The Effect of Credit to the Agriculture Sector on Coffee Export Growth in Tanzania

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Abstract
Coffee is among the traditional exports that contribute to the economic growth in Tanzania. Depending on the increasing efforts of the country to increase foreign exchange earnings, coffee exports can be met by increasing coffee production and export exports. Schumpeter (1912) pointed out that well-functioning banks spur technological innovation by identifying and funding entrepreneurs with the best chances of successfully implementing innovative products and production processes. In this respect, it is crucial to investigate the coffee export growth and the factors affecting coffee export growth. This study aimed to examine the effect of credit on agriculture and coffee export growth in Tanzania. In the study, with the aim of examining the relationship between agricultural credit and coffee export growth in Tanzania, 1991 – 2022 data on credit to agriculture by commercial banks and the value of coffee exported annual data covering the period given above were sourced from Bank of Tanzania and Tanzania Coffee Board. The statistics analysis tool is the Vector Error Correction Model (VECM) technique. The results of VECM estimation show that agricultural bank credit has a positive significant effect on coffee export growth in the long run. This implies that the increased number of loans issued to the agriculture sector by commercial banks also promotes coffee export growth in Tanzania. This study suggests that an agricultural credit mechanism needs to be developed to increase the agricultural financing opportunities for the realization of the use of recommended agricultural practices including the use of fertilizers, pesticides, modern seeds, and the adoption of new technology by coffee growers. The paper concludes by suggesting that policy intervention in the form of availability of credit supply on flexible terms to farmers could be effective in improving export performance as farmers could be able to purchase inputs and modern equipment to increase productivity. These findings will inform policymakers and coffee stakeholders on the best actions and decision-making regarding the importance of farmers.

Keywords: *Farmers, Coffee Export Growth, Credit to Agriculture Sector, Vector Error Correction Model*

INTRODUCTION

Tanzania is an enormous resource base- with a huge expanse of fertile arable land that can sustain a highly productive and profitable agricultural sector (URT, 2022). If these resources are managed well, they could support a vibrant agriculture sector capable of generating foreign exchange through farm exports. Despite having these endowment resources, the agriculture performance in terms of productivity and crop quality is not impressive. This is evidently by coffee which is one of the traditional exports with more than 90 percent of the total national output being exported, however, its export volume has been showing a decreasing trend over the three decades (BOT,2022). The sector has also continued to be characterized by low productivity and quality, making it suffocate in competing global markets. The record shows coffee prices have been low and inefficient throughout the production and marketing value chain. For instance, in 2021, Tanzania's coffee average price was US$ 2.42/kg while Ethiopia recorded an average price of US$ 3.41/kg (ICO, 2021). The coffee price trend in the last thirty years is also seen below the coffee-producing East African regional countries such as Ethiopia, Uganda, and Kenya.

Despite the country's potential to produce specialty coffee due to its ecological positioning, small-scale farmers have not yet realized its benefits. Notwithstanding, the noticeable improvement in recent trade of goods and services exports, the composition of the coffee export has not changed much. This is exhibited by its growth in exports value remaining stagnant and the share of total exports has reduced to less than 5 percent compared with 36 percent reported in 1985 (TCB, 2022). The low sector performance and lack of better pay have resulted in farmers in some areas uprooting coffee plants and shifting to other alternative crops such as horticultural produce. Theoretical and empirical evidence suggest that the availability of financial services particularly accessibility of credit has a lot to do with boosting the performance of productive sectors like agriculture. This truth relies on the way the financial sector of the country is connected to farm operations (Okafor, 2020).

In Tanzania, the coffee sector is dominated by small-scale farmers. The majority of them are small-scale coffee growers and are rural-based with poor access to useful information and a lack of access to credit finance. Lack of access to credit by these farmers constrain their acquisition of recommended inputs to increase their output. The enduring lack of credit access faced by coffee growers has also significant consequences for technological adoption, productivity, and crop quality to compete in the

global market which in turn limits coffee export growth. Given that, financing agriculture through credit from financial institutions is a very important catalyst for the agriculture sector's prosperity, the government has set targets and actions to increase formal financial services to farmers. This has been made possible by financing medium and large-scale agriculture through the guarantee schemes operated by the Bank of Tanzania (BOT) and Kilimo Kwanza initiatives (URT, 2020).

The other important moving stage that has been taken by the government is that of setting up specialized banks for financing agricultural investment and activities such as the Agricultural Development Bank (AgDB) and Tanzania Investment Bank (TIB). Their establishment was aiming to ensure that, the mainstream banking industry adequately catered to the urgent need of farmers. It also intended to increase the level of lending to the agriculture sector by lowering interest rates estimated from 17% to 9% which will help to reduce the cost of loans and increase crop productivity (BOT, 2020). Along with these efforts, the Bank of Tanzania (BOT) has played a sizeable role in this endeavor by using direct and indirect instruments to regulate the functioning of the banks and financial institutions in the country to direct the economy in the desired direction. The Bank has recently through policy measures to promote lending in the agriculture sector by allowing a reduction of the Statutory Minimum Reserve Requirement (SMR) to commercial banks to raise liquidity in the banking sector (BOT, 2022). Other measures undertaken were for the Bank to extend a special credit facility amounting to one trillion Tanzanian shillings to commercial banks with the condition to extend an acquired loan to agriculture at an interest rate not exceeding 10 percent per annum. However, the agriculture sector especially small-scale farmers still constrained by the accessibility of credit from commercial banks for financing their farming activities in particular the purchase of recommended inputs which in turn may enhance export growth.

The broad objective of this study is to investigate agricultural credit and coffee export growth in Tanzania. The specific objective of the study is to: -

i) Analyze the trend of credit disbursed by commercial banks to agriculture and the value of coffee exports.
ii) Estimate the relationship between agriculture credit and the value of coffee export.

To this end, the contribution of this study is in two ways as follows: -
First, the study helps to determine to what extent agriculture credit has been enabling high coffee productivity and crop quality to compete in the global

markets for enhancing coffee export earnings growth. It is assumed that credit obtained by farmers from commercial banks is used for the purchase of recommended inputs, expanding their farming activity, and adoption of new technology. Second, this study will also help to inform policymakers and coffee growers on understanding how financial institutions through the credit provision feed into farm operations for efficiency. The paper is organized as follows: - the first section depicts the introduction of the study. The second section provides a literature review, and methodology, while the fourth section highlights empirical results. The fifth section provides a discussion of the findings and the final section gives a conclusion and policy recommendations.

LITERATURE REVIEW

Theoretical Literature Review

The work is anchored on the bank lending credit channel theory based on Bernanke & Gertler's (1995) model where a contractionary monetary policy results in a reduction in bank deposits which in turn ends up reducing aggregate loan supply. According to the theory, monetary policy works by affecting bank loans and deposits so that, monetary policy besides shifting the supply of deposits also shifts the supply of bank loans by affecting the balance sheet of borrowers and lenders.

The theory explains that the credit channel should be considered as a mechanism that reinforces the traditional money channel. It considers that, for the banks to facilitate credit to the productive sector, depends on various factors conditioning the relationship between the monetary authority's intervention and the economic agent's expenditure decisions. These are institutional frameworks governing the financial system and economic agent's financial position. The underlying theory of the credit channel, suggests that firms have few substitute sources of funds beyond bank borrowing. The theory presumes that; banks' actions might affect the supply of loans from the banking system which in turn real spending in the economy. The theory has been popular in studying the impacts of banks' conditions on the provision of credit and the transmission mechanism of the monetary policy. Through credit channel theory, access to credit could have a significant contribution to the production function of small-scale farmers. It gives the opportunities to invest in farm inputs to enhance productivity which in turn will affect the level of farm exports.

Empirical Review

Empirical studies on the effects of banks' credit and agricultural output are replete globally. Among this plethora of research endeavors, many have

investigated and tried to establish the relationship between credit issued by financial institutions referred to as lenders and the performance of the agriculture sector.

For instance, Nordjo & Adjasi, (2020) evaluated the impact of access to production credit on the productivity of small farmers using Propensity Score Matching (PSM) to estimate the average treatment effect of access to production credit on the productivity of small farmers in Ghana. The result of the study revealed small farmers with access to production credit increased productivity through investment in farm inputs.

Adewale et al., (2022), conducted a study to examine the effect of farmers' credit on agricultural productivity from 1981 to 2016 in Nigeria using the Ordinary Least Squares (OLS) model. According to the results, agricultural bank credit exerts a significant positive effect on agricultural output in Nigeria.

Ngong et al., (2023) conducted a study to investigate the impact of bank credit on agricultural productivity in the Central Africa Economic and Monetary Community (CEMAC). The data from 1990 to 2019 were analyzed by using the autoregressive distributed lag technique.

The results show a long-term co-integration among the variables used. According to the study results. Banks' credit has positive and significant effects on agricultural productivity in the CEMAC) during the study period.
Florence & Nathan (2020), conducted the study in Uganda to examine the short-run and long-term relationship between commercial banks' credit and Uganda's agricultural GDP performance. The study applied the Autoregressive Distributed Lag (ARDL) approach to analyze quarterly data from 2008 to 2018. In the long run, the study found credit to have a significant positive impact on agricultural output; while in the short run, the study found bank credit not to have an immediate impact on agricultural output.

Athanasius (2017), conducted a study to examine the relationship between banks' credit and agricultural sector performance in Nigeria from 1980 to 2014 using LSM and ECM. The study found that banks' credit to agricultural supply has a positive and significant relationship with agricultural Gross Domestic Product (GDP). The other study was conducted by, Olorunsola et al., (2017) to investigate the relationship between credit to agriculture and agricultural output in Nigeria. The study applied a nonlinear autoregressive

distributed lag (NARDL) model by analyzing quarterly data from 1992 to 2015. The results show no evidence of asymmetry in the impact of credit to output growth in the agricultural sector (positive and negative changes) in the short-run but different equilibrium relationships exist in the long-run.

Bahsi & Cetin (2020) examined the impact on the agricultural production value of agricultural banks in Turkey by the Ordinary Least Squares (OLS) technique. The study used time series data spanning from 1998 to 2016. The results from the empirical study show that agricultural credit does not directly contribute to agricultural production, and there was a very weak relationship.
Ita et al., (2020) conducted a study to examine the effect of commercial banks' lending on the growth of the agricultural sector in Nigeria by using a multiple regression statistical technique. The study specifically examined the impact of total loans and advances on the agricultural sector output, to examining the impact of lending rate on the agricultural output and to establish the relationship between commercial bank liquidity and the agricultural sector output. The findings revealed that there was a positive and significant relationship between loans and advances, interest rates, liquidity, and bank assets on agricultural output.

Zabatantou et al., (2023) using the ESR model estimated by the maximum likelihood method found that on average the effect of agricultural credit on agricultural productivity is 92.2% indicating that, the majority of farmers in Congo who have obtained agricultural credit have a high probability of improving their productivity.

Okafor (2020) examined the effect of banks' credit on the agricultural output in Nigeria using the Ordinary Least Squares (OLS) technique. The study found that commercial bank credit has a positive effect on agricultural output in Nigeria and has increased agricultural production in Nigeria for the study period.

Although there a numerous study regarding agricultural credit and farm performance as reviewed above, only a limited number of studies in this field have been carried out in Tanzania.

The reviewed studies have revealed mixed results some majority showing a positive and significant effect of agricultural credit on farm performance' while others show a credit to agriculture to have no effects on farm performance (Olorunsola et al., 2017 and Bahsi & Cetin 2020). In addition, from the reviewed previous studies no study has attempted to examine the

effects of commercial banks' credit on different value chain segments such as marketing, they all focus on farm output and productivity which presents a research gap in this respect.

RESEARCH METHODOLOGY

Data Sources

The study used secondary annual time series data for all the variables under consideration from 1991 -2022 which is about 31 years. The selection of this timeframe based on the fact that this time marks the period when major reforms in the coffee sector and financial sector were occurred. The main sources of data were from reputable institutions responsible for this information which are the Bank of Tanzania (BOT) and Tanzania Coffee Board (TCB) various reports.

In this study, paper, four macroeconomic variables have been selected from amongst variables which include agricultural credit, inflation rate, discount rate, and annual growth money supply as explanatory variables while the dependent variable is coffee export growth explained by the value of coffee exports (CEG). The key reason for studying the selected variables is that they have been used by previous studies (Ita et al,2020; Athanasius, 2017; Bahşi & Çetin 2020; Nordjo, & Adjasi, 2020) as considered to have a significant relationship with monetary policy which influences the real economy.

Table 1: Summary of Variables

Variable	Description and Measurement Variable	Source
CEG	Coffee export growth refers to a value obtained from coffee sold abroad measured in millions of USD.	Tanzania Coffee Board (2022)
CrAgr	Agriculture credits are the aggregate amount of the commercial banks' system credit issued to the agricultural sector.	Bank of Tanzania (1991-2022)
INF	Headline inflation is a change in the price level of the entire CPI basket.	Bank of Tanzania (1991-2022)
DISC	This is the discount rate (%) at which commercial banks borrow funds from the central bank.	Bank of Tanzania (1991-2022)
M2	The money supply growth rate is the percent of the total amount of money circulating within an economy.	Bank of Tanzania (1991-2022)

Source: Researcher (2023)

Model Specification and Estimation Technique

In an attempt to investigate the effects of credit to the agriculture sector on coffee export growth in Tanzania as set out in the objective of the study, this study adopted the model in the study conducted by Adewale et al., (2022), on the analysis of the effect of credit to farmers and agricultural productivity in

Nigeria. The model states that AOUT= f (ABCR, BLR, FREX) whereby, AOUT presents the agricultural gross domestic product as an independent variable, and ABCR, BLR, FREX are all dependent variables representing, Banks' credit to agriculture, banks' lending rate and foreign exchange rate respectively. This model was modified as follows;

CEG= f (CrAgr, DISCR, INF, M2) ……2
The model further was statistically specified as follows: -

$CEG_t = \beta_o + \beta_1 CrAgr_t + \beta_2\ DISCR_t + \beta_3\ INF_t + \beta_4\ M2_t + \mu_t$ ……3

Where
CEG; is the dependent variable representing the value of coffee exported; while CrAgr, DISCR, INF, and M2 are independent variables for Credit to agriculture, discount rate, inflation rate, and broad money supply annual growth rate, respectively as explanatory variables.

βo represents a regression constant; while regression intercept = β_1, β_2, β_3, and β_4 which stand for the weight of the unit change of the explanatory variables that is parameter or estimation coefficient of explanatory variables; and stochastic error terms = μ_t
By considering that, the data used in this study are time series data, and therefore it is important to capture long run and short run effects on the model, equation 3 was further modified into mathematical form in natural logarithm (ln), as shown below: -
$LnCEG_t = \beta_o + \beta_1 LnCrAgr_t + \beta_2 Ln\ DISCR_t + \beta_3 LnINF_t + \beta_4 LnM2_t + \mu_t$ ……4

The data was analyzed with econometric techniques involving descriptive statistics, Augmented Dicker Fuller for unit root test, and Johansson technique for co-integration test for a long-run relationship. The Vector Error Correction Model was used to regress independent variables Credit to agriculture, discount rate, inflation, and money supply growth rate) on the dependent variable (coffee export growth) as follows: -

$$Y_t = \beta_0 + \beta_1 + \beta_1 Y_{t-1} + \sum_{i=1}^{m} Y_i\ X_{it} + \mu t \ldots\ldots 5$$

Where:
Y_t = Coffee export growth
$Y_{t-1} = Lagged\ coffee\ export\ growth$
X_{it} = Independent variables

β_0 = Constant or intercept
$\beta_1 = model$ coefficient of the lagged coffee export growth
Y_i= Model coefficients of the independent variables
μt = Error Term of structural shock

RESULTS

Summary statistics

Before econometric estimation, the study examined the statistical characteristics of the variables under the study to check how they are behaving for the selected timeframe. Table 2, shows the descriptive statistics of coffee export value (CEG) and explanatory variables (*CrAgr, INF, DISCR, and M2*) over the sample period.

Table 2: Summary statistics of the study Variables (1991-2022)

	CEG	CrAgr	DISCR	INF	M2
Mean	111.86	667.61	14.33	10.23	17.28
Median	111.19	520.58	15.99	6.13	15.09
Maximum	186.61	1884.91	27.00	35.28	39.26
Minimum	35.22	13.92	3.70	3.29	3.76
Std. Dev.	40.21	631.48	6.65	8.08	8.09
Skewness	-0.11	0.48	0.31	1.54	0.76
Kurtosis	2.04	1.92	2.24	4.59	3.26
Jarque-Bera	1.25	2.76	1.24	15.46	3.08
Probability	0.54	0.25	0.54	0.00	0.21
Observations	31	31	31	31	31

Source: Source: author's computation and reviews 13 output, 2023.

The descriptive statistics show that coffee exports, credit to agriculture, discount rate, inflation, and growth money supply have a mean of 111.86 million USD, 667.61 billion per annum in aggregate value, 14.33 percent, 10.23 percent, and 17.28 percent, respectively. The standard deviation for coffee exports, credit to agriculture, discount rate, inflation, and growth money supply is 40.21; 631.48; 6.65; 8.08, and 8.09 respectively. Save for coffee export growth, credit to agriculture, discount rate, inflation, and growth money supply has a positive distribution as indicated by the skewness. On kurtosis, Credit to the agriculture sector, discount rate inflation, and growth money supply are highly picked relative to the normal distribution with a value above two (2) implying that, the distribution is leptokurtic (Table 2).

Trend of Value of Coffee Exports and Agriculture Credit

The data show that, improving trend in the value of coffee exported during the study period. The fastest-growing value of coffee exports was observed

between 2021 and 2022 (Figure 1). The success may be the implementation of the coffee development strategy with the ambition of enhancing the production and value of exports by harmonizing multi-sectoral engagement to support and drive the transformation of the coffee industry.

Furthermore, in accordance with the analysis, credit issued to the private sector in aggregate has also exhibited quick improvement over time. The results may reflect, the efforts taken by Central Bank to make accessibility of credit in influencing the real sector development. However, the share of credit to the agriculture sector is seen to grow at a slow pace (Figure 2).

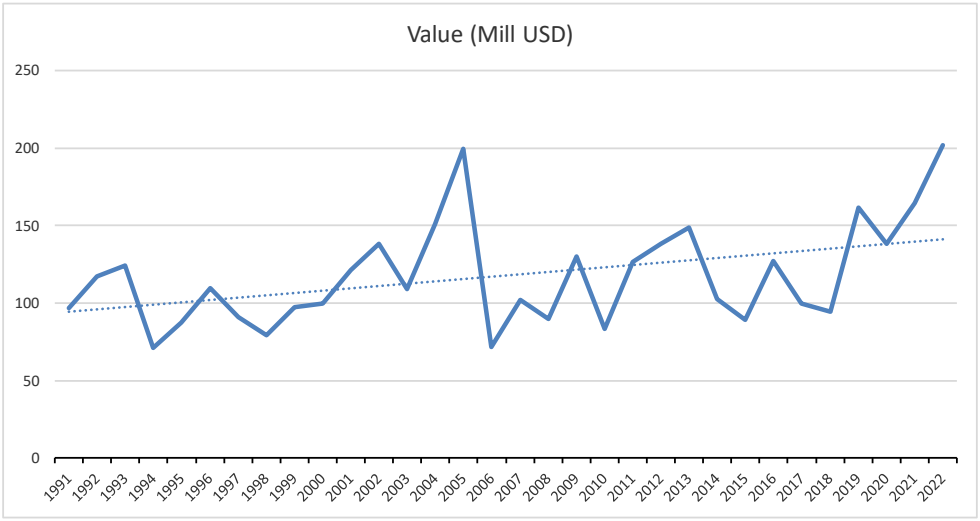

Figure 1: Value of Coffee exports
Source: Bank of Tanzania and Tanzania Coffee Board

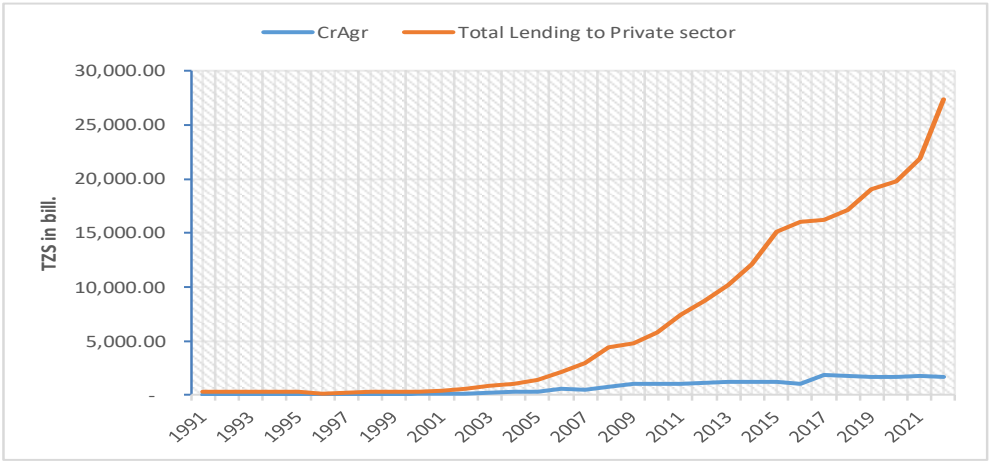

Figure 2. Share of Commercial Bank lending to agriculture Sector 1991- 2021
Source: *Bank of Tanzania, Various issues and* Author's Computation

Diagnostic Test Results

This paper applied the Augmented Dickey-Fuller (ADF) test for stationarity and the Johansen test for co-integration in performing diagnostic tests. The stationarity tests were undertaken for all study variables. The test was done to determine if they were stationary or non –non-stationary.

Stationarity Tests Results

To avoid spurious results and nonsensical regression the study undertakes a stationarity test. The Augmented Dickey-Fuller (ADF) test was applied to test for stationarity.

From the result in Table 5, all variables (*LnCrAgr, LnDISCR, LnINF, and LnM2),* became stationary at first differencing.

From the results, probability is below 0.05 levels of significance which indicates that the variables are integrating at order one I (1). The results are given in Table 3 below: -

Table 3: Augmented Dickey-Fuller (ADF) Test Results

Variable	ADF Calculated value		McKinnon 5%	Prob.	Order of
	At level	At 1st difference	Critical value		Integration
LnCEG	-1.5545	-6.2705**	-2.9639	0.0000	1(1)
LnCrAgr	-0.9889	-4.7643**	-2.9639	0.0006	1(1)
LnDISCR	-1.9302	-5.9476**	-2.9639	0.0001	1(1)
LnINF	-1.7995	-5.6574**	-2.9640	0.0001	1(1)
LnM2	-2.0334	-10.3894**	-2.9639	0.0000	1(1)

**Significant at 5%

Source: Author's Computation and EViews 13 Output 2023.

Determination of Optimum Lag

Optimal lag length was more important in the estimation procedure. To determine the optimal lag length, the information criteria considered were the Akaike Information Criteria (AIC), Schwarz; 's Bayesian information (SIC), and the Hanna-Quinn Information Criteria (HQC). The objective of performing the information criteria is to select the number of parameters that minimize the value of the information criteria. Table 4. shows the optimum lag structure. The outcome indicates that the majority of the selection criteria select the optimum lag length of 2 at a 5% level of significance. Hence, the lag length of 2 will be used in estimating the VECM and the Johansen co-integration test.

Table: 4. Determination of Optimum Lag Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-50.5363	NA	0.0000	4.4259	4.7646	4.5234
1	70.9763	168.2482*	0.0000	-1.1520	1.557726*	-0.3717
2	145.6370	63.1745	3.21e-10*	-3.125921*	1.9549	1.662841*

Source: Source: author's computation and Eviews 13. Output 2023

Co-integration Test (Johansen Co-Integration Test)

Cointegration tests were performed to test if the variables have a long-run relationship.

The results from the Johansen Co-integration analysis were presented in Tables 5 and Table 6; where the trace statistics and eigenvalue examine the null hypothesis of non-co-integration against the alternative of co-integration. Therefore, analysis of annual data from 1991 to 2022 seems to support the proposition that, there exists a long-run relationship among the dependent variable and independent variables under the study. The values of trace statistics were greater than relevant critical values which showed the existence of at most 2 co-integrating equation (s) at 0.05 statistically significant level (Table 5).

The maximum eigenvalue test in Table 6 confirmed the presence of a long-run relationship among the variables under the study with at least one co-integrating equation at a 0.05 statistically significant level. We, therefore, reject the null hypothesis and conclude that there exists a long-run relationship between the dependent and independent variables.

Because the series for the estimated model is co-integrated, we proceed to fit the Error Correction Model for the study.

Table 5: Johansen Co-Integration Trace Test

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.8797	157.8874	125.6154	0.0001
At most 1 *	0.7712	102.8174	95.7537	0.0149
At most 2	0.6071	64.4718	69.8189	0.1240
At most 3	0.5787	40.1856	47.8561	0.2159
At most 4	0.3284	17.7120	29.7971	0.5874

Trace test indicates 2 cointegrating equation(s) at the 0.05 level
* Denotes rejection of the hypothesis at the 0.05 level
Source: Authors' Computation and EViews 13 Output

Table 6: Johansen Co-Integration Maximum Eigenvalue Test

Unrestricted Cointegration Rank Test (Max-eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.8797	55.0700	46.2314	0.0045
At most 1	0.7712	38.3456	40.0776	0.0774
At most 2	0.6071	24.2862	33.8769	0.4349
At most 3	0.5787	22.4736	27.5843	0.1971
At most 4	0.3284	10.3517	21.1316	0.7111

Source: Authors' Computation and EViews 13 Output. 2023
Max-eigenvalue test indicates 2 co-integrating equation(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level;

Vector Error Correction Model (VECM) Results and Analysis

After the evidence of co-integration among the variables Vector error correction model (VECM) was found to be the most appropriate model to be used. This was performed based on, findings from the Johansen co-integration tests showing *that CrAgr, DISCR, INF, and M2*, are co-integrated in the long run. Therefore, the next step was to run the vector error correlation model (VECM) to test the hypothesis. The optimal lag length of the model used in estimating VECM to run regression was 2 as determined with vector autoregressive (VAR).

Table 7: Long-run relationship

	Coefficient	Std. Error	t-Statistic
C	-0.4891	-	-
D(D_LNCEG(-1))	1.0000	-	-
D(D_LNCrAgr(-1))	0.1597	-0.0153	10.4531**
D(D_LNDISCR(-1))	0.3341	-0.0169	0.8260
D(D_LNINF(-1))	-0.9900	-0.0196	5.4476**
D(D_LNM2(-1))	0.1825	-0.0192	9.5262**

Source: Authors' Computation and EViews 13 Output 2023
** denotes significant at 5%

Table 7 shows the Vector Error Correction Estimates of coffee export growth as an endogenous variable. From the above regression coefficients, we can express the long-run model as follows: -

$LnCEG_t = -0.4891 + 0.1597LnCrAgr_t - 0.3341Ln\ DISCR_t - 0.9900LnINF_t + 0.1825LnM2_t + \mu$

The results from the estimated model show that, except for DISCR all other variables are statistically and significantly affect the coffee export growth in Tanzania in the long run for the study period.

Agricultural Credit (*CrAgr)*: For credit to the agriculture sector, the coefficient of (CrAgr) is positive (0.1597) with t –Statistics of 10.4531 which

means that credit to the agricultural sector has a positive and significant effect on coffee export growth in the long run. A unit increase in credit to the agriculture sector (CrAgr) will cause coffee export growth (CEG) to increase by 0.1597 units in the long run, ceteris paribus.

Inflation rate (INF): For the inflation rate the coefficient of (INF) is negative (-0.9900) with t- Statistics of 5.4476 which means that an increase in inflation rate has a negative and significant effect on coffee export growth in the long run, ceteris paribus. This signifies that a unit increase in the inflation rate will cause coffee exports to grow by 0.9900 units in the long run.

Money supply growth rate (M2): As for the money supply growth rate, the coefficient of (M2) has a positive (0.1825) with t-statistics 9.5262 which means that growth money supply has a positive and significant effect on coffee export growth in the long run. This indicates that a unit increase in money growth rate will cause coffee export growth to increase by 0.1825 units in the long run.

Discount rate (DISCR): In the case of the discount rate (*DISCR*) the coefficient of DSCR is negative (0.3341) with t statistics 0.8260 which means that the discount rate has a positive and insignificant effect on coffee export growth. This indicates that a unit increase in the discount rate will cause coffee export to increase by 0. 3341 units however this effect is not significant. In addition to long-run results, Table 8 below shows the short-run dynamics.

Table 8: Short-Run Dynamics of VECM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.1321	0.2118	-0.6240	0.5434
D(D_LNCEG(-1))	0.0831	1.4839	0.0560	0.9562
D(D_LNCrAgr (-1))	0.4030	0.8317	-1.6868	0.1155
D(D_LNDISCR(-1))	-0.7377	0.8311	-0.8876	0.3909
D(D_LNINF(-1))	-0.4412	1.3451	-0.3280	0.0421
D(D_LNM2(-1))	0.1822	0.5518	-0.3302	0.7465
ECM(-1)	-0.5243	1.6528	-0.3172	0.7561
R-squared	0.5353	Mean dependent var.		-0.1561
Adjusted R-squared	-0.5163	S.D. dependent var.		1.0272
S.E. of regression	1.1328	Akaike info criterion		3.3884
Sum squared resid	16.6834	Schwarz criterion		4.1428
Log-likelihood	-33.1325	Hannan-Quinn criterion.		3.6247
F-statistic	6.6681	Durbin-Watson stat		1.4476
Prob(F-statistic)	0.0343			

Source: Authors' Computation and EViews 13 Output 2023

The estimation results from Table 6b the coefficients of credit to the agriculture sector and money supply growth rate are both positive (0.4030 and 0.1822) with t Statistics of -1.6868 (prob. 0.1155) and -0.3302 (prob. Value off 0.7465) respectively; which means that credit to the agriculture sector and money supply growth rate has a positive and insignificant effect on coffee export growth because the prob value is greater than 5% significant level. This indicates that a unit increase in credit to agriculture and money supply growth rate will cause coffee export to increase by 0.1155 units and 0.7465 units respectively in the short run ceteris paribus, though this effect is not significant.

Inflation rate (INF): For the inflation rate, the coefficient is negative (0.4412) and with t statistics of -0.3302 and prob value of 0.0421 which means that the inflation rate has a negative and significant effect on coffee export growth because the probability value is less than 5% of significant level. This indicates that a unit decrease in the inflation rate will cause coffee exports to grow by o.0421 units ceteris paribus in the short run.

Likewise, the coefficient of the discount rate is negative (0.7377) with t statistics of -0.8876 and prob value of 0.3909 which means that the discount rate has a negative and insignificant effect on coffee export growth in the short run because prob. Value is less than 5% significant level. This means that a unit decrease in the discount rate will cause coffee exports to grow by 0.7377 units in the short run when all factors are held constant.

Finally, From the estimation results in Table 7b above, the simultaneous test (F-statistics) in the study model results obtained at 6.6681 with Prob. Equal to 0.0343 which means it is statistically significant at a 5% level of significance and the model is a good fit. The Durbin-Watson statistics of 1.4476 which approximated to 2 indicates that there is no autocorrelation detected in the model. The R-squire is 0.5353. This means that 53% of the total variation in coffee exports can be explained by changes in the values of the independent variables while the remaining 47% is due to other stochastic variables outside the model. The negative sign and coefficient of the residual (i.e. ECM) meet the requirement for short-run adjustment to long-run equilibrium.

Diagnostic Tests

The diagnostic check was conducted for some fundamental aspects of the research model in terms of the VEC Residual Serial Correlation LM test, test

for normality, heteroscedasticity, multicollinearity test, and stability test using CUSUM Residuals to validate the model. The results have been given in Figure 3; Figure 4, Table 8a; Table 8b, and Table 8c below: -

Stability Test

To evaluate the strength of the regression estimate stability test by cumulative sum (CUSUM) was conducted on the residuals of the regression estimates. The stability test showed that, the model is adequately specified and that the parameters of the models did not suffer from any structural instability throughout the study. This is because the plot of CUSUM is within the boundary line of a 5 percent significant level as seen in Figure 3.

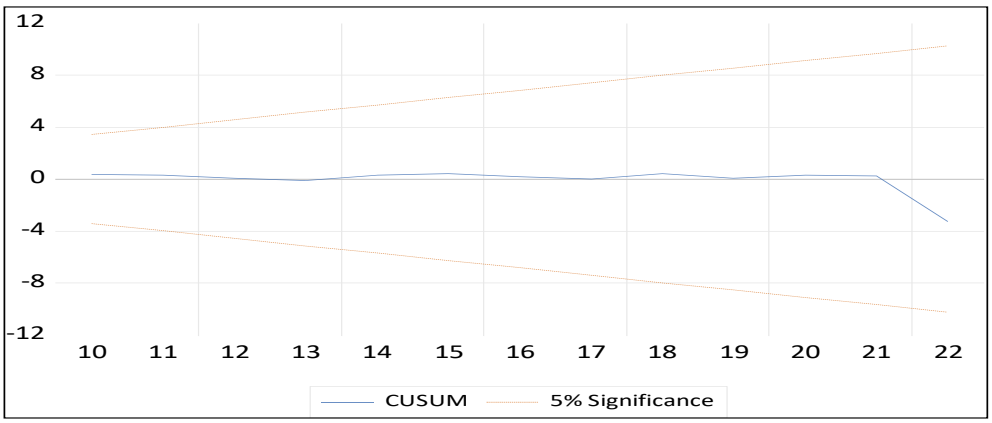

Figure 3: Plot of CUSUM Residuals
Source: Authors' Computation and EViews 13 Output

VEC Residual Serial Correlation LM test

The auto-correlation tests were conducted using Breusch-Godfrey (BG). As per BG, the following results are shown in Table 9. The results of auto-correlation tests indicate that Obs*R-squared is 1.7175 with the Prob. Chi-Square (2) of 0.4237 which is greater than five percent, therefore, we accept the null hypothesis that there is no serial correlation in the series residual.

Table 9: VEC Residual Serial Correlation LM Test Results

F-statistic	0.937858	Prob. F (2,24)	0.4053
Obs*R-squared	2.319662	Prob. Chi-Square (2)	0.3135

Source: Author's computations and Eviews 13. output

Tests for Normality

The normality test carried out in the study using the Jarque-Bera, test with a result of 1.410251 and the probability value 0.494046 being greater than 5

percent (Figure 4). The results indicate that the overall for the entire research model residual is normally distributed.

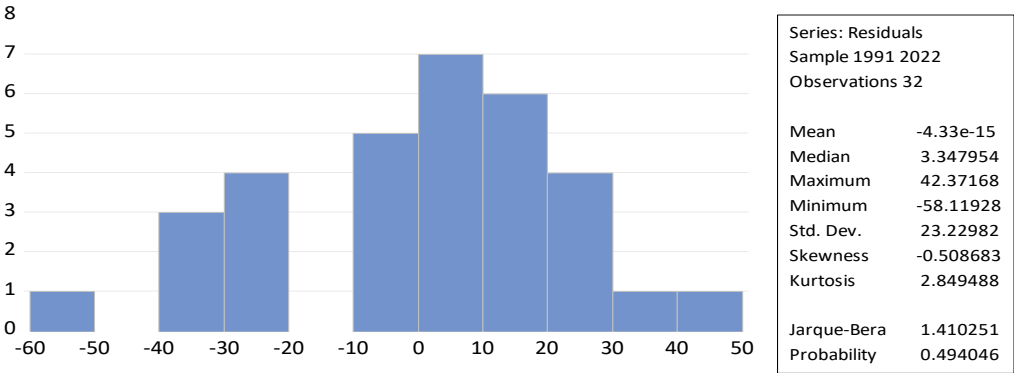

Figure 4: Normality Test results
Source: Authors' Computation and EViews 13. Output 2023

Heteroscedasticity Test

A heteroscedasticity test was done in order to determine if there was heteroscedasticity between the variables after running the model as indicated in Table 10.

From the results of the heteroscedasticity tests conducted using Breusch-Pagan-Godfrey PBG the Obs * R-squared is 7.502937 and the Pro. Chi-Square (2) of 0.1858 which is greater than 5 percent, therefore, we accept the null hypothesis that there is no heteroscedasticity.

Table 10: Heteroscedasticity Test Results

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.592651	Prob. F(5,26)	0.1972
Obs*R-squared	7.502937	Prob. Chi-Square(5)	0.1858
Scaled explained SS	4.580359	Prob. Chi-Square(5)	0.4692

Source: Authors' Computation and EViews 13. Output 2023

Multicollinearity Test

From the results in Table 11 below, it can be seen that the Cantered VIF value is less than 10. If the VIF appears to be less than 10, then it can be concluded that in the regression model, there is no multicollinearity and the regression model is feasible to use.

Table 11: Multicollinearity Test Results

	Coefficient Variance	Uncentered VIF	Centered VIF
D_LNDISCR	0.0258	1.8580	1.7839
D_LNM2	0.0128	1.7937	1.7486
D_LNINF	0.0360	1.9036	1.7815
D_LNCRAGR	0.0052	3.0119	2.9990
C	0.0522	16.0645	NA

Source: Authors' Computation and EViews 13. Output 2023

DISCUSSION OF THE FINDINGS

The study found that agriculture credit exerts a significant positive effect on coffee export growth in Tanzania in the long run but not so in the short run. This finding supports the results of The result are in line with the findings of Adewale et al., (2022); Ngong et al., (2023), and Athanasius (2017), who found that banks' credit to agriculture has positive and significant effects on agricultural exports in the long run. Also, the results are similar to that of Ita et al., (2020) where commercial banks' lending on the growth of the agricultural sector in Nigeria was found to positively and significantly affect agricultural sector performance including agricultural exports growth in Nigeria. Thus, our obtained findings confirm that agricultural credit insured by commercial banks significantly increased coffee export growth in the long run. These results imply that the efforts taken by the government to make credit available to the agricultural sector at an affordable rate was a welcome development, and further steps should be taken to ensure the stability of the banking sector. The reason behind this is that credit facilities in the context of Tanzania are essential for small-scale farmers who commit 90% of the total coffee output. Access to credit services helps farmers enhance their agricultural production and increase productivity through the purchase of inputs. This will intern results to enhance coffee export earnings as well.

From the study results, inflation was found to have a negative and significant effect on coffee export growth in both the short run and long run. This could have been caused by the fact that agriculture is more responsive to a change in inflationary pressure. Persistence increase in inflation leads to an increase in the prices of exported goods which might reduce the competitiveness of coffee exports in the international markets; but also it can impact the cost structure of the coffee industry by raising the prices of inputs such as labor, fertilizer, machinery, and transportation costs. High input costs can tend to reduce profit margins for coffee producers and exporters. Therefore, if the inflation is significantly high, it might limit the ability of coffee producers to

expand production, potentially impacting the value of coffee exports. The results are in line with the study results by Mbunduki (2024) who found inflation to have a negative and significant effect on coffee export growth in Tanzania in the long run. According to his results, inflation appears to have significant effects because farm production costs are more responsive to changes in the inflationary pressure.

The results provide strong evidence that, the money supply growth rate as measured by M2 leads to increased coffee export growth in Tanzania. According to the results, the money supply growth rate was found to have a positive and significant effect on coffee export growth in Tanzania. This indicates that, as the money supply growth rate increases by one unit, influence coffee export growth by 0.1825 units in the long run. The same results were found different from the study result by Shamsoddini et al., (2021) conducted in Iran, who found money supply to have no significant effect on agricultural prices which impacts export growth.

CONCLUSION AND RECOMMENDATION

The results presented and analyzed above underscore the strategic role of the government in making credit available to agriculture such as coffee from financial institutions in accelerating economic growth. This is evidenced by the results above which indicate that, there is a positive and significant relationship of the credit issued by commercial banks to coffee export growth in the long run and short run.

Therefore, based on the results above, we reject the null hypothesis that "Credit to the agriculture sector, does not have a significant effect on coffee export growth in Tanzania"; and we accept the alternative hypothesis. This can lead to the conclusion that one of the most important determinants of growth in coffee exports is the availability of productive credit in a required quantity at a reasonable cost. This can be translated that, it is opined that greater attention in policy strategies on the availability and affordable credit to agriculture sector should be accorded the coffee sector performance in terms of export growth. By doing so, the government should be able to promote and consolidate progress in the agriculture export growth in particular coffee, which is among the six prioritized traditional export crops with a high potential and capability of contributing to the national economic growth.

Based on the above study, it can be well concluded that agriculture credit remains an important factor for supporting indirectly the development and

growth of coffee exports through purchasing modern production inputs such as fertilizers, pesticides, and agriculture machinery. Due to this fact, this study therefore ends up by recommending the following: -

Firstly, the procedure of credit to small-scale farmers by commercial banks should be made simple and easy. By doing so, it will provide opportunities for small-scale farmers to obtain funds from credit sources to finance their agricultural activities. The government through the Bank of Tanzania should establish a special credit facility for cash crops including coffee. The facility should have channeled through AMCOS and not through commercial banks to shorten the unnecessary lending procedures to enable small-scale farmers to obtain credit on time to facilitate agricultural activities.

Limitations

The bigger limitation the Researcher encountered was of missing of the data for some years between the study timeframe. For consistency the data on the value of coffee were sourced from the Tanzania Coffee Board,, data for some years were not published on time during the study specifically the Dada for the last two years however the research opted to use the data from Bank of Tanzania reports.

Areas for further studies

This study has identified several areas where further research is necessary to continue intensifying knowledge about agriculture financing. However, a comprehensive investigation of the effects of lending rates on coffee production is essential for enhancing coffee output production and crop quality is one of the vital areas.

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