices and financial policy constraints. Additionally, the Asian economies were expected to experience the strongest growth, with deadline increased prices predicted to decline from 8.7% to 6.8%. The fast fiscal strategy constraint has debilitated world-wide housing marketplaces, reduced bank loaning, and pressed factories near to decline (Cohen, Mitra, & Natalucci, 2023). Furthermore, the FDI flows in the first half of 2023 were 30% less than in the same time in 2022, but rose to USD 727 billion (White & Case, 2023). Specifically, the inflows into the OECD region were 42% lower than in the first half of 2022 and lower than in the same period in 2021(FDI Intelligence, 2023). Furthermore, the first quarter of 2023 saw a rise to positive levels, while Q2 saw a 58% decline, mostly due to fewer equities inflows and reinvested earnings (OECD, 2024).

Regionally, Sub-Saharan Africa's economic outlook is challenging due to escalating instability, sluggish growth in major economies, and global economic uncertainties. South Africa, Nigeria, and Angola were forecasted to increase at 0.5%, 2.9%, and 1.3%, respectively, but the region's GDP was predicted to drop to 2.5% in 2023 (Bakari & Tiba, 2020). Central Africa's growth is expected to slow from 5.0% in 2022 to 4.9% in 2023 and 4.6% in 2024 due to declining commodity prices. North Africa's growth is predicted to increase from 4.1% in 2022 to 4.6% in 2023 and 4.4% in 2024 (Saidi, Labidi, & Ochi, 2022). Southern Africa's growth is expected to fall by 1.1 ratio points but could rebound to 2.7% by 2024 with the right policy measures. Besides, The East Africa's economy is expected to perform best in the region, with growth rates exceeding 5% in 2023 and 2024. However, the region is vulnerable to threats such as global economic downturns, rising commodity costs, geopolitical unrest, trade restrictions, and Covid-19 revival (The Reliefweb, 2024).

2. Foreign Direct Investment in Somalia's Fragile Economy

Somalia, a least developed country, has a projected GDP of $8.37 billion as of December 2023 (African Economic Outlook, 2023). The country's economy has grown significantly since 1994, with a predicted growth rate of 2.6% and a 2009 GDP of $5.731 billion. However, Somalia has experienced a slight decline in foreign direct investment (FDI), which affects trade, competitiveness, employment creation, foreign savings, capital investment, productivity gains, and access to international markets (Ibrahim, Omar, & Ali, 2017). The IMF states that development in primary and secondary sectors contributed to Somalia's 3.7% predicted economic growth in 2014. The Somali diaspora has primarily funded the extension of the private segment, particularly in the services sector. As a result, the increase in GDP is predicted to be attributed to both local and foreign demand, reaching 2.8% and 3.5% in 2023 and 2024, respectively (World Bank, 2023).

With a 19.98 ease of doing business score, foreign direct investment (FDI) inflows into Somalia have increased since 2012, ascribed to the end of the civil conflict (UNCTAD, 2023). The phenomenon is associated to the principal investors, including The US and Germany, with

Germany housing the German Agro Action Office (African Development Bank Group, 2022). The main drivers of Somalia's economy are agriculture, foreign aid, and remittances from the diaspora. Furthermore, The World Bank notes the impact of state failure following the civil war on Somalia's economy, but the collapse has been argued to improve economic welfare due to the previous predatory state. The economy is expected to gradually grow to 3.7% and 3.9% in 2024 and 2025, driven by increased economic activities. Consequently, remittances and private sector credit have bolstered construction, real estate, and investment, but net exports remain a drag on growth. To date, research on FDI in Somalia has produced conflicting findings, with some studies showing a negative association between FDI and economic development (Anyanzwa, 2023), while others highlight Somali's FDI's role in peacebuilding through various means (Mohamed, Abdulle, & Abdullahi, 2021), contributing to household income and human capital development. This study aims to empirically examine the impact of foreign direct investments on economic growth in Somalia for the period 1970-2022. In addition, in the study, population growth, trade balance, exchange rate and inflation, which are thought to have an impact on economic growth, were also included in the empirical model and a broad perspective model was created. This enables the study to be considered from a broader perspective and makes the study important. In the following parts of the study, international literature in this field is primarily included. Then, the model and data set of the study were introduced. Finally, the study ended with a discussion of the findings and policy recommendations.

3. Literature Review

There are very important studies in the economic literature examining the relationship between foreign direct investments and economic growth. One of these is the study of Okuyan and Erbaykal (2008). The authors examined the relationship between FDI and economic growth in developing countries using Toda Yamamoto (1995) causality analysis. The study findings prove that foreign direct investment is a result of economic growth in developing countries. On the other hand, another important study in this field is the work of Özdemir and Koyuncu (2023) for Türkiye. The period covered in the study is 1996-2018, and the sample consists of selected transition economies. As a result of the analysis, the authors concluded that foreign direct investments affect economic growth positively and significantly. In their study, Özmerdivanlı and Akgül (2024) examined the relationship between foreign direct investments, high-tech product exports and economic growth with the 2010-2021 data set for G20 countries. While the findings obtained show that there are causal relationships between variables at the country level and that the direction of these relationships varies from country to country, the findings obtained at the panel level show that there is a two-way interaction between foreign direct investments, economic growth and high-tech product exports.

Foreign direct investment (FDI) is the purchase of property and assets in another country to gain direct control (Kishor, Hamdard & Khan, 2020). Differentiating from foreign portfolio or indirect investment by the level of control exerted, FDI can be achieved through mergers, acquisitions, new facility construction, profit reinvestment, and intra-company loans. It encompasses equity, long-term and short-term capital, often involving management participation, joint ventures, and technology transfers (Jones, Serwicka, & Wren, 2020). As part of global factor movements, FDI is influenced by emerging market multinational enterprises (EMNEs). Franco, Rentocchini, and Vittucci (2011) classify FDI motives into market, non-marketable asset, and resource-seeking. Conducting an exploratory study on seven MNC subsidiaries entering the Polish market in the early 1990s, Gorynia, Howak, and Wolniak (2007) shed light on FDI motivations. Similarly, Hill and Munday (1994) explored the motivations for FDI and its distribution, offering developmental contributions to a theory explaining firms' FDI engagement.

The types of FDI vary depending on the host and investor nations (Herger & McCorriston, 2014). On the investor side, classifications include conglomerate, vertical, and horizontal FDI. Horizontal FDI copies the industry chain from the home country in the target country, while vertical FDI occurs when a multinational purchases a business to promote its products through

distribution channels or to take advantage of natural resources. Conglomerate FDI combines both horizontal and vertical components (Ali, 2020). Facilitated by several strategies, FDI can involve creating a fully owned subsidiary, purchasing stock in a related company, merging or acquiring another company, or participating in an equity joint venture (Calimanu, 2021). Incentives such as financial and land subsidies, tax holidays, overseas manufacturing regions, special economic zones, adjustments, favorable tariffs, low tax rates, relocation perks, and infrastructure assistance draw FDI and foster economic growth in host nations (Hill & Munday, 1994). Alfaro and Charlton (2009) argue that FDI literature identifies five main types: greenfield FDI, acquisitions, mergers, joint ventures, and consortiums. These strategies offer companies flexibility in global markets and adaptation to various business environments.

China's investment in Africa surpasses that of the continent's top three investors, indicating a significant presence and interest in the region (Cavusgil et al., 2017; Morisset & Pirnia, 2000). In practice, multinational corporations (MNCs) consider various factors when deciding on international investment destinations, including market size, trade conditions, economic stability, availability of human resources, quality of institutions, and potential profit retention (Moosa, 2002; Scaperlanda & Mauer, 1969). Market size contributes significantly to recruiting FDI, with larger markets offering economies of scale and becoming more attractive for investment. Secondly, institutional factors are increasingly recognized for their impact on economic performance and FDI attractiveness. Thus, countries with weak public institutions often experience slower growth and reduced entrepreneurial activity, while countries with strong institutions are more appealing for FDI due to the favorable business environment they provide. Moreover, the economic policy stability, particularly macroeconomic stability, is another critical factor influencing FDI decisions (Blonigen, 1997; Chakrabarti, 2001; Kinoshita & Campos, 2003). Similarly, skilled labor availability and cost are significant factors in the human resource dimension of FDI, with low-cost labor being attracted to locations with low-cost labor. Furthermore, the openness of a country, indicating its engagement in trade, is positively associated with FDI, aligning with global economic trends FDI (Wei & Shleifer, 2000).

Foreign direct investment (FDI) plays a significant role in economic recovery, particularly in developing and post-conflict nations. Studies by Botelho et al. (2021) and Turner et al. (2008) outline the capacity of international investment to stimulate economic revival, repair infrastructure, and decrease reliance on aid. Moreover, institutional strength has a reverse-U-shaped influence on FDI, and local financial markets are crucial for moderating the effect of international investment on economic development. In contrast, Yelpaala (2010) challenges traditional views on FDI in post-conflict transitions, advocating for policy shifts towards domestic, value-added investments. Additionally, Jonas and Bunte's (2018) study on Liberia's post-conflict strategy reveals varying growth outcomes from FDI in the natural resource sector, suggesting the need for tailored approaches. Furthermore, Appel and Loyle (2012) explore the link between post-conflict justice institutions and FDI, finding that implementing such institutions signals stability to investors, boosting FDI levels in post-conflict periods.

In postwar environments, attracting FDI is challenging due to risks of violence and political instability. Moore (2021) argues for policy improvements in transparency, governance, and international aid engagement to accelerate FDI recovery. Furthermore, Hanna, Hammoud, and Russo-Converso's (2014) study on FDI in Iraq highlights challenges like security issues and corruption, indicating the need for improved government policies to attract FDI.

The National Development Plan (NDP9) for Somalia aims to reduce poverty and promote economic expansion but faces challenges in domestic revenue and spending. The Federal Government of Somalia (FGS) has a small budget per person, struggles to increase tax collection, and has a weak formal economy with a non-existent domestic tax system (Zhang et al, 2023). Ali (2023) notes that the main cause of uneven tax compliance is the absence of an efficient tax administration system and low public trust in the government's capacity to deliver public services. Additionally, the FGS's spending trends show that administrative and recurrent costs

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predominate, with the social sector receiving very little funding. In 2018, 36% of expenditure went toward operational costs, including security costs, while 52% went toward administrative costs. In the same period, social sector received just 4.1% of the total budget (Abdi, 2022).

Somalia's economic landscape is deeply linked with its historical challenges, internal dynamics, and external support (African Development Bank, 2023). The government's efforts to address these challenges through development policies, as outlined in NDP9, reflect a commitment to transforming the economy and reducing poverty. However, the journey has been marked by financial constraints, limited domestic revenue, and the delicate balance of relying on international aid and remittances (Mutambo & Khalif, 2024). The diverse sources of international financing, including ODA, remittances, and security assistance, provide both opportunities and challenges. Remittances, worth US$1.5 billion in 2018 and 2019, accounted for one-third of Somalia's GDP, more than ODA and humanitarian aid combined, supporting around 40% of the population, primarily in certain lineages and clans (The United Nations, 2021). Additionally, there has been a steady rise in developmental ODA, which peaked in 2015 at US$773.9 million (Liptáková, Rigová, & Cibuľa, 2023).

While debt relief and increased ODA signal positive steps towards financial stability, there is still cause for concern about the government's ability to distribute monies fairly among various industries and areas. Furthermore, the reliance on humanitarian structures for service delivery, particularly during the Covid-19 response, underscores the need for a coordinated and sustained effort to strengthen the country's institutions and promote long-term development (NRC Global Assets, 2021). Additionally, the Somalia government emphasized the importance of repurposing donor funds after scaling up the Covid-19 humanitarian response plan to US$784.3 million in August 2020 (Federal Government of Somalia, 2020). Moreover, Somalia's economic landscape is influenced by geopolitical dynamics, with non-DAC donors playing a growing role. The distribution of ODA among regions reflects the challenges of delivering aid in conflict-affected areas (Ali, Dalmar, & Ali, 2018).

4. Model and Data Set
4.1 Data Set, Sample and Methodology

The study adopted descriptive correlational design. This non-experimental approach was suitable for understanding the complex interplay of variables such as inflation, trade balance, exchange rate, population growth, and economic growth. The population entailed economic indicators in Somalia, focusing on independent variables such as FDI, inflation, trade balance, exchange rates, and population growth. The sample consisted of time series data from 1970 to 2022, offering a significant temporal scope for analysis. Furthermore, purposive sampling was suitable for this study as it allowed for diverse data points relevant to the study goals.

Data sources for the study included official departments of the Federal Republic of Somalia and international organizations like the World Bank Group, IMF Reports, UNCTAD, World Investment Reports, IFS, Central Bank of Somalia, and SIPO. Secondary data was used to provide a broad temporal perspective, allowing an extensive analysis of how FDI, inflation, trade balance, exchange rates, and population growth collectively contribute to or hinder Somalia's economic growth. The data collection process was systematic, using a data collection sheet to ensure consistency and accuracy throughout the analysis. The study employed numerical statistical methods to analyze data on Somalia's GDP, FDI, INFL, TB, ER, and PG from 1970 to 2022. It adopted descriptive statistics, empirical analysis, and OLS regressions. Microsoft Excel was utilized for descriptive statistics and time series analysis for temporal trends, while Eviews version 12 software was used to investigate the link between macroeconomic factors, specifically interest-related variables.

4.2 Model Specification and Tests
4.2.1 ARDL boundary test

Using the variables listed in Table 3.1, the ARDL boundary test technique was used.

Table 1: Variables Used in the Analysis (Somalia, 1970-2022)

Variable	Definition	Source	Expected Sign
GDP	Real GDP per person (constant USD)	World Bank – WDI, The Central Bank of Somalia (CBS)	+
FDI	Net inward FDI inflows (as % of GDP)	UNCTAD - FDI Statistics, Somalia Investment Promotion Office (SIPO)	+
INF	Inflation rate (consumer prices, %)	World Bank - WDI	-
TB	Trade balance (as % of GDP)	World Bank - WDI	+
ER	Real effective exchange rate (index, 1970=100)	World Bank - WDI	+/-
PG	Population growth rate (%)	World Bank - WDI	+/-

Source: Researcher (2024)

Equation 1:

$$LGDPt = \beta_0 + \beta_1 LFDIt + \beta_2 ILNFt + \beta_3 LTBt + \beta_4 LERt + \beta_5 LPGt + \varepsilon_t$$

where:

- t indicates that the data are time series
- β_0 is the constant coefficient of the model
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the coefficients of the independent variables
- εt is the error term

Özarslan and Bayraç (2018) argue that analysis of time series far from stationarity often leads to spurious regression problems. Differential operations are used to ensure consistency, but they can eliminate information, causing the connection between the series to disappear. Therefore, tests suggest that non-stationary series can have stationary combinations and can be analyzed econometrically (Tarı & Yıldırım, 2009).

4.2.2 Unit root tests

With a critical value determined by MacKinnon (1991), the Augmented Dickey–Fuller (ADF) and Phillips Perron tests used the t-statistic to assess the null hypothesis of non-stationarity (determine if a sample of time series data has a unit root). The ADF statistic, a negative value, serves as the test metric. A more negative value signifies a stronger rejection of the unit root hypothesis at a given confidence level (Harvey, Leybourne, & Taylor, 2009). Regarding unit root tests, the method of evaluating involved applying the ADF test to a model of the form:

$$\Delta yt = \propto + \beta t + \gamma y_{t-1} + \delta 1 \Delta y_{t-1} + \cdots + \delta_{p-1} \Delta y_{t-p+1} + \in t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(i)$$

where:

- α is a fixed,
- β is the coefficient on a time trend,

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- γ is the coefficient on the lagged dependent variable (GDP)
- $\delta p-1$ are coefficients on lagged differences, and
- p is the lag order of the autoregressive process.

4.2.3 Structural break test

For structural break tests, Zivot-Andrews Unit Root Test was performed (Zivot & Andrews, 1992).

H_0 =There is unit root under structural breaks.

H_1 = There is no unit root under structural breaks

4.2.4 Autoregressive distributed lag (ARDL) model

The research adopted Autoregressive Distributed Lag (ARDL) model, developed by Pesaran, Shin, and Smith (2001). This model offers several advantages over other boundary tests, including the ability to test the model regardless of whether factors are I(0) or I(1) at the level, the use of the untainted Error Correction Model, which yields statistically more significant findings than the Engle-Granger model, and more reliable results in studies with limited observation numbers. In evaluating the economic impact of FDI on GDP, the cointegration relationship model is expressed in the following equation:

$\Delta LGDP = \beta_o + \sum_{i=1}^{m} \beta_1 + \Delta LGDP_{t-p} + \sum_{i=1}^{n} \beta_2 \Delta LFDI_{t-p} + \sum_{i=1}^{d} \beta_3 \Delta LINF_{t-p} + \sum_{i=1}^{1} \beta_4 \Delta LTB_{t-p} + + \sum_{i=1}^{w} \beta_5 \Delta LER_{t-p} + \sum_{i=1}^{q} \beta_6 \Delta LPG_{t-p} + \beta_7 LGDP_{t-1} + \beta_8 LFDI_{t-1} + \beta_9 LINF_{t-1} + \beta_{10} LTB_{t-1} + \beta_{11} LER_{t-1} + \beta_{12} LPG_{t-1} + \epsilon_t$……………....(ii)

Moreover, boundary test technique involved determining the lag length (p) in the second equation and examining coherence by applying the F-statistic to the first-period values of the dependent and independent variables, based on the test's hypotheses.

$H_0: \beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = \beta_{12} = 0$

$H_1: \beta_7 \neq \beta_8 \neq \beta_9 \neq \beta_{10} \neq \beta_{11} \neq \beta_{12} \neq 0$

4.2.5 Granger causality test

The Clive Granger test was used to establish the relationship between variables and their directions. Models iii and iv were used to estimate the direction of the relationship between FDI and GDP, determining whether FDI influences GDP in a bivariate (X, Y) relationship:

$\Delta GDP_t = \sum_{j=1}^{m} \alpha_t \Delta GDP_{t-j} + \sum_{j=1}^{m} b_t \Delta LFDI_{t-j} + \epsilon_t$……..(iii)

$\Delta LFDI_t = \sum_{j=1}^{m} c_t \Delta GDP_{t-j} + \sum_{j=1}^{m} b_t \Delta LFDI_{t-j} + \delta_t$……..(iv)

$E(\epsilon_t \epsilon_s) = E(\delta_t \delta_s) = 0 \qquad t \neq s \qquad$ …………………..(v)

The study investigated the Granger causality between two stationary time series, ΔFDI_t and $\Delta LGPR_t$, at the I (1) level. The basic hypothesis was tested, and the relationship between ΔFDI and Granger causality of $\Delta LGPR$ was revealed. The rejection of the basic hypothesis implied no causality relationship between the two variables (Afşar, Doğan, & Doğan, 2021).

4.2.6 Toda-Yamamoto causality test

The T-Y Causality test was performed on the premise that foreign direct investment (FDI) affects economic growth, and future economic growth can be predicted more accurately by considering past values of both FDI and economic growth. Toda and Yamamoto (1995) suggest considering a bivariate model with p lags and a relevant VAR model based on equations. To test for this causality, the VAR(p+dmax) equation of Yamamoto's causality test was demonstrated (Dritsaki, 2017).

$$\begin{bmatrix} GDP_t \\ FDI_t \end{bmatrix} =$$

$$\begin{bmatrix} \phi_0^{GDP} \\ \phi_0^{FDI} \end{bmatrix} + \begin{bmatrix} \phi_{11,1} \phi_{12,1} \\ \phi_{21,1} \phi_{22,1} \end{bmatrix} \begin{bmatrix} GDP_{t-1} \\ FDI_{t-1} \end{bmatrix} + \ldots + \begin{bmatrix} \phi_{11,p+d_{max}} \phi_{12,p+d_{max}} \\ \phi_{21,p+d_{max}} \phi_{22,p+d_{max}} \end{bmatrix} \begin{bmatrix} GDP_{t-p+d_{max}} \\ FDI_{t-p+d_{max}} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \end{bmatrix} ..(vi)$$

In equation vii, Estimating the VAR(p+dmax) model, coefficient matrices Φ were determined using information criteria, and the model was stable. The "dmax" value was added to the appropriate number of lags in the causality test, and the variables were stationary at first difference, "dmax=1".

4.3 Empirical Results

4.3.1 Descriptive results

According to results in Table 4.1, with an average log of GDP of 2.523218, FDI of 2.344619, inflation of 3.833754, population growth of 2.268244, and trade balance of 4.277483. The median results show that LGDP is 2.78795, LFDI is 2.344619, LER is 0.774031, LINF is 10.72849, LPG is 2.333414, and LTB is 4.39073. However, all variables, except LER, reported negative skewness, with -3.67813, 1.00713, -1.16488, -2.24396, and -1.66262 for LGDP, LFDI, LINF, LPG, and LTB, respectively. The Kurtosis statistics show that LER is leptokurtic, while LGDP, LFDI, LINF, LPG, and LTB are platykurtic.

Table 4.1: Descriptive Result

Statistic	LGDP	LFDI	LER	LINF	LPG	LTB
Mean	2.523218	2.344619	0.988405	3.833754	2.268244	4.277483
Median	2.78795	2.640609	0.774031	3.843421	2.333414	4.39073
Maximum	2.970515	2.704478	3.675975	4.94805	3.006152	4.583023
Minimum	-1.18727	1.132949	-1.18587	2.14558	0.906803	0.031398
Std. Dev.	0.661364	0.481906	0.906576	0.374436	0.314765	0.606755
Skewness	-3.67813	-1.00713	0.551494	-1.16488	-2.24396	-1.66262
Kurtosis	1.99166	2.317833	3.667235	2.71358	2.00292	2.025963
Jarque-Bera	3.0853	9.987324	3.669779	2.3806	5.2155	4.496305
Probability	0.003486	0.006781	0.159631	0.006591	0.003792	0.002547
Sum	133.7306	124.2648	52.38549	203.189	120.2169	226.7066
Sum Sq. Dev.	22.74491	12.07614	42.73781	7.290516	5.152015	19.14387
Observations	53	53	53	53	53	53

4.3.2 Unit root results

The study investigated the existence of unit rout or non-stationarity in variables using ADF and PP tests. The findings showed that LPG and LTB were stationary at level, indicating that most variables used in the research were steady during the research period. The stationarity degrees of the variables were considered as I(1), as they were stationary after being converted to first difference.

Table 4.2: ADF Unit Root and Phillips-Perron Tests

Variable	Augmented Dickey-Fuller (ADF) Test				Phillips-Perron (PP) Test				Order of Integration
	@ Level		1st Difference		@ Level		1st Difference		
	t-stat.	p-value	t-stat.	p-value	t-stat.	p-value	t-stat.	p-value	
LGDP	-2.924	0.882	-6.925	0.000	-3.025	0.039	-3.840	0.000**	1(1)
LFDI	-1.374	0.587	-6.139	0.000	-2.597	0.053	-2.597	0.013**	1(1)
LEX	-4.118	0.373	-9.840	0.000	-2.918	0.950	-2.920	0.000**	1(1)
LPG	-4.387	0.001	-5.791	0.000	-4.676	0.000	-4.678	0.000**	1(0)
LINF	-4.588	0.076	-7.262	0.000	-4.257	0.067	-4.297	0.000**	1(1)
LTB	-7.857	0.000	-8.076	0.000	-8.455	0.000	-8.479	0.000**	1(0)

* At the 5% probability stage, the unit root null hypothesis is rejected.

4.3.3 Structural break test

Based on Table 4.3, the study rejects the null hypothesis that GDP has a unit root with a structural break in both the intercept and trend. The test statistic (-6.3953) was more negative than the critical values (-5.31), -5.94, and -6.12, indicating a structural break in the series at the 1%, 5%, and 10% significance levels. This results in the null hypothesis of the unit root being rejected, indicating a stationary at first difference variable with a breakpoint in 1991, which is crucial given the outbreak of civil war in Somalia in 1991.

Table 4.3: Zivot-Andrews test statistic

Variable	At Level 1(0)			First Difference		
	Test-Statistic	Break-Time	Prob.	Break-Time	Test-Statistic	Prob.
LGDP	-4.9573	1993	0.271	1991	-6.3953	<0.05
LFDI	-2.1648	1991	0.282	1994	-4.4613	<0.05
LFE	-5.3005	1992	0.371	1997	-7.1431	<0.05
LPG	-4.5941	1997	0.504	1994	-5.8116	<0.05
LINF	-5.4322	1994	0.129	1993	-7.3374	<0.05

LTB	-8.301	1995	0.002	1995	-9.652	<0.05
Sig. Critical Values						
1%	-6.12					
5%	-5.94					
10%	-5.31					

Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process

Chosen breakpoint*1991

4.3.4 Cointegration test

The bound cointegration test, developed by Pesaran et al. (2001), confirmed a long-term link between parameters in the ARDL model. The test can be applied to variables with I(0), I(1), or both orders of integration. The results showed an ongoing connection between the model's factors, rejecting the null hypothesis of no cointegration. The required value of Pesarian F statistics is 7.51, exceeding the critical value of 6.3 at a 1% level. The results were summarized in Table 4.4.

Table 4.4: Cointegration Test Results

			Critical importance limits derived from the 2001 values of Pesaran et al.		
Test statistic	Value	degree of statistical significance	I(0)	I(1)	
F- statistic	7.51394	1%	2.7343	6.3200	
		5%	1.8557	4.5600	
		10%	1.5015	3.8283	

Table 4.5 displays the ARDL extended coefficients, which were established using the SIC Information Criterion and lag lengths of (2,2,0,0,0,1). The findings show that GDP is positively and statistically significantly impacted by trade balance, population growth, and foreign direct investment. This implies that a 1% rise in FDI is equivalent to a 0.05% rise in GDP. Given that the present proportion of FDI in total investment is around 6.1%, the GDP is expected to benefit from this rise. On the other hand, a 1% rise in FDI results in a 0.750517 improvement in GDP. The modified R^2 value is 0.920762 and the coefficient of multiple determinants, also referred to as the goodness of fit (R^2) value, is 0.931638. This suggests that the dependent variable (GDP) has more than 95% variance due to the independent factors.

Table 4.5: Long-Term Coefficients and Regression Results

Variables	Coefficients	P-Value
LGDP(-1)	0.655691	0.0002*

LFDI	0.750517	0.0002*
LER	-0.11873	0.0001*
LTB	0.359368	0.0153**
LPG	0.489584	0.0277**
LINF	-0.049455	0.0001*
C	0.151526	
R-squared	0.931638	
Adjusted R-squared	0.920762	
F-statistic	85.66149	
Prob(F-statistic)	0.000000**	
Durbin-Watson stat	1.628692	

Note: * and ** imply the 1% and 5% significance stages, appropriately.

4.3.5 Error correction model test results

When the ARDL short-term error correction coefficient is examined, it is seen that the ECT coefficient is negative (-0.74) as expected and is statistically significant. The ARDL adjustment results show a calculated short-term relationship, with appropriate lag values determined and presented in Table 4.6.

Table 4.6: Error Correction Model Test Results

Variables	Coefficient	T-Statistic	P-Value
DLGDP(-1)	0.652781	2.840319	0.0119**
DLGDP(-2)	0.655691	3.240929	0.0023**
DLFDI	-3.32918	0.319251	0.0528**
DLFDI (-1)	0.860342	1.276086	0.0394**
DLFDI (-2)	0.750515	2.468077	0.0176**
DLER	-0.11873	-2.069515	0.0445**
DLINF	-0.22595	-2.27826	0.0277**
DLPG	0.049455	0.870458	0.3889
DLTB	0.359368	3.058107	0.0038**
ECT(-1)	-0.748532	-3.117284	0.0586**
C	0.151526	0.274516	0.0437**

* At the 5% statistical degree, the unit root null hypothesis is rejected.

Origin: Computed by Author from (E-Views 12.0 iterations Results) Test of ARDL and Long Run Form.

The study found significant probability values in Table 4.7, rejecting the null hypothesis, indicating Granger causality between FDI and Somalia's economic growth, contradicting Mohamed and Isak's (2017) findings.

Table 4.7: Granger Causality Wald Tests

Null Hypothesis	Chi-Square, X2	Probability	Decision
LFDI does not Granger-cause LGDP	5.9374	0.0258	Rejected
LGDP does not Granger -cause LFDI	4.2653	0.0409	Rejected

The test results showed a bidirectional causality between foreign direct investment (FDI) and economic growth in Turkmenistan, contradicting previous studies that found a unidirectional relationship (Wondimu, 2023). These findings align with Gürsoy, Sekreter, and Kalyoncu (2013), which also established a bidirectional causality between FDI and GDP. The findings were summarized in Table 4.8 below:

Table 4.8: Toda-Yamamato causality test

Null Hypothesis	Lag (k)	Lag (k+dmax)	Chi-sq	Prob.	Direction and Sign of causality	Decision
FDI does not Granger Cause GDP	1	1+1	9.233**	0.0426	FDI$\nRightarrow$GDP	Reject
GDP does not Granger Cause FDI	1	1+1	6.207*	0.0371	GDP$\nRightarrow$FDI	reject

*Critical values were generated at a 5% significance level

3.1 Stability (Diagnostic) test results

According to Table 4.9, the model is well specified. Both the dependent and independent variables have a linear relationship under investigation, p>0.05.

Table 4.9: Ramsey Reset Test

Specification: GDP GDP(-1) FDI FDI(-1) FDI(-2) FDI(-3) ER ER(-1) ER(-2) ER(-3) er(-4) PG PG(-1) TB TB(-1) TB(-2) TB(-3) TB(-4) C @TREND

Rasey RESET Test

	Value	df	Probability
t-statistic	0.083688	29	0.9399
F-statistic	0.007004	(1,29)	0.9339
Likelihood ratio	0.011832	1	0.9134

3.2 Heteroscedacity test

The analysis adopted ARCH Heteroscedacity Test. Since the F-Statistics and Observed R-Square probabilities (0.4109 and 0.3862 respectively) are greater than 0.05. Therefore, there is no problem of Heteroskedasticity. The ARCH approach was considered more reliable than the Breusch test. These results were presented in Table 4.10.

Table 4.10: Heteroskedasticity test: ARCH

| Heteroskedasticity Test: ARCH			
F-statistic	1.015621	Prob. F (4,40)	0.4109
Obs*R-Square	4.148921	Prob.Chi-Square (4)	0.3862

3.3 Auto-correlation test

The study adopted Serial Correlation LM Test to justify the presence of auto correlation. According to the results in Table 4.10, the analysis confirmed absence of auto correlation as revealed by the 0.0669 and 0.2558 probabilities respectively as shown in Table 4.11.

Table 4.11: Breusch-Godfrey serial correlation LM test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 4 lags			
F-statistic	1.418393	Prob. F (4,26)	0.2558
Obs*R-Squared	8.777194	Prob. Chi-Square (4)	0.0669

The model's integrity was verified using Cumulative Sum (CUSUM) and CUSUM of squares structural breakdown tests at 5% significance. The model remained stable as the cumulative total and cumulative squares of residuals were within critical lines, indicating no structural break (Figure 1 below).
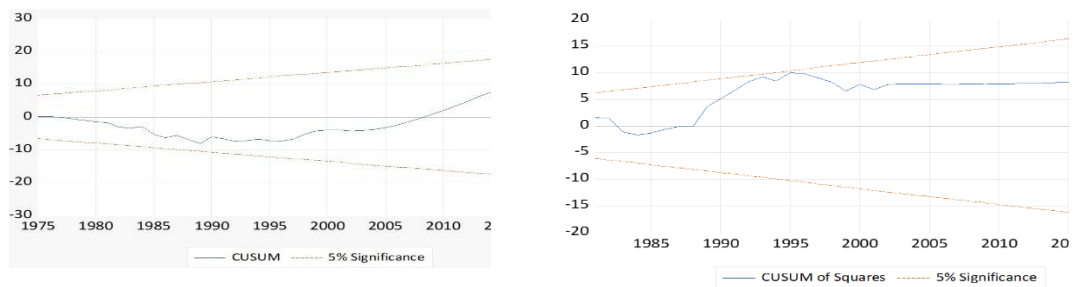
Figure 1: CUSUM and CUSUM of Squares Test

4.4 Conclusion

The study concludes that foreign direct investment (FDI) positively impacts Somalia's prosperity by promoting growth in key sectors. Long-term, lag FDI benefits are significant, even if initial inflows do not immediately translate into increased GDP. These results also coincide with Özdemir and Koyuncu (2023) and Özmerdivanlı and Akgül (2024). Population growth also positively impacts GDP growth, leading to increased economic activity and output. Additionally, maintaining a favorable trade balance, where exports exceed imports, contributes to sustained

economic expansion. The real exchange rate depreciation and lower inflation contribute to higher long-run GDP growth. The analysis supports the complex relationship between development and FDI, suggesting the importance of long-term planning and investment strategies to harness the benefits of FDI for economic growth. Therefore, Somalia's government should implement targeted policies to attract and retain FDI, including tax incentives, streamlining investment procedures, addressing business costs, and improving infrastructure. The government should also focus on improving the country's trade balance by diversifying exports and reducing import dependency. To meet the demands of an expanding population, the government should prioritize education and skill development, increasing funding for education, expanding vocational training programs, and promoting lifelong learning opportunities. Furthermore, policy implementation to promote price stability and control inflation should include sound monetary policies, improving food security, and enhancing regulatory frameworks. Finally, further analysis could be enhanced by investigating alternative econometric models, which may provide different perspectives and potentially different results.

Etik Beyan

"Doğrudan Yabancı Yatırımın (DYY) Somali'nin Ekonomik Büyümesine Etkisi: ARDL Sınır Testi" başlıklı çalışmanın yazım sürecinde bilimsel kurallara, etik ve alıntı kurallarına uyulmuş; toplanan veriler üzerinde herhangi bir tahrifat yapılmamış ve bu çalışma herhangi başka bir akademik yayın ortamına değerlendirme için gönderilmemiştir. Bu çalışma etik kurul kararı zorunluluğu taşımamaktadır. Makale, Etik Kuralları Yayın Etiği Komitesi'nin (Committe on Publication Ethics-COPE) yazar, hakem ve editörler için belirlemiş olduğu kurallardan oluşturulmuş olan Anasay Dergisi etik kuralları çerçevesinde yazılmıştır.

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