

THE EXCHANGE RATE AND ECONOMIC GROWTH: AN EMPIRICAL ASSESSMENT OF SOMALIA

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Abstract

The purpose of this research investigation is to determine the effect of the exchange rate with control variables including inflation, capital, and labor, on economic growth by using data spanning from 1989 to 2018 in Somalia. ARDL bounds testing approach was employed to model the long-run and short-run cointegrations and the causality directions respectively of the scrutinized variables. The empirical results of the study found a long and a short cointegration between the variables. It revealed that exchange rate, inflation, and capital improves the economic growth of Somalia in the long-run and short-run both, whereas labor harms economic growth both in the long and short runs. Capital is seen to contribute to long-term gross domestic product (GDP). Long-term economic growth of 1.079 percent is induced by a 1% increase in capital, suggesting that capital growth is more responsive to economic growth than other variables. Therefore, policymakers should establish a strategy to expand the economy by promoting the economy's most important drivers, such as exchange rates, capital, and inflation, and address drivers that impede the country's economic growth, such as the labor force.

Keywords: Exchange Rate, GDP, Inflation, Capital, ARDL, Labor Force, Somalia

1. INTRODUCTION

The Exchange Rate (ER) is the price of one currency to another (Asid et al., 2012). According to other authors, exchange rate volatility is the continual variation in exchange rates that has recently generated a lot of discussion in the literature because of its implications for developing countries (Ozata, 2020; Barguelli et al., 2018). The connection between the exchange rate and economic expansion has remained a contentious issue (Deeviya Patel, 2018). The exchange rate has always been a crucial economic factor since open economies are affected by changes in other macroeconomic indices (Agbugba & Onyeaka, 2018). According to some economists, ER is an endogenous variable whose impact on growth may be difficult to distinguish (Habib et al., 2017). Therefore, economic growth can be considered as an increase in the country's Gross Domestic Product (GDP) (Utile et al., 2018). The accumulation of capital through all forms of investment, population growth, which will raise the need for labor, and technological advancement are the three fundamental drivers of economic growth (Ozata, 2020). The importance of the exchange rate to the country can be summed up by how many industries it affects, an imported goods will be inexpensive in the home market if the domestic currency appreciates relative to other currencies, which will make foreign competitors' products more appealing to consumers (Barguelli et al., 2018). If the country has a strong currency, then its goods become expensive in the international market. There are various contradictory hypotheses regarding the effects of Exchange Rate Intermediate Regimes on the economies of

emerging countries, but according to the corner solution, Exchange Rate Intermediate Regimes cannot persist under conditions of capital movement (Ashour & Chen Yong, 2018).

In emerging nations, exchange rate volatility has been viewed as an issue (Frankel, 2003). In emerging nations, exchange rate volatility has been viewed as an issue (Khan, 2021). Exchange rates have a significant impact on international trade, investment, finance, tourism, and migration (Conrad & Jagessar, 2018). No one can dispute the relevance of understanding foreign exchange rate market behavior due to the exchange rate's huge importance to an economy (Nageye, 2017).

A country's economy is considered to be growing if its real GDP rises. Economic growth is a measure of this growth (Kala et al., 2018). studies are showing that exchange rate volatility has a positive effect on international trade and economic growth (Ozata, 2020).

A key economic concern nowadays is the relation between inflation and economic growth. The economic literature has contested this relation and revealed several relationships between it and global economic situations (Goya Kala et al., 2018).

As labor/man is the driving force behind all factors of production, labor not only serves as one of the factors of production used in the manufacturing process, but it also becomes the most significant element of the other factors. The number of workers has a positive and considerable impact on economic growth, which will rise as that number rises (Goya Kala et al., 2018).

In the context of Africa, Since a sizable amount of manufacturing costs are incurred in the home currency in African nations, exchange rates hurt economic growth there and make it more difficult for exporters to compete on global markets (Nageye, 2017).

In Somalia, thousands of vendors conduct currency transactions and daily determine the exchange rate based on regionally specific dependent factors (Mohamud, 2014). The value of one currency relative to another is known as the exchange rate, and Somalia must increase the value of the Somali shilling to increase the value of its exports on the global market (Nageye, 2017).

Although the Somali state has disintegrated and many national institutions have vanished, the foreign exchange rate market has survived (Nageye, 2017). Before the breakdown of the central government of Somalia in 1991, the value of the Somali shilling appeared to be higher as a result of the administration's interference in the exchange market (Mohamud, 2014). According to several observers, the Somali Shilling had been harmed by phony money, which generates currency depreciation, inflationary pressure, and unstable financial situations (Nageye, 2017). The currency in Somalia has fluctuated considerably over the years. The Somali shilling was valued at 4,500 in 1991 and increased to 13,500 in 2006 before declining to 31,000 so. sh in 2010. Because there is no central bank or treasury in Somalia that can balance the supply and demand of local and foreign currencies, private sectors are forced to generate additional money, which increases exchange rate volatility overall and notably for the US dollar to Somali shilling exchange rate (Mohamud, 2014).

The purpose of the paper is to determine the effect of the exchange rate on economic growth in Somalia. This paper specifically examines some important variables like GDP per capita, exchange rate, inflation capital, and labor.

The findings of this study will help the central bank of Somalia and decision-makers learn more about how exchange rates affect the country's economic development. The study contributes to the development of economic growth instruments for the nation that will benefit both international investors and decision-makers in policy and finance. This paper is comprised of three parts structured as follows: the next section reviews related literature. The data and methodology used in this study are described in Section 3. Discussion of the results presented in Section 4. Conclusion and policy implications appear in Section 5.

2. LITERATURE REVIEW

Scholars in the fields of finance and economics have continued to be interested in two ideas: exchange rate volatility and economic growth (Ehikioya, 2019). When a country's annual GDP-based measure of its ability to produce goods and services rises, there is economic growth. Neoclassical growth theory and endogenous growth theory have both been used to study economic growth on a theoretical level. According to Solow's pioneering neoclassical growth theory, stable economic growth can be achieved by making continual investments in exogenous technical innovation (Frankel, J and Rose, 2002). However, the endogenous growth theory popularized by (Lucas, 1988) argued that any country can achieve economic growth even in the absence of exogenous technological advancement through conscious efforts in endogenous activities like the accumulation of external capital, foreign aid, the development of human capital, or the redesign of existing products, among others. Arguments for the endogenous growth hypothesis rely on sensible economic measures that support and encourage macroeconomic stability, higher investment, and better productivity (Ehikioya, 2019).

Exchange rate and monetary policies are Keynesian tools that need to be independent to successfully address asymmetric shocks to the economy, according to the Optimal Currency Area (OCA) theory (Mundell, 1968). For open economies that depend on imported goods for consumption and productivity, price stability is one of the economic advantages of fixed exchange rate regimes (McKinnon, 1963). Additionally, fixed exchange rate regimes encourage stability in the business environment, increased trade, and economic growth by lowering the level of exchange rate uncertainty, which in turn would lower transaction and other risk-mitigating costs (Frankel, J and Rose, 2002). However, the argument for a flexible exchange rate regime is that it enables an economy to counteract output losses by adjusting to external shocks caused by discrepancies between domestic and foreign prices (Mundell, 1968). In addition, noted that countries with a flexible exchange rate regime typically suffer fewer production losses during financial crisis periods (Furceri & Zdzienicka, 2011). However, excessive exchange rate volatility, which may be harmful to economic growth, can also affect this sort of exchange rate regime.

The empirical tests of the relations between exchange rate and economic growth have been having been unsettled. For example, Khan (2021) study employed the Ordinary Least Squares method is applied to determine the relationship between the exchange rate and the economic growth of Bangladesh. The results of their study revealed that the exchange rate has significantly affected the country's economic growth. The goal of the study was to aid in the identification, creation, and implementation of effective policies for that nation's economic growth. A Nigerian study examined the impact of USD/NG exchange-rate fluctuation on Nigeria's economic growth using monthly data from 2003 to 2017 (Moses et al., 2020). The findings of analysis using the generalized autoregressive conditional heteroscedasticity (GARCH) and vector error correction model (VECM) showed that the USD/NG volatility had a considerable impact on the growth of the nation's gross domestic product (GDP). The semi-official forex window known as the interbank exchange rate, which was also discovered to have no impact on Nigeria's economic growth, is a clear sign that a sizable segment of the productive sector lacks access to this forex market. Similarly, Hatmanu & Cautisanu (2020) this study employing the ARDL technique, researchers have looked into how interest and exchange rates affect Romania's ability to build its economy. The outcome shows that the exchange rate has a beneficial short-term impact on economic growth. The generalized approach of moment estimators was utilized in the study. The findings suggested that findings the generalized autoregressive conditional heteroskedasticity-based measure of nominal and real exchange rate volatility has a negative impact on economic growth (Barguelli, 2018). Similarly, Morina & Hysa (2020) analyzed the nature and extent of the impact of such movements on growth using annual data for fourteen CEE countries from 2002 to 2018 to investigate the influence of exchange rate volatility on economic growth: Case of the CEE Countries. Ha (2020) employed the GMM (Generalized Method of Moments) technique on unbalanced panel data to examine the impact of the exchange rate regime on economic growth in Asian nations from 1994 to 2016. The study was conducted in the Asian region and was titled Exchange Rate Regime and Economic Growth in Asia: Convergence or Divergence. It was discovered that a fixed exchange rate regime (with limited flexibility) would have a similar impact on economic growth.

Real economic growth is significantly negatively impacted by exchange rate volatility, according to empirical results using panel data using fixed effect estimation. The information given by the GDP indicator serves as the foundation for the conventional approach to gauging economic activity (Hatmanu & Cautisanu, 2020). GDP only offers statistics on a quarterly or annual basis outside of its measurement range. In addition, the several-week delay between the publishing of the data and the period to which they pertain causes us to learn about economic development in a nation after the fact. Although significant, using data with higher frequencies, such as monthly data, might be more beneficial. To gauge economic growth, this study used the Industrial Production Index (IPI).

In the context of Somalia, even though there are many newspaper articles and government reports that shed light on the issue, published empirical studies are limited. First, a study conducted by Mohamud (2014) Exchange Rate Volatility: Empirical Evidence from Somalia in 2010 by employing content analysis was utilized to analyze the data. The study focuses on

exchange rate volatility and omitted the impact of exchange rate on GDP. Second, the study conducted by Nageye (2017) examined the factors that determine exchange rates in Somalia and how those factors influence the exchange rates by using MRA under the OLS method. The weaknesses of the study never related the exchange rate and the economic growth of the country, because it focuses on the determinants of the exchange rate in Somalia. Therefore, this study examines the impact of exchange rate on economic growth in Somalia.

The analysis of the relationship between the exchange rate and the economic growth in Somalia is the main goal of this study. The study formulated the following research hypotheses:

Hypothesis1. The exchange rate influences economic growth in Somalia.

3. DATA AND EMPIRICAL METHODOLOGY

3.1. Data

This study analyses the data regarding the industrial production index, exchange rate, inflation, labor, and capital, time series data running from 1989 to 2018 was used to scrutinize the effect of both exchange rates on economic growth. To uniformities the used series, variables were transformed into a natural logarithm. Gross domestic product (GDP) was used as a dependent variable; exchange rate, inflation, labor, and capital were considered independent variables. The data of the study were extracted from the Organization of Islamic Cooperation Statistical, Economic, and Social Research and Training Centre for Islamic Countries (SESRIC) and the World Bank. The variables incorporated in the model are GDP, exchange rate, inflation labor, and capital. All variables were converted into a logarithm. Table 1 summarizes the data description and sources, whereas Fig. 1 exhibits the time plots of the variables analyzed in the study.

Table1

Variable	Code	Description	Source
Gross domestic product	GDP	GDP (GDP) is used that denotes the economic growth of the country.	SESRIC
Exchange Rate	ER	The exchange rate has measured a currency against a weighted average of several foreign currencies divided by a price deflator.	SESRIC World Bank
Inflation	INF	Inflation (INF) is measured as an annual percentage change in the consumer price index as a proxy for macroeconomic stability.	SESRIC
Labor	L	Labor is measured total population of the country.	World Bank
Gross fixed capital formation	GFCF	Gross fixed capital formation Is measured as a percentage of GDP. The promotion of the economy through gross fixed capital formation is in terms of production, employment, cost, and benefit to businesses and households.	SESRIC

3.2 Econometric modeling

To achieve the objective of the study, we adopt the ARDL approach developed by Pesaran et al. (2001). It outperforms the previous cointegration techniques in several ways. First, the ARDL methodology is appropriate for a small sample size, whereas previous methodologies require large spanning time-series data. Second, it can estimate the variables' long-run and short-run cointegration regardless of their integration order whether I (0), I (1) or the combination of both. Third, it regresses long-run and short-run cointegration simultaneously, whereas the previous methods do not. Besides, it considers the asymmetric function of the coefficients of the conditional error correction and bias-corrected bootstrap method which can be estimated to derive reliable statistical inferences of the long-run cointegration between sampled variables.

In modeling the effect of exchange rate on the gross domestic product, we followed the model specification of (Ha, 2020; Barguelli et al., 2018; Kala et al., 2018) who explained the relationship between economic growth and exchange rate in their model specification and also included other control variables such as inflation, labor, and capital. Thus, our model is formulated as follows:

$$GDP = \alpha EX^{B1} IN^{B2} L^{B3} K^{B4} e^{\epsilon t} \quad (1)$$

$$L \text{ GDP} = B0 + B1 IEX + B2 LIN + B3 LL + B4 LK + \epsilon t \quad (2)$$

$$B0 = L\alpha$$

$\ln CP_t$ is the log crop production in year t , $\ln AR_t$ is the log of average rain in year t , $\ln RP_t$ is the log rural population in year t , $\ln CO_2_t$ is the log of carbon dioxide emission in year t , $\ln LUC_t$ is the log of land under cereal in year t , and ϵ_t is the disturbance term in time t .

The motive of this study is to uncover the influence of long-run and short-run exchange rates, inflation, capital, and labor variables on the economic growth of Somalia; the study rewrites Eq. (1) as the long-run cointegration of the ARDL equation as follows:

$$\Delta GDP_t = \alpha_0 + \sum \Delta \alpha_1 GDP_{t-k} + \sum \Delta \alpha_2 EX_{t-k} + \sum \Delta \alpha_3 LIN_{t-k} + \sum \Delta \alpha_4 LL_{t-k} + \sum \Delta \alpha_5 LK_{t-k} + \beta_1 \ln GDP_{t-1} + \beta_2 IEX_{t-1} + \beta_3 IN_{t-1} + \beta_4 LL_{t-1} + \beta_5 LK_{t-1} + \epsilon_t \quad (3)$$

where α_0 is the intercept, α_1 is the coefficient of short-run, β_1 represents the coefficient of long-run variables, p represents the number of lags, Δ is the operator of the first difference, ECT_{t-1} is the error correction term, and ϵ_t is the error term. The Wald F-statistic is employed to test the null hypothesis of no cointegration among the exchange rate, inflation, labor, and capital variables, and gross domestic product (GDP) in Somalia against the alternative hypothesis indicates that there is cointegration among dependent variables and GDP. The hypothesis is formulated as follows:

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$ The null hypothesis H_0 is: the variables are not cointegrated:

$H_a: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$ The alternative hypothesis H_a is: the variables are cointegrated:

The Wald F-statistics determines whether to discard the null hypothesis or not. It is compared with lower bound critical values $I(0)$ and upper bound critical values $I(1)$ which assumes that all variables are $I(0)$ and $I(1)$, respectively. If the Wald F-statistics is less than the lower value, we fail to discard the null hypothesis, so it omits the existence of cointegration in our model. If the Wald F-statistics value is greater than the upper value, we discard the null hypothesis and conclude that the variables are cointegrated. Moreover, the Schwarz Bayesian Criterion is used as the lag selection criteria, since we are regressing small sample observations. After determining the long-run cointegration between the scrutinized variables, we, then, regress short-run dynamic cointegration among the interested variables. It was constructed as follows:

$$\Delta \text{IGDP}_t = \alpha_0 + \sum \Delta \alpha_1 \text{GDP}_{t-k} + \sum \Delta \alpha_2 \text{EX}_{t-k} + \sum \Delta \alpha_3 \text{LIN}_{t-k} + \sum \Delta \alpha_4 \text{LL}_{t-k} + \sum \Delta \alpha_5 \text{LKT}_{t-k} + \phi \text{ECT}_{t-1} \quad (4)$$

Analysis and discussion

Descriptive statistics

Table 2

	LRGDP	LER	LGFK	LGK	LINF	LL
Mean	20.84920	9.317573	19.32830	19.32417	4.971860	0.772189
Median	20.85547	9.692556	19.30447	19.30169	5.006226	1.020041
Maximum	21.14040	10.36045	19.66457	19.63828	5.523299	1.333698
Minimum	20.57770	6.195782	19.08406	19.08161	4.045504	-1.271585
Std. Dev.	0.174211	1.057794	0.165733	0.162378	0.416398	0.698894
Skewness	-0.079208	-1.747836	0.327467	0.261744	-0.331592	-1.946445
Kurtosis	1.888203	5.865432	2.051849	1.928594	2.459143	5.731872
Jarque-Bera	1.523937	24.68676	1.604581	1.718192	0.884910	27.32974
Probability	0.466747	0.000004	0.448301	0.423545	0.642457	0.000001
Correlation						
	LRGDP	LER	LGFK	LINF	LL	
LRGDP	1					
LER	0.212910	1				
LGFK	0.8428556	-0.292193	1			
LINF	-0.449067	0.319779	-0.714090	1		
LL	0.032914	0.508917	-0.320957	0.631015	1	

Table 2 shows the initial summary statistics and correlation matrix of the variables that are significant for describing the properties of the raw data. Capital has the highest mean among the independent variables (19.328), whereas the labor force has the lowest mean (0.772). Observed maximum and minimum values for capital (19.665) and labor force (-1.272), respectively, are the greatest. Comparing the exchange rate to other independent variables, the exchange rate is found to have the highest standard deviation (1.058), which suggests that the exchange rate values deviate most from the mean. Additionally, the Jarque-Bera test suggests that the data are regularly distributed and homogeneous. Similarly, Table 1 shows a correlation matrix. Gross domestic product (GDP) is positively correlated with the exchange rate, capital, and labor, In contrast, there is an inverse relationship between inflation and GDP. Additionally, the correlation asserts that the regressors are not multicollinear.

Unit root

Testing the stationary of time series data is necessary because if we estimate a nonstationary series, it may generate a spurious regression that provides misleading statistical evidence of a linear relationship between variables. To check the unit root problem, the researchers applied both Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) methodology. The null hypothesis of ADF and PP shows that the series is non-stationary which means the presence of a unit root problem, whereas the absence of a unit root problem is shown in the alternative hypothesis. So, to reject the null hypothesis that the data is non-stationary and fail to reject that it is stationary, the t-statistic of the variable must be higher than the variable's given critical t-value, but if we fail to reject the null hypothesis, the variables are non-stationary. Table 3 shows the results of the unit root tests exhibiting the order of integration at level (I (0)) and the first difference level (I (1)). As shown in table 1, all the variables are non-stationary in the levels except LER which is stationary at the 10% level when no trend and trend is included in both ADF and PP results. So, at a level, most of the variables have a unit root, but they are stationary at the first difference level (I (1)) at conventional significance levels. Thus, this implies that an ARDL regression can be applied because of a mixed order of integration of variables (I (1) and I(0)) and variables are free from unit root problems at the first difference. This implies that an ARDL regression can be applied thoroughly since ADF and PP indicate that our data is free from unit root problems. Before we proceed to regress the Cointegration of the model which examines the effect of the exchange rate, inflation, labor, and capital on the gross domestic product (GDP) in Somalia, the study selects the optimal lag length by using general to the specific approach of Hendry. Since the study's sample is limited to 29 observations, we select three as the maximum lag order and then reduced it to two and one, until the optimal lag order is free from diagnostic errors and exhibits model stability.

Table 3: Unit root tests

Variable	ADF Level		PP Level	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LRGDP	-1.1105	-3.3372	-0.7323	-2.4095
LER	-3.4516**	-6.3037***	-4.1696***	-3.6426**
LGFK	-1.7982	-2.3483	-2.0215	-2.4889
LGK	0.8137	-2.2470	-1.9368	-2.3261
LINF	-2.4677	-2.3104	-1.7129	-1.2626
LL	-2.4677	-0.0003	-1.2324	-1.9402
	First difference		First difference	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LRGDP	-3.1035**	-1.7743	-4.3597***	-5.3539***
LER	-6.0348***	-3.6095**	-6.0221***	-6.8338***
LGFK	-4.5425***	-6.3256***	-4.5930***	-5.9453***
LGK	-7.6102***	-6.3147***	-4.7175***	-6.0101***
LINF	-3.8787***	-3.8952**	-3.7567***	-3.7089**
LL	-36.1846***	-27.6569***	-2.4102	-2.1833

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively ADF augmented

Dickey-Fuller, PP Phillips–Perron

ARDL Bounds Test

After selecting the optimal lag length and checking the unit root problem, the next step is testing the cointegration between real GDP and its determinants, and results from the bounds test for cointegration are shown in table 4. The null hypothesis of the bounds test for cointegration is no long-run relationships exist, or no cointegration among variables. Results show the rejection of the null hypothesis of no cointegration given that the calculated *F*-statistics of 4 is greater than the upper bound critical values, 3.49, at a significance level of 1%. Since the null hypothesis is rejected and the result validates the long-run relationship between the dependent variable and explanatory variables. Therefore exchange rate, labor, capital, and inflation are long-run forcing determinants of the GDP of Somalia.

Table 4: F-bounds cointegration tests

Model	F-statistic	Significant	Bounds test critical values	
			K (4)	
			I (0)	I (1)
IGDP = f(IER, linf, IL, IK)	9.254076	10%	2.2	3.09
		5%	2.56	3.49
		2.5%	2.88	3.87
		2.5%	3.29	4.37

Table 5: Long-run coefficient elasticities

Explanatory variable	Coefficient	Std. Error	t-Statistic	Prob.
LER	0.143981	0.027055	5.321832	0.0001
LGFK	1.079833	0.101474	10.641480	0.0000
LINF	0.076510	0.032869	2.327731	0.0325
LL	-0.054004	0.031541	-1.712151	0.1050
C	-1.679985	1.939836	-0.866045	0.3985

Table 6: Short run Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LER)	0.031118	0.006695	4.647804	0.0002
D(LER(-1))	-0.055238	0.010090	-5.474808	0.0000
D(LGFK)	0.471008	0.069098	6.816558	0.0000
D(LINF)	0.032188	0.012859	2.503136	0.0228
D(LL)	-0.148375	0.025027	-5.928614	0.0000
D(LL(-1))	0.112060	0.018505	6.055778	0.0000
CointEq(-1)	-0.468663	0.068652	-6.826649	0.0000
Cointeq = LRGDP - (0.1440*LER + 1.0798*LGFK + 0.0765*LINF -0.0540 *LL -1.6800)				

Table 5 & 6 shows the results of long-run and short-run coefficients of variables. Since variables are in natural logarithm form, they measure the elasticity or percentage response of real GDP to the change of explanatory variables in the model. According to the results in Tables 4 & 5, exchange rate, capital, and inflation positively and significantly affect real GDP, while labor affects negatively on real GDP. As these results show, the elasticity of real GDP

concerning exchange rate is about 0.143981, suggesting that if the exchange rate goes up by 1 percent, on average, the real GDP goes up by about 0.143981percent. Thus, real GDP is not very responsive to changes in the exchange rate. Similarly, if capital increases 1 percent, the real GDP increases 1.079833 percent. So that Thus, real GDP is very responsive to changes in capital. While a 1% increase in inflation increases the real GDP by 0.076510 percent in the long run. On the other hand, labor is the only variable in the model which has a negative relationship with real GDP. Interpretively, a 1% increase in the number of labor decreases real GDP by 0.05% in the long run.

The positive effect of the exchange rate on GDP is consistent with the previous findings of (Musa et al., 2019; Khan, 2021; Hatmanu & Cautisanu, 2020; Ha, 2020; Paludo & Paiva, 2021) who reported that exchange rate boosts gross domestic product (GDP). However, this study (Morina & Hysa, 2020) presented a negative impact of the exchange rate on economic growth. And also this study Moses et al (2020) indicates that the interbank exchange rate, which was also discovered to have no impact on Nigeria's economic growth, is a clear sign that a sizable segment of the productive sector lacks access to this forex market, whereas other studies even suggested that exchange rate has a negative impact on economic growth (Barguelli, 2018). Second, capital also has shown a positive relationship with the gross domestic product (GDP) which is consistent with the result of previous studies (Goya Kala et al., 2018). Similarly, the positive impact of inflation on GDP is consistent with the previous findings of(Khan, 2021) who reported that the exchange rate boosts gross domestic product (GDP). However, most of the previous studies that indicated inflation has a negative impact on economic growth (Goya Kala et al., 2018; Utile et al., 2018). In addition, this study (Shaukat et al., 2019) indicated that inflation has a negative impact on economic growth in developing nations.

Conversely, labor has indicated a negative relationship with the gross domestic product (GDP) which is unusually and contradict the finding of most previous studies that found labor has a positive impact on GDP (Shaukat et al., 2019), which means human capital plays a negative and significant role towards the domestic economic growth; this mainly defines the lacks of integration of the skilled individual in the local industry. However, other studies have shown otherwise (Goya Kala et al., 2018).

Table 7: Diagnostic checks

Estimate	Technique	t-stat	Prob
Serial correlation	Breusch–Godfrey Lagrange Multiplier test of residual serial correlation	0.185046	0.7225
Functional form normality	Ramsey RESET test for omitted variables/functional form Jarque–Bera normality test based on a test of skewness and kurtosis of residuals	0.608737	0.737989
Conditional heteroscedasticity	White’s test for heteroscedasticity is based on the regression of squared residuals on squared fitted values	1.286391	0.2800

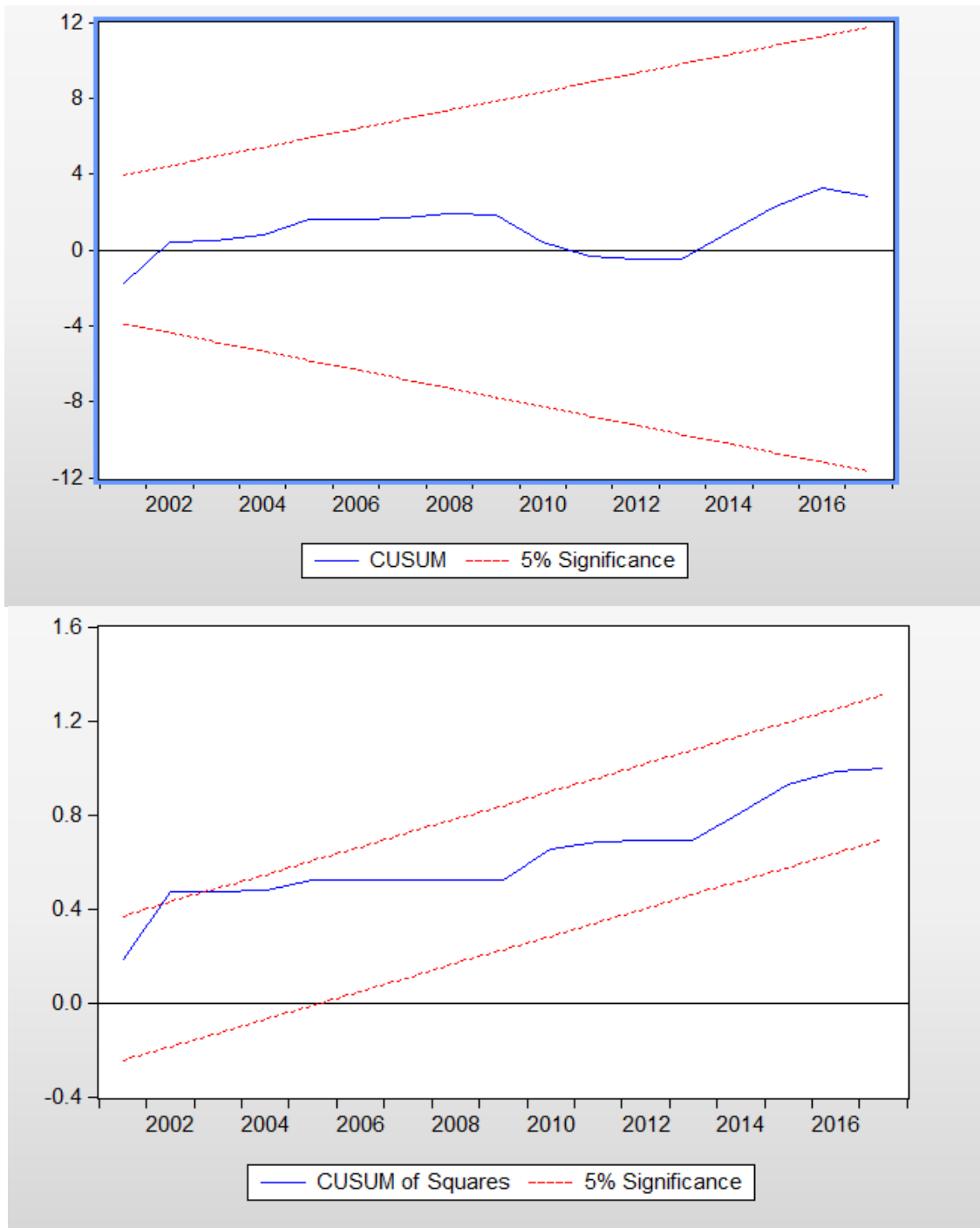


Fig 1: Parameter constancy. A CUSUM Test. b CUSUM squared test

Diagnostic Test

The residual diagnosis makes it clear that there are no issues with normality, heteroskedasticity, or serial correlation, indicating that the selected model is appropriate and accurate. According to Table 4, there is no serial correlation in the model because the probability of the P Chi-square (0.7225) is >0.05 . On the other hand, there is no heteroskedasticity in the model because all independent variables are insignificant and the probability of the P Chi-square (0.2800) is >0.05 . Finally, there is a normal distribution because the P 0.5. (0.7225). additionally, to check for parameter constancy, the CUSUM and CUSUM square plots are used. According to Fig. 1, both tests demonstrate that the model is stable from 1982 to 2018.

4. CONCLUSION AND POLICY IMPLICATION

It is essential for policy development to improve and revitalize the economic shocks to conduct a thorough empirical study that examines the effect of the exchange rate, inflation, capital, and labor on economic growth in Somalia from 1989 to 2018. This study used the ARDL framework, which simulates both short-run and long-run cointegration. This study's weakness is that it did not account for other significant macroeconomic variables that have an impact on economic growth. The factors that our study specifically left out of the model include export and import, economic stability index, and foreign direct investment (FDI). However, due to data availability concerns and Somalia's over-decadal data constraint, these variables were not included.

According to the study's findings, the effects of the exchange rate, inflation, capital, and labor on economic growth are all long-run cointegrated. First, the relationship between the exchange rate and long-term gross domestic product (GDP) is noted. GDP rises by 0.143 percent over time for every 1% increase in the exchange rate. Long-term inflation affects GDP as well. Long-term, an increase in inflation of one percent raises GDP by 0.077 percent. Additionally, capital is seen to contribute to long-term gross domestic product (GDP). Long-term GDP growth of 1.079 percent is induced by a 1% increase in capital, suggesting that capital growth is more responsive to GDP (GDP). First, the sensitivity might be attributed to growth being more vulnerable to capital shocks as a result of having the greatest and newest technologies. Second, economic development is more susceptible to the increasing capital that has been used which results in economic development and prosperity for the country.

On the other hand, labor is seen to have a minor but long-term negative impact on gross domestic product (GDP). However, the majority of earlier studies discovered that labor has a favorable impact on economic expansion. The lack of integration of skilled individuals in the local industry is the primary cause of this detrimental impact. However, we carried out various diagnostic and model stability checks in the estimated model to ensure that our results are reliable and devoid of bias and false inferences. The consistency and reliability of the estimated model across the study period were confirmed by all diagnostic and stability tests.

The study's conclusions have various policy ramifications. To improve the economy of the nation by encouraging factors that contribute to economic development, the government should

first develop a cogent economic growth policy that allows the full participation of development partners, NGOs, farmers, experts, private, public, and civil society sectors in the planning and implementation stages. In this regard, adaptation and intervention policies should develop measures specifically to enhance the capital or equipment used, stable the exchange rate between Somali shillings and other currencies, particularly US dollars, and address the inflation of the goods. And finally, the government needs to implement a plan to increase the labor force's abilities to achieve long-term economic growth. Additionally, new economic growth strategies must be created while taking into account all the variables that affect the country's economic growth, such as the exchange rate, inflation, capital, labor, and so forth.

References

- 1) Agbugba, I., & Onyeaka. (2018). Homogeneous and heterogeneous effect of exchange rate on economic growth in African countries. *Int J Econ Commerce Manag*, 6(9), 1–14.
- 2) Ashour, M., & Chen Yong, C. (2018). The impact of exchange rate regimes on economic growth: Empirical study of a set of developing countries during the period 1974–2006. *Journal of International Trade and Economic Development*, 27(1), 74–90. <https://doi.org/10.1080/09638199.2017.1339117>
- 3) Asid, R., Lily, J., Mulok, D., & Loganathan, N. (2012). The Effect of Exchange Rates on Economic Growth : Empirical Testing on Nominal Versus Real The Effect of Exchange Rates on Economic Growth : The Effect of Exchange Rates on Economic Growth : Empirical Testing on Nominal Versus Real †. *Journal of Financial Economics*, x(1).
- 4) Barguelli, Achouak, O. B.-S. (2018). *Exchange Rate Volatility and Economic Growth*. 33(2), 1302–1336.
- 5) Conrad, D., & Jagessar, J. (2018). Real exchange rate misalignment and economic growth: The case of Trinidad and Tobago. *Economies*, 6(4), 1–23. <https://doi.org/10.3390/economies6040052>
- 6) Deeviya Patel, G. M. (2018). RER and GDP from 1980-2015. *Journal of Economics and Behavioral Studies*, 10(1), 146–158.
- 7) Ehikioya, B. I. (2019). The impact of exchange rate volatility on the Nigerian economic growth: An empirical investigation. *Journal of Economics and Management*, 37(3), 45–68. <https://doi.org/10.22367/jem.2019.37.03>
- 8) Frankel, J and Rose, K. (2002). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 117(1), 437--466. <http://www.jstor.org/stable/1884513>
- 9) Frankel, J. (2003). A proposed monetary regime for small commodity exporters: Peg the Export Price ('PEP'). *International Finance*, 6(1), 61–88. <https://doi.org/10.1111/1468-2362.00106>
- 10) Furceri, D., & Zdzienicka, A. (2011). The real effect of financial crises in the European transition economies. *Economics of Transition*, 19(1), 1–25. <https://doi.org/10.1111/j.1468-0351.2010.00395.x>
- 11) Goya Kala, Raja Masbar, S. S. (2018). the Effect of Exchange Rate, Inflation, Capital and Labor Force on Economic Growth in Indonesia. *Jurnal Ekonomi Dan Kebijakan Publik Indonesia*, 5(1), 35–50.
- 12) Ha, D. T. (2020). Exchange Rate Regime and Economic Growth in Asia : Convergence or Divergence. *Journal of Risk and Financial Management*, 4(2), 1–15.
- 13) Habib, M. M., Mileva, E., & Stracca, L. (2017). The real exchange rate and economic growth: Revisiting the case using external instruments. *Journal of International Money and Finance*, 3(5), 386–398. <https://doi.org/10.1016/j.jimonfin.2017.02.014>
- 14) Hatmanu, M., & Cautisanu, C. (2020). *The Impact of Interest Rate , Exchange Rate and European Business*

- Climate on Economic Growth in Romania : An ARDL Approach with Structural Breaks*. 5(2).
- 15) Isse Abdikadir Mohamud. (2014). Exchange Rate Volatility: Empirical Evidence from Somalia in 2010. *Journal of Distribution Science*, 12(3), 99–103. <https://doi.org/10.15722/jds.12.3.201403.99>
 - 16) Khan, M. F. H. (2021). Impact of Exchange Rate on Economic Growth of Bangladesh. *European Journal of Business and Management Research*, 6(3), 173–175. <https://doi.org/10.24018/ejbmr.2021.6.3.891>
 - 17) Lucas, R. E. (1988). World Devziopment Report. *Journal of Monetary Economics*, 22(3), 3–42. <http://linkinghub.elsevier.com/retrieve/pii/0304393288901687>
 - 18) McKinnon, R. I. (1963). Optimum Currency Areas. *The American Economic Review*, 53(4), 718–725. <https://doi.org/10.1057/9780230226203.3213>
 - 19) Morina, F., & Hysa, E. (2020). The E ff ect of Exchange Rate Volatility on Economic Growth : Case of the CEE Countries. *Journal of Risk and Financial Management*, 20(7), 1–13.
 - 20) Moses, T. K., Victor, O. U., Uwawunkonye, E. G., Fumilade, O. S., & Nathaniel, G. (2020). Does Exchange Rate Volatility Affect Economic Growth in Nigeria? *International Journal of Economics and Finance*, 12(7), 54. <https://doi.org/10.5539/ijef.v12n7p54>
 - 21) Mundell, R. A. (1968). American Economic Association A Theory of Optimum Currency Areas Author (s): Robert A . Mundell Source : The American Economic Review , Vol . 51 , No . 4 (Sep . , 1961), pp . 657-665 Published by : American Economic Association Stable URL : <https://www.TheAmericanEconomicReview.com>, 51(4), 657–665.
 - 22) Musa, K. S., Maijama, R., & Shaibu, H. U. (2019). *Crude Oil Price and Exchange Rate on Economic Growth : ARDL Approach*. 6(e5930), 1–16. <https://doi.org/10.4236/oalib.1105930>
 - 23) Nageye, A. I. (2017). Determinants of Exchange Rates in Somalia. *Asian Journal of Economic Modelling*, 5(3), 233–244. <https://doi.org/10.18488/journal.8.2017.53.233.244>
 - 24) Ozata, E. (2020). The effect of exchange rate volatility on economic growth in Turkey. *Pressacademia*, 9(1), 42–51. <https://doi.org/10.17261/pressacademia.2020.1191>
 - 25) Paludo, S. N., & Paiva, M. S. De. (2021). The Role of Returns to Scale in the Relationship between Exchange Rate and Economic Growth. *Theoretical Eco- Nomics Letters*, 11, 145–165. <https://doi.org/10.4236/tel.2021.112011>
 - 26) Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326. <https://doi.org/10.1002/jae.616>
 - 27) Shaukat, B., Zhu, Q., & Khan, M. I. (2019). Real Interest Rate and Economic growth: A Statistical Exploration for Transitory Economies. In *Physica A*. Elsevier B.V. <https://doi.org/10.1016/j.physa.2019.122193>
 - 28) Utile, B. J., Okwori, A. O., & Monica Dooter, I. (2018). Effect Of Interest Rate On Economic Growth In Nigeria. *International Journal of Advanced Academic Research | Social & Management Sciences |*, 4(1), 66–76.