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Determinants of farm investment in Somalia: A var model application

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ABSTRACT

The main objective of this study is to examine the determinants of farm investment in Somalia using quarterly time-series data from 2015 to 2021. The study selected financing assets (FA), farm output (FO), credit for commercial banks (CCB), and saving (S) as macroeconomic variables. The augmented Dickey–Fuller (ADF) test was employed to evaluate the stationarity of the variables, and the Granger causality test was used to assess the causal relationship between the study variables. It was found that all variables became stationary at the second difference, with a trend for each of the three critical levels of 1%, 5%, and 10%. The Granger causality test indicates a unidirectional causal connection between farm investment, farm output, financial assets for commercial banks, savings for commercial banks, and loans for commercial banks in Somalia. The vector autoregressive (VAR) estimation revealed that the coefficient of determination explains 98% of the model, and the ordinary least squares (OLS) estimation showed a highly significant P-value. The results show that financing assets and savings will increase farm output if managed effectively and efficiently. Based on the findings, the study recommends that the government focus on the overall institutional framework in Somalia to facilitate economic growth, poverty reduction, and sustainable development.

Contribution/Originality: Farm investment boosts economic development, food security, and environmental sustainability, but most studies on investment look at the aggregate level and focus on high-income countries. This study contributes to the literature on agricultural investment at the disaggregated level by using the VAR model to examine savings, financial assets, and commercial bank credit as explanatory variables.

1. INTRODUCTION

Farm investment is an essential element of underdeveloped countries' gross domestic product (GDP), and it creates employment opportunities in agriculture for households in rural areas. Most of Somalia's population receives their food from agricultural products. Therefore, the study believes that the development of farms in Somalia in terms of fertilization, human skills, technological improvement, and farm output marketing will lead to economic development and economic growth for the entire country. Also, farm investment will increase farm output and increase the country's exports and GDP. Farm investment improves rural infrastructure and technology (Fielding et al., 2015). Kenya's medium-term investment plan describes the investment strategy needed to achieve agricultural sector development and 6% of agricultural GDP from 2010 to 2020 (Mabiso, Pauw, & Benin, 2012).

Additionally, Mohamed (2015) studied the contribution of crop and livestock production to Somalia's exports and found that they have a positive relationship with Somalia's exports. Historically, intra-company loans have accounted for most foreign and private investments. From 1960 to 1969, Somalia witnessed nine years of free trade where multinational companies dominated the local enterprise through foreign direct and private investments. The democratic government applied free trade policy, but from 1970 to 1982 after the democratic government, the military regime nationalized all enterprises, which demotivated foreign director investors applying the Soviet model of socialism, and investment decreased. From 1982 to 1988, Somali investment increased while the regime constituted a free trade policy. From 1991 to 2000, Somalia's central government collapsed and the country experienced a civil war that destroyed all capital infrastructures. From 2001 to 2012, foreign direct investment and private investment gradually increased, and investment was used to reform the security sector to end the conflict. From 2013 to 2020, investment shifted its attention to greenfield projects, joint ventures, and international firm subsidiaries (UNCTAD, 2020). Somalia boasts a vast geographical mass, and it has one of the world's longest coastlines in Africa, beaches, oil reserves, abundant natural resources, and inexpensive labor. The largest investors in Somalia are Germany and the United States. There is a bilateral trade agreement between Somalia and Germany for the protection and development of investments, and Germany has the largest subsidiary of a multinational firm of agriculture in the country, the German Agro Action Office (AfDB, 2016). Somalia receives extremely little foreign direct investment compared to neighboring nations such as Ethiopia, Kenya, and Djibouti (Ibrahim, Omar, & Ali, 2017).

Farm investment is a backbone for mass crop production and other agricultural output, which leads to economic growth, sustainable livelihoods, food security and poverty reduction. The investment facilitates equip farmers with fertilizers, advanced technological equipment, and advanced agricultural skills through human resources training. Therefore, enhancing government incentives and commercial loans will bring institutional reform and excellent pricing for primary farming goods and accelerate agricultural growth in Somalia to historic levels. The gross value of agricultural output at constant prices rose between 1980 and 1990, mainly owing to enhanced efficiency driven by improved government incentives. After 1991, the rate of expansion in agricultural output slowed significantly, due primarily to the possible efficiency loss in investment following the fall of the central government. Therefore, lack of investment will lead to a shortage of food and agricultural output and will reduce the country's economic growth.

Additionally, most farm investment studies have been carried out in Pakistan, India, Ethiopia, Kenya, and Nigeria, but no study has been carried out in Somalia on the determinants of farm investment. This opens a gap in the literature that this study intends to fill by exploring the determinants of farm investment in Somalia through the application of the vector autoregressive (VAR) model.

2. LITERATURE REVIEW

Researchers have developed a technique to identify the best allocation of investment resources at different phases of the investment process (Sivash, Ushakov, & Ermilova, 2019). An interrelated financial econometric model was used for the investment process's successful indicators (liquidity, financial stability and profitability). According to the research findings, using variable and corrective modules in the agriculture sector's investment process may help safeguard investment activity from hazards and find ways to immobilize economic operations. There are many serious issues regarding whether or not agricultural investments are still a stimulus for regional and local economic growth. Although investment undoubtedly influences agriculture, the real problem is whether they will also impact other sectors of the economy. In this study, we have devised a new method to examine how agricultural investment affects economic growth. China's agricultural investment was analyzed using the autoregressive distributed lag (ARDL) approach and the empirical estimate produced strange results. In both the short and long terms, agricultural investment was found to positively influence economic development. If China's agricultural sector is to remain robust, policymakers should consider the findings of this research (Bakari, Tiba, & Ofien, 2020).

The Ecological Footprint (EFP) provides a detailed picture of environmental performance. After China and the United States, India is the third largest emitter of greenhouse gases. Both linear and nonlinear ARDL models were employed concurrently to study the mediation of foreign direct investment and agriculture on India's ecological footprint, but the nonlinear autoregressive distributed lag (NARDL) was dropped because it could not support the claim of cointegration in the analysis. The research, therefore, used linear ARDL models (both short-run and long-run) with diagnostic tests and Granger causality calculations. The ARDL findings confirm a positive and substantial association between the ecological footprint and agriculture, energy consumption, and population, but not with foreign direct investment (FDI). According to the Granger causality test, agriculture, FDI, energy consumption, and population all have a one-way effect on the ecological footprint. Foreign direct investment has a one-way transmission to GDP and a feedback transmission to energy consumption (Udemba, 2020). From 1983 to 2015, Ojong, Ogar, and Arikpo (2018) analyzed the factors that influenced domestic investment in Nigeria. Economic growth, inflation, currency rate, and credit to the private sector were all investigated in the study's focus on domestic investment. The study applied the ARDL method to analyze the data. According to the findings, there is no long-term correlation between government spending, interest rate spread, economic growth rates, inflation rates, currency rates, and private-sector lending in Nigeria. However, there is a short-term correlation between Nigerian government spending and domestic investment. According to this research, government spending should be concentrated on long-term capital projects, such as infrastructure and social amenities, to maintain short-term causation and establish long-term causality in domestic investment.

Agwu (2019) observed the macroeconomic factors that influence Nigerian investments, such as inflation, government expenditure, interest, and currency rates, from 1980 to 2018, and also employed time series data. The study's goal was to determine the role of Nigeria's major macroeconomic factors in explaining private financing. Multiple regression analysis employing an ARDL model was used to examine short-term and long-term regressed relationships, and the macroeconomic factors matched the theoretical predictions. It was found that, in Nigeria, money supply and investment are linked using the vector autoregressive (VAR) model. Research shows that a decrease in the overall money supply causes an increase in the volatility of aggregate investment. According to the study's results, money supply shocks may have unintended effects on Nigeria's real economy. Effective money supply and interest rate management should be pursued by the monetary authorities in Nigeria when implementing monetary policy. The improvement of food security depends on development and increased production of organic agriculture output in the nation by supplying high-quality nutrition. Sustainable rural development mechanisms must not rely on environmental degradation to endanger human life and health, especially for future generations. Instead, they must work in harmony with nature. Recent analyses of the expansion of organic agriculture on a global scale have been undertaken, and it has been found that Public Private Partnership (PPP) mechanisms are useful tools for fostering better ties between agricultural organizations and the state, assisting in developing a productive system for upgrading fixed assets and, consequently, raising agricultural production levels. The results have shown that the development of organic agriculture is essential for the long-term survival of the Russian economy today (Polushkina, Akimova, Koroleva, Kochetkova, & Zinina, 2020).

The Gambia was explored as an example of the factors influencing private sector investment in a less developed nation. An equilibrium private investment model was analyzed using the ARDL cointegration technique. According to the findings, imports, particularly capital goods, became more expensive because of the high exchange rate. The Gambia's enormous debts also stifled private investment. The aggregate demand condition, real interest rate, real exchange rate, and inflation all exceeded expectations. Private sector credit in the Gambia has not been able to stimulate private investment as much as it might have due to a lack of available credit (Ayeni, 2020). The economic effects of investment in Punjab's agriculture industry were also examined using a sample of 150 farmers (Saini, 2020). The factors that affect agricultural investment were identified by reviewing the respondents' income, consumption, cash left over after consumption, and investment levels. Despite the higher total amount of investment, marginal farms had a greater impact per hectare of investment than giant farms. Larger farm families had easier access to spending, saving, and earning resources. However, as farm size increased, less credit was utilized for investment since large farms depend more on their funds. The regression analysis revealed a significant correlation between investment and operational holding size, savings, and credit availability. There was, however, no correlation between investment and family type, crop intensity, or degree of education.

The eastern Indian states of Bihar, Jharkhand, West Bengal, and Odisha are lagging far behind the agriculturally developed states in terms of public and private agricultural investment. In agriculture and irrigation, there has been a huge increase in budgetary expenditures. As a means of boosting private investment as well as agricultural yields, eastern states must prioritize agriculture spending and increase the capital intensity of irrigation systems. Public capital creation in agriculture in eastern states is determined by the availability of money, per capita income, and the revenue shortfall, as verified using a two-stage least squares regression analysis. In addition to favorable terms of trade, agricultural input subsidies, and institutional finance, these additional variables have a beneficial impact on private capital development. Agricultural and irrigation capital formation costs are twice the amount spent on input subsidies per acre (Bathla & Aggarwal, 2022). In light of the shifting economic conditions in a few of Poland's agricultural markets, researchers at Polan Farms looked at the factors influencing the amount of money invested in fixed assets. A total of 878 farms were included in the research, and the study's premise was that farm investments are influenced by production profitability. The study employed Pearson's linear correlation approach and a comparison of farm economic outcomes from 2005 to 2013. Variations in investments were linked to changes in the profitability of agricultural output in certain markets, as predicted by the researchers. Pig farms showed the most sensitivity to changes in the pricing situation in agricultural markets when it came to investment adjustments in any agricultural sector. Co-financing projects and their long-term characteristics could reduce the effect of shocks on investment patterns (Szymańska & Dziwulski, 2021).

3. METHODOLOGY

This study employed an explanatory research design to explain the macroeconomic variables that determine farm investment. The study employed the vector autoregressive (VAR) econometric model using a time series of secondary data from 2010 to 2021, obtained from the Somalia National Bureau of Statistics and the Central Bank of Somalia. The data was analyzed using EViews 10, an application of the VAR Model.

3.1. Theoretical Framework and Empirical Model

This research uses the accelerator model by Clark (1917), which posits a direct linkage between capital and output. Each period's investment instantly modifies capital and production shares. The concept asserts that economic demand promotes investment choices, which boosts supply and production. Prices, salaries, taxes, and interest rates don't alter investment choices. Clark (1917) believes that capital stock and production are interrelated. However, investing in each period adjusts the real capital stock to the intended supply (Ambrocio & Jang, 2021). These critiques led to the flexible accelerator and neoclassical ideas. The accelerator hypothesis is Keynesian since it assumes that aggregate demand affects the actual economy, with output acting as a surrogate for demand in Clark's model. The user cost of capital is essential in neoclassical investment theory (Fernald, 2022). Given that there is no rapid adjustment, and the capital-to-output ratio is not constant, current investment equals the difference between the intended capital stock and the preceding period's value. The user cost of capital is not usually statistically significant in empirical studies for developed countries. Tobin's Q theory of investment defines investment as a function of a firm's market value and replacement value. Tobin's Q coefficient is the market value/replacement cost. A 'Q' coefficient larger than one increases investment, whereas a coefficient smaller than one decreases it (Andrei, Mann, & Moyen, 2019).

3.1.1. Model Specification

$$I = \beta(K^* - K_t) \quad (1)$$

Where K* is the desired capital stock, K is the actual capital stock in the current period, and β is a coefficient of adjustment, such that $0 < \beta < 1$.

$$I_t = \beta(\gamma Q^* - K_{t-1}) \quad (2)$$

Where Q* is the expected demand and output γ is the determinant by relative price.

$$I_t = \beta(\gamma \emptyset Q^* - K_{t-1}) \quad (3)$$

The first differencing of Equation 3 will find: $I_t = \alpha_1 \Delta Q + (1-\beta)I_{t-1}$ (4)

Where $\alpha_1 = \beta\gamma\emptyset$ and ΔQ is a change in output. Equation 4 is the traditional flexible accelerator model, where fluctuations in sales induce investment.

$$I_t = C^{-1}(\pi_t) \quad (5)$$

$$\beta = b_0 + \frac{1}{I^* - I_{t-1}}(\sum b_i X_i) \quad (6)$$

After simultaneously solving Equations 5 and 6 with respect to Equation 4, the following empirical function was developed:

$$FI = f(FO, FA, S, CCB) \quad (7)$$

Where FI is farm investment, FO is farm output, FA is financial assets for commercial banks, S is savings as customer deposits, and CCB is the credit for commercial banks. The equations can also be written in linear form as follows:

$$FI = \beta_0 + \beta_1 FO + \beta_2 FA + \beta_3 S + \beta_4 CCB + \mu \quad (8)$$

$$LogFI_{t,1} = \alpha_1 + \varphi_{11} logFO_{t-1,1+}\varphi_{12} LogFA_{t-1,2} + \varphi_{13} LogS_{t-1,3} + \varphi_{14} LogCCB_{t-1,4} + \varepsilon_{t,1}$$
$$LogFO_{t,2} = \alpha_2 + \varphi_{21} LogFI_{t-1,1+}\varphi_{22} LogFA_{t-1,2} + \varphi_{23} LogS_{t-1,3} + \varphi_{24} LogCCB_{t-1,4} + \varepsilon_{t,2}$$
$$LogFA_{t,3} = \alpha_3 + \varphi_{31} LogFO_{t-1,1+}\varphi_{32} LogFI_{t-1,2} + \varphi_{33} LogS_{t-1,3} + \varphi_{34} LogCCB_{t-1,4} + \varepsilon_{t,3}$$
$$LogS_{t,4} = \alpha_4 + \varphi_{41} LogFI_{t-1,1+}\varphi_{42} LogFO_{t-1,2} + \varphi_{43} LogFA_{t-1,3} + \varphi_{44} LogCCB_{t-1,4} + \varepsilon_{t,4}$$
$$LogCCB_{t,5} = \alpha_5 + \varphi_{51} LogFI_{t-1,1+}\varphi_{52} LogFO_{t-1,2} + \varphi_{53} LogFA_{t-1,3} + \varphi_{54} LogS_{t-1,4} + \varepsilon_{t,5} \quad (9)$$

Where LogFI is the logarithm of farm investment (dependent variable); α_1 is a constant; φ_{11} to φ_{54} are slope coefficients that measure the optimal farm investment; LogFA is the logarithm of financial assets; LogFO is the logarithm of farm output; LogCCB is the logarithm of credit for commercial banks; LogS, is the logarithm for savings; and μ is the error term or residual (other explanatory variables not mentioned in the model). Each variable in the VAR model was regressed on a constant variable, lags of itself, lags of the other variables, and the error term.

3.2. Data

The quarterly time series data used for this study was obtained from the Somali Ministry of Finance, the Somalia National Bureau of Statistics and the Central Bank of Somalia between 2015 to 2021.

3.3. Data Estimation Methods

This study aims to investigate the factors that influence agriculture investment in Somalia. For this investigation, the augmented Dickey–Fuller (ADF) approach was used. According to Holden and Perlman (1994), the implementation of Johansen's maximum probability approach (Johansen, 1988) removes the need for unit root tests (Thornton, 2001). This is because the presence of a cointegrating relationship between the variables assures the existence of a unit root (Sims, 1988). Evidence of stationarity is indicated by a positive mean in the series' initial difference and then a test is performed with the greater than zero mean and a temporal trend. The linear regression statistic rejects serial correlation up to the fourth order if enough lagged dependent variables are given. The time shifts were calculated after stationing the differentiation series before developing the VAR model. The lag length was calculated using the selection criterion model's p-value to obtain optimal time offsets using Akaike, Schwartz, Schwartz–Bayes, and Hannan–Quinn criteria. The HQ was analyzed to investigate how much its dynamics change. The VAR model examined the determinants of farm investment in Somalia, and the analysis of variance demonstrates how each random change impacts the parameters of the VAR. In contrast, variance decomposition splits volatility in an independent variable into constituent disturbances to the VAR estimation. A long-term equilibrium relationship is shown by the presence of cointegration between two or more series (Thornton, 2001).

4. EMPIRICAL RESULTS AND DISCUSSIONS

4.1. Unit Root Tests

As shown in Table 1, the ADF test findings demonstrate that the variables LogFI, LogFO, LogS, LogFA, and LogCCB are not stationary in the model's level and at first difference. All the absolute values of the t-statistics are less than the critical value, so the study cannot reject the null hypothesis. But when the variables are changed to the second difference, D (LogFI, LogFA, LogS, LogFO, and LogCCB (-2)), all the study variables become stationary with a trend for each of the three important levels (1%, 5%, and 10%). Therefore, the study uses a second difference model.

Table 1. ADF test statistics.

2nd difference ADF test statistic					
Variable	**Constant with trend**	**C. value 1%**	**C. value 5%**	**C. value 10%**	**Pro**
LogFI	-5.828	-4.374	-3.603	-3.238	0.000
LogS	-6.415	-4.416	-3.622	-3.248	0.000
Log CCB	-6.541	-4.394	-3.612	-3.243	0.000
LogFO	-6.369	-4.374	-3.603	-3.238	0.000
Log FA	-5.432	-4.394	-3.612	-3.243	0.001

4.2. Lag Selection Criteria

For accuracy, the decision rule will choose the model with the lowest information criterion value as the default. As per the Akaike Information Criterion (AIC), the ideal lag time should be employed to reduce the selection criteria's value. A lag length of one was optimal for all tests with a 5% significance level (see Table 2), illustrating the proper lag structure for the VAR selection criterion for the lagged variables. Testing using the likelihood ratio (LR) test statistics, information criteria, and Hannan–Quinn test statistics, all successively changed, corroborated this. The Johansen cointegration test and the VAR calculation utilize a lag length of one in light of the conclusions reported below.

Table 2. VAR lag selection criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-48.016	NA	0.000	4.241	4.485	4.309
1	66.774	174.481*	0.000*	-2.942*	-1.479*	-2.536*
2	86.857	22.492	0.000	-2.549	0.133	-1.805

Note: * indicates lag selection. LogL = Log-likelihood, LR = Likelihood ratio, FPE = Final prediction error.

4.3. Cointegration Test

The cointegration test results utilizing the trace and eigenvalue tests are shown in Tables 3 and 4, respectively.

Table 3. Johansen cointegration trace test.

Eigenvalue	Trace (Statistic)	5% (Critical value)	Prob.**
0.861	135.066	69.818	0.000
0.814	87.633	47.856	0.000
0.677	47.285	29.797	0.000
0.486	20.162	15.494	0.009
0.159	4.169	3.842	0.041

Note: ** $p < .05$.

The findings indicate the existence of a long-run positive relationship that is significant and favorable between the five variables of farm investment (LogFI), savings (LogS), financial assets for commercial banks (LogFA), farm output (LogFO), and credit for commercial banks (LogCCB). This relationship has been examined for 28 quarters over seven years.

Table 4. Johansen cointegration eigenvalue test.

Eigenvalue	Maximum eigenvalue statistics	5% Critical value	Prob.**
0.861	47.432	33.877	0.001
0.814	40.348	27.584	0.001
0.677	27.122	21.132	0.006
0.486	15.992	14.265	0.026
0.160	4.170	3.842	0.041

Note: ** $p < .05$.

4.4. Granger Causality

Granger causality refers to the existence of a connection between the present values and the historical values of variables. Using the Granger causality test, this research aims to analyze the causal relationship between farm investment, farm production, commercial bank financial assets, savings, and commercial bank lending in Somalia. The results showed a causative link between the dependent and independent variables in the study. As shown in Table 5, the findings of the Granger causality test indicate a unidirectional causal relationship between farm investment, farm output, financial assets for commercial banks, savings for commercial banks, and loans for commercial banks in Somalia.

4.5. VAR Model Estimation

Table 6 shows the VAR estimate results, which reveal that the coefficient of determination, also known as R-squared, is 0.9765, or 98%. The adjusted R-squared value is 0.9707, which shows that the explanatory variable fits well and plays a big part in determining the investment gap in farms. The results show that the factors that explain investment in agriculture account for 98% of the total variation.

Table 5. Granger causality test.

Null hypothesis	Obs.	F-statistic	Prob.
LogFO does not Granger cause LogFI	25	1.541	0.239
LogFI does not Granger cause LogFO		0.096	0.909
LogS does not Granger cause LogFI	25	2.920	0.077
LogFI does not Granger cause LogS		0.718	0.500
LogFA does not Granger cause LogFI	25	2.648	0.096
LogFI does not Granger cause LogFA		2.175	0.140
LogCCB does not Granger cause LogFI	25	4.517	0.024
LogFI does not Granger cause LogCCB		0.664	0.526
LogS does not Granger cause LogFO	25	0.459	0.638
LogFO does not Granger cause LogS		1.358	0.280
LogFA does not Granger cause LogFO	25	0.410	0.669
LogFO does not Granger cause LogFA		2.701	0.092
LogCCB does not Granger cause LogFO	25	0.553	0.584
LogFO does not Granger cause LogCCB		0.485	0.623
LogFA does not Granger cause LogS	25	0.439	0.651
LogS does not Granger cause LogFA		1.387	0.273
LogCCB does not Granger cause LogS	25	0.113	0.894
LogS does not Granger cause LogCCB		0.969	0.397
LogCCB does not Granger cause LogFA	25	5.806	0.010
LogFA does not Granger cause LogCCB		0.383	0.687

Commercial banks, agricultural production, savings, and credit extended by commercial banks have R-squared values of 98%, 53%, 98%, and 45%, respectively. On the other hand, the adjusted R-squared values are 98%, 42%, 98%, and 32%, respectively. This suggests that the models are an accurate representation of the data. Since the estimate does not contain the values of the probabilities, it is hard to explain the significance of any of the individual variables. As a result, an estimate of the system equation is necessary to determine the probability values of the variables while placing a great emphasis on the first equation.

Table 6. Vector autoregression results.

Standard errors are in ( ) and t-statistics are in [ ]					
	LogFI	**LogFA**	**LogFO**	**LogS**	**LogCCB**
LogFI(-1)	0.833	-0.157	-0.199	0.044	-0.780
	(0.135)	(0.062)	(0.213)	(0.069)	(0.670)
	[6.144]	[-2.536]	[-0.935]	[0.635]	[-1.164]
LogFA(-1)	0.232	0.818	0.312	-0.021	0.402
	(0.166)	(0.076)	(0.260)	(0.084)	(0.820)
	[1.397]	[10.780]	[1.199]	[-0.253]	[0.491]
LogFO(-1)	-0.017	0.028	0.496	-0.050	-0.077
	(0.135)	(0.061)	(0.212)	(0.068)	(0.668)
	[-0.125]	[0.449]	[2.341]	[-0.729]	[-0.115]
LogS(-1)	0.0857	0.363	0.135	0.949	1.646
	(0.276)	(0.127)	(0.434)	(0.140)	(1.367)
	[0.310]	[2.869]	[0.311]	[6.765]	[1.204]
LogCCB(-1)	0.030	0.022	-0.009	0.020	0.206
	(0.055)	(0.025)	(0.086)	(0.028)	(0.270)
	[0.555]	[0.887]	[-0.100]	[0.729]	[0.761]
C	-2.999	-1.759	5.553	1.438	-12.909
	(3.191)	(1.460)	(5.011)	(1.619)	(15.778)
	[-0.940]	[-1.205]	[1.108]	[0.888]	[-0.818]
R-squared	0.977	0.983	0.532	0.982	0.452
Adj. R-squared	0.971	0.979	0.415	0.978	0.315
Sum sq. resids	0.548	0.113	1.351	0.141	13.391
S.E. equation	0.165	0.076	0.260	0.084	0.8183
F-statistic	166.809	235.375	4.548	218.842	3.300
Log-likelihood	13.293	33.625	1.557	30.926	-28.267
Akaike (AIC)	-0.561	-2.125	0.342	-1.9174	2.6365
Schwarz (SC)	-0.271	-1.835	0.632	-1.627	2.926
Mean dependent	17.652	18.556	20.520	19.578	14.255
Standard deviation dependent	0.967	0.524	0.340	0.561	0.989
Determinant residual covariance (Dof adj.)		0.000			
Determinant residual covariance		0.000			
Log-likelihood		63.634			
Akaike information criterion		-2.587			
Schwarz criterion		-1.136			
Number of coefficients		30			

4.6. OLS Estimation

Table 7 shows that the probability value of LogFA is 0.2330, which is above 5%, and the coefficient is positive, while the t-test is significant. However, LogFA is insignificant and implies a weak relationship between farm investment and financial assets for commercial banks. In addition, the coefficient is negative and the p-value of the logarithm of farm output (LogFO) is 0.5073, which is more than 5%. Because of this, the fact that farm output has a negative effect on farm investment is meaningless. On the other hand, the value of savings (LogS) has a p-value of 0.000, and its coefficient is positive. This shows that savings have significantly increased farm investment in Somalia. The p-value of 0.007, which is less than 5%, reveals that credit for commercial banks decreases farm investment.

Similarly, credit for commercial banks to agricultural investment (LogCCB) has a negative coefficient. Overall, the p-value of the model is highly significant.

Table 7. Least squares estimation.

Dependent variable: LogFI				
Method: Least squares				
Variable	**Coefficient**	**Std. error**	**T-statistic**	**Prob.**
LogFA	0.336	0.274	1.225	0.233
LogFO	-0.156	0.231	-0.674	0.507
LogS	1.514	0.254	5.955	0.000
LogCCB	-0.226	0.078	-2.915	0.008
C	-11.787	4.464	-2.640	0.015

5. CONCLUSION AND POLICY IMPLICATIONS

The empirical analysis of this study is based on quarterly data from the Somali Ministry of Finance, the Somali National Bureau of Statistics, and the Central Bank of Somalia from 2015 to 2021. The ADF test results show that the variables are not stationary at level or first difference, but they become stationary at second difference, with a trend for the three critical levels of 1%, 5%, and 10%. The lag selection criteria resulted in one lag length. The results of the cointegration test indicate the existence of a significant positive long-run relationship between the outcome variable and the explanatory variables. The Granger causality test indicates a unidirectional causal connection between farm investment, farm output, financial assets, credit from commercial banks, and savings. The VAR estimation showed that the explanatory variables significantly explain farm investment, and the model is well-fitted. The OLS estimation showed an overall p-value of 0.0000, which shows that the model is highly significant.

It is essential for Somalia's government to implement policies for farm investment and pay more attention to its determinants of financial assets for commercial banks (FA), savings for customer deposits (S), credit for commercial banks (CCB) and farm output (FO). The government and the commercial banks should direct their attention to saving to increase private investment, including farm investment, in Somalia. Additionally, the government needs to focus on the overall institutional framework of farm investment in Somalia to facilitate economic growth, poverty reduction, and sustainable development.

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