The Role of Agriculture in Economic Development in Somalia

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Abstract
This study investigates the relationship between agriculture and economic growth in Somalia over the period from 1980 to 2020. The research objectives encompassed describing the role of agriculture employment, agriculture exports, and crop production in contributing to economic development during the specified time frame. To achieve these objectives, the study employed the Autoregressive Distributed Lag (ARDL) model, a form of regression analysis that utilizes historical data to identify relationships between variables. The dependent variable chosen to represent economic development was the Gross Domestic Product (GDP), while the independent variables included the agriculture employment rate, agriculture exports, and crop production. Data analysis was performed using E-views software, and descriptive statistics and graphical representations were utilized to present the findings effectively. Secondary data were sourced from reputable institutions such as the World Bank, International Monetary Fund (IMF), and the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC) for the extensive period from 1980 to 2020. The results revealed a positive relationship between the agricultural sector and Somalia's GDP, indicating that an increase in agricultural activities positively impacted the country's economic growth. These findings highlight the significance of agriculture as a driving force behind economic development in Somalia during the examined period. As such, policymakers and stakeholders should consider investing in and promoting the agriculture sector to foster sustainable economic growth in the country.
Keywords: Agriculture, Economic Growth, Somalia, Autoregressive Distributed Lag (ARDL), Gross Domestic Product (GDP)

Introduction

The role of agriculture in driving economic development has been a subject of significant interest in the context of Somalia. Early studies in the 1950s focusing on the economic history of agriculture in the country during the seventeenth and eighteenth centuries have influenced theoretical narratives (Andersson et al., 2021). These studies portrayed agriculture as a critical factor for industrialization and had a lasting impact on the understanding of Somalia's economic growth trajectory (Todaro & Smith, 2020).

There is hardly any increase of agricultural employment during the 90s (1994-00), while employment in certain sub-sectors of agriculture like livestock, forestry and fishing has in fact decline (Li et al., 2019). Consequently, there has been a decrease in agricultural employment across numerous states. In those states where employment in this sector has risen, the observed trends may not be indicative of positive developments (De Haas et al., 2019). Push as well as pull factors appear to have been responsible for these spatial trends in agricultural employment (Hoffmann et al., 2019). In agriculture, the share of female workers has increased at the aggregate level; though there are states registering a decline in the corresponding share. From certain states there are also evidences of male workers crowding out female workers in agriculture (Pattnaik & Lahiri-Dutt, 2022). Labor productivity in agriculture has increased; this increase is associated with almost a complete decline of agricultural employment in the 1990s (Zimmermann, 2020).

The real wages for agricultural workers has increased consistently during the 90s, though certain indices of agricultural productivity have not increased significantly (Erten & Leight, 2021). A regression analysis to explain the factors behind real wages in agriculture shows that the effect of labour productivity on real wage has decreased while that of the labour-land ratio has increased during the reference period (1983-99)(Sen, 2019). In other words, in agriculture the labour market influence of demand decreases while that of supply has increased. The effect of the statutory minimum wages on agricultural wages appears to have increased during the 1990s (Manning, 2021). Though disparity in wages across states has declined during the 90s, wages in certain states like Punjab and Haryana remain higher than in many other states. Only recently (2001-03), the real wage in these states has decreased suggesting that increase of wage incommensurate with the increase in agricultural productivity cannot be sustained for long (Lamba & Subramanian, 2020).

The history of Somalia's economic development comprises diverse developments within the nation and its interactions with other countries in the region and the rest of the world (Manning, 2021). Understanding agricultural developments at the national level is crucial because significant changes in agricultural production and productivity can be revealed through this approach (Kukal & Irmak, 2018). Moreover, quantitative and qualitative information about output, productivity growth, and related factors is often available at the national level making it a critical focus for analysis (Stam & Van de Ven, 2021) . While traditional approaches to economic development assumed that agriculture's role was to provide the resources required for funding industrial sectors, the experience of Somalia since World War II has challenged this notion(Willis, 2020). The country's unique circumstances and challenges have led to a reevaluation of the role of agriculture in its economic development (Ableeva et al., 2019).

Increased agricultural output and productivity are considered vital contributors to overall economic growth in Somalia (Mohamed & Nageye, 2021). The study presents five propositions highlighting the significance of agriculture in economic development in the country. These include meeting growing demands for agricultural products, expanding agricultural exports to increase income and foreign exchange earnings, providing the labor force for expanding sectors, and making a net contribution to capital for investment in secondary industries (Praburaj et al., 2018). However, achieving economic development in Somalia requires the creation of economic and social overhead capitals to improve overall well-being and living standards (Mohamed, 2023). Capital formation plays a crucial role in this process, and both internal and external sources are instrumental in fostering economic growth in the country (Ioan et al., 2020). Agriculture remains a significant driver of economic activity in Somalia, contributing to employment opportunities and income generation (Lwanga-Ntale & Owino, 2020). However, the sector faces several challenges, including armed conflicts, natural disasters, and limited access to resources, hindering its full potential (Rondeau et al., 2020).

Given the importance of agriculture for economic growth in Somalia, this study seeks to investigate the specific contribution of agriculture to the country's economic development (Warsame et al., 2023). By analyzing historical efforts, internal and external factors, and potential strategies, the study aims to gain valuable insights into leveraging agriculture for enhancing economic growth in Somalia.

Therefore, this research aims to bridge the gap between economic history and development theory by providing numerous case studies that shed light on the position of agriculture in modern Somali economic growth (Haula & Agbozo, 2020). The findings from these studies are intended to be beneficial for economic historians, development theoreticians, agricultural economists, and social scientists, particularly in Somalia where agriculture remains a vital sector of the economy.

Methodology
This research aims to explore the connections between GDP as the explained variable and four explanatory variables: AGEMP, AGEXP, CRP, and AGRI. To achieve this, the study adopts a quantitative approach using the Autoregressive Distributed Lags (ARDL) model, which has gained popularity for its efficacy in analyzing short- and long-term correlations among variables. Employing the ARDL model allows the researchers to gain valuable insights into the dynamics and interactions of these economic indicators and their influence on GDP.

The time series data utilized in this thesis comprises annual, semiannual, quarterly, and monthly data. To streamline the data collection process and ensure efficiency without compromising quality, the researchers opted for secondary data collected at the country level. The data was sourced from reputable institutions like the World Bank, SESRIC, and trading economics. This choice not only reduced data collection time but also provided accurate and comprehensive information, effectively saving costs.

The study carefully selected specific variables to examine their impact on Somalia's GDP. These variables include agriculture, agriculture employment rate, agriculture exports, and crop production. Data on these variables were collected from the World Bank database and SESRIC, allowing for a detailed analysis of their relationships with GDP. In conducting the

regression analysis, the researchers utilized Electronic Views (E-views) software to test and run the models. By utilizing this tool, the study ensures efficient and accurate regression analysis, facilitating a comprehensive understanding of the relationships among the variables and their effects on GDP in Somalia.

Lag Selection

To determine the optimal lag for each variable in the ARDL framework, various approaches can be considered. However, in small samples, the Akaike Information Criterion (AIC) tends to provide more accurate estimates than the Schwarz Information Criterion (SIC), as suggested by Pesaran and Shin (1998). The SIC criteria tend to overestimate the number of lags required, which is not ideal for small samples where the number of observations decreases with increased lag length. To ensure a cohesive model, the AIC criteria will be used to limit the lag order for both the Augmented Dickey-Fuller (ADF) test and the ARDL model. Additionally, it is essential to address potential biases related to serial correlation, heteroskedasticity, misspecification, and non-normality, as advised by Pesaran et al. (2001), by adjusting the lag duration accordingly.

Unit root test

The researchers performed stationary tests on the variables before estimating the equation to prevent potential issues with spurious regression. The objective of these tests was to determine whether the time series data exhibited stationarity or non-stationarity. If the data series, after being differenced, was found to be stationary, it could be integrated to the order of one or greater. However, if the differenced series remained non-stationary, it indicated the presence of a non-stationary series.

To evaluate the presence of unit roots in the data, the researchers utilized the Augmented Dickey-Fuller and Phillips-Perron tests. These tests are designed to test the null hypothesis of non-stationarity. If the null hypothesis cannot be rejected, indicating non-stationarity, appropriate differencing would be required to induce stationarity for further analysis. Conversely, if the null hypothesis is rejected, implying stationarity, differencing may not be necessary. By conducting these tests, the researchers ensured that the time series data used in the analysis was stationary, avoiding the problem of spurious regression and enhancing the reliability of their results.

Bound Test

The bound test is employed to determine the existence of a long-run relationship between variables. If the test statistic value falls below the lower bound critical value (I(0)), the null hypothesis is not rejected, indicating no long-run relationship. On the other hand, if the test statistic value exceeds the upper bound critical value (I(1)), the null hypothesis is rejected, signifying the presence of a long-run relationship. In this particular analysis, the F-statistic value is below the lower bound critical value I(0), leading to the non-rejection of the null hypothesis. Thus, it is concluded that there is no long-run relationship between the variables at both 1% and 5% significance levels.

Autoregressive Distributed Lags

To examine the short-run and long-run relationship between the macroeconomic indicators and the stock market, the study employs the Autoregressive Distributed Lags (ARDL) method. Initially introduced and developed by Pesaran & Smith (1995) and further refined by

(Bertsatos et al., 2022). the ARDL method has gained widespread usage due to its numerous advantages over traditional statistical methods in assessing cointegration and short/long-run relationships. By utilizing the ARDL approach, this study aims to gain valuable insights into the dynamics and interactions between the macroeconomic indicators and the stock market, providing a comprehensive understanding of their relationships over different time horizons.

Model Specifications

In this study, the mathematical specification represents the transformation of the theoretical relationship into a mathematical form. The functional relationship between the variables, Employment Rate (AGEMP), Agriculture Export (AGEXP), Crop Production (CRP), and the Economic Development (GDP) of Somalia, is expressed as follows:

GDP = F (AGEMP, AGEXP, CRP) .... (1)

Where GDP represents the Gross Domestic Product, AGEMP is the Agriculture Employment Rate, AGEXP is the Agriculture Export, and CRP is the Crop Production.
To further simplify the equation, it can be written in linear form:

$GDP = \beta0 + \beta1 * ER + \beta2 * AE + \beta3 * CRP + \mu$ (2)

Where GDP is the Economic Development (dependent variable), $\beta0$ is a constant, $\beta1$ to $\beta3$ are the slope coefficients representing the marginal increment of Economic Development, ER represents Employment Rate, AE represents Agriculture Export, CRP represents Crop Production (independent variables), and μ is the error term or residual (representing other explanatory variables not mentioned in the model). The study utilizes the Autoregressive Distributed Lags (ARL) model to analyze and interpret the relationships between these variables, aiming to gain valuable insights into the impact of Employment Rate, Agriculture Export, and Crop Production on the Economic Development (GDP) of Somalia.
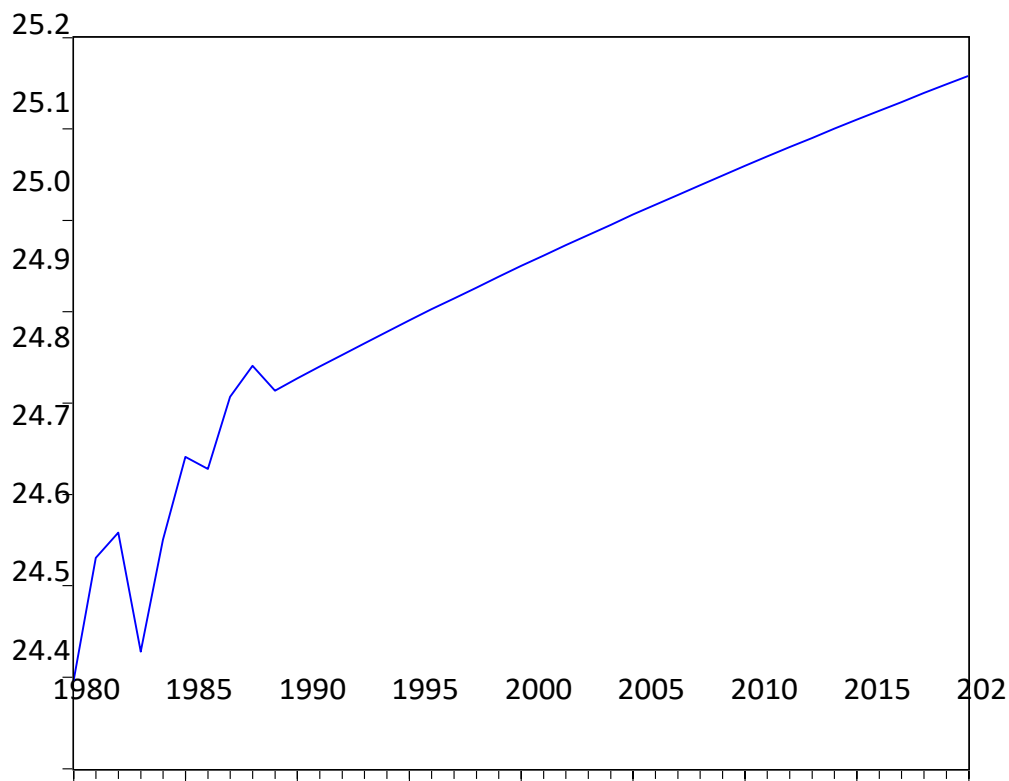

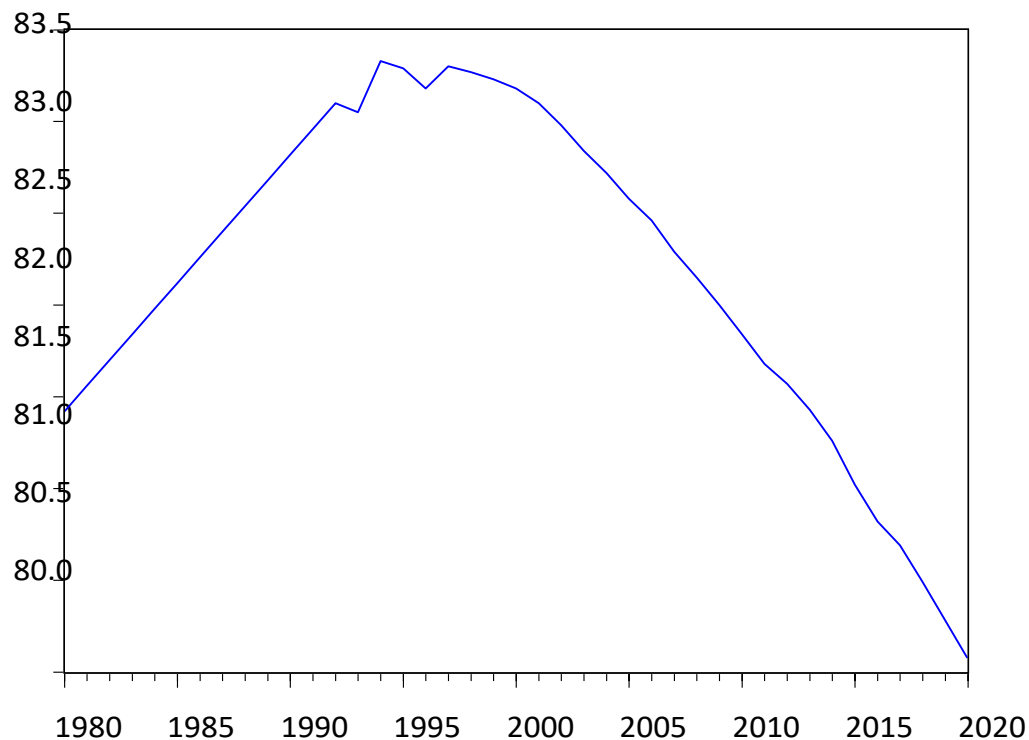Figure 1 Gross Domestic Product (GDP)

Figure 2 Agricultural and Economic Growth

Figure 2 illustrates the trends in agriculture and economic growth in Somalia from 1980 to 2020. The data indicates a noteworthy pattern of agricultural activity during this period. From 1984 to 2020, there has been a consistent increase in agricultural production, signifying a positive development in the sector. However, between 1982 and 1983, there was a smooth decline in agriculture, possibly attributed to a drop in production levels or a loss in the market for agricultural products.

Furthermore, the figure displays fluctuations in agriculture exports. Specifically, there was a decrease in agricultural exports from 1983 to 1985, followed by an increase from 1985 to 2020. These export trends could have played a role in influencing the country's economic growth during this period. Somalia experienced a period of robust economic growth with annual increases in employment from 1980 to 1990. However, after the collapse of the state, the nation encountered a significant decline in economic growth rates, leading to widespread unemployment. The country's economy was heavily impacted by civil wars, droughts, natural disasters, and the subsequent decrease in agricultural production, which also contributed to a decline in its Gross Domestic Product (GDP) over time.

One noticeable factor affecting the overall pattern in Figure 2 is the influence of natural climate change. Fluctuations in the Climate Resilience Index (CPR) are evident between 1980 and 2020. After 1990, the country experienced a series of civil wars and environmental challenges like droughts and natural disasters, which further impacted agricultural production and subsequently contributed to a decrease in the CPR. This decline in CPR likely had adverse effects on the overall GDP of the country.

Bound Test
As previously stated, the bound test is used to determine if there is a long-run relationship.

Table 1

GDP as dependent variable F bound test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	**I(1)**
Asymptotic:n=1000				
F-statistic	1.57233	10%	2.2	**3.09**
K	4	5%	2.56	**3.49**
		2.5%	2.88	**3.87**
		1%	**3.29**	4.37

Table 2

 CRP as dependent variable F bound test

F-Bounds Test		relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic:n=1000				
F-statistic	2.11387	10%	2.2	3.19
K	4	5%	2.56	3.49
		2.5%	2.88	3.27
		1%	3.29	4.60

The joint analysis of the four independent variables (Agricultural employment, agricultural export, crop production, and agriculture) reveals a positive relationship with the Climate Resilience Index (CRP) of Somalia and its Gross Domestic Product (GDP). Table 2 provides the estimated partial coefficients for each independent variable. The partial coefficient of CRP is approximately $0.57553, suggesting that a one-unit increase in crop production, while keeping other factors constant, will lead to an average GDP increase of $0.57553 million. Similarly, there is a positive relationship between Agricultural employment and GDP of Somalia, with an estimated partial coefficient of approximately $2.088300. This means that a one percentage point increase in Agricultural employment, while other independent factors remain constant, will result in an average GDP increase of $2.088300.

Furthermore, the analysis indicates a positive relationship between GDP and Agriculture (AGRI) of Somalia, with an estimated partial coefficient of approximately $9.46E-05. Hence, a one-unit increase in agricultural production, while keeping other explanatory factors constant, will contribute to an average GDP increase of $9.46E-05 million.

Likewise, there is a positive relationship between GDP of Somalia and Agricultural export (AGEXP), with an estimated partial coefficient of approximately $5.52E-08. This suggests that a one-unit increase in agricultural exports, while other independent factors remain constant, will lead to an average GDP increase of $5.52E-08 million. It is noteworthy that the intercept

value of the multiple regression model is approximately -$65.72387, indicating a negative value. This economically meaningful value suggests that if all independent variables (Agricultural employment, agricultural production, crop production, and agricultural export) were fixed at zero, the average Gross production (GDP) of Somalia would decrease by $65.72387 million.

Discussion

This research investigated the determinants of Economic Growth in Somalia spanning the period 1980 to 2020. The study collected annual time series data from various sources, including trading economics, the World Bank, mundi index, and world development indicators. The primary objective was to analyze the role of agriculture in the country's economic development. Descriptive statistics were initially employed to summarize and describe the data series before conducting further analysis. To estimate the parameters of the model, a correlation matrix approach was utilized to assess potential multicollinearity among the independent variables. Additionally, a Heteroskedasticity test was conducted tocheck for any instability in the variance of residuals. The study employed the auto-distributed lag (ARDL) method using the E-views software package to perform the regression analysis. The four factors under consideration for their impact on economic growth in Somalia were Agricultural production (AGRI), Agricultural Export (AGEXP), Agricultural Employment (AGEMP), and Crop production (CRP).

The research findings revealed the key factors influencing economic growth in Somalia, which can contribute to the improvement of economic conditions. Specifically, the results indicate a positive impact of crop production on economic growth, suggesting that an increase in crop production leads to higher GDP growth. Similarly, agricultural export demonstrated a positive influence on economic growth, implying that higher agricultural exports correlate with increased economic growth. The study also revealed a positive impact of agricultural employment on economic growth which indicates that a rise in agricultural employment contributes to GDP growth. Lastly, agricultural production emerged as a significant and positively correlated factor with economic growth which means that an increase in agricultural production is associated with higher levels of economic growth.

Conclusion

This study has examined the trends of Agriculture and economic growth in Somalia from 1980 to 2020, revealing cyclical fluctuations in both variables during the period under investigation. Besides, the research has explored the relationship between Agriculture and economic growth using correlation and regression analysis with hypothesis testing which indicates a positive association between the two.

To analyze the data spanning from 1980 to 2020, we utilized the Autoregressive Distributed Lag Bounds Testing (ARDL BT) co-integration approach. The findings demonstrate a long-run relationship among the variables, even at the individual variable level. Additionally, the study reveals a positive and statistically significant impact of agriculture on economic development. The model's specification was also confirmed through the Ramsey test.

Recommendations

Given that Somalia is still a developing country with a low level of skilled labor and a reliance on importing capital and intermediate goods, the government is advised to focus on

industrialization and adopting modern agricultural techniques. Enhancing agricultural productivity in this way can lead to higher employment rates and increased economic growth. Furthermore, promoting the exportation of goods and services will contribute to achieving a favorable balance of payments, which is essential for maintaining a healthy economy and fostering further economic growth. These measures can play a vital role in advancing the economic conditions and prospects of Somalia.

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